

# VACANT RESIDENTIAL BUILDINGS AS POTENTIAL RESERVES? A GEOGRAPHICAL AND STATISTICAL STUDY

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## Abstract

Vacant housing has been associated with a variety of interests from economic implications and consequences for the urban structure to the possibility to provide housing for the homeless. In addition to the social and financial aspects, unused buildings have resources embedded in them. They take up land from other activities and contain refined natural resources in the form of building components and materials. Therefore, empty buildings can be regarded as reserves for housing and urban mining, *i.e.* material extraction. In doing so, these buildings contribute to the resilience of cities. This geographical and statistical study on residential vacancies is situated in Finland, a Northern country, where empty homes may also keep using energy and producing emissions. The research material consists of a vast data set of all residential buildings with vacancies in Finland in mid-2014, a total of 275 486 buildings with 1 100 267 occupied and 378 802 unoccupied dwellings (52% of the Finnish housing stock). The paper shows several characteristics that increase understanding on vacancies and their role in the dynamics of the building stock. Vacancy is an issue policies should address, not only because of social and economic implications, but also its environmental impacts and opportunities.

# 1 Introduction

Urban resilience can be defined as a city's buffering capacity to changed conditions. The building stock undeniably affects resilience. A vacant building is a building in transition – a potentially usable building that contributes to resilience or as a sign of degeneration that deteriorates resilience. For example, Kohler and Hassler (2002) have stated that obsolete parts of building stocks can act as reserves for current and future needs. Wyatt (2008) has observed a growing political interest in vacant English housing because empty dwellings are seen as waste of resources. Thomsen and van der Flier (2011) have remarked that the assessment of buildings' use value should not be based only on the present performance but also on the potential for adaptation.

On the other hand, vacant buildings are often seen to increase social and environmental problems, as they may contribute to the increase of vandalism, dereliction and deterioration (Remøy & van der Voordt, 2007; Wyatt, 2008). Morckel (2013) states that abandonment of properties worsens neighbourhood decline. In US, vacant homes have been found to lower the value of the surrounding properties even if the empty buildings are not decaying (Whitaker & Fitzpatrick, 2012, pp.35–36). Thus, it is perhaps not surprising that Thomsen and van der Flier (2011) have found that policies often prioritize demolition over other alternatives. Clearances have been used as a tool from Haussmann's 19th century Paris to today's France, Britain, US and the Netherlands (Kruythoff, 2003; Power, 2008; Gilbert, 2009; Mallach, 2011). But even when obsolete buildings are demolished, Thomsen and van der Flier (2011) consider that they can still be seen as resources for 'urban mining', *i.e.* the extraction of building components or materials. After all, demolition produces significant amounts of waste globally, and construction could act as a sink for this waste.

In the Waste Framework Directive of the European Union, prevention of waste is prioritized over preparation for reuse, and preparation for reuse over recycling as

material (European Union, 2008, p.10). In the context of building stocks, reconstitution of abandoned buildings could be interpreted as prevention of waste, and component reuse as preparation for reuse. However, few tools exist to assess obsolete building stocks' potential for reutilization. Building stock models anticipate amounts of demolished buildings, not their characteristics; construction and demolition waste models predict mass flows, not the availability of components; and vacancy chain models simulate residential mobility with regard to consequences for housing markets, not housing stocks. In all, evidence-based knowledge about existing building stocks has long been considered as insufficient; accessing data on demolished or vacant parts of stocks has been found to be especially difficult (Kohler & Hassler, 2002; Kohler, Steadman & Hassler, 2009; Thomsen, Schultmann and Kohler, 2011). Nevertheless, Thomsen et al. (2011) remind that buildings' end-of-life phase has large quantitative and qualitative significance, despite the inadequate attention so far.

Long-term vacancy can be seen as a transition phase between the in-use stock and the obsolete or demolished part of the stock. Therefore, investigating vacancies can help to increase understanding about the dynamics of the building stock. This paper takes advantage of Finnish vacancy data, which, despite its availability, has not been explored beyond the compilation of official statistics and occasional articles (e.g. Makkala, 2002; Virtanen, 2002; Taipale, 2015). The purpose of the research is twofold. The main goal is to study the properties and location of vacant housing in Finland, but the paper also touches upon its possible futures by examining links between vacancy, demolition and new construction. Table 1 presents the detailed research questions. Based on previous literature, it is hypothesized that vacancy is related to (1) demographics; (2) location; (3) size of housing stock; (4) building type; and that vacancy is not straightforwardly related to (5) building age; or (6) demolition.

Theme	Question(s)	Motivation for question(s)
Extent of vacancy	What are the vacancy rates for Finland in general; for municipalities of different sizes; and for different tenure types? What is the size of the underutilized part of the stock when compared with annual volumes of new construction or demolition?	Magnitude of the underutilized housing stock in different contexts.
Building types	Does vacancy touch on different building types up to a different degree?	Distribution of vacancies in the housing stock; types of homes in the reserve
Duration of vacancy	What is the duration of vacancy in different building types? Which proportion of their vacancy is normal and how much is problematic?	Severity of vacancy and obsolescence
Geography	How are vacant homes located geographically and with regard to urban and rural areas?	Location of reserves for homes or building parts and materials.
Tenure	Which submarkets does vacancy touch upon?	Landlords' interests and capacities with regard to vacancy.
Materials	What construction materials are prevailing in underutilized buildings? Which percentage of them is built with prefabrication technology?	Reworkability of used building materials, recycling and reuse potential. Preconditions for reuse of components instead of recycling as material.
Relationship with other variables of building stock	Is there correlation between vacancy and population, demographic change, size of the building stock, or demolition?	Vacancy as a part of the dynamics of the building stock.
Replacement behaviour	Assuming that vacant buildings become demolished, which buildings replace demolished buildings in different contexts?	Possible futures for vacant and/or obsolete buildings.

Table 1. Research questions and their motivation.

## **2 Background**

### **2.1 Theoretical and empirical knowledge on vacancies**

Vacancies participate in the functionality of housing markets, which is why most of the existing theory concentrates on the perspective of real estate economics. Markets are driven by supply and demand, which are assumed to be in equilibrium. According to this theory, prices rise and vacancies reduce when demand exceeds supply and vice versa. (Glaeser & Gyourko, 2005). However, a certain amount of empty homes ('natural', 'transaction' or 'frictional' vacancy) is always considered as necessary to allow residential mobility (Couch & Cocks, 2013). Since vacancies act as a market correction mechanism (Zabel, 2014), 'cyclic' vacancy occurs if there is an oversupply of housing (Couch & Cocks, 2013). This oversupply may become permanent, for instance, as a result of global redistribution of labour and subsequent outmigration.

Moreover, studies are reporting about different contexts in which the equilibrium theory fails to explain how housing markets function (Zabel, 2014). In Spain and Malta, for instance, prices have risen despite of excessive vacancies (Hoekstra & Vakili-Zad, 2011; Vakili-Zad & Hoekstra, 2011). In addition, shortage and oversupply can occur simultaneously (see e.g. Lauf, Haase, Seppelt & Schwarz, 2012). This is because, besides the aforementioned 'natural' and 'cyclic' vacancies, vacancy can be caused by unsuitability for prevailing market conditions based on the properties of housing, such as location, type or tenure ('structural vacancy') (Couch & Cocks, 2013). Therefore, more understanding is needed about the drivers, characteristics and implications of vacancy in different contexts in order for sustainable policies to be practiced on housing stocks and spatial planning.

Lately, the interest has also grown beyond the financial considerations to include socio-cultural aspects. For example, empty homes have been seen as an equity issue. The Guardian has raised awareness on empty homes in continental Europe and the UK. According to the figures collected from national censuses and other sources, there are 11 Million empty homes in Europe, double the number of homeless people (Neate, 2014). In Britain, vacant apartments could house one fourth of households in council house waiting lists (Griffits, 2010). The implications of vacancy have also been examined with regard to residential segregation (Großmann, Arndt, Haase, Rink & Steinführer, 2015) and the quality of life (Schetke & Haase, 2008).

In addition to the aforementioned financial and social aspects, research should acknowledge that vacant buildings have resources embedded in them. They keep taking up land and contain refined natural resources in the form of building components and materials. Although Thomsen and van der Flier (2011) regard obsolete buildings as resources for urban mining, they have reasoned that unused buildings on low value land will not become demolished. Supporting this theory, Huuhka (2014) has observed that the building stock as well as the area of human-occupied land has kept growing in all Finnish municipalities, despite the fact that two thirds of them have shrinking populations. Other authors have paid attention to new construction exacerbating the problem (Mukkala, 2002; Vakili-Zad & Hoekstra, 2011) as well as to the consequences of shrinkage sprawl, which empty buildings contribute to (Siedentop & Fina, 2010; Mallach, 2011; Reckien & Martinez-Fernandez, 2011).

Furthermore, in the Nordic conditions, including Finland, empty homes may keep using energy and, thus, producing emissions. Firstly, multi-family buildings in Finland have central heating systems, meaning that they must be heated fully despite the number of vacant flats. Secondly, empty buildings with water supply need to be kept heated at 5–15°C to prevent piping from freezing and bursting during the winter. Thirdly, retaining this ‘basic temperature’ is recommended even for buildings without water supply because of mould and frost damage prevention. As far as the current author knows, these resource- and energy-related environmental viewpoints still remain unaddressed.

## **2.2 How much vacancy is too much?**

Theory acknowledges that natural vacancy rates may fluctuate in time and differ between markets and submarkets (Hagen & Hansen, 2010). For example, in the US, the countrywide rental vacancy rate has fluctuated between 5–11% and the homeowner vacancy rate between 1–3% since 1968 (US Census Bureau, 2014).

Nevertheless, 5% is usually considered as the upper limit for the normal mobility reserve (Glock & Häusermann, 2004). In Finnish social housing, a vacancy rate over 10% is considered as critical (Ympäristöministeriö, 2011, p.16). As seen in Table 2, gross vacancy rates often exceed these limits notably.

Country	Vacancy rate (%)
UK	3.6
US	10.4
Spain	13.9
Slovenia	14.0
Bulgaria	14.4
Malta	23.0
Italy	24.0
Germany (Western)	6.4
Germany (Eastern)	14.7
Czech	12.3
Estonia	6.2
France	6.8
Luxembourg	2.3
Poland	6.1
Portugal	10.8
Romania	11.6
Slovakia	11.6

Table 2. Vacancy rates in certain countries (years differ). Sources: Deilmann et al., 2009 (Germany); Norris & Shiels, 2004, p. 5 (Other countries); US Census Bureau, 2014 (US); Wyatt, 2008 (UK).

Geographically more detailed vacancy rates have been published for Britain and Spain. In the metropolitan areas of Northwest England, cities' vacancy rates land between 2–7% (Couch & Cocks, 2013). In Spain, the rates have been 7–19% for provinces and 4–27% for municipalities with more than 25 000 inhabitants (Hoekstra & Vakili-Zad, 2011). Even higher rates can occur in distressed areas. In Southern Italy, for example, a rate as high as 34% has been observed (Norris & Shiels, 2004, p.51). In Eastern Germany, the vacancy rate is more than double the rate in the West, and in the most precarious regions, vacancies may reach up to 50% of the building stock, as is the case with some neighbourhoods of Leipzig (Schetke & Haase, 2008).

## **2.3 How long vacancy is too long?**

The US Census Bureau (2014) lists vacancies for time spans ranging from one month to two years or more. In Britain, vacancy of six months or more is referred to as long-term (Griffits, 2010; Couch & Cocks, 2013). In Finland, two time spans, two and six months, are used for monitoring vacancies in public housing (Ympäristöministeriö, 2011, p.15). As for the private housing stock in Finland, the average marketing time has not exceeded four months in the last ten years. Flats have the shortest and detached houses have the longest average marketing time, with row houses between the two. Since 2004, the maximum average marketing time has been 100 days for flats and 160 days for detached houses. In the most distressed towns of Finland, the latter has peaked at 9–12 months during the 10-year period. (Etuovi.com, 2014). In less central parts of the country, the sales time can be as much as two years (Tanskanen, 2014).

## **2.4 Where does vacancy take place?**

Vacancy patterns are more or less country- and context-specific. The geographical location, building type and tenure are the main factors to consider, be that they are often intertwined. For instance, in Germany, vacancies concentrate on suburban GDR blocks and historical multi-storey dwellings (Glock & Häusermann, 2004; Deilmann et al., 2009), but in Slovakia, they focus on detached houses (Norris & Shiels, 2004, p.73). In Belgium, vacancies occur in city centres (Norris & Shiels, 2004, p.23) but in Finland, vacancies have been said to affect the peripheries (Mukkala, 2002).

In Europe, the highest vacancy rates have been observed in Southern and Eastern countries. While vacancies in the former have been associated with holiday residence, those in the latter have been explained with population decline in specific regions (Norris and Shiels, 2004, p.6). In the US, vacancy rates have generally been the highest in the South (US Census Bureau, 2014). In Italy, vacancies have likewise concentrated in the Southern and more rural part of the country (Norris & Shiels, 2004, p.51). In Norway, the vacancy rate has been found to increase the more peripheral the location and to correlate with the share of retirees. Therefore, it has been reasoned that the centralization process taken place in Norway between 1960–80s would show with delay in housing vacancies. (Nordvik & Gulbrandsen, 2009).



