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ARTICLE

Swedish public and private housing companies' access to the capital market for financing energy renovation

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Abstract

The financing of energy efficiency measures and renovations is key to reaching energy efficiency targets for the housing sector. The purpose of this article is to add the Swedish case of how capital market funds have become accessible and used by public and private housing companies, in particular for energy efficiency measures. The core of this article are interviews with representatives of Swedish housing companies made during the spring of 2021 with the purpose of mapping how public and larger private housing companies finance renovation and energy efficiency measures, and to what extent funds from the capital market are used for these purposes. In this article, we have found that capital market funds are commonly used by the Swedish public and the largest private housing companies. Bonds are less costly compared to bank loans, and green bonds are 0.02–0.03 percentage points less costly than conventional bonds. Furthermore, control systems that investigate the values of building portfolios as security for bonds are poor. A conclusion is that governmental control systems over the capital market issuing bonds for the housing market could be needed to avert future housing bubbles.

Keywords Multifamily buildings · Financing energy renovation · Capital market · Housing ownership · Renovation · Energy efficiency

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1 Introduction

The focus on energy efficiency and greenhouse gas emissions is set to increase in Europe with the 'Fit for 55' European legislative initiative to reach 55% net emissions reduction by 2030 (European Commission, 2021). The Energy Performance of Buildings Directive is set to be revised aiming at even higher targets for greenhouse gas emission reductions and an increased pace of energy renovation. Green bonds are one of the suggested financial solutions (Maragopoulos, 2021). Renovations and energy efficiency measures in multifamily housing constructed during the post-war era are needed to reach the environmental goals and but also societal targets of reducing geographical segregation and differences in living standards (UNEP, 2016). The challenge is to increase both pace and depths of building energy renovation while also reaching societal targets. Several well-investigated barriers are contributing to the low rate of comprehensive energy renovation, including split incentives, inadequate information about costs and (co-) benefits, the inability to finance upfront costs, decision-making process (van Oorschot, Hofman, and Halman 2016), low profitability and long payback time for investments (Mjörnell et al., 2019), lack of access to finance (Bertone et al., 2018) and scarcity of available private capital (Vogel et al., 2015). This article addresses the current financial solutions for renovations and energy efficiency measures in the multifamily building stock in Sweden.

Private and public housing companies have various ways of acquiring the needed capital for financing renovation and energy efficiency measures. Since after the financial crisis in 2008, the capital market has increased its share of providing capital for housing market actors (Fields, 2018; Martins et al., 2021; Wainwright & Manville, 2017). Swedish authorities (The Swedish Ministry of Finance and Swedish National Board of Housing, Building and Planning) have expressed an interest in this opportunity, but also a concern about the potential risk the capital market represents in financing renovations needed to meet societal targets (Swedish Ministry of Finance 2020), which prompted this study on financing solutions used by private and public housing companies. The authors of this article conducted interviews with representatives of public and larger private housing companies to map the companies' possibilities and barriers for financing energy renovation. This article summarizes the results of this study.

The purpose of this article is to present the status of the Swedish housing companies' access to capital for investment in renovation, energy efficiency, and acquisitions; as well as the companies' preferred financial instruments, with a particular focus on funds from the capital market. To focus this effort the following research questions were developed:

- Research question A: Which financial solutions are public and private housing companies in Sweden using to enable/invest in renovations, energy efficiency measures, and acquisitions?
- Research question B: What are the preferred financial instruments (in terms of policy and access to capital) according to the housing companies in order to increase the energy efficiency renovation pace?
- Research question C: What are the potential implications of existing financial instruments?

Research question C is a more open research question used to broaden the issue and discuss potential future implications. Wainwright and Manville (2017) argue that further research is needed to explore practices of financialization and how it is reshaping housing.

Our research questions are designed to provide a snapshot of the Swedish financialization process. The intention is also to explore the importance of new institutional characteristics in the housing market (in Sweden), as requested by Martins et al. (2021).

