Tenure type landscapes and housing market change: a geographical perspective on neo-liberalization in Sweden

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ABSTRACT
Discussions of tenure mix have received renewed interest as many have suggested that neo-liberalization has made way for gentrification of neighbourhoods and increasing segregation. Yet, few scholars have studied country-wide changes in tenure mix, due to the lack of data and appropriate methods. In this article, we propose to use tenure type landscapes to analyse changes in housing policy. We do so while acknowledging the evolution of housing policies in Sweden since 1990. Using individualized and multi-scalar tenure type landscapes to measure change in neighbourhoods, we analyse housing clusters in 1990 and 2012. We show that the tenure landscape in 1990 at the height of the welfare state was fairly diverse and mixed. During the next 22 years, however, the landscape changed to become more homogenized and dominated by ownership through tenure conversions and new housing. We argue that awareness of these changes is essential to understanding present and future segregation and gentrification processes.

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Introduction
During most of the twentieth century, Sweden was considered successful in its regulation of the housing market through active policies, enabling housing for all and curbing segregation. Mixing different tenure forms in neighbourhoods, often referred to as tenure mix, became a widely used strategy and policy goal (Musterd & Andersson, 2005). However, in the last 20 years, housing policy in Sweden has been deregulated, similar to many other countries in the West, to the degree that more market-like principles apply (Grundström & Molina, 2016). In this article, we propose to use tenure type landscapes instead of neighbourhoods in order to provide a more detailed geographical analysis of tenure form mixing all over Sweden.

Tenure type landscape is a tool building on the idea that not only is the immediate neighbourhood of importance for individuals’ lives but also the position of the
neighbourhood in the wider tenure form pattern of the city, across different scales. This multi-scalar approach has been used in previous studies which stress that residential segregation processes are better understood using such tools (Andersson & Malmberg, 2015; Clark et al., 2015). Tenure mix studies, however, analyse neighbourhoods by focusing on specific administrative areas, assuming that the tenure mix at that scale matters the most. However, we will consider that individuals live lives that span beyond their immediate neighbours in administrative areas. In a tenure type landscape, the composition of households’ tenures in surrounding areas is equally important to that in the immediate neighbourhood. Furthermore, tenure type landscapes can be illustrated favourably in geographical maps due to clustering of neighbourhoods that are similar at different scales enabling straightforward visual readings. To illustrate this literarily, a neighbourhood in the tenure type landscape can be seen as the centre point in an individual’s life. As the individual wanders from their home, the landscape changes and the individual becomes subject to the tenure compositions of the new surroundings. The surrounding area will vary depending on the direction from the home of the individual. Reading the mosaic of tenure types in maps enables the reader to follow such wanderings. In short, tenure type landscapes enable a reading of tenure mixing from an individual, scalable, and geographical perspective.

The importance of tenure lies in the fact that tenure forms condition entry and exit into specific dwellings. These are very different for home ownership, private rental, public rental and tenant cooperatives. The process of residential sorting, including the potential process of gentrification, is therefore, to a large extent mediated by the forms of tenure that dominate in different areas. This is the reason that tenure mixing policies have been central as a means of combating segregation in several countries in the West (Bond et al., 2011; Musterd & Andersson, 2005). Thus, an analysis of tenure form mixing is not only of interest as a way to evaluate the success or failure of mixing policies; it also provides a fundamental structure within which the processes of residential sorting take place. Examining patterns of tenure form mixing, therefore, provides a picture of the underlying housing market structure in which the fabric of everyday life is played out. Furthermore, analysing changes in the tenure type landscape provides a basis for exploring how different policy and societal trends take material form over time, which, in turn, will determine future conditions for social interactions.

Against this backdrop, we explore Swedish tenure form mixing and how it has evolved since 1990 using tenure type landscapes. We address two questions:

- To what extent did housing construction during the heyday of the Swedish welfare state succeed in establishing tenure mixed landscapes?
- To what extent has this pattern of tenure mix been sustained the post-1990 period of marketization, deregulation and increasing social inequality?

**Tenure mix, housing policy and neighbourhood change**

In both research and policy circles, tenure has been discussed for quite some time, with a focus on tenure mix in neighbourhoods. The reason for this is a long belief among policymakers that increased tenure mix leads to increased social mix and better
opportunities for individuals’ outcomes (Galster, 2007; Galster & Friedrichs, 2015; Graham et al., 2009; Groenhart, 2013) and thus curbs residential segregation. Studies from various countries in the West have shown that there are correlations between tenure mix and social mix but it is less clear how much tenure mix matters for individuals’ outcomes (Graham et al., 2009; Livingston et al., 2013; Musterd & Andersson, 2005). However, the policy landscape has changed vastly and tenure mix has largely been abandoned for neoliberal policies promoting marketization of the housing market, e.g. through privatization of rental housing stock (i.e. right to buy, tenure conversions of public housing) and eradication of subsidies for specific tenure forms (see, e.g. Boterman & Gent, 2014; Christophers, 2013; Hodkinson et al., 2013). This change in policy direction is often related to neoliberalism, an ideological change in politics which reduces the power of the state and promotes market forces (Hodkinson et al., 2013).

Residential segregation is not the only process of neighbourhood change being discussed as a result of tenure mixing policies. Critical geographers have shown that neoliberal policies can cause gentrification (see, e.g. Andersson, 2013; Andersson & Kähr, 2015; Andersson & Turner, 2014; Bergsten & Holmqvist, 2013; Boterman & Gent, 2014; Grundström & Molina, 2016; Hedin et al., 2012; Hochstenbach, 2016), which is a process of neighbourhood change (e.g. renewal of housing, tenure conversions, new buildings) in which the population composition changes through the inflow of higher income groups and the (in)direct displacement of lower income groups (see Davidson & Lees, 2005). As Smith (2002) argues, in the neoliberal era, the State has become an agent, rather than a controller of the housing market through neoliberal politics. Housing transformations initiated by capital flows and market agents, such as the State, are often referred to as production-side explanations of gentrification in urban studies (Lees et al., 2013).