Moreover, public rental, private rental and owner-occupied housing are submarkets that have different demand. In Finland, vacancy is considered a problem of public housing (Ympäristöministeriö, 2011), while in Britain, the social housing sector has a lower vacancy rate than the private sector (Couch & Cocks, 2013). A study from Sweden shows that mobility between the submarkets can be very limited (Magnusson Turner, 2008), which offers one explanation for why housing shortage and oversupply can parallel.

## **2.5 Private and public policy responses**

Besides demand, tenure also affects how landlords act in the face of vacancy. Proprietors can be divided into public professional, private professional and private non-professional owners, who have differing interests and capacities. Professional owners are motivated by their own asset management policies. In the case of private professional owners, policies can be traced back to yield, which is influenced by market potency and, indirectly, functional and technical quality of dwellings, since these factors affect rentability. Public owners can also be expected to foster social responsibility, although this is not always the case, while private non-professionals may be influenced by secondary motives such as emotional ties. (Thomsen & van der Flier, 2009). Their motives likely also differ depending on whether they use the dwelling as their home or if they rent it out. Furthermore, it should be noted that these dwellings also change their tenure type depending on the use, whereas tenures of professionally owned rental homes are of a more permanent nature.

In addition, proprietors' capability to conduct measures depends on the housing type. In multi-family buildings (row houses and blocks of flats), the decision-making is collective, whereas detached house owners and professional landlords usually have more freedom, since they tend to own the whole building. (Thomsen & van der Flier, 2009). However, the ownership of detached houses may also be dispersed between heirs or members of an undistributed estate, complicating the decision-making. To give an example of the range of the measures, the responses Finnish public housing companies have practiced to extensive vacancies include: increasing and targeting marketing; improving functionality; changing flat sizes and distribution; adaptive reuse as sheltered housing; selling to private buyers or property developers; and demolition (Ympäristöministeriö, 2011).

However, since long-term vacancy is 'a temporal mismatch between adjustments of the housing stock and regional change' (Nordvik & Gulbrandsen, 2009, p. 397), it has been

pointed out that 'many housing problems cannot be solved using housing market policy tools alone as vacancy is caused by the general trends of depopulation and deindustrialization' (Glock & Häußermann, 2004). In East-German shrinking cities, public policies pursue consolidation of historical inner-city quarters and demolition of excess homes from large-panel blocks, but it has been questioned if the demand for these submarkets has been understood correctly (Glock & Häußermann, 2004; Grünzig, 2010). In UK, clearance and refurbishment policies have fluctuated over decades (Couch & Cocks, 2013). In US, tax foreclosure policies keep returning abandoned properties to market, but it has been argued that public interest requires more freedom of choice be given to authorities in this process to enable more sustainable social and urban development (Hackworth, 2014).

Nevertheless, public policy-making has not been limited exclusively to shrinkage contexts. In the 1970–80s, the authorities of Helsinki, Finland, strived for returning flats that were unauthorizedly turned into offices back to homes (Suvanto, 2013; Jääskeläinen, 2015). In England, the Housing Act 2004 allows council to force empty homes into use to alleviate housing shortage (Wyatt, 2008; Henderson, 2015).

## **2.6 Understanding Finland**

To provide the reader an understanding about the study's context, a brief overview to Finland's conditions is necessary. The Finnish population of 5.5 million is divided between 320 municipalities. Figure 1 shows the map of Finland and the sizes of municipalities, ranging from 100 inhabitants to 613 000 inhabitants (the capital Helsinki in the South coast). The nine cities with over 100 000 inhabitants are considered as large; in addition, there are 11 mid-sized cities with 50 000–100 000 residents and 35 towns with 20 000–50 000 citizens. The average community size is 17 000 residents and the median is as little as 5800 residents. Two-thirds of the municipalities are shrinking. Shrinkage concentrates on rural communities, small towns and some rust-belt cities. (Statistics Finland, 2014).

The housing stock is among the youngest in Europe with only few percent built before 1920 (Hassler, 2009). Wood prevailed as a construction material until the 1950s and has dominated the construction of detached and row houses at all times (Siikanen 2008, pp.17–18). Wood construction methods consist of log construction (prevailing up to WWII) and balloon frames (dominant from 1945 on). The construction of multi-storey buildings was dominated by masonry structures until the late 1950s, when they became replaced by *in situ* cast concrete. Construction with precast concrete elements

started in the 1960s and fully prefabricated frames took over during the 1970s. (Hytönen & Seppänen, 2009; Neuvonen, 2006). 44% of flats were built between 1960–79 and 39% after 1980 (Statistics Finland, 2014).

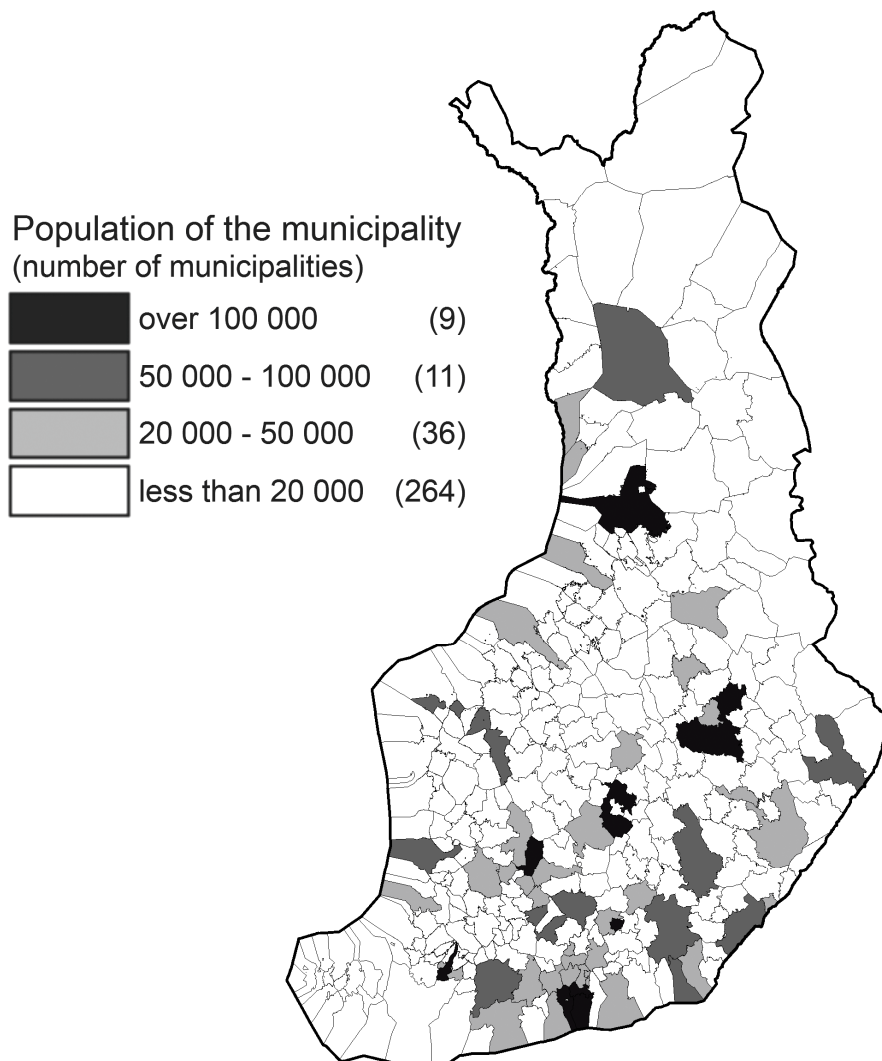


Figure 1. Map of Finnish municipalities. Base map Finnish Land Survey.

A special feature of Finland is the summer cottage culture, which emerged in the 1960s as a result of the late urbanization of the country. In addition to a number of rural houses having become temporary residences for the homesick city dwellers, new construction has also been vigorous. The number of holiday homes is 500 422 (Statistics Finland, 2014). Their size, quality and equipment have kept increasing constantly. In 2003, 70% of holiday homes were connected to the electrical grid and

four-fifths were considered as suitable for year-round use. (Statistics Finland, 2007). The newer holiday housing differs notably from traditional rural settlements: cottages sprawl along lakeshores on vast geographical areas (Huuhka, 2012). The law regulates it in detail due to unwanted environmental and societal consequences, including sprawl, cost of municipal services, risks related to waste water management and habitat losses of wildlife and flora. However, many rural municipalities consider holiday housing as crucial for the local economy. The population of these communities may multiple during the summer holidays, often by two but even by five (Statistics Finland, 2007). In some communities, the number of holiday homes exceeds the number of permanent residences (Huuhka, 2012). Whether turning holiday homes into permanent housing should be allowed is a hardy perennial. Understanding the current magnitude of residential vacancies may provide new insight into this discussion as well.

### **3 Research material and methods**

The methods of this study are quantitative: a geographical analysis and a descriptive statistical examination. The research material consists of three extracts from the Building and Dwelling Register (BDR), which is a part of the official Population Information System. The primary data includes all residential buildings that had vacancies in June 2014 (275 486 buildings). Non-residential buildings could not be included because their state of usage has not been recorded in the BDR since 1991. Thus, homes in the non-residential part of the building stock were also omitted. The results from the examination of vacancies were supplemented by studying demolition and replacement patterns with two data sets. The first one covers all buildings demolished in Finland in 2000–12 (50 818 buildings) and the second one consists of all buildings built to replace the demolished buildings by August 2013 (32 008 buildings).

The BDR extracts are tables that have the records on buildings as rows and tens of variables as columns. For this study, the most important variables were the coordinates; intended purpose; floor area; year of construction; primary construction material; degree of prefabrication; public subsidization and tenure type. The tables were turned into maps in the Mapinfo Professional computer programme. 16 records lacked coordinates and they were removed from the data. Thus, the raw data consists of map points with the same information as the original tables. Statistical data was formed using SQL and geographical query functions of the programme.

In the terminology of this paper, a 'building' refers to a residential building of any type and a 'home' refers to a dwelling unit, occupied or unoccupied, in a building. The buildings with vacancies belonged to three main categories and seven subcategories: three types of detached houses, two types of row houses and two types of blocks of flats. To simplify the investigation, only the primary categories were considered. Row

houses and blocks of flats together are referred to as 'multi-family buildings'. As for construction materials and methods, steel buildings were considered as prefabricated and brick buildings as *in situ* built. Concrete and timber buildings with no method recorded were assumed as *in situ* built.

After consulting the literature, vacancy was considered as short-term if it did not exceed six months, mid-term if it had lasted between six months and two years, and long-term if the duration exceeded two years. Referring to the same sources, vacancy was labelled as 'problematic' if, in the case of multi-family buildings, at least 10% of homes had been empty for more than six months or, in the case of detached houses, the duration of vacancy exceeded two years. The number of vacancies in the data was added to the number of households in the end of 2013 (Statistics Finland, 2014), which equals the number of occupied apartments, in order to calculate vacancy rates for different building and tenure types. The research material was also complemented with official and government-maintained statistics of Finland (OSF, 2013; Suomen ympäristökeskus 2014a), which were studied for demographic change and simultaneous construction activity.

Geographical inquiries were carried out for municipalities (in 2013) and for urban and rural zones whose borders do not follow those of municipalities (see Figure 4). This is because the municipality-based division has often been considered as too rough, since municipalities are geographically large and usually encompass urban as well as rural areas (Suomen ympäristökeskus, 2014b). The borders for the former were acquired from The National Land Survey of Finland and for the latter from the Finnish Environment Institute.

### **3.1 Quality of the data**

The BDR was compiled in 1980 with the help of questionnaires filled by erstwhile landlords. Since then, the law has bound municipal building inspection authorities to submit the information on new buildings and to update the information on existing buildings concerning such changes that have required an official permit or notification (major renovations, changes of usage or demolitions). The information on occupancies and vacancies is based on notifications of changes of addresses delivered to local register offices. It is updated twice a year (K. Kaivonen, personal communication, October 29, 2014). According to the law, residents must notify the register office if they change address permanently or temporarily (for more than three months). Only registered residents have the right to receive municipal services such as discount

prices in healthcare, dental care and public transport, which is why people have a strong incentive to register in the municipality where they conduct their daily life.

A limitation of the data is that other usages are not recorded reliably in the BDR. These may include irregular residence (second homes, holiday homes) and uses as offices or other business premises. Nevertheless, the latter should not be present in significant amounts. This is because the allowed usages of buildings are defined in urban plans in a legally binding manner. Converting a building from residential to non-residential use is usually not possible without re-zoning and re-registering the intended purpose of the building. In the case of blocks of flats, urban plans may allow both residential and commercial usage, but the acceptable usage of spaces within the building is defined in the corporate articles of the blocks of flats, as they are limited liability housing companies according to the Finnish law. The corporate articles usually define dwelling as the only type of allowed usage for apartments. In all, the data set can be considered reliable, with the occurrence of irregular residence as the highest uncertainty.

As for floor area, it was necessary to bridge gaps in the raw data with estimates for 3298 buildings (1%) and 16 445 homes (1%). The missing figures were compensated using the averages of the same room number and/or building type. When available, one could also be calculated with the help of the other. Similar compensations were performed for the demolition data regarding the floor area of the buildings. All vacancy rate calculations are with the proviso that there was a six months discrepancy in the data (statistics on the whole housing stock are from the end of 2013, and the data on vacant buildings from mid-2014). Whether this would have a major effect on the vacancy rate was tested by adding the number of newly built homes from the first half of 2014 (Statistics Finland, 2014) to the whole housing stock in 2013. The resulting change of the vacancy rate was 0.06%, so the discrepancy does not seem to distort the results. In addition, it should be noted that 2.0% of the housing stock is located in non-residential buildings (Statistics Finland, 2014), and the data on vacancies does not cover these buildings although they are included in the statistics for the entire housing stock.