Capital markets have come to fund an increasing share of housing projects and acquisitions. However, how the capital market resources can be used for funding projects in the housing sector differs between countries. There is a need to map the ways in which housing companies make use of capital markets funds to increase the opportunities for green investments while making sure that social values are protected, such as the security of inhabitants in social housing. The contribution of this article is the Swedish case of how capital markets funds have become accessible to Swedish housing companies and what risks and opportunities the companies see.

In this article, the result section is intended to give a fair representation of the interviewees' positions and answers with minimal distortion of the authors, whereas the discussion section collects interpretations and elaboration on potential implications.

1.1 Financial instruments for the energy renovation of multi-family housing

There are a number of financing schemes for energy renovation available in the EU such as grants, subsidies, tax incentives, soft loans, energy efficiency bonds, energy performance contracts, energy service agreements, revolving fund instruments, energy efficiency feed-in tariffs, energy efficiency mortgages, solar panel subsidies and even crowdfunding as new and innovative instruments (Bertoldi et al., 2021; Bieliński & Mosionek-Schweda, 2018; Hilke & Ryan, 2012). Public grant programs in the EU are mostly used to reduce initial costs for the purchase of equipment as well as provide advice and certification services. More and more schemes support comprehensive renovations with energy performance criteria attached to them, rather than individual interventions (European Commission, 2021).

Funds from the capital markets for energy efficiency improvements made by housing associations and property owners have gone from a minor to a mainstream funding source during the last decade (Bertoldi et al., 2021). While housing ownership and financing are organised differently in different countries, during the last decade the capital markets have expanded institutional ownership of multi-family housing in most countries (Belotti & Arbaci, 2021; Bernt et al., 2017; Beswick & Penny, 2018; Fields, 2018). In many countries social housing or larger combined estates of rental housing has attracted capital as a form of secure institutional investments (Fields & Uffer, 2016; Uffer, 2011; Wainwright & Manville, 2017).

The housing companies, or organisations that represent housing companies, issue bonds that are bought by institutional investors. This is an alternative to raising funds by the means of loans from banks. While loans are generally fixed with a bank, bonds can be traded at the capital market. In recent years there has been a pressure to develop green financing (Bertoldi et al., 2021). Green bonds and green loans have emerged, and even more recently this trend has been extended to social bonds and loans. New credit lines tailored toward energy efficiency measures have been implemented in different EU countries. For example, preferable loan schemes with favourable conditions for borrowers providing support for more ambitious energy efficiency measures include low rates, longer payback times and loan guarantees, KredEx Renovation loans for improving energy efficiency in apartment buildings constructed before 1993 in Estonia (Bertoldi et al., 2021). Private finance for supporting energy renovation is limited due to the fact that the financial

institutions have not been familiar with the investments and consider energy efficiency loans as high risks investments (Bertoldi et al., 2021).

Energy performance contracting has gained popularity in many EU member states in the last few years but is only relevant for large multifamily social housing. In energy performance contracting, "the remuneration of the provider is directly linked to the performance of the contracted project. The provider is incentivised to maximise projected and delivered savings. Moreover, performance guarantees generate liabilities on the side of the provider, hence creating new financing possibilities. However, the need for verification and monitoring increases the cost of intervention" (Moles-Grueso, Bertoldi, and Boza-Kiss 2021, p. 6).

The energy renovation market is complex and many stakeholders such as multifamily building owners, tenants and other actors are not always served by traditional instruments. Moreover, it is not always possible to offer attractive loan terms for deep renovations. Conventional mortgages from commercial banks do not take into consideration energy efficiency parameters and energy costs.

Broader financial schemes for renovation projects have recently become more relevant in Sweden because of the ageing building stock (Mangold & Johansson, 2016; Mangold et al., 2019). Authorities have designed such subsidies with targets of increasing renovation pace while also addressing environmental and social sustainability targets, with varying success (Swedish Ministry of Finance 2020; The swedish national audit office, 2019). Grants and subsidies are used by governments when optimal levels of investments cannot be provided by the market alone, but the effectiveness of subsidy programs is difficult to assess and might even hinder more ambitious measures to achieve higher energy savings.