Neighbourhood change can also result from the promotion of private ownership forms, making gentrification possible as the middle class become principal players in the housing market, as stressed in the works of Ley (1997). Ley put forward the idea that the new middle class has a different consumption pattern of housing, e.g. desiring both old historical and new build housing. As Phillips (2004) was quick to notice, this is not solely an urban process since similar patterns can be observed in rural areas as well. However, other processes of neighbourhood change, such as social upgrading of areas, are equally likely to occur as a result of the promotion of private ownership tenure, be it from urban renewal/restructuring policies aiming to achieve social justice in the city (Musterd & Ostendorf, 2008), to alleviate deprivation (Kleinhans, 2004) or to achieve social control of residents (Uitermark et al., 2007).

This study diverge from the above-mentioned studies in several ways. First, despite studies showing that neighbourhood change does not solely occur at metropolitan scale, studies of tenure mixing tend to focus on larger cities (Gibb et al., 2018). In this study, we focus on neighbourhoods across all of Sweden. Second, most Swedish studies of changes in housing policy have emphasized tenure conversions as the most significant change in housing policy for segregation and gentrification. However, we argue that other changes in housing and urban policies, such as the construction of new areas, densification programmes, renewal programmes, privately driven housing acquisition, and metropolitan growth to include dormant, old era areas, are of great
importance as well. Third, studies have analysed tenure mix on small neighbourhood scales, i.e. they have studied tenure mix in the most immediate neighbourhood (Gibb et al., 2018). In this study, we follow recent residential segregation studies highlighting individuals and their geographical tenure context from a multi-scalar perspective (Andersson & Malmberg, 2018; Clark et al., 2015).

Changes in Swedish housing policy and tenure forms

Sweden has a long history of regulating the housing market. At the beginning in the 1930s, the Folkhem model was introduced, regulating what, how and when housing was built (Grundström & Molina, 2016). Several policy instruments were introduced over time, including subsidies for new housing, public municipal housing companies, and housing allowances for all (Andersson et al., 2010). However, the Folkhem model culminated in the 1990s when a severe economic crisis hit Sweden, after which the model began to be dismantled (Grundström & Molina, 2016). In conjunction with, or arguably because of the crisis, the national housing policy changed drastically as subsidies for new housing were gradually removed (Andersson, 2006; Turner & Whitehead, 2002) and tenure conversions of public municipal housing were made possible (Hedin et al., 2012). Since then, the neo-liberalization of the housing sector has continued through the increased marketization of public rental companies and of rent setting schemes (Grundström & Molina, 2016), to the extent that it is now argued that Sweden has a liberal housing policy regime (Hedin et al., 2012; Lind & Lundström, 2007).

To equate the Swedish housing market with pure market-based principles would, however, be questionable. Due to the complexity of the housing market, Christophers (2013, p. 885) termed it a ‘a monstrous hybrid’. As housing has been a key part of the welfare state, the tenure forms in Sweden differ from the basic owner-renter scale (see Ruonavaara, 1993). On the renter side of the scale, municipal housing companies (allmännyttta) offer rental dwellings in most municipalities, as opposed to privately owned rental dwellings. The municipal rental housing segment is usually referred to as public housing as it is owned by the municipalities (Magnusson & Turner, 2008). When it was introduced, it was aimed at creating good housing for all and preventing tenants from being victims of speculation on the housing market (Grundström & Molina, 2016).

The legislation of tenure conversion (1990s) has led to tenure conversions of public housing in the major cities in Sweden (Andersson & Turner, 2014). Nevertheless, public rental housing still represents a key proportion of the housing market. Another tenure form introduced by the Folkhem model is tenant-owned housing (bostadsrätt), often referred to as tenant cooperative housing (henceforth referred to as tenant cooperatives). This means that the person living in a tenant cooperative does not own the dwelling, but has the right to use the dwelling for an unlimited period of time. The dweller can sell this right to another buyer on the market, making it an indirect ownership (Turner, 1997). A tenant cooperative is sometimes referred to as a tenant housing association, as dwellers jointly own the entire building in an association. Initially, this indirect ownership was separated from the market,
but in the 1960s, market-based valuation was accepted (Christophers, 2013). A large proportion of multi-family housing still comprises tenant cooperatives and there are no restrictions for dwellers except for the usual mortgage and buyer requirements. To directly own an apartment in a multi-family house, as is common in many other European countries, was made possible in 2009 but has not been particularly in demand (Holmqvist & Turner, 2014). In contrast, the most common form of ownership is private ownership in single housing.

The selection of households into different tenure forms has also changed. To become a homeowner, a sufficient income, savings for a down payment, and a mortgage are necessary. Tenant cooperatives work in a similar way, but those dwellings have historically also been assigned to dwellers according to the number of years they have held active savings in the cooperative association. Nowadays, saving in a tenant cooperative is much less common and mortgages are the main entry form. Public rental is often assigned on the basis of queuing time but can also be allocated for reasons of social assistance. However, low income is not a requirement for dwellers as it is in housing systems with social housing. During the heyday of the welfare model, queuing times were short, but today the queuing times in larger cities are much longer, and it takes years to receive a first contract. Consequently, residualization of public housing is less in larger cities where there is high demand, whereas residualization is a problem for public housing in more rural locations (Borg, 2018). Modes of entry into private rental have varied over time, but as a rule, both queuing time and the possession of sufficient income have been central.

Another key feature of the housing policy in Sweden has been the building of socially sustainable neighbourhoods by implementing a tenure mix policy. As Holmqvist (2009) has elaborated upon, tenure mix became a national policy in the 1970s. Even though it was a national policy, it was the municipalities’ responsibility to implement the policy. There were no specific subsidies for tenure mix, but municipal housing companies could use the general subsidies for new housing until the beginning of the 1990s. It should be stressed that municipalities in Sweden have a planning monopoly, making them the sole decider of what tenure is allowed in a specific location (Bergsten & Holmqvist, 2013). This means that new housing areas were and still are planned with a mix of tenures in mind (Andersson & Turner, 2014). The tenure mix policy has been complemented with the tenure conversion policy. However, the encouragement of ownership through tenure conversions by liberal/conservative governments has also made it possible to convert mixed tenure areas into more homogeneous areas (Andersson & Turner, 2014; Holmqvist & Turner, 2014). Demolition of housing is also a way of achieving tenure mix in some areas. However, demolition has never been used to any great extent for achieving tenure mix (Bergsten & Holmqvist, 2013). Table 1 shows the amount of new housing, tenure conversions and demolition in Sweden since the 1990s.