## 4 Results

### 4.1 Overview of vacancies

In total, the 275 486 buildings with vacancies have 1 110 267 occupied and 378 802 unoccupied homes. When no distinction is made between short-term and long-term vacancy, the phenomenon touches on 208 429 detached houses (18.5% of their stock); 23 772 row houses (30.2% of their stock); and 43 285 blocks of flats (74.1% of their stock). 163 966 buildings are completely vacant with 181 273 homes: 161 599 detached houses (14.3% of their stock, 167 623 homes), 1273 row houses (1.6% of their stock, 5 650 homes) and 1094 blocks of flats (1.9% of their stock, 8 000 homes). Table 3 shows the numbers and shares of vacant homes in the buildings of the data, and Table 4 in the whole housing stock. Table 5 compares buildings touched by vacancies with the whole building stock and makes a distinction between normal and problematic vacancy.

The gross vacancy rate in Finland is 12.7% (or 19.8% if calculated as the average of municipalities' vacancy rates). Respectively, the rate is 9.7% (16.0%) for owner-occupied housing; 10.4% (25.0%) for public-funded rental housing; and 18.2% (29.0%) for private rental housing. At smallest, the vacancy rate is 3.0% (public-funded rental housing in Helsinki; owner-occupied housing in the neighbouring city Vantaa) and at largest, 75.0% (public-funded rental housing in the rural settlement of Karijoki). Gross vacancy rates as well as vacancy rates for different tenure types show negative power correlation with population (Figures 2 and 3). Circa half of the municipalities have a gross vacancy rate greater than 20%. Compared to privately-owned housing, the vacancy rates of public housing are notably more dispersed.



	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>All homes in the data</b>	253 329	140 443	1 085 297	1 479 069
<b>Vacant homes</b>	200 674	39 385	138 743	378 802
<b>Per all homes of the building type</b>	79.2 %	28.0 %	12.8 %	25.6 %
<b>Short-term vacant homes</b>	15 367	11 611	48 375	75 353
<b>Per vacant homes of the building type</b>	7.7%	29.5%	34.8%	19.9%
<b>Mid-term vacant homes</b>	21 664	9 028	31 868	62 560
<b>Per vacant homes of the building type</b>	10.8%	22.9%	23.0%	16.5%
<b>Long-term vacant homes</b>	163 643	18 746	58 500	240 889
<b>Per vacant homes of the building type</b>	68.1%	47.6%	42.2%	63.6%

Table 3. Number and share of vacant homes in the buildings of the data.

	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>Number of all homes</b>	1 164 774	395 562	1 290 215	2 850 551
<b>Overall vacancy rate</b>	17.2 %	10.0 %	10.6 %	13.3 %
<b>Short-term vacancy rate</b>	1.3%	2.9%	3.7%	2.6 %
<b>Mid-term vacancy rate</b>	1.9%	2.3%	2.5%	2.2 %
<b>Long-term vacancy rate</b>	14.0%	4.7%	4.5%	8.5 %

Table 4. Share of vacant homes in the whole building stock.

	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>Number of all buildings in stock</b>	1 128 366	78 751	58 430	1 265 547
<b>Number of buildings with vacant homes</b>	208 429	23 772	43 285	275 486
<b>Per all buildings of the type in stock</b>	18.5%	30.2%	74.1%	21.8%
<b>Number of completely vacant buildings</b>	161 599	1 273	1 094	163 966
<b>Per all buildings of the type in stock</b>	14.3%	1.6%	1.9%	13.0%
<b>Number of buildings with normal vacancy</b>	52 083	8 585	28 108	88 822
<b>Per all buildings of the type in data</b>	25.0%	36.1%	64.9%	32.2%
<b>Number of buildings with problematic vacancy</b>	156 346	15 137	15 177	186 664
<b>Per all buildings of the type in data</b>	75.0%	63.9%	35.1%	67.8%

Table 5. Number and share of buildings touched by vacancies.

The average duration of vacancy is 10.5 years for detached houses, 4.7 years for homes in row houses and 3.9 years for flats. Table 6 shows the durations of vacancies in these building types in detail. To sum up the observations from Tables 3–6, most vacant homes are detached houses, and over two-thirds of them are long-term vacant. Although there are significant numbers of empty homes in blocks of flats as well, these are more often short-term vacant and in two-thirds of the buildings, the vacancy is to be considered as normal transaction vacancy. Figure 4 shows how the whole housing

stock and vacant homes are distributed to geographical areas of different degree of urbanization. In cities, the share of vacant homes is smaller than the share of all homes, and in the countryside, the situation is the opposite.

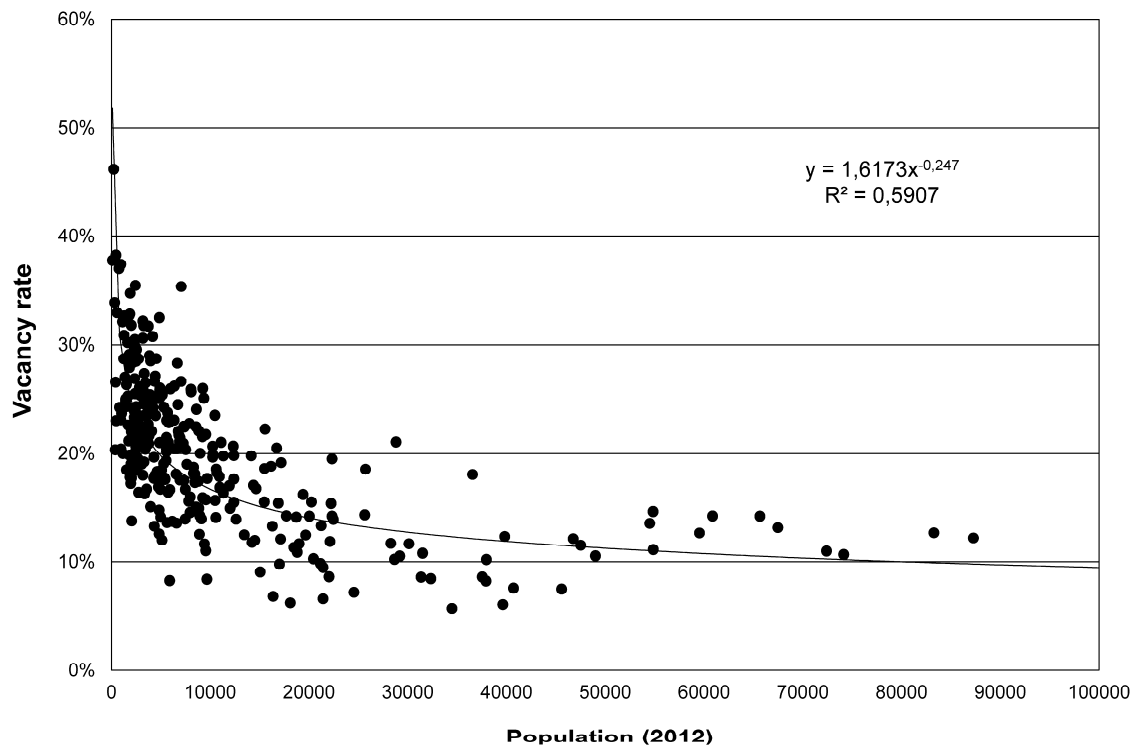


Figure 2. Gross vacancy rates and populations of Finnish municipalities. Note: The figure has been cropped to exclude nine cities with over 100 000 inhabitants for better readability.

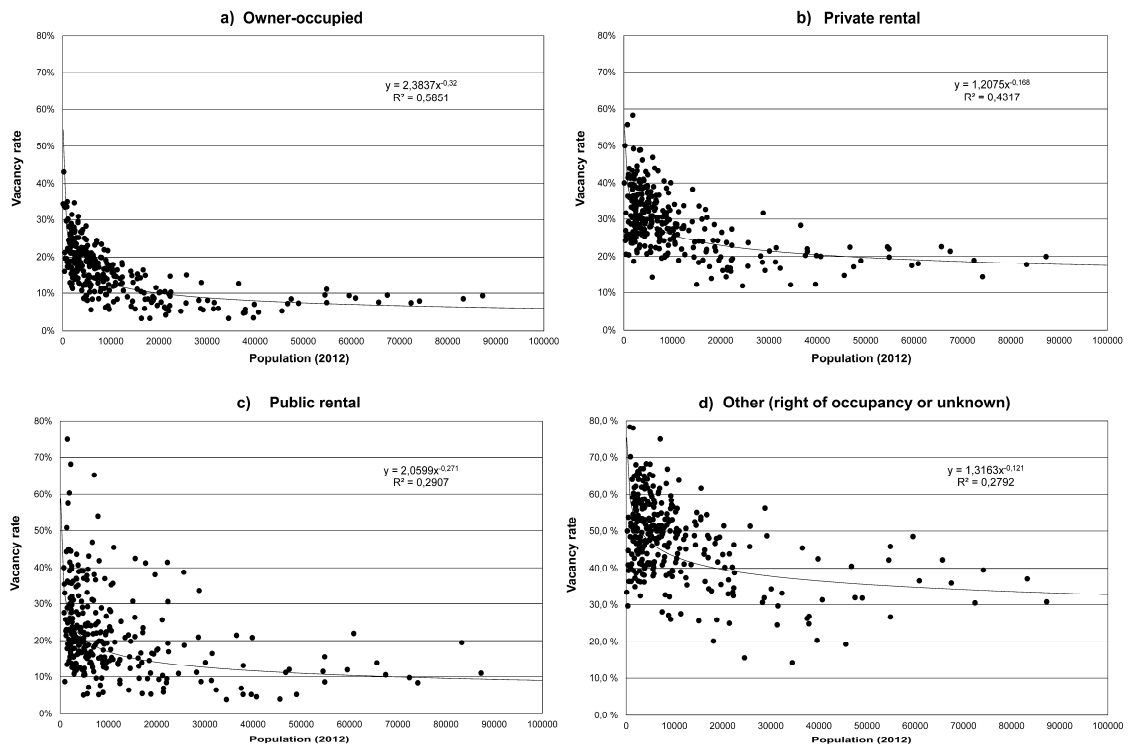


Figure 3. Vacancy rates for different tenure types and populations of Finnish municipalities: a) owner-occupied housing; b) private rental housing; c) public rental housing d) other (right of occupancy and unknown). Notes: In the whole housing stocks of municipalities, the shares of the tenure types are as follows (average [min, max]): owner-occupied 73% [46; 90]; private rental 13% [5; 44]; public rental 8% [1; 20]; other 6% [3; 20]. The figure has been cropped to exclude nine cities with over 100 000 inhabitants for better readability. Clearly erroneous figures (*i.e.* 0% and 100%) have been removed from the figure. These include public housing in Åland Islands (16 municipalities) due to data missing from the official statistics.

Duration of vacancy	Homes detached in houses	Homes in row houses	Homes in blocks of flats	Total
1 year or less	23 403 (11.7%)	15 862 (40.3%)	63 873 (46.0%)	103 138 (27.2%)
1-2 years	13 179 (6.6%)	4 892 (12.4%)	17 153 (12.4%)	35 224 (9.3%)
<b>Short to mid-term, total</b>	<b>36 582 (18.2%)</b>	<b>20 754 (52.7%)</b>	<b>81 026 (58.4%)</b>	<b>138 362 (36.5%)</b>
2-5 years	29 768 (14.8%)	6 723 (17.1%)	22 736 (16.4%)	59 227 (15.6%)
5-10 years	40 507 (20.2%)	5 298 (13.5%)	16 843 (12.1%)	62 648 (16.5%)
10-20 years	62 330 (31.1%)	4 778 (12.1%)	13 504 (9.7%)	80 612 (21.3%)
20-30 years	31 112 (15.5%)	1 814 (4.6%)	4 455 (3.2%)	37 381 (9.9%)
over 30 years	375 (0.2%)	18 (0.0%)	174 (0.1%)	567 (0.1%)
<b>Long-term, total</b>	<b>164 092 (81.8%)</b>	<b>18 631 (47.3%)</b>	<b>57 712 (41.6%)</b>	<b>240 435 (63.5%)</b>

Table 6. Duration of vacancy in different building types.

	Share of Finland's geographical area	Share of all homes	Share of vacant homes
Inner cities	0.2%	36.3%	25.6%
Outer cities	0.6%	23.8%	13.5%
City rings	3.8%	9.0%	8.2%
<b>Cities, total</b>	<b>4.6%</b>	<b>69.1%</b>	<b>47.4%</b>
Rural towns	0.2%	6.4%	6.5%
Countryside near cities	11.1%	6.6%	9.9%
Cultivation countryside	15.3%	11.6%	20.7%
Sparsely populated countryside	68.8%	6.3%	15.5%
<b>Countryside, total</b>	<b>95.4%</b>	<b>30.9%</b>	<b>52.6%</b>



Figure 4. Location of vacant homes. Shares of all homes were calculated with 2012 data (Suomen ympäristökeskus, 2014a). Base map Finnish Land Survey.