Taxation is another powerful tool to stimulate energy-efficiency renovation through incentives related to property tax. In Sweden, there is a tax reduction accessible for villas, tenant-owned multifamily dwellings, cooperative flats and freehold apartments, but public and private housing companies are excluded (Swedish Tax Agency, 2015). It is often argued by housing companies and their interest organizations that this tax-deductible should become available for all building owners, potentially with conditioned energy efficiency (Elmgren & Björkvald, 2017). Another issue is that Swedish property taxation negatively burdens energy performance. The real-estate taxation is based on the maintenance costs and collected rent. Buildings that use less energy have lower running costs and consequently pay more real estate tax.

1.2 The Swedish housing system

The Swedish ownership of public multifamily housing has been characterized as a general system, as compared to other social housing systems in Europe aimed at targeting vulnerable or low-income groups (Scanlon, Fernández Arrigoitia, and Whitehead 2015). Public ownership exists through municipal housing companies owning and subletting apartments, not only to vulnerable groups but to all populations irrespective of income, but these companies cover the need of the whole Swedish population rather than for specific groups (Holmqvist & Turner, 2014). Rents are assumed to cover the costs of overarching maintenance and renovation to meet legally binding living standards. The rent regulation system is designed to only permit rent increases based on increased housing standards provided in the apartments, based on an indicator system (Swedish Government, 2009).

Municipalities are obliged to create conditions for an adequate supply of housing (Swedish Ministry of Finance, 2000), although they are free to decide how to achieve that objective. The housing companies are owned by the municipalities but are supposed

to act 'according to business-like principles' according to the law about public housing companies (Swedish Ministry of Finance, 2010). The law restricts the possibilities of fiscal transfers between the municipality and the public housing company. It also details how much funds can be accumulated for later usage. A subsequent court ruling (Stockholm's Court of Appeals, 2013) permits investments in disadvantaged areas in order to support integration and increase societal cohesion.

Social housing and housing for more economically disadvantaged groups are large enough in scale to be attractive for institutional investments by the capital market. Capital market funds are used in the housing sector through bonds for housing associations (Wainwright & Manville, 2017), housing market (de)regulation, en-bloc sale of major housing companies and housing estates or a gradual accumulation of social housing building portfolios (Fields & Uffer, 2016). In Sweden, the majority of the housing where economically disadvantaged groups live is owned by public housing companies. However, since the public ownership of multi-family buildings goes beyond social housing the Swedish public sector of housing ownership is comparatively large and enables collaborations with institutional investors. Public housing companies have access to capital markets via a joint bank that gathers 292 of the 310 Swedish municipalities and regions (Kommuninvest, 2021).

Another way in which housing for disadvantaged groups can be made available for institutional investments from the capital markets is through a private company issuing bonds. There are examples of privatization of social housing that caused segregation (Bernt et al., 2017). In Sweden, the sales of multifamily housing from the public housing companies have generated a business opportunity for private housing companies during the last decades. Some private housing companies have grown quickly by acquiring properties through a variety of financial solutions driven by access to global capital with low interest rates including pension fund investments, capital market access, debenture stock and different types of bonds. There has been a concern that private housing companies have different and conditioned perspectives on what long-term investments are (Wijburg et al., 2018).

There is a growing concern that the private housing companies focus on "concept renovations", i.e., interior renovation of the apartment when a tenant moves out, which gives an opportunity to maximize rent increases according to the rent regulation system without affecting the resident tenant. By doing so they focus less on value-preserving renovations, such as more expensive building level renovations of roofing, façades and sewer trunks, which are essential to assuring the technical functions of the building during its expected lifetime. When rents increase, the property market value rises, and it is possible to sell the buildings with a rather quickly acquired profit. The overall technical maintenance of these properties has then been neglected, which in the future may lead to large investment needs, but with few opportunities for raising the rents to cover the costs of technical renovation of the building. Focusing on the indicators that are required by the rent regulation system is an example of 'What gets measured, gets managed ' (Davies, 2002).