**Data and methods**

The data used in the analysis was drawn from longitudinal register data provided by Statistics Sweden. Statistics Sweden collects data from authorities on all Swedes on a
yearly basis. Through combining individual data with property data, we were able to determine households’ residence and tenure. For the analysis, we have used a cross-section from the years 1990 and 2012. In order to analyse the recent changes in the tenure composition, we construct tenure type landscapes in four steps.

First, tenure for each property was calculated through combining building type ([hustyp]) with property owner type ([juridisk form]). This resulted in five tenure forms: 1. Cooperative, 2. Owner-occupied, 3. Public rental, 4. Private rental, and 5. Other. The tenure form of the tenant cooperative has been described above. Owner-occupied tenure is single-family houses owned by one or more private individual(s). Public rental tenure is multi-family dwellings owned by municipal companies. Private rental consists of multi-family dwellings owned by one or more private landlord(s) or companies. The Other tenure form is composed of houses owned by bodies other than public, private, or cooperative owners, mainly dwellings owned by housing foundations. Table 2 shows the distribution of households over the different tenure forms.

In this table, it is clear that the proportion of households living in cooperative tenure has increased for all years, while the opposite is true for the proportion of households living in public rental tenure and in the other tenure. The proportion of households living in private rental initially increased and then more or less stabilized at around 14%. The only tenure form that has remained more or less stable over all the years studied is owner-occupied tenure.

Second, we constructed individualized neighbourhoods based on the tenure that households live in. These were created by expanding a buffer around the residential location of a household until the buffer contained a pre-determined number of neighbouring households. With this buffer population identified, it is possible to compute different aggregate measures for the population, such as the proportion of households living in different tenure forms. The composition of the households’ neighbourhoods have been computed with the Equipop programme (see Östh, 2014). Equipop uses the grid system and calculates neighbourhoods based on the number of closest neighbours. After deciding upon a number of neighbours to create the neighbourhood (the so-called k-level), the programme searches for that number of closest individuals until the k-level is reached. If the geo-square contains the k-level of individuals, the programme stops immediately. Otherwise, it searches in the neighbouring squares until the k-level is reached. The grid system used in this study was based on 250 × 250 metre squares for areas considered densely populated (ätort) and 1000 × 1000 metre squares for areas in less densely populated areas.

For the analysis, we used 13 different k-levels (50, 100, 200, 400, 800, 1600, 3200, 6400, 12,800, 25,600, 51,200, 102,400 and 204,800). This implies that the largest areas for which the tenure composition has been calculated are well beyond the size of

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**Table 1.** New housing, tenure conversions and demolitions 1990–2012, number of dwellings.

| Year       | New housing | Tenure conversions | Demolitions |
|------------|-------------|--------------------|-------------|
| 1990–1997  | 219,693     | 10,238             | 12,858      |
| 1998–2005  | 139,844     | 82,081             | 21,775      |
| 2006–2012  | 203,826     | 86,235             | 6028        |
| Sum        | 540,295     | 178,554            | 40,661      |

Source: Statistics Sweden, authors’ calculations.
aYear 1990 missing.
what is normally considered to be a neighbourhood. The term ‘neighbourhood’ in this article, thus, is used as a technical term referring to the geographical context of an individual or location. For each square, the calculation results in 65 different values that describe the tenure form composition of the surrounding area (13 different scale levels times five different tenure forms). On the basis of these 65 values, squares (or locations) have been classified into 12 different categories using cluster analysis.

Third, we used cluster analysis to identify groups of neighbourhoods that had similar values on a set of variables. The hierarchical cluster method is the most commonly used method; however, due to the large amount of data, we chose the \(k\)-means method using Euclidean distances between the cases. When utilizing the \(k\)-means method, one chooses the number of clusters beforehand. We explored different numbers of clusters through and decided to use 12 clusters, as they were the most reasonable in terms of tenure composition within each cluster and made sense when interpreted. In order to characterize the clusters, we analysed the cluster means for all variables. Three criteria were used: the dominant tenure form, the proportion of the dominant tenure from across geographical scales, and the extent of tenure form mixing across scales.

Fourth, instead of using the Bergsten and Holmqvist (2013) method for classifying clusters according to how homogeneous they are on one scale, we calculated entropy indices for all 12 clusters (for all scales), a well-used method in studies of housing market structure (see, e.g. Andersson et al., 2007; Bailey et al., 2012; Bailey & Livingston, 2008; Górczyńska, 2017; Livingston et al., 2013). The index \(E\) is created through the following two steps:

\[
H_k = \sum_{j=1}^{5} p_{kj} \times \ln \frac{1}{p_{kj}}
\]

(1)

\[
E_k = \frac{\ln 5 - H_k}{\ln 5}
\]

(2)

Here, \(k\) represents the \(k\)-level, \(j\) represents tenure form, and \(p\) represents the proportion of households. The index measures how evenly distributed the variables (tenure forms) are within the group (cluster). It varies between 0 and 1, where 0 represents the most mixed areas (i.e. the households are equally divided on all tenure forms) and 1 represents the absolute homogeneous areas (i.e. all households live in the same tenure form).

### Table 2. Housing market structure in Sweden as share of households living in dwellings by tenure form.

| Year | Cooperative | Owner occ. | Public rental | Private rental | Other | Households | Grid squares |
|------|-------------|------------|---------------|---------------|-------|------------|--------------|
| 1990 | 16.7        | 37.4       | 21.3          | 12.3          | 12.3  | 4,215,814  | 198,630      |
| 1997 | 17.8        | 37.1       | 19.7          | 14.6          | 10.9  | 4,449,823  | 199,647      |
| 2005 | 19.7        | 37.9       | 18.4          | 13.9          | 10.1  | 4,684,301  | 200,311      |
| 2012 | 21.9        | 37.8       | 17.3          | 13.8          | 9.2   | 4,974,870  | 200,077      |

Source: Statistics Sweden, authors’ calculations.
The index as such does not deliver any description about the types of neighbourhoods, nor does it say anything about whether a certain score on the scale represents an ultimate mixed neighbourhood. For the former, we make use of cluster analysis. For the latter, we are inspired by the categorization used in previous studies (Górczyńska, 2017; Musterd & Andersson, 2005) that classifies clusters according to their score on the index, where:

- \( >0.75 \) = Homogeneous neighbourhoods
- \( 0.50-0.74 \) = Semi-homogeneous neighbourhoods
- \( 0.25-0.49 \) = Semi-diverse neighbourhoods
- \( <0.24 \) = Diverse neighbourhoods

The clusters we use, however, are based on values across different \( k \)-levels, which means that we also obtained entropy indices for all scales, see Figure 2. In order to characterize the clusters, we have chosen to rely on the entropy indices of the first five \( k \)-levels (50, 100, 200, 400, and 800). The existence of large differences in entropy on low scale levels motivated this choice. In the following, we refer to the tenure type clusters created as tenure type landscapes.