## 4.2 Properties of buildings with problematic vacancies

In this section, the paper zooms to that part of the vacant stock that has problematic vacancies and examines the properties of these buildings in comparison to buildings with normal vacancies and the whole building stock. Table 7 presents the areas of the buildings. Although there are far more problematically vacant homes in detached houses, there is slightly more floor area in blocks of flats with problematic vacancies. Although this area includes both vacant and occupied flats, the future of the whole buildings can be seen as being at risk. As seen in Figures 5, 6 and 7, the share of problematic vacancies is higher in the older cohorts, but the largest numbers occur in buildings of different age depending on the building type: in older detached houses (–1960), contemporary row houses (1970–2000) and post-war blocks of flats (1940–1980). Figure 8 shows that vacant homes concentrate on private ownership in all building and tenure types. Detached houses are more prevalent amongst buildings with problematic vacancies than amongst buildings with normal vacancies.

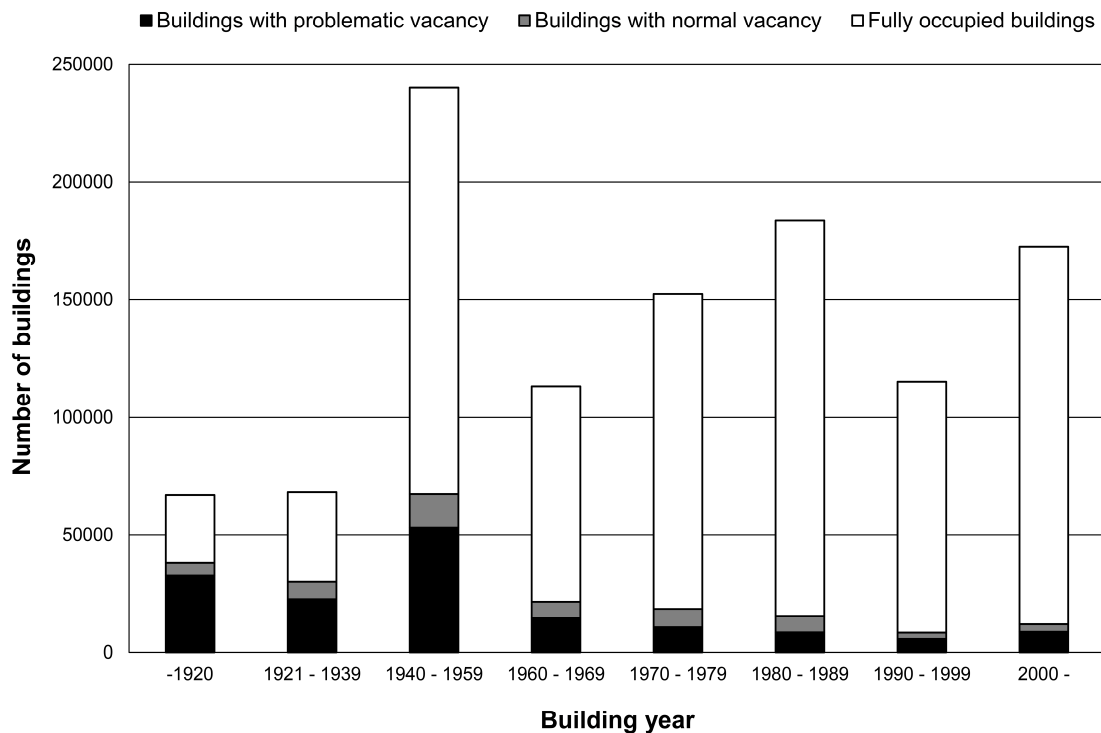


Figure 5. Building year distribution of detached houses.

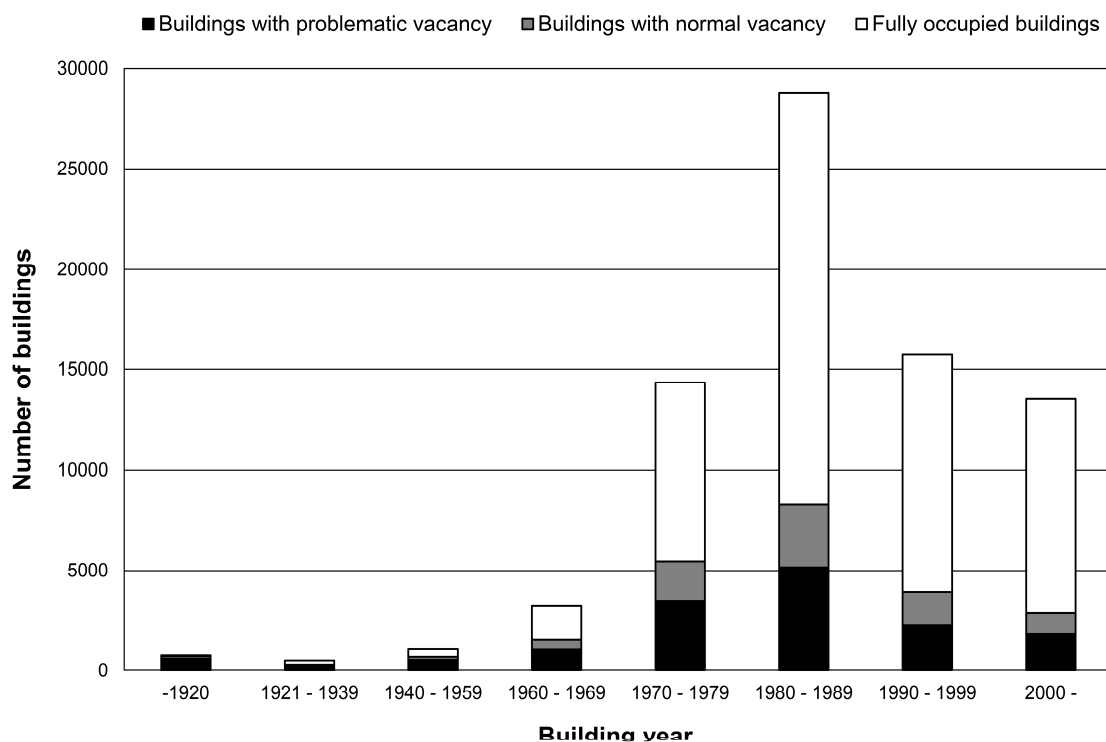


Figure 6. Building year distribution of row houses.

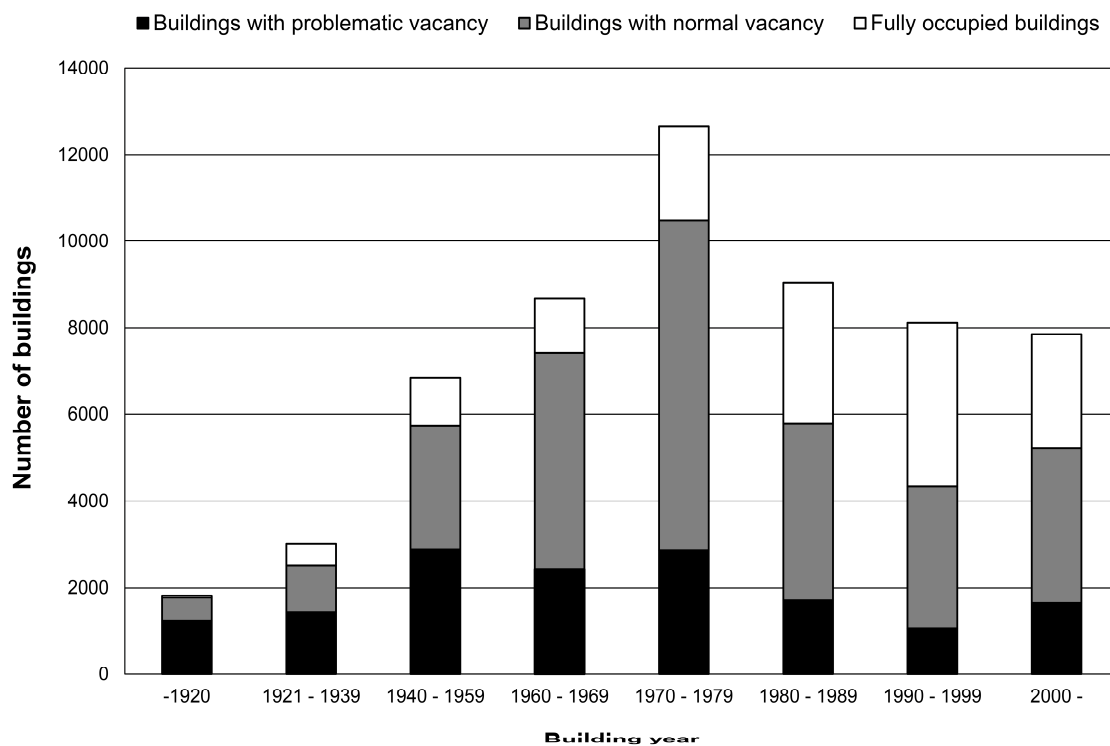


Figure 7. Building year distribution of blocks of flats.

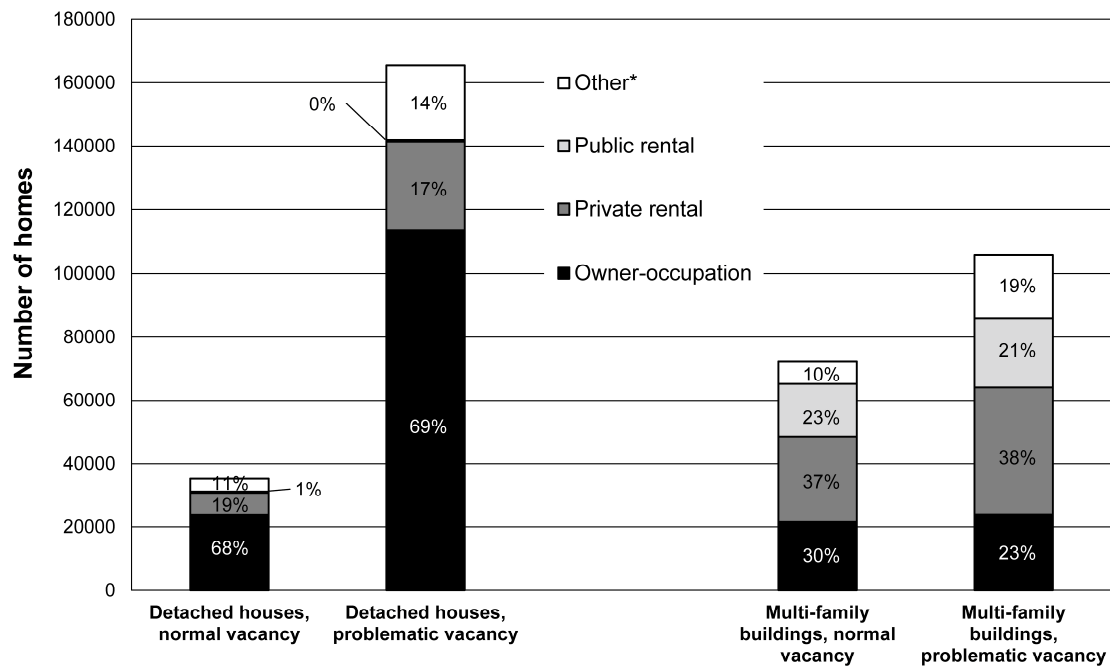


Figure 8. Numbers of normally and problematically vacant homes with different building and tenure types. \* Other tenure types include right of occupancy and unknown tenure.

Tables 8 and 9 present the construction materials and methods of buildings with problematic vacancies. Detached houses and row houses are mostly wooden, while blocks of flats are usually made of *in situ* cast concrete. Due to the significant size differences between the different building types, the floor area (Table 9) gives a better indication of the volumes of embedded materials than the number of buildings (Table 8). Timber is the prevalent material, followed by *in situ* cast concrete. The share of prefabricated concrete is equal to that of bricks; the proportion of steel is negligible. In all, 14.4% of the floor area is prefabricated: 10.6% is made of prefabricated concrete and 3.6% of prefabricated timber. However, it is highly likely that a significant share of *in situ* cast concrete buildings have prefabricated facades. According to Neuvonen (2006, p.150), *in situ* cast floors and prefabricated facades was the most common construction method in 1960–75. Alas, the data does not recognize partially prefabricated buildings.

	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>Area of all buildings in stock</b>	158 054 032	33 537 646	93 825 473	285 417 151
<b>Area of buildings with vacant homes</b>	20 851 302	8 817 382	60 777 208	90 445 892
<b>Area of buildings with problematic vacancy</b>	14 706 794	5 323 675	15 146 911	35 177 380
<b>Per all area of the building type in stock</b>	9.3%	15.9%	16.1%	12.3%
<b>Per all area of the building type in data (buildings with vacancies)</b>	70.5%	60.4%	24.9%	38.9%
<b>Area of completely vacant buildings</b>	10 352 982	323 144	423 511	11 099 637
<b>Per all area of the building type with problematic vacancies</b>	70.4%	6.1%	2.8%	31.6%

Table 7. Area and share of buildings touched by normal and problematic vacancy and completely empty buildings.

	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>Concrete, prefabricated</b>	380 (0.2%)	604 (4.0%)	2 586 (17.0%)	3 570 (2.0%)
<b>Concrete, in situ cast</b>	2 143 (1.4%)	1 527 (10.1%)	6 582 (43.4%)	10 252 (5.6%)
<b>Bricks, built in place</b>	3 804 (2.5%)	1 072 (7.1%)	2 284 (15.0%)	7 160 (3.9%)
<b>Steel, prefabricated</b>	118 (0.1%)	23 (0.2%)	36 (0.2%)	177 (0.1%)
<b>Wood, prefabricated</b>	6 091 (4.0%)	1 288 (8.5%)	62 (0.4%)	7 441 (4.1%)
<b>Wood, built in place</b>	139 993 (91.8%)	10 470 (69.2%)	3 481 (22.9%)	153 944 (84.2%)
<b>Other</b>	0 (0.0%)	39 (0.3%)	43 (0.3%)	82 (0.0%)
<b>Material unknown</b>	0 (0.0%)	115 (0.8%)	103 (0.7%)	218 (0.1%)
<b>All</b>	152 529 (100.0%)	15 138 (100.0%)	15 177 (100.0%)	182 844 (100.0%)

Table 8. Number of buildings with problematic vacancy from different construction materials.