The Swedish Tax Agency is mandated to collect real estate tax. Companies report the conditions of their buildings as well as the rents and revenues that have been collected on a yearly basis. Based on these reported figures, cadastral economic information and registered renovations the Swedish Tax Agency determines the real estate taxation level. From the Swedish Tax Agency registers used by Mangold et al. (2022), it is possible to contrast the interviewee statements with actual investments and real-estate taxation value changes that have been made by the housing companies during a six-years-period. In Fig. 1 the increase in real estate taxation value of private and public housing companies are compared. The ten largest private housing companies were also specifically singled out.

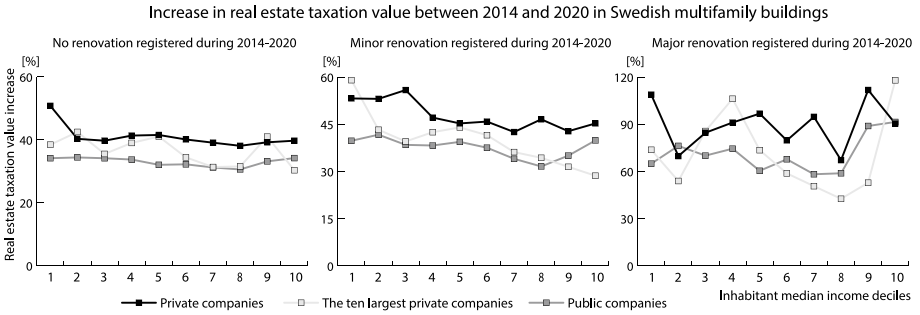

Fig. 1 Increase in real estate taxation value between 2014 and 2020 in Sweden of buildings separated and arranged by inhabitant median income decile groups. 1a, 1b, and 1c show average real estate taxation value increases in building with respectively different renovation investments made during 2014–2020. The ownership groups include all multifamily buildings in Sweden. (Source data: Mangold et al., 2022)

2 Materials and methods

While the primary material that is presented and in focus in this article are the interviews conducted with housing companies' representatives. Two prior studies have been fundamental in formulating an understanding of the profiles and strategies of the companies (Mangold et al., 2022; Mjörnell et al., 2019). Mjörnell et al. (2019) conducted workshops with company representatives to map the housing companies' renovation and energy efficiency strategies. Mangold et al. (2022) presented building-specific renovation investments and rent increases for all multifamily buildings in Sweden during the last six years, with a focus on analysing the difference between the largest private housing companies and public housing companies. Company real estate taxation data from the source material of Mangold et al. (2022) is used in this article to provide an additional understanding of the companies that the interviewees represent.

2.1 Interviews

Interviews were made with persons with good insight into the housing companies' investments and capital acquisition strategies, primarily Chief Financial Officers (CFO) or Chief Executive Officers (CEO) of the companies, see Table 1. The interviewees were selected from public housing companies connected to a transdisciplinary research network for sustainable integrated renovation, SIRen (Wallentén & Mjörnell, 2021). The ten largest private housing companies were selected to represent the private companies.

Together with the Swedish National Board of Housing, Building and Planning six questions were phrased, of which four were intended for the research study to be analysed in this article, the full list of questions can be found in Appendix 1.

1. What financing solutions do you use to raise the necessary capital for investments in, for example, renovation and energy renovation measures?
2. Do you have experience in finding financing solutions via the capital market? Alternatively, are you considering such a financing solution? For example, through the emission of so-called "green bonds" or "social bonds"?
3. How do you handle energy efficiency in connection with renovations?

Table 1 Respondents and companies in this study in Sweden

Role of the respondents	Company / organisation
Head of Finance, Sweden	Private housing company 1
CFO	Private housing company 2
CFO	Private housing company 3
CFO	Private housing company 4
vice CEO, CFO	Private housing company 5
CTO/Administrative support manager	Public housing company 1
CTO/Operation manager	Public housing company 2
CFO	Public housing company 3
Project and purchasing manager	Public housing company 4
CEO	Public housing company 5
Acting accounting manager	