When working across scales and when making buffers centred on individual households the distance is not taken into account; nor are geographical barriers, e.g. railways or highways. This is clearly a limitation when working on population (households’ dwellings)-based space. Furthermore, a focus on tenure types means that we ignore the fact that there is not a perfect overlap between tenure mix and social mix. This overlap is often assumed, and can be presumed in this paper as well (see, e.g. Musterd & Andersson, 2005). However, that we do not perform such analysis is a clear limitation of this article.

**Tenure type landscapes and housing market in 1990**

The results of the neighbourhood classification described above are presented in Figure 1. In this figure, each tenure type landscape is presented in a separate panel that shows the proportion of different tenure forms across neighbourhood scales. The panels are arranged in four columns and three rows. Tenure type landscapes dominated by owner-occupied dwellings are placed in the first column, Tenure type landscapes dominated by tenant cooperative dwellings are in the second column. Column three shows tenure type landscapes dominated by public rental dwellings (the two upper rows) and the tenure form other dwellings (bottom row). Landscapes dominated by private rental dwellings are in the right-most column, number four. In each column, landscape types have been arranged based on the proportion of dwellings that are in the dominating tenure form and the extent to which this proportion of the dominating tenure form declines with increasing landscape scale. Thus, landscapes that have the highest concentration of a particular tenure form, and where this tenure form is also dominating on larger neighbourhood scales, are in the top row and are designated as ‘concentrated’. The second row, with the exception of column four, contains small-scale landscape types with lower concentrations of the
dominating tenure form, and where there is a mixing of tenure forms at larger neighbourhood scales. These are designated as ‘small-scale’. The bottom row, with the exception of columns three and four, contains landscapes where the concentration of the dominant tenure form is relatively high and remains high across neighbourhood scales, thus these are designated as ‘large-scale’. The bottom two graphs in column four show relatively mixed areas on all scales; we therefore name these ‘mixed’.

In 1990, 45% of the Swedish households lived in the three different owner-occupied dominated landscape types: Owner-occupied concentrated, Owner-occupied small-scale, and Owner-occupied large-scale. The remaining households are relatively evenly distributed in the landscape types dominated by tenant cooperative dwellings (Cooperative concentrated, Cooperative small-scale, and Cooperative large-scale, 15%), landscape types dominated by public rental dwellings (Public rental concentrated and
Public rental small-scale 21%), and landscape types dominated by private rental dwellings (Private rental concentrated, Mixed private rental, and Mixed even, 15%). In this way, the Swedish tenure type landscape in 1990 can be described as relatively diversified. There is a domination of owner-occupied, single-family housing dwellings, but the other tenure forms also play an important role.

In the analysis of the tenure type landscape in 1990, we also interpret the segregation profiles of the neighbourhood landscape types using entropy indices for different k-levels, i.e. the scale of neighbourhoods. The layout in Figure 2 is based on segregation profiles and not on dominant tenure forms, as in Figure 1. However, the blue colouring surrounding the landscapes in both figures enables a cross reading between them. In Figure 2, the first row shows graphs of the landscapes with the most homogeneous areas for the low-to-high k-levels, i.e. households in these landscapes are living in neighbourhoods that are strongly segregated from other tenure type landscapes. The second row of the graphs illustrates semi-homogeneous landscapes. In the first two rows of Figure 2, one can detect non-horizontal profiles that indicate that the different scales show various segregation results. However, in the third row of the graphs, four neighbourhood landscape types have a seemingly flat profile, that is, they have similar degrees of segregation across scale levels. As has been discussed in earlier works by Clark et al. (2015), this is important, as a flat segregation profile means that it does not matter on what scale you measure the tenure composition – you will get the same result. These landscape types are furthermore semi-diverse and diverse, i.e. landscape types that are close to a perfect mixing between the different tenure forms, see Figure 2.

In the study of tenure mix in the housing market, previous studies have preferred to use predefined area units at a seemingly low k-level, e.g. SAMS areas in Sweden (Andersson et al., 2007; Holmqvist & Bergsten, 2009; Musterd & Andersson, 2005), LSOA in England (Livingston et al., 2013), or IRIS in France (Górczyńska, 2017), to name just a few. In the study using LSOA areas, the average LSOA area population is 1500 individuals, and in the studies using SAMS areas, the average population for SAMS areas in the Stockholm country was about 2000 by the time of the creation (Malmström et al., 1999), and IRIS has the ‘target size of 2 000 residents’ (Górczyńska, 2017: 406). The smaller the area, the larger the segregation; this is natural, as small areas are more likely to become homogenous. As expected, our graphs show higher segregation at smaller scales (k = 500) equivalent to approximately 1000–2000 individuals (assuming a two-person average in households in Sweden). Analyses can be misleading if the segregation profiles are not the same on different scales. For the Swedish housing market, we can observe, from the above analysis of the segregation profiles, that a method considering several scales simultaneously delivers more information than one that does not.