	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>Concrete, prefabricated</b>	70 554 (0.5%)	260 359 (4.9%)	3 350 168 (22.1%)	3 681 081 (10.6%)
<b>Concrete, in situ cast</b>	343 785 (2.4%)	732 856 (13.8%)	7 783 112 (51.4%)	8 859 753 (25.4%)
<b>Bricks, built in place</b>	585 265 (4.1%)	459 069 (8.6%)	2 738 076 (18.1%)	3 782 410 (10.6%)
<b>Steel, prefabricated</b>	16 769 (0.1%)	8 363 (0.2%)	46 634 (0.3%)	71 766 (0.2%)
<b>Wood, prefabricated</b>	810 199 (5.6%)	423 562 (8.0%)	35 956 (0.2%)	1 269 717 (3.6%)
<b>Wood, built in place</b>	12 560 299 (87.3%)	3 386 351 (63.6%)	1 053 773 (7.0%)	17 000 423 (48.8%)
<b>Other</b>	0 (0.0%)	15 312 (0.3%)	48 726 (0.3%)	64 038 (0.2%)
<b>Material unknown</b>	0 (0.0%)	37 776 (0.7%)	90 468 (0.6%)	128 244 (0.4%)
<b>All</b>	14 386 871 (100.0%)	5 323 648 (100.0%)	15 146 913 (100.0%)	34 857 432 (100.0%)

Table 9. Area of buildings with problematic vacancy from different construction materials.

As seen in Tables 10 and 11, which cover all residential building types, the proportion of problematic vacancy is the higher the more rural the area. Similarly, the share of completely empty buildings or floor area is the higher the more peripheral the location. Tables 12 and 13 present the same information for detached houses, Tables 14 and 15 for row houses and Tables 16 and 17 for blocks of flats. Comparing the tables shows that only blocks of flats in all sub-areas of cities and row houses in outer cities have more normal vacancies than problematic vacancies. As can be expected, in multi-family buildings, the share of completely empty buildings is relatively low even in the most distressed areas. However, even in cities, every second row house and over 40% of blocks of flats that have empty homes are challenged by problematic vacancies. Nevertheless, problematic vacancies hit detached houses the hardest. The majority of problematically vacant detached houses and row houses are spread across the vast countryside, while most blocks of flats are situated in cities and, more specifically, in city centres. Looking at floor areas, blocks of flats in cities contain the most floor space (of the buildings with problematic vacancies). Although the amount of floor area is nearly as large in rural detached houses, these buildings are scattered on regions that encompass, as Figure 4 shows, over 95% of Finland's geographical area. Cities, where the blocks of flats are located, cover only 5%.

Geographical area	Buildings with normal vacancy	Buildings with problematic vacancy	Completely empty buildings	Completely empty buildings per buildings with problematic vacancy
Inner cities	24 610 (60.2%)	16 291 (39.8%)	3 522	21.6%
Outer cities	18 629 (51.7%)	17 373 (48.2%)	7 377	42.5%
City rings	8 519 (31.7%)	18 358 (68.3%)	13 682	74.5%
<b>Cities, total</b>	<b>51 758 (49.9%)</b>	<b>52 022 (50.1%)</b>	<b>24 581</b>	<b>47.3%</b>
Rural towns	5 835 (38.1%)	9 455 (61.8%)	4 466	47.2%
Countryside near cities	7 762 (22.2%)	27 147 (77.8%)	22 218	81.8%
Cultivation countryside	14 816 (21.7%)	53 386 (78.3%)	43 219	81.0%
Sparsely populated countryside	8 653 (16.2%)	44 652 (83.8%)	39 863	89.3%
<b>Countryside, total</b>	<b>37 066 (21.6%)</b>	<b>134 640 (78.4%)</b>	<b>109 766</b>	<b>81.5%</b>

Table 10. Number of buildings. Problematically vacant buildings include completely empty buildings.

Geographical area	Buildings with normal vacancy	Buildings with problematic vacancy	Completely empty buildings	Completely empty buildings per buildings with problematic vacancy
Inner cities	34 071 869 (76.6%)	10 409 100 (23.4%)	489 087	4.7%
Outer cities	11 904 164 (71.3%)	4 783 438 (28.7%)	730 249	15.3%
City rings	2 156 197 (43.7%)	2 777 086 (56.3%)	1 193 236	43.0%
<b>Cities, total</b>	<b>48 132 230 (72.8%)</b>	<b>17 969 624 (27.2%)</b>	<b>2 412 572</b>	<b>13.4%</b>
Rural towns	2 408 894 (44.7%)	2 985 534 (55.3%)	433 295	14.5%
Countryside near cities	1 191 224 (27.7%)	3 102 077 (72.3%)	1 837 309	59.2%
Cultivation countryside	2 437 490 (26.6%)	6 725 790 (73.4%)	3 427 760	51.0%
Sparsely populated countryside	1 099 050 (20.0%)	4 394 128 (80.0%)	2 988 656	68.0%
<b>Countryside, total</b>	<b>7 136 658 (29.3%)</b>	<b>17 207 529 (70.7%)</b>	<b>8 687 020</b>	<b>50.5%</b>

Table 11. Area of buildings. Problematically vacant buildings include long-term completely empty buildings.

Geographical area	Detached houses with normal vacancy	Detached houses with problematic vacancy	Completely empty detached houses	Completely empty detached houses per detached houses with problematic vacancy
Inner cities	5 139 (39.5%)	7 861 (60.5%)	3 149	40.1%
Outer cities	9 311 (43.0%)	12 355 (57.0%)	7 112	57.6%
City rings	6 811 (29.4%)	16 327 (70.6%)	13 469	82.5%
<b>Cities, total</b>	<b>21 261 (36.8%)</b>	<b>36 543 (63.2%)</b>	<b>23 730</b>	<b>64.9%</b>
Rural towns	3 483 (38.0%)	5 687 (62.0%)	4 229	74.4%
Countryside near cities	6 880 (21.6%)	25 040 (78.4%)	22 575	90.2%
Cultivation countryside	12 597 (21.0%)	47 356 (79.0%)	42 652	90.1%
Sparsely populated countryside	7 860 (15.9%)	41 721 (84.1%)	39 439	94.5%
<b>Countryside, total</b>	<b>30 820 (25.7%)</b>	<b>119 804 (74.3%)</b>	<b>108 895</b>	<b>90.9%</b>

Table 12. Number of detached houses. Problematically vacant buildings include long-term completely empty buildings.

Geographical area	Detached houses with normal vacancy	Detached houses with problematic vacancy	Completely empty detached houses	Completely empty detached houses per detached houses with problematic vacancy
Inner cities	785 364 (40.3%)	1 164 398 (59.7%)	317 095	27.2%
Outer cities	1 224 472 (44.5%)	1 527 094 (55.6%)	628 156	41.1%
City rings	821 745 (33.0%)	1 665 363 (67.0%)	1 127 077	67.7%
<b>Cities, total</b>	<b>2 831 581 (39.4%)</b>	<b>4 356 855 (60.6%)</b>	<b>2 072 328</b>	<b>47.6%</b>
Rural towns	425 130 (40.3%)	629 398 (59.7%)	367 115	58.3%
Countryside near cities	755 645 (25.1%)	2 260 658 (74.9%)	1 775 175	78.5%
Cultivation countryside	1 362 896 (24.7%)	4 159 428 (75.3%)	3 263 383	78.5%
Sparsely populated countryside	769 355 (18.9%)	3 300 228 (81.1%)	2 874 936	87.1%
<b>Countryside, total</b>	<b>3 313 026 (24.2%)</b>	<b>10 349 712 (75.8%)</b>	<b>8 280 609</b>	<b>80.0%</b>

Table 13. Area of detached houses. Problematically vacant buildings include completely empty buildings.

Geographical area	Row houses with normal vacancy	Row houses with problematic vacancy	Completely empty row houses	Completely empty row houses per row houses with problematic vacancy
Inner cities	1 470 (48.2%)	1 578 (51.8%)		7.0%
Outer cities	2 692 (51.4%)	2 546 (48.6%)	121	4.8%
City rings	849 (40.8%)	1 231 (59.2%)	119	9.7%
<b>Cities, total</b>	<b>5 011 (48.3%)</b>	<b>5 355 (51.7%)</b>	<b>350</b>	<b>6.5%</b>
Rural towns	804 (33.1%)	1 622 (66.9%)	112	6.9%
Countryside near cities	634 (29.1%)	1 547 (70.9%)	142	9.2%
Cultivation countryside	1 571 (26.7%)	4 307 (73.3%)	331	7.7%
Sparsely populated countryside	615 (21.0%)	2 307 (79.0%)	306	13.3%
<b>Countryside, total</b>	<b>3 624 (27.0%)</b>	<b>9 783 (73.0%)</b>	<b>891</b>	<b>9.1%</b>

Table 14. Number of row houses. Problematically vacant buildings include completely empty buildings.

Geographical area	Row houses with normal vacancy	Row houses with problematic vacancy	Completely empty row houses	Completely empty row houses per row houses with problematic vacancy
Inner cities	754 286 (52.6%)	680 382 (47.4%)	29 995	4.4%
Outer cities	1 176 078 (46.3%)	1 013 333 (46.3%)	35 094	3.5%
City rings	333 700 (42.9%)	443 913 (57.1%)	34 689	7.8%
<b>Cities, total</b>	<b>2 264 064 (51.4%)</b>	<b>2 137 628 (48.6%)</b>	<b>99 778</b>	<b>4.7%</b>
Rural towns	298 659 (34.2%)	574 330 (65.8%)	27 445	4.8%
Countryside near cities	211 047 (29.5%)	504 593 (70.5%)	34 589	6.9%
Cultivation countryside	531 603 (27.3%)	1 414 418 (72.7%)	86 202	6.1%
Sparsely populated countryside	188 611 (21.4%)	692 706 (78.6%)	75 130	10.8%
<b>Countryside, total</b>	<b>1 229 920 (27.9%)</b>	<b>3 186 047 (72.1%)</b>	<b>223 366</b>	<b>7.0%</b>

Table 15. Area of row houses. Problematically vacant buildings include completely empty buildings.

Geographical area	With normal vacancy	With problematic vacancy	Completely empty blocks of flats	Completely empty blocks of flats per blocks of flats with problematic vacancy
Inner cities	18 001 (72.4%)	6 852 (27.6%)		3.8%
Outer cities	6 626 (72.8%)	2 472 (27.2%)	144	5.8%
City rings	859 (51.8%)	800 (48.2%)	94	11.8%
<b>Cities, total</b>	<b>24 486 (58.7%)</b>	<b>10 124 (41.3%)</b>	<b>501</b>	<b>4.9%</b>
Rural towns	1 548 (41.9%)	2 146 (58.1%)	125	5.8%
Countryside near cities	248 (30.7%)	560 (69.3%)	98	17.5%
Cultivation countryside	648 (27.3%)	1 723 (72.7%)	236	13.7%
Sparsely populated countryside	178 (22.2%)	624 (77.8%)	118	18.9%
<b>Countryside, total</b>	<b>2 622 (34.2%)</b>	<b>5 053 (65.8%)</b>	<b>577</b>	<b>11.4%</b>

Table 16. Number of blocks of flats. Problematically vacant buildings include completely empty buildings.

Geographical area	With normal vacancy	With problematic vacancy	Completely empty blocks of flats	Completely empty blocks of flats per blocks of flats with problematic vacancy
Inner cities	32 532 219 (79.2%)	8 564 320 (20.8%)	141 997	1.7%
Outer cities	9 503 614 (80.9%)	2 243 011 (19.1%)	66 999	3.0%
City rings	1 000 752 (60.0%)	667 810 (40.0%)	31 470	4.7%
<b>Cities, total</b>	<b>43 036 585 (78.9%)</b>	<b>11 475 141 (21.1%)</b>	<b>240 466</b>	<b>2.1%</b>
Rural towns	1 685 105 (48.6%)	1 781 806 (51.4%)	38 735	2.2%
Countryside near cities	224 532 (40.0%)	336 826 (60.0%)	27 545	8.2%
Cultivation countryside	542 991 (32.0%)	1 151 944 (68.0%)	78 175	6.8%
Sparsely populated countryside	141 084 (26.0%)	401 194 (74.0%)	38 590	9.6%
<b>Countryside, total</b>	<b>2 593 712 (41.4%)</b>	<b>3 671 770 (58.6%)</b>	<b>183 045</b>	<b>5.0%</b>

Table 17. Area of blocks of flats. Problematically vacant buildings include completely empty buildings.

### 4.3 Comparison to new construction and demolition

This section compares the number of vacant homes and area of problematically vacant buildings to those of new construction and demolition to reveal the magnitude of the reserves in the underutilized housing stock. Table 18 shows that in mid-2014, circa 8.5 times as many homes were long-term vacant as were built in the previous year or as were demolished during 13 years (2000–12). Compared to the current pace of new construction, the vacant stock is especially large for detached houses: over 17 times the yearly production. For blocks of flats, it is roughly four times the yearly addition. On the other hand, flats' vacant stock is notable with regard to demolition: nearly 12 times as many homes are long-term vacant in blocks of flats as have been demolished from blocks of flats in over a decade. In other words, at the past demolition pace, it would take over 100 years to demolish the long-term vacant homes from blocks of flats.

	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total (incl. homes in NRB)</b>
<b>New homes in 2013</b>	9 559	3 705	15 242	28 506
<b>Demolished homes 2000-2012</b>	18 002	2 364	4 930	28 158
<b>Long-term vacant homes</b>	163 643	18 746	58 500	240 889
<b>Per new homes</b>	1712%	506%	384%	845%
<b>Per demolished homes</b>	909%	793%	1187%	855%

Table 18. Number of long-term vacant homes compared to the number of new homes built in 2013 and demolished between 2000 and 2012.

When looking at the floor areas of buildings (Table 19), the magnitudes of the underutilized stocks in multi-family buildings come off larger than if only vacant homes are observed. This is natural because although these are buildings at risk, they keep containing many occupied homes. When compared to the past magnitude of demolition, the stocks at risk encompass significant amounts of floor space: in blocks of flats, for instance, more than 58 times as much as was demolished between 2000–12.

	<b>Detached houses</b>	<b>Row houses</b>	<b>Blocks of flats</b>	<b>Total</b>
<b>Area of newly constructed buildings in 2013</b>	1 774 842	341 660	1 221 264	3 337 766
<b>Area of demolished buildings 2000-2012</b>	1 448 106	147 611	260 700	1 856 417
<b>Area of problematically vacant buildings</b>	14 706 794	5 323 675	15 146 911	35 177 380
<b>Per area of new buildings</b>	829%	1558%	1240%	1054%
<b>Per area of demolished buildings</b>	1016%	3607%	5810%	1894%

Table 19. Area of problematically vacant buildings compared to the area of new residential buildings built in 2013 and demolished between 2000 and 2012.

## 4.4 Vacancy patterns

This part of the examination focuses on calculating linear correlations for vacancy, demolition and other variables in the scale of municipalities. Although the number of vacant homes correlates strongly with the population of the community ( $r=0.96$ , Figure 9) and the size of the housing stock ( $r=0.97$ ), the correlations are negative for the vacancy rate ( $r=-0.40$  and  $r=-0.38$  in a respective order). Figures 2 and 3 show that the negative correlation with population is, in fact, power correlation. The situation is similar with the change of inhabitants (in absolute numbers): the correlation is positive with the number of empty homes ( $r=0.78$ ) but negative with the proportion of empty homes ( $r=-0.39$ ). Unsurprisingly, the correlation between the vacancy rate and the relative change of population is clearly negative ( $r=-0.73$ , Figure 10). As could be expected, the share of long-term vacant homes is the greater the higher the vacancy rate is ( $r=0.79$ , Figure 11). In addition, the share of vacant homes has a strong positive correlation with the share of over 65-year-old population ( $r=0.76$ , Figure 12). Here, it must be noted that the number of inhabitants and the share of over 65 year-olds correlates negatively ( $r=-0.30$ ), suggesting that the share is usually higher in smaller communities. In brief: the larger the community, the larger the net migration (absolute as well as relative), and the larger the number of empty homes, but the smaller the vacancy rate. In addition, the smaller the vacancy rate, the smaller the share of the elderly and long-term vacant homes.

To study the connection between demolition and vacancy, correlations were calculated for the current vacancy rate; the floor area demolished between 2000–12; and the number of demolished homes. The correlations are negative ( $r=-0.36$  and  $r=-0.45$  in a respective order), which suggest that the higher the vacancy rate, the less was demolished in absolute numbers (see Figure 13). This is explained by the sizes of the municipalities: the ones with high vacancy rates are small and have small housing stocks. Practically no linear correlation, however, occurred ( $r=0.02$ ) between the share of demolished homes and the vacancy rate (Figure 14).

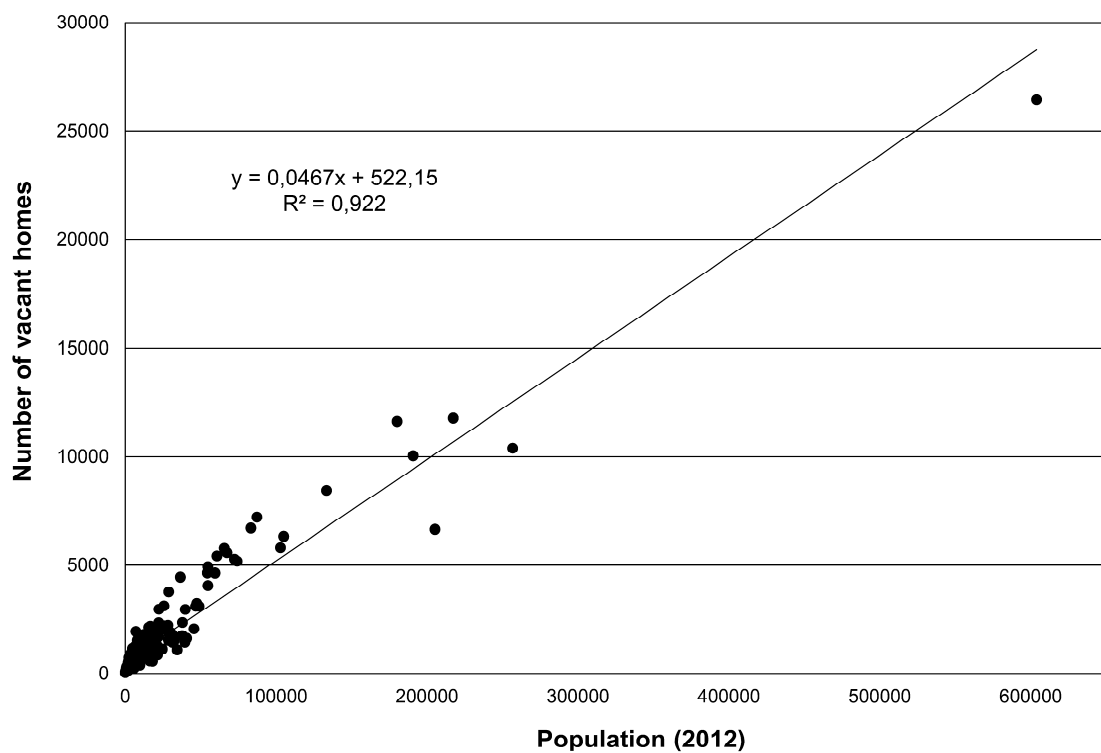


Figure 9. Numbers of vacant homes and populations of Finnish municipalities.

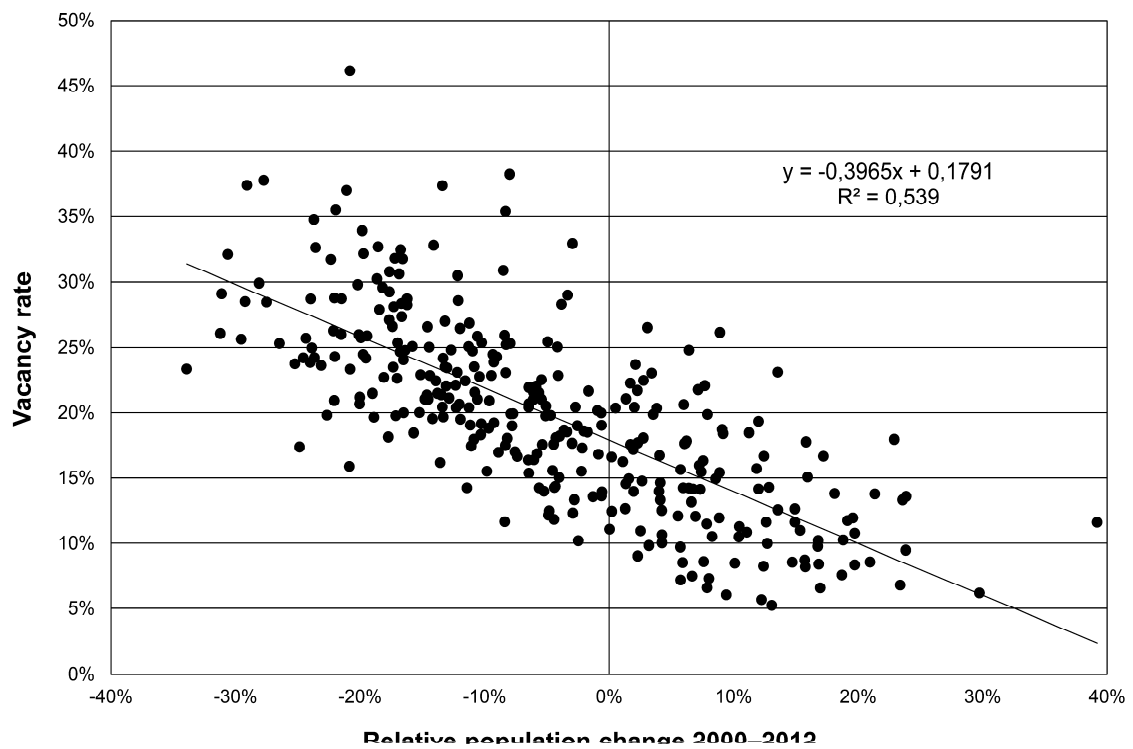


Figure 10. Vacancy rates and relative population changes in Finnish municipalities.



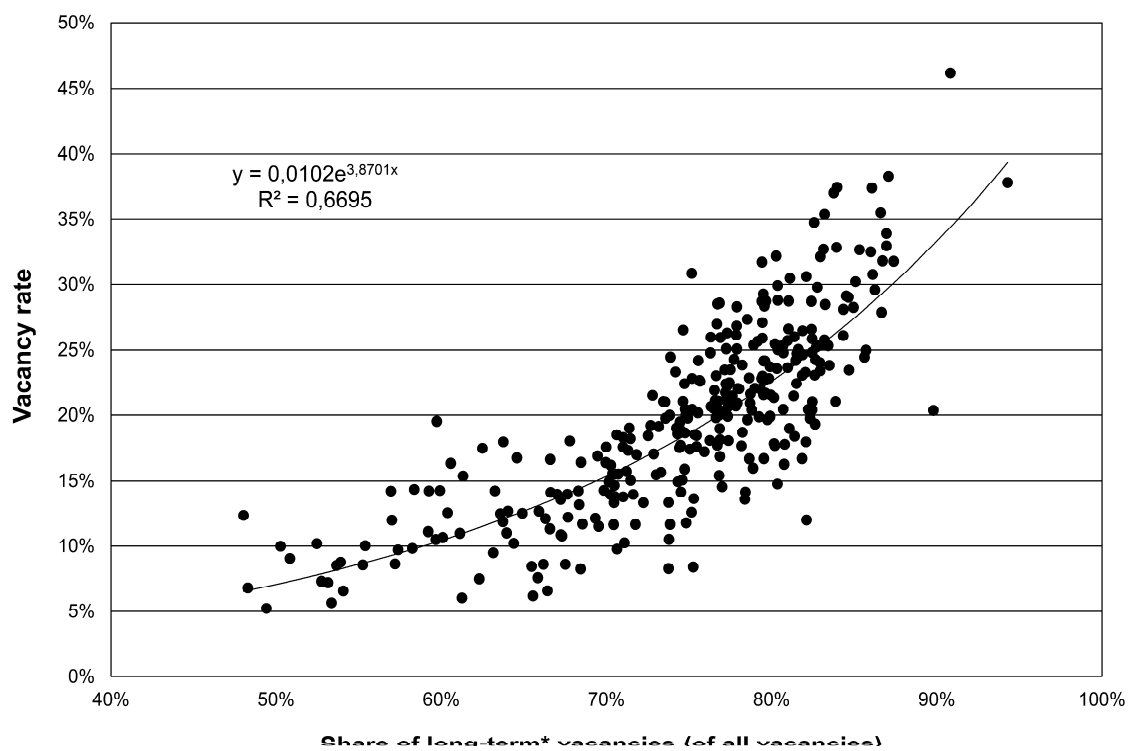


Figure 11. Vacancy rates and shares of long-term\* vacancies of all vacancies in Finnish municipalities. \* In this chart only: homes that have been vacant for more than 18 months regardless of the building type.