Figure 3(a,b) shows the geography of the tenure type landscapes, across Sweden, as well as for the three metropolitan areas of Stockholm, Gothenburg and Malmö. To our knowledge, these types of comprehensive maps showing tenure type composition in the whole country at a detailed level have not been presented before. In Figure 3(a), each landscape is represented in a separate map showing the locations of the landscape in 1990. The landscape maps are arranged in the same way
as in Figure 1. As shown in the figure, the different tenure type landscapes have very
distinct geographical patterns and the geographical sorting of these landscape types
is primarily along a metropolitan to rural gradient. The most rural and peripheral
pattern is found for the Owner-occupied large-scale type. This landscape type,
characterized by high proportions of owner-occupiers across all neighbourhood scales, is found in rural areas all over Sweden. It is almost totally absent in regions influenced by Sweden’s metropolitan centres. The *Owner-occupied concentrated* type is absent from the central parts of the metropolitan regions. Instead, it can be found in the commuting zone of the metropolitan areas as well as in the commuting zone of large and medium-sized cities. The *Owner-occupied small-scale* tenure type landscape, on the other hand, is found in peri-urban locations, in the transition zone between the most densely populated parts of the urban areas and the surrounding urbanized countryside.

At the other end of the metropolitan to rural gradient one finds the *Cooperative large-scale* landscape type. This landscape type, characterized by high proportions of tenant cooperatives across all neighbourhood scales, is instead exclusively found in the central parts of the metropolitan areas. The *Mixed even* is another tenure type landscape that is strongly concentrated within metropolitan areas, but it is also found in some of Sweden’s largest non-metropolitan urban areas. The *Cooperative concentrated*, *Public rental concentrated* and the *Private rental concentrated* tenure type landscapes are mainly found in semi-central parts of the metropolitan areas, in regional centres, and in other larger cities, with the *Private rental concentrated* landscape being somewhat more centrally located in the metropolitan areas compared to the *Cooperative concentrated* and *Public rental concentrated* landscapes. In contrast, the *Cooperative small-scale*, *Public rental small-scale* and *Mixed private rental* types are found not only in larger urban areas, but also in smaller urban settlements.

In Table 3, the tenure type landscapes are described in words explaining the main geography, tenure composition, and scales.

In Figure 3(b), it is also possible to analyse the tenure type landscape mosaic of Sweden in 1990. Taking the urban cores of the three major cities of Sweden as a point of departure, one can see that these are dominated by mixed tenure type landscapes, illustrated in yellow and orange. This means that the urban cores are dominated by mixed tenure type landscapes. At a distance from the cores, tenure landscapes are dominated by either public rental or cooperative landscapes, signified by blue and red coloured variegated tenure type landscapes in the figure. This signifies that once one travels out from the cores, the landscapes become more homogenized. Surrounding the cities, in what look like rings, are the last three tenure type landscapes dominated by the owner-occupied tenure form, marked in green on the map. In fact, it is apparent that there are two landscape types that entirely dominate Sweden, both with owner-occupied as the dominant tenant form. The *Owner-occupied large-scale* neighbourhood type is represented all over Sweden but is more common in sparsely populated areas. Analysing the majority of the larger and medium-sized cities in Sweden in Figure 3(b), one can find similar patterns everywhere: a core of mixed neighbourhoods surrounded by pockets of more homogeneous public rental concentrated/small-scale neighbourhoods and cooperative concentrated/small-scale neighbourhoods.

This geographical analysis reflects how housing policy in Sweden has been implemented through tenure mixing in neighbourhoods. It shows that virtually all city cores in Sweden are dominated by mixed neighbourhoods, resulting partly from the
attempt to build mixed cities. However, it is also clear that neighbourhoods outside the city cores are homogeneous and are dominated, to a large degree, by public rental neighbourhoods or cooperative neighbourhoods.

Using this classification, we argue that housing policy, including tenure form mixing, at the height of the welfare state was relatively successful, although the degree of mixing varied by neighbourhood scale. At the smallest scale, i.e. in the most immediate neighbourhood with the closest 200 households, mixing is limited. For example, in the most homogeneous neighbourhood landscape types on the smallest scale level, more than 60, 70, 80 or even 90% of the households live in the dominating tenure form. However, at a slightly larger scale, i.e. in the larger neighbourhoods with more

| Name                        | Geography                                                                 | Tenure composition and scale                                                                                                                                 |
|-----------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Owner occupied concentrated | Surrounding urban areas like rings at a large distance from the urban core | Strongly dominated by households in the owner occupied tenure form. Domination drops as the neighbourhood becomes larger                                      |
| Cooperative concentrated    | Dispersely located around the major cities at a distance from the urban core | Strongly dominated by households in the cooperative tenure form. Domination drops as the neighbourhood becomes larger                                      |
| Public rental concentrated  | Dispersely located around urban areas at a distance from the urban core   | Strongly dominated by households in the public rental tenure form. Domination drops as the neighbourhood becomes larger                                      |
| Private rental concentrated | Dispersely located around cities at a close distance from the urban core  | Strongly dominated by households in the private rental tenure form. Domination drops as the neighbourhood becomes larger                                      |
| Owner occupied small scale  | Surrounding urban areas like rings at a short distance from the urban core | Strongly dominated by households in the owner occupied tenure form. Sharp drop in domination as the neighbourhood becomes larger                           |
| Cooperative small scale     | Dispersely located around urban areas at a distance from the urban core   | Strongly dominated by households in the cooperative tenure form. Sharp drop in domination as the neighbourhood becomes larger                           |
| Public rental small scale   | Dispersely located around urban areas at a distance from the urban core   | Strongly dominated by households in the public rental tenure form. Sharp drop in domination as the neighbourhood becomes larger                           |
| Other small scale           | Dispersely located around the three major cities and the city of Lund     | Strongly dominated by households in the other tenure forms, foremost housing owned by housing foundations. Sharp drop in domination as the neighbourhood becomes larger |
| Owner occupied large scale  | Cover most of Sweden at a large distance from urban areas                 | Dominated by households in the owner occupied tenure form. The domination does not drop as the neighbourhood becomes larger                               |
| Cooperative large scale     | Mainly located in the core of the city of Malmö                           | Dominated by households in the cooperative tenure form. The domination does not drop as the neighbourhood becomes larger                               |
| Mixed private rental        | Scattered around Sweden at a distance from urban areas                    | There is no tenure form that reaches 50% of the households at any neighbourhood size                                                                      |
| Mixed even                  | Only exist in medium and larger cities, mainly in or very close to the urban core | There is no tenure form that reaches above 50 percent of the households at any neighbourhood size                                                             |
than 400 closest neighbours, the proportion of the dominating tenure form quickly declines, especially for the landscape types named ‘small-scale’.