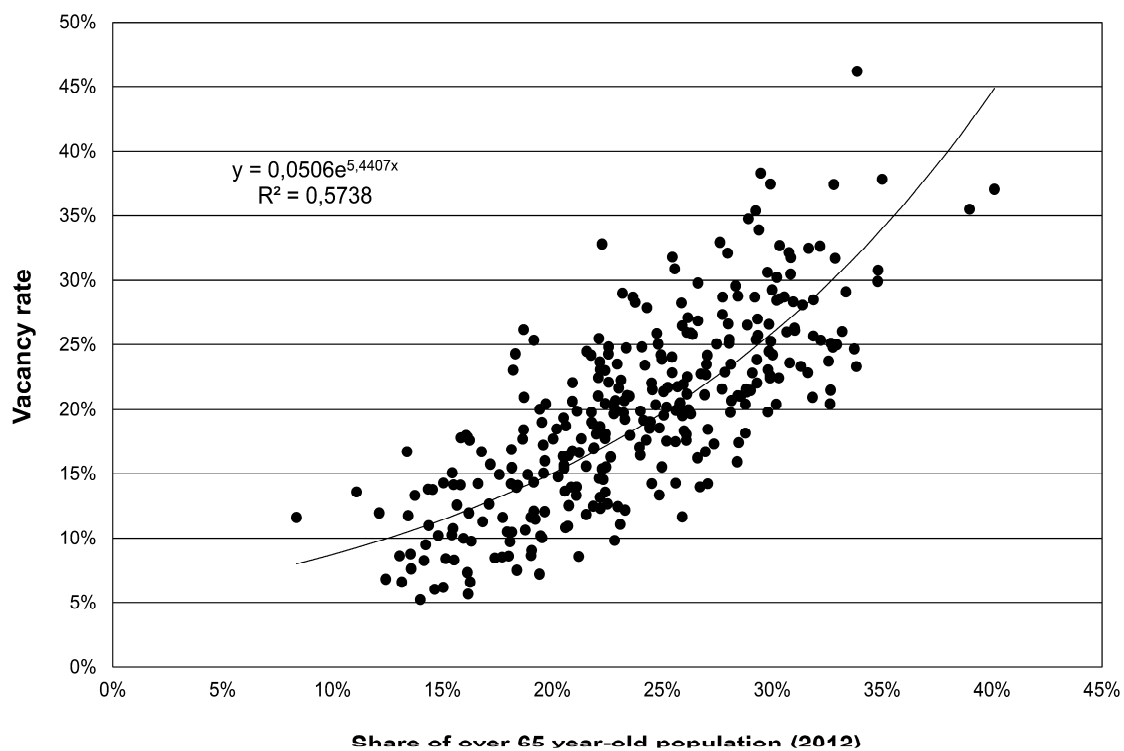


Figure 12. Vacancy rates and shares of over 65 year-olds in Finnish municipalities.

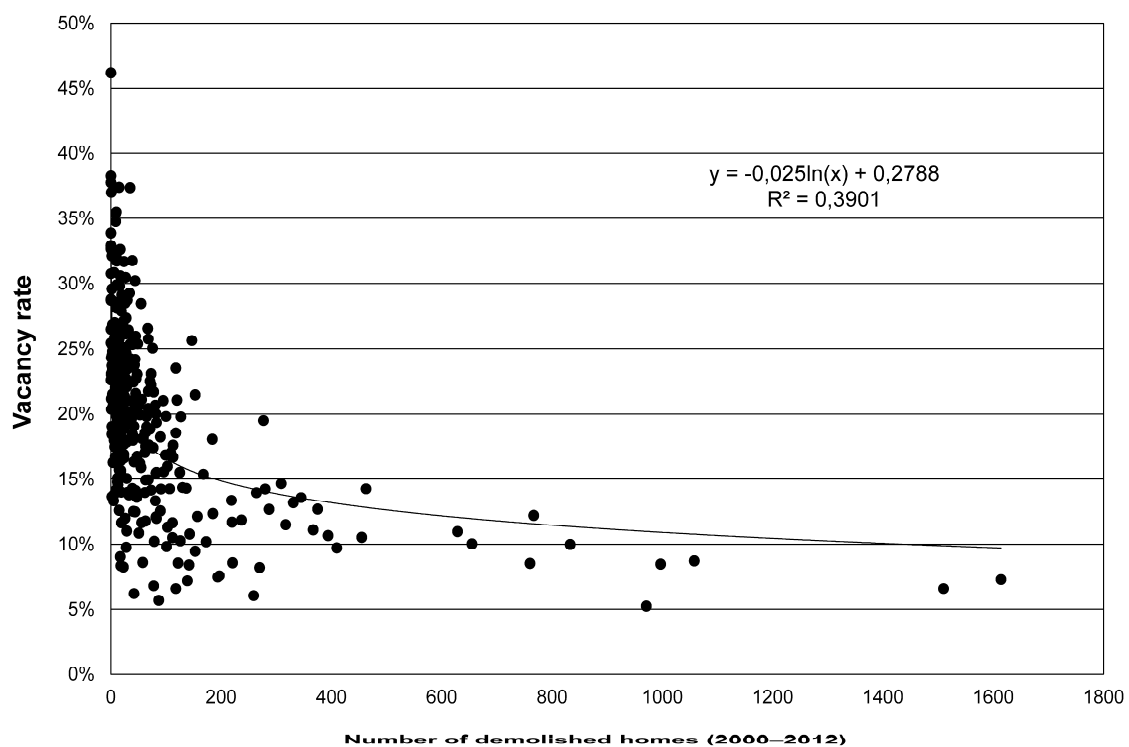


Figure 13. Vacancy rates and numbers of demolished homes in Finnish municipalities.

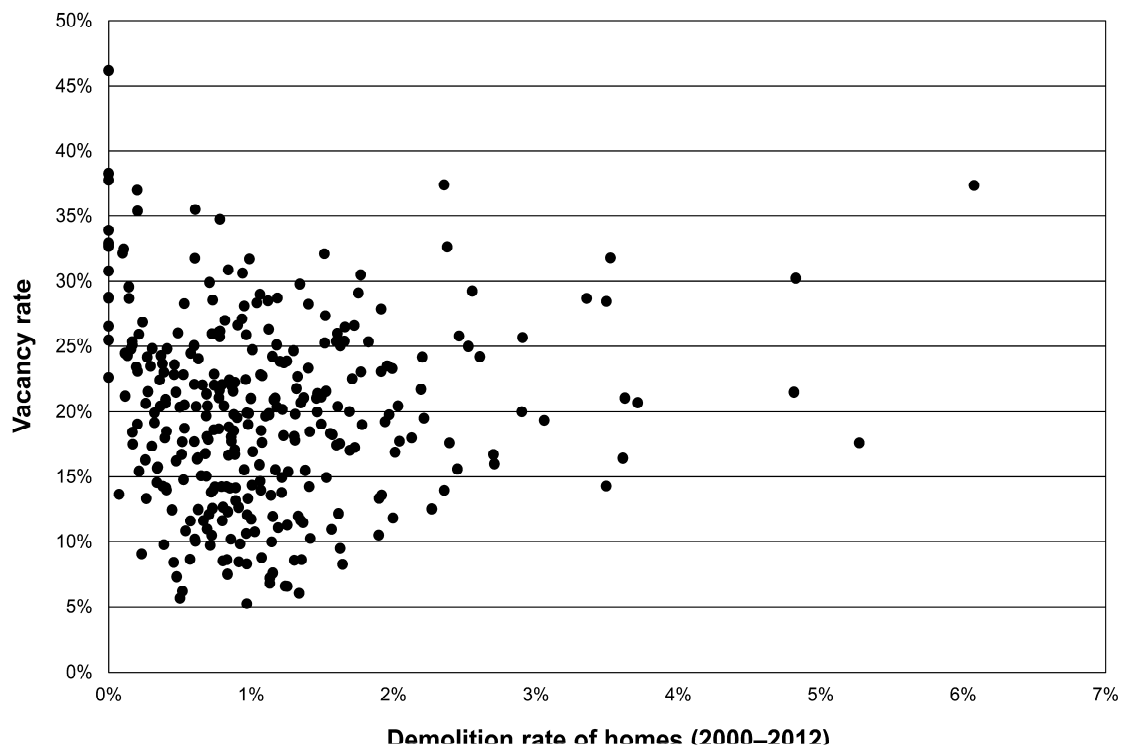


Figure 14. Vacancy rates and demolition rates in Finnish municipalities.

## 4.5 Replacement behaviour

To consider possible futures for vacant buildings, replacement behaviour of buildings was studied by comparing demolished and built buildings on the same plots. In total, 10 520 pieces of real estate had residential buildings demolished and new buildings built in 2000–12. In 81% of them, new construction was residential. As Table 20 shows, detached houses were usually substituted with detached houses and blocks of flats with blocks of flats. Row houses, however, were most often replaced with non-residential buildings. Tables 21, 22, and 23 zoom on the replacement behaviour in urban and rural area types. Regardless of the degree of urbanity, detached houses were most often replaced with detached houses. Exchange into non-residential buildings was notable in the countryside. Row houses were usually exchanged into blocks of flats in inner cities; more often into blocks of flats or detached houses than row houses in outer cities; and usually into detached houses in city rings. Replacing old row houses with row houses was common only in the countryside. However, the majority of row houses in all area types, except inner cities and sparsely populated countryside, were exchanged into non-residential buildings. Replacing blocks of flats with the same type prevailed only in inner cities and rural towns, *i.e.* community centres. In outer cities, blocks of flats usually made way for detached houses, and in all other area types, for non-residential buildings.

Demolished building	New construction					
	None	Detached house	Row house	Block of flats	NRB	Total
Detached house	51.9%	33.4%	3.3%	2.7%	8.8%	100%
Row house	51.7%	4.8%	7.3%	11.9%	24.2%	100%
Block of flats	57.1%	9.9%	2.6%	17.8%	12.5%	100%

Table 20. New construction on the plots of demolished residential buildings. NRB=non-residential building.

Geographical area	None	Detached house	Row house	Block of flats	NRB
Inner cities	39.0%	38.8%	7.6%	8.5%	6.0%
Outer cities	47.6%	40.2%	3.7%	1.2%	7.2%
City rings	54.2%	35.7%	1.2%	1.1%	7.8%
Rural towns	61.1%	21.2%	3.6%	4.2%	10.0%
Countryside near cities	57.8%	19.5%	0.7%	0.4%	11.6%
Cultivation countryside	60.8%	26.0%	1.6%	0.6%	10.9%
Sparsely populated countryside	80.8%	10.5%	0.2%	0.1%	8.3%

Table 21. New construction on the plots of demolished detached houses.

Geographical area	None	Detached house	Row house	Block flats	of NRB
Inner cities	44.3%	6.1%	6.9%	34.4%	8.4%
Outer cities	30.9%	8.7%	7.4%	9.4%	43.6%
City rings	77.8%	5.6%	3.7%	1.9%	11.1%
Rural towns	53.3%	0.0%	2.2%	0.0%	44.4%
Countryside near cities	53.6%	1.8%	10.7%	3.6%	30.4%
Cultivation countryside	73.2%	1.2%	7.3%	1.2%	17.1%
Sparsely populated countryside	74.4%	2.7%	15.4%	0.0%	7.7%

Table 22. New construction on the plots of demolished row houses.

Geographical area	None	Detached house	Row house	Block flats	of NRB
Inner cities	47.0%	11.0%	3.6%	29.0%	9.4%
Outer cities	67.7%	15.3%	1.6%	3.2%	12.1%
City rings	67.5%	5.0%	5.0%	7.5%	15.0%
Rural towns	69.6%	8.9%	1.8%	10.7%	8.9%
Countryside near cities	67.3%	0	0	9.1%	23.6%
Cultivation countryside	59.1%	6.8%	0	6.8%	27.3%
Sparsely populated countryside	70.8%	0	4.2%	4.2%	20.8%

Table 23. New construction on the plots of demolished blocks of flats.

Since tenure and the building type affect the range of measures owners can conduct, Figure 15 shows the building and tenure types of all homes demolished between 2000–12. A comparison to tenure types of vacancies reveals that rental homes are overrepresented amongst demolished homes in comparison to vacant homes. Alas, the data does not allow distinguishing between professional and non-professional private owners. However, a significant share of demolition in the private rented stock took place in multi-family buildings, which implies to professional ownership. As could be expected, almost all demolished owner-occupied homes are detached houses. They are also more prevalent in the whole of the demolished stock than in the problematically vacant part of the stock, let alone the normally vacant part.

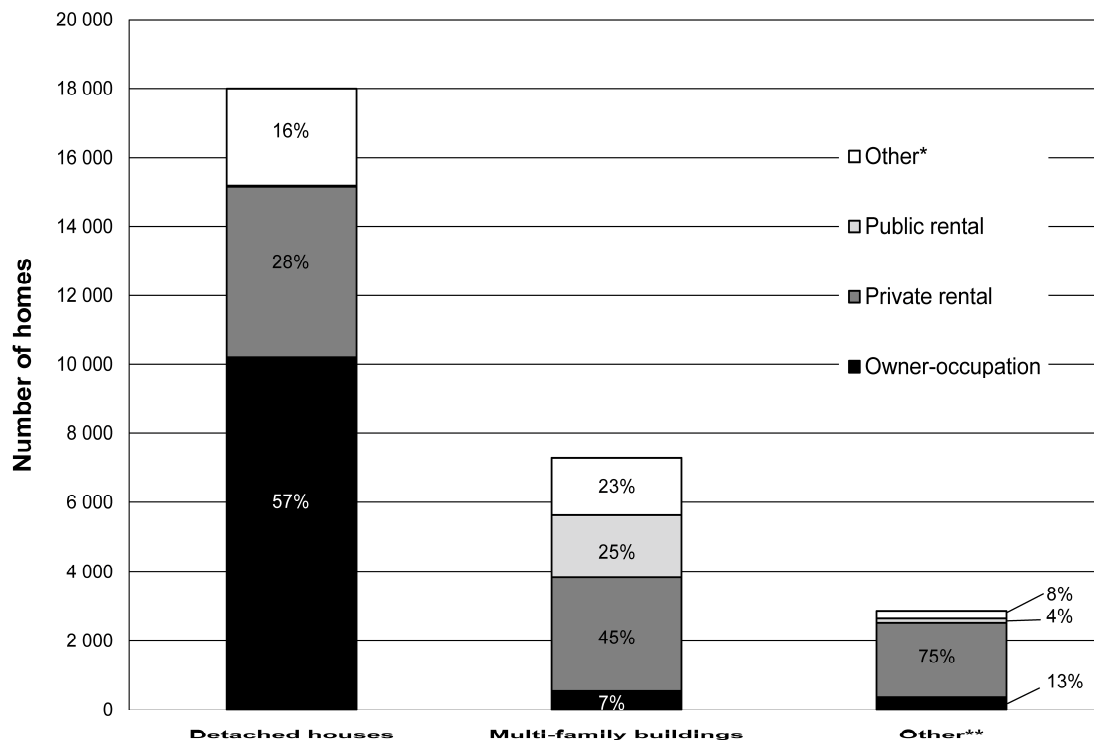


Figure 15. Numbers of demolished homes with different building and tenure types. \* Other tenure types include right of occupancy and unknown tenure. \*\* Other buildings include NRB and unknown building types.

## **5 Discussion**

### **5.1 On vacancy in Finland**

Finnish vacancy rates are remarkably high compared to many other countries (see Table 2). The national average is 12.7% and there is no single municipality where the overall vacancy rate would be less than 5%, the proportion considered as the upper limit for normal transaction vacancy. Instead, half of Finnish municipalities have a vacancy rate between 20% and 46%. The average of municipalities, 19.8%, is perhaps the best indicator for the big picture because the largest cities skew the national average downwards.

However, the Finnish vacancy rate is not unprecedented in the European context, where it seems to couple with those of East and South European countries as declared by Norris and Shiels (2004). The magnitudes of the European vacancy rates seem to challenge the estimates for normal transaction vacancy. Hoekstra and Vakili-Zad (2011) and Vakili-Zad and Hoekstra (2011) have sought for explanations for the Spanish and Maltese vacancy rates from welfare state ideology and strong homeownership culture. Both these remarks apply to Finland as well (Tanninen, 2004), so they might offer a partial explanation. In addition, holiday residence has been thought to explain the high vacancy rates around the Mediterranean (Norris & Shiels, 2004). Although its nature is fundamentally different from the Southern tourism industry, the phenomenon of holiday residence is also rooted in Finland. Yet, the operational expenses and environmental stresses of empty homes are significantly higher in the North than in the South as the buildings consume heating energy during the winters. Although these expenses seemingly fall on the private sector, vacancy has implications for the society as well, for instance, in the form of energy consumption, emissions, infrastructure underutilization and shrinkage sprawl.

Although vacancy rates are higher in shrinking settlements, the population decline alone cannot explain the magnitude of the Finnish vacancy rate as Norris and Shiels (2004) have suggested. Due to the sheer size of the housing stock in cities, there are much more vacant homes in the urban than in the rural, and this applies to long-term vacant homes as well.

## 5.2 On problematic vacancies

This paper considers buildings with high rates of long-term vacancies as 'problematic', *i.e.* as being at risk of becoming demolished. Demolition policies are quite common in other countries (Kruijthoff, 2003; Power, 2008; Gilbert, 2009; Mallach, 2011), and Thomsen and van der Flier (2011) have pointed out that policies have a tendency to favour demolition over reconstitution. Despite of no such policies existing in Finland for the time being, the Finnish demolition rate is already one of the highest in Europe (Huuhka & Lahdensivu, 2014). Although the share of problematic vacancies is higher in the older cohorts, the total number of homes in them is small. The largest numbers of vacancies occur in the largest cohorts, even though the relationship with the size of the stock is otherwise not linear. The vast majority of problematically vacant homes are in private ownership. In the buildings with problematic vacancies, there is nearly equally as much floor space in blocks of flats and detached houses. Timber embedded in detached houses is the most significant building material that could originate from this stock. *In situ* cast concrete is another significant material, and this group can be expected to withhold partially prefabricated buildings with panel facades as well. Only little under 15% of the floor area is completely prefabricated, most often from concrete, possibly enabling component extraction.

The proportion of problematic vacancy is the higher the more rural the geographical area is. The proportion of vacant homes is also the higher the more there are over 65-year-olds in the municipality. These observations coincide with Nordvik and Gulbrandsen's (2009) findings about Norway. The demographic development in Finland has been very similar to Norway: Aro (2007) has labelled the period 1945–75 as 'an era of concentration'. He concludes that the development has been inevitable and irreversible: 'Over a period of over 100 years, no single administrative procedure has been able to reverse the direction of migration or its target areas but temporarily and locally at most' (Aro, 2007, p.302). Mikkala (2002) has also concluded that the problem concentrates on peripheral Finland. However, the share of problematic vacancy is greater than the share of normal transaction vacancy in most cases regardless of the location. This is in line with Couch and Cocks' (2013) findings on

England, where even in the strong market of London the share of structural vacancy was as high as 45%. A major difference is that while the overall vacancy rate of London is 2.5%, the vacancy rates of Finnish cities exceed 5%. In the latter, problematic vacancies touch every second row house and over 40% of blocks of flats that have empty homes. What is more, problematically vacant detached houses and row houses are spread on a very vast geographical area. Problematically vacant blocks of flats, instead, concentrate on cities; and they contain the highest share of floor area of all buildings at risk. Despite the extent of the phenomenon, Finland currently has no policies for reducing vacancies.

### **5.3 On the development of communities**

The building stocks and the geographical areas of settlements have been found to keep growing in all Finnish municipalities despite the fact that two-thirds of them have shrinking populations (Huuhka, 2014). The current study points out that at the same time, tens of percent of the existing housing stock is vacant in many municipalities. Thomsen and van der Flier (2011) have aptly pointed out that obsolete buildings on valueless land will not be demolished. Even though the literature on shrinkage sprawl underlines its many disadvantages to the community (e.g. Siedentop & Fina, 2010; Reckien & Martinez-Fernandez, 2011), municipalities keep granting building permissions for new construction on virgin land and the current Centre party-led Finnish government is set to ease turning the scattered holiday housing into permanent homes (Valtioneuvoston kanslia, 2015, p.12). On the other hand, growth centres suffering from housing shortages and high housing prices demolish the largest numbers of housing and, yet, have larger reserves of vacant housing than what is considered as normal for a functional housing market.

Studying past replacement of residential buildings by building type was intended to shed more light on the current, lightly-regulated replacement behaviour. As changing the intended use of a plot requires re-zoning in urban areas, it could be expected that buildings would be most often replaced by the same type of buildings. On the other hand, it could also be anticipated that small buildings would be replaced with larger ones. The former assumption proved to apply to detached houses and blocks of flats, and the latter to row houses. Exchange into non-residential buildings was remarkable, especially with row houses but also blocks of flats. However, it should be noted that there were significant differences in the replacement behaviour between urban and rural areas. The findings on tenure types suggest that the limitations posed by shared



ownership as described in Thomsen and van der Flier (2009) would, indeed, have an effect on the demolition of buildings.

## **5.4 Does housing vacancy reflect non-residential vacancy?**

Although the study is based on examining residential buildings, there is an underlying assumption that the amount of vacancies in residential buildings (RB) would also reflect that in non-residential buildings (NRB). Because data on non-residential vacancy is not available, this could not be verified. However, the assumption is based on two other observations. Firstly, the number of RB and NRB in Finnish municipalities correlate linearly ( $r=0.94$ ), and so do their floor areas ( $r=0.99$ ). Secondly, the number of demolished RB and NRB ( $r=0.91$ ) and their floor areas ( $r=0.84$ ) correlate linearly, although the coefficients are slightly smaller. In addition, it has been generally accepted that population decline is connected to structural changes in industrial and agricultural production, which suggest that the decline would have an effect on the non-residential building stock.

## Conclusions

This study offers new evidence-based insight into vacancy in Finland and the relations between the housing stock, vacancy and demolition. On top of half a million holiday homes, there were 382 802 Finnish homes (12.7%) that were not permanently inhabited. The average municipal gross vacancy rate was 19.8%. The tenure-type-related average municipal vacancy rate was lowest for owner-occupied housing (16.0%) and highest for private rental housing (29.0%), with social housing (25.0%) in-between the two.

The six hypotheses set were found to stand. Firstly, vacancy rates were related to demographics: they showed negative correlation with population and population change, and positive correlation with the share of the elderly. Secondly, the extent of vacancy depended on the location: vacancy was more severe in rural areas. Thirdly, the size of housing stock correlated negatively with the vacancy rate but positively with the number of vacant homes. Fourthly, building type also had an effect: vacancy was more severe in detached houses than in multi-family buildings, although a larger share the latter was touched by (normal) vacancies. Fifthly and sixthly, vacancy was not straightforwardly related to building age or demolition: problematic vacancies prevailed in older cohorts, but the vacancy rates of cohorts differed between building types; and demolition rates showed no correlation whatsoever with vacancy rates.

A comparison with past new construction and demolition was carried out to assess the magnitude of the reserves in the underutilized housing stock. Depending on the building type, the size of the reserve is 4–17 times the annual new construction. Although cities have the lowest vacancy rates, quantitatively largest and geographically most concentrated reserves are found in cities, where the housing needs are also the most apparent. The challenge is whether the need and demand meet in the same submarkets. On the other hand, if the underutilized housing stock was to be demolished, it could be considered as a possible reserve for building components or, at worst, a source of demolition waste. The floor area in the stock is significant in magnitude: depending on the building type, 10–58 times as much as demolished in 2000–12. Removing it would denote a significant increase in waste production, or a notable reserve for building parts and materials, depending on whether demolition or deconstruction was employed. Although this study suggests that a lot of this removal should take place in the countryside, previous research (Huuhka & Lahdensivu, 2014) has shown that in practice, most of demolition occurs in cities.

## Policy implications

Understanding the true magnitude of empty homes should have implications for policies regarding housing and sustainable urban development as well as energy and resource conservation. It should affect the deliberation regarding zoning of virgin land, granting of building and demolition permits and allowing holiday homes to be turned into permanent residences, as well as energy use allowances for irregularly used buildings. To address the empty homes themselves, policies could include increasing demolition (and, in parallel, recycling) and encouraging reconstitution and more permanent usage. The decision-making should be backed up by similar but more local investigations into the building stock as the approach presented in this paper.

The Finnish legislation does already encompass tools, similar to those in the US (Hackworth, 2014), that authorities could employ, especially in the context of shrinking communities. First of all, allowing buildings to blight is forbidden, and building authorities have the right to order a blighted building to be repaired or demolished (Maankäyttö- ja rakennuslaki [MRL], 1999, §§ 166, 170). If the owner refuses, authorities can impose conditional fines or have the measures done at the owner's expense (MRL, 1999, § 182). Authorities also have the right to use eminent domain (expropriation) and pre-emption (MRL, 1999, § 99; Etuostolaki, 1977, § 5). However, Finnish planning has been argued to be fundamentally entangled with landowners' interests (Mäntysalo & Nyman, 2001), of which it is symptomatic that authorities prefer not use these tools. This applies especially to eminent domain, which also requires permission from the ministry, possibly discouraging authorities further. As for pre-emption, the conditions set for it in the law prevent the purchase of normal-sized urban plots, since only plots larger than 5000m<sup>2</sup> may be acquired this way. This limitation makes pre-emption less usable within the existing fabric, unless the municipality declares the area a 'development zone' (MRL, 1999, § 112).

It should be discussed if the provisions on eminent domain and pre-emption could be reformed to allow an easier usage against property abandonment. However, these tools consider only pieces of real estate, leaving housing companies (row houses and blocks of flats) out of their scope. Moreover, an equally important question is how to address simultaneous vacancy and housing shortage in growth centres, where most homes are located in multi-family buildings. The current mechanisms require that the owner has fallen into financial difficulties. For instance, the law on housing companies provides the company a way to take over a home for a term if a shareholder is neglecting the maintenance charges (Asunto-osakeyhtiölaki, 2009, 8:2,6). This enables the company to rent the home in order to cover the debts. In shrinking communities,

the opportunity to find tenants may be weak (Vaara, 2014). Authorities can also hold compulsory auctions as a form of debt recovery proceedings. Although the number of forced sales have increased in the last years, the volumes are negligible compared to the size of the housing stock: in 2014, 561 homes in housing companies and 1264 pieces of real estate were auctioned (Valtakunnanvoudinvirasto, 2015, pp.22–23). This implies that property abandonment in Finland is, in Hackworth's (2014) terms, rather 'functional' than 'literal', meaning that proprietors prefer not to relinquish ownership formally.

Furthermore, it can be speculated that many vacant homes are used irregularly and their owners have no problem with affording it. In Helsinki, most areas with high vacancy rates are high society neighbourhoods, whereas the lowest rates occur in areas characterized by social housing (Taipale, 2015). With this regard, the UK Housing Act that enables authorities to force unused dwellings into use is interesting (although second homes have factually been limited outside its scope), but such ideas would hardly comply with the Finnish mentality. In future, however, the issue should be addressed in the name of energy and resource use. Personal carbon or energy allowances (see e.g. Fawcett, 2010) could be one opportunity for achieving results.

## **Future research opportunities**

Since the implications of vacancy are not only financial but also social and environmental, further multidisciplinary research is still needed to create a holistic understanding of its different aspects. Especially the knowledge on context-related drivers should be deepened further. A first step in this work should be a review paper that would gather the knowledge from existing studies, followed by a meta-analysis if possible. Future research opportunities include collecting data from other countries, on the non-residential part of the building stock and longitudinal data as well as taking advantage of multivariate regression modelling and other refined statistical methods. In future, dynamic building stock models could perhaps be developed to include vacancies as one variable. Possible policy responses to vacancy in growth contexts would also deserve more academic attention.

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