Considering that previous studies, mentioned above, have used neighbourhood population sizes that are larger than this value, this result is truly interesting. It means that even though we name these neighbourhood landscape types ‘homogeneous’, they become diverse on larger scales and can be considered mixed, if using the same neighbourhood sizes as in previous studies. Diverse landscape types, in the third row of Figure 3(a), are already mixed on the lower scales. Moreover, these figures are not simply statistical artefacts, but reflect the way in which Swedish urban areas and rural areas are structured, as well as, of course, the planning models that were used during the period from the 1930s onwards when the dwellings that constituted the Swedish 1990 housing stock were constructed. These planning ideals can be said to represent a housing market corresponding to the mixed economy model, where it was considered that public companies, private companies, cooperative companies, and private homeownership should be represented.

Most importantly, perhaps, the analysis shows how tenure form mixing is a multi-scalar phenomenon. A general pattern is that there is very little tenure mixing at local scales. In 1990, only 15% of the households lived in areas where the dominating tenure form had a market share of less than 60% among the nearest 200 neighbours. Many more (44% in 1990) lived in areas where there was substantial mixing in the local area (less than 60% in the dominating tenure type among the nearest 800 households). But there were also households (around 35% in 1990) that lived in areas where a single tenure form dominated also at large scales (more than 40% of the households lived in the same type of tenure among the nearest 25,600).

Changes in neighbourhood landscape types, 1990–2012

In the above analysis, we concluded that the Swedish housing market was characterized by diverse and mixed neighbourhoods at the height of the welfare state at the beginning of the 1990s. In this analysis, we focus on the changes in the housing market structure over the last 22 years, during which time the housing policy has changed thoroughly. We do so by comparing the changes in tenure type landscapes on the neighbourhood level and then analysing the changes geographically. In Table 4, the number of households living in each neighbourhood landscape type in the year 2012 is illustrated (vertically). Furthermore, it also shows what neighbourhood landscape type the very same dwelling belonged to in 1990 (horizontally). Thus, in this table it is possible to read the direction of the change. This analysis can be summarized in three major points. These major points are summarized in the last row of the table showing the increase or decrease of the number of households in the neighbourhood landscapes. These changes are also illustrated geographically in Figure 4, showing the Stockholm area.

The rise of Cooperative large-scale landscapes in major cities

The first result concerns the large increase in the neighbourhood landscape characterized as Cooperative large-scale, illustrated in the bottom row of Table 4.
Table 4. Transition matrix showing the number of households in 2012 living in each neighbourhood landscape type in 2012 (vertically) and the same households divided over the landscape type belonging in 1990 (horizontally).

| Year 1990 clusters | Homogeneous | Semi homogeneous | Semi diverse | Diverse |
|--------------------|-------------|-----------------|-------------|---------|
| Coop concentrated  | 212 050     | 919             | 153         | 1 353   | 1 177 | 910 | 2 157 | 17 157 | 20 403 | 1 482 | 431 |
| Public concentrated| 24 794      | 375 654         | 65          | 5 647   | 56 488 | 21 403 | 33 715 | 18 763 | 36 981 | 13 019 | 11 389 |
| Owner occ. concentrated | 353 | 573 031         | 26 376      | 562     | 4 990  | 71    | 7 420 | 9 771 | 2 932 |
| Owner occ. small scale | 2 778 | 1 607           | 57 896      | 312 874 | 1 105  | 8 104 | 2 458 | 18 691 | 3 249 | 4 741 | 1 557 | 15 630 |
| Semi homogeneous   |             |                 |             |         |       |       |       |       |       |
| Private rental concentrated | 4 115 | 1 216 | 1 164 | 179 760 | 104 | 17 765 | 1 510 | 20 417 | 21 802 | 4 713 |
| Public small scale  | 3 728       | 13 231          | 4 579       | 10 628  | 8 003  | 266 044 | 3 459 | 17 461 | 15 185 | 517    | 321   | 36 220 |
| Other small scale   | 4 353       | 3 991           | 7           | 968     | 8 120  | 4 584 | 27 034 | 2 653 | 15     | 18 769 | 6 434 | 2 145 |
| Coop small scale    | 38 235      | 7 139           | 4 463       | 14 534  | 1 785  | 11 648 | 3 263 | 298 949 | 2 482 | 8 802 | 10 736 | 34 816 |
| Semi diverse        |             |                 |             |         |       |       |       |       |       |
| Owner occ. large scale | 175 221 | 21 907          | 205         | 28 845  | 317   | 7 001 | 689 552 |       | 28 663 |
| Coop large scale    | 1 220       | 846             | 390         | 1 099   | 590    |       |       |       | 18 265 | 948 |
| Diverse             |             |                 |             |         |       |       |       |       |
| Mixed even          | 7 342       | 4 238           | 420         | 16 443  | 12 088 | 7 231 | 230 587 | 100 508 | 1 645 |
| Mixed private rental | 429       | 1 645           | 435         | 5 002   | 42 262 | 11 413 | 5 299 | 14 612 | 2 306 | 1 873 | 15 198 | 239 166 |
| Population 2012     | 299 397     | 410 590         | 815 850     | 400 203 | 259 469 | 358 406 | 102 707 | 413 243 | 723 043 | 381 900 | 214 072 | 382 363 |
| Difference 1990 and 2012 | 41 205 | -187 329        | 190 344     | -30 487 | 1 113  | -20 970 | 23 634 | -23 609 | -228 678 | 358 477 | -166 430 | 42 729 |
These neighbourhoods, with 50–60% cooperative housing on all scale levels, can be found in the five largest cities in Sweden: Stockholm, Gothenburg, Malmö, Uppsala, and Västerås (size according to population in the tätort). In Figure 4 this is illustrated geographically for the Stockholm area, where an increase of the tenure type landscape is marked in red and a decrease in blue. The housing market in other areas of Sweden is not structured to show such large-scale areas of the specific tenure form tenant cooperative. The increase is from 23,000 households to almost 400,000 households, and mainly stems from Mixed even areas (with the exception of Uppsala and Västerås; see Table 4). Mixed even areas are located in the metropolitan regions and other larger cities. This means that new dwellings with cooperative tenure and/or tenure conversions from public and private rental tenure to cooperative tenure have resulted in a drop in the number of households living in diverse neighbourhoods, marked in blue in Figure 4. The Cooperative large-scale neighbourhood type increases at the expense of the Mixed even neighbourhoods. That the centre of Stockholm has become dominated entirely by tenant cooperatives is striking, but perhaps not surprising, considering previous research. In their study, Bergsten and Holmqvist (2013) found that the consequence of tenure conversions in the Stockholm area was that the cooperative sector increased. Also, Andersson and Turner (2014) found that tenure conversions in the inner city of Stockholm have led to a virtually non-existent public rental sector there. However, Bergsten and Holmqvist (2013) also found that tenure conversions in the three metropolitan areas differed; conversions in Gothenburg and Malmö were found to increase the tenure mix. Our results contrast to their conclusion that tenure conversions and newly built dwellings with cooperative tenure contributed to an increase in the diversity of the housing market. It should be noted that even though our analysis shows that this is a process of homogenization, the shift from Mixed even areas to Cooperative large-scale is only a shift from diverse to semi-diverse, see Figure 2.
Densification of owner-occupied areas outside cities

The second main result concerns the strong increase in the number of households living in the Owner-occupied concentrated landscape type. Almost 200,000 more households live in this landscape type in 2012 compared to 1990 (see Table 4). In Figure 4, the map of Stockholm, it is shown that the Owner-occupied concentrated landscape type has increased strongly (red neighbourhoods). It is also shown that the opposite is true for the Owner-occupied small-scale (blue neighbourhoods). This means that one of the main changes in the housing market can be attributed to the densification of owner-occupied dwellings. The concept of densification can be used since, at the lower scales (up to 500 closest households), the area type consists of over 80% owner occupiers. Also, it is a densification of areas already dominated by home ownership, because the increase in the number of households comes from the Owner-occupied small-scale and Owner-occupied large-scale landscape types. Geographically, these areas are to be found in the outer rings/outskirts of metropolitan regions and larger cities.

A conclusion is that this major change in the densification of owner-occupied dwellings makes neighbourhoods more homogeneous. This is in contrast to previous research. Bergsten and Holmqvist (2013), for example, base their analysis on predefined areas (SAMS) and conclude that the housing market became more diverse in the period 1995–2008 due to an increase in the number of diverse neighbourhoods. Reasons for these differing results include the fact that they only analyse municipalities of over 20,000 inhabitants and predefined areas.

Decline in public rental concentrated areas

A third finding from the analysis of the neighbourhood landscape change over time is the large decline in households in the Public rental concentrated landscape type. There was a decline of almost 200,000 households from a total of 600,000 households in 1990 (see Table 4). Unlike the main results shown above, this cannot be easily explained by an equal increase in other neighbourhood landscape types. Instead, it can be explained by the increase of households in several different landscape types. The main four landscape types to which neighbourhoods have transformed are, in declining order, Private rental concentrated, Cooperative large-scale, Other small-scale and Cooperative concentrated. These transformations cannot be easily summarized as a simple process of homogenization since some neighbourhoods have become less homogenized. In the maps of Figure 4 illustrating the Stockholm area, one can discern that the decline in Public rental concentrated is mainly a phenomenon that can be observed in the Stockholm area (decline marked by blue neighbourhoods). The supplementary file illustrates that the other two metropolitan areas are more stable (marked by green neighbourhoods). Furthermore, this is not coupled with an increase in Private rental concentrated for the Stockholm region. Instead, the main decline in Public rental concentrated, for the Stockholm area, can be explained by the increase in Cooperative concentrated and Cooperative large-scale. As these tenure type landscapes are equally or less homogeneous than the Public rental concentrated type, this means that the decline of public rental dominated areas away from the urban core in the Stockholm region is not a sign of homogenization.
This change is mainly due to tenure conversions as both Public rental concentrated and Cooperative concentrated have similar entropy indexes. These results corroborate previous observations that tenure conversions in the Stockholm built up area have led to a stark decrease in public rental dwellings, giving way to tenant cooperatives (Andersson & Kähr, 2015; Andersson & Turner, 2014; Magnusson Turner & Andersson, 2008). It is important to stress that these observations cannot be noted in the Gothenburg or Malmö areas (apart from a decline in Private rental concentrated areas). One of the studies, mentioned above, on the municipality of Stockholm came to the conclusion that tenure conversions from private rental to cooperative were more dispersed than public to cooperative conversions (Magnusson Turner & Andersson, 2008). Conducting an analysis on a larger scale, in this case the whole area of the Stockholm region, this does not seem to be true. In general, these observations are highly interesting, as it has been politically argued that tenure conversions can be warranted in order to create areas that are more tenure mixed. This is clearly not the case for the area of Stockholm. Tenure conversions from public rental to other tenures have resulted in fewer public rental neighbourhoods, but these have to a large extent remained homogeneous as they have become dominated by cooperative neighbourhoods. Bergsten and Holmqvist’s conclusion that tenure conversions from public rental (in Stockholm) have led to neighbourhoods that are more homogeneous can be deemed as true for the mixed areas in central Stockholm, which have often become cooperative havens, but not for the surrounding areas, which remain, or to some extent become, less homogeneous. (Note that the bulk of conversions have taken place in central Stockholm, which may explain the difference in results.)

Discussion

For decades now, tenure mix and tenure conversions have been politically advocated as means to curb residential segregation, making neighbourhoods more mixed. Studies focusing on tenure mix have traditionally analysed single cities, using one scale and predefined areas. In this article, we have introduced the tenure type landscape as a tool for analysing housing market change. Tenure type landscapes are based on measuring tenure form composition at different geographical scales using an individualized neighbourhood approach. This implies that tenure type landscapes are characterized both by the tenure form mix at very local scales (among the nearest 100–200 households) but also by the tenure form mix at intermediate scales (nearest 800–6400 households) and at larger scales (12,800–200,000 households).

Using Sweden as an empirical example, we have identified 12 characteristic tenure type landscapes that differ with respect to the dominating tenure form, to homogeneity and diversity, and to the extent to which the tenure form composition changes with increasing scale. Sweden is an interesting case, as tenure mix has even been used as a strategy to de-segregate entire cities (Holmqvist & Bergsten, 2009), while tenure conversions have been used selectively in some cities (Andersson & Kähr, 2015; Andersson & Turner, 2014).

A shared characteristic of these different tenure type landscapes is that almost all of them have little tenure mixing at the most local scales (100 or 200 nearest
households) with the exception of the Mixed even landscape, which is mixed at very low scales. Three tenure type landscapes (Owner-occupied concentrated, Owner-occupied large-scale, and Cooperative large-scale) are dominated by a single tenure form also at intermediate scales and in large-scale surroundings (up to the nearest 51,200 households). However, the typical pattern for the tenure type landscapes is that of homogeneity at the local scale and rapidly growing diversity with increasing scale. This demonstrates that tenure form mixing is a multi-scale phenomenon and suggests that multi-scalar tenure type landscapes can be helpful for analysing tenure form mixing. The pattern of relatively strong homogeneity at local levels, with growing diversity with increasing scale can also be seen as a material manifestation of the ideals that have been strong in Sweden (Franzén & Sandstedt, 1993).

As demonstrated in Figure 3(a,b), the tenure type landscapes can capture central features of the spatial organization of the Swedish housing market. The spatial distribution of tenure type landscapes is important since tenure forms regulate how individuals can get access to dwellings. Thus, the tenure type landscapes that we have identified can be seen as forming an underlying structure that will influence to what extent different groups can access different residential spaces in the city and its surroundings. Analysing tenure form composition is, therefore, important for understanding patterns of social sorting (Andersson & Turner, 2014; Hochstenbach & Musterd, 2018; Logan & Li, 2012; Rhein, 1998; Van der Veer & Schuiling, 2005). The multi-scalar approach adds a possibility for distinguishing between large-scale and small-scale tenure type landscapes (Kearns et al., 2013).

Our analysis has also demonstrated that tenure type landscapes can be used to provide a detailed geographical account of housing market restructuring. We have identified three major trends in the housing market change: the rise of the Cooperative large-scale landscape, a decline of Public rental concentrated areas and, a densification of Owner-occupied areas outside cities. The first two trends have been most evident in the Stockholm area where conversion has been especially intense. The most dramatic change is the transformation of the inner city from a mixed area to a cooperative tenure desert. Tenant cooperatives have also increased outside of the inner city, but have not become totally dominating. Our maps also show clearly how concentrated public rental landscapes in the Stockholm area have been transformed into small-scale public rental, small-scale cooperative, and mixed private rental landscapes. The third trend is more widespread geographically, with concentrated owner-occupied areas expanding in both northern, central, and southern Sweden.

Moreover, all three trends can be seen as linked to the process of neo-liberalization. Perhaps the link with neo-liberalization is clearest with respect to rental conversion to cooperative tenure, a process that is strongly concentrated to the most attractive urban locations. It is probable that conversion into cooperative tenure has been driven by increasing market values in central locations, with policy shifts promoting conversion as an enabling factor. The decline in concentrated public rental can be seen as another example of neo-liberalization even if this decline outside the most attractive areas has not to the same extent resulted in an expansion of tenure type landscapes dominated by cooperatives, but rather by private rental. Here the concept of financialization of the housing market is appropriate as an explanation,
where large private rental companies invest in previously municipality owned multi-family housing (Christophers, 2013, p. 892). Finally, the expansion of the concentrated owner-occupied landscape type can be seen as reflecting an expansion of private financing and income growth in middle-income groups and, thus, as exemplifying a market-driven type of housing change, in contrast to the more regulated housing market of the pre-1990 period.

Equally interesting is that we are able to attribute the process of homogenization to some of the changes in the housing tenure landscape but not to all. On the one hand there are changes that have resulted in a more homogeneous housing market. These changes are most evident in the densification of owner-occupied areas outside of cities and in tenure conversions and newly built dwellings resulting in the Cooperative large-scale landscape in the major cities. On the other hand, however, the change from mixed areas to the Cooperative large-scale landscape means that these neighbourhoods have changed only from being diverse to semi-diverse. We cannot conclude that there has been a stark homogenization process in these areas. Moreover, the decline in Public rental concentrated landscapes is not explained simply by the increasing extent of homogenized areas. Instead, the change indicates both more diversified and homogenized neighbourhoods. Thus, in contrast to previous studies of tenure mix (Andersson & Kähr, 2015; Bergsten & Holmqvist, 2013; Livingston et al., 2013) our use of the tool tenure type landscapes enables us to both corroborate and elaborate further upon the process of homogenization.

Housing policies aiming at changing the tenure landscape as a way of creating a greater mix in neighbourhoods or as a way to gentrify neighbourhoods have been discussed for quite some time (Lees, 2008). Many housing studies have pointed toward the consequences of housing policies becoming increasingly neoliberal, e.g. these studies have drawn links between tenure conversions and gentrification processes (see, e.g. Andersson & Turner, 2014; Boterman & Gent, 2014; Hedin et al., 2012). In this article, we have analysed the changes in tenure mix in a deregulative housing policy era and have shown that neighbourhoods are being seized by ownership tenure forms. As we have argued, tenure forms are essential for determining residential sorting processes. Tenure forms both decide the current residential sorting processes and settle the foundation for future sorting. Thus, the change of tenure composition both contributes to the gentrification of the neighbourhoods in real time and determines the future landscape for the gentrification process. We can conclude that the changes in tenure landscape over the last 22 years in Sweden, be they from policy-driven tenure conversions or private-driven new housing, have laid the foundation for future processes of gentrification.

Notes

1. Most, but not all of the municipalities in Sweden have their own housing company, varying in size according to historical, local policy approaches and local conditions (Andersson, 2013; Boverket, 2013; Magnusson & Turner, 2008).
2. Statistics Sweden define ‘tätort’ as (1) a concentrated settlement with at least 200 individuals, (2) where the distance between the buildings may not exceed 200 meters.
3. It should be noted that the number of households in 1990 in this table are not equal to the actual number of households in 1990. The table shows the number of households in 2012 living in neighbourhoods belonging to the cluster type in 2012. Further it shows what cluster type the very same neighbourhood belonged to in 1990.

4. For simplification reasons we do not show the whole of Sweden, but these maps can be found in the supplementary file.

5. Note that some scholars (Turner, 1997; Christophers, 2013) use dwellings and not households as the measure of proportion of different tenure forms.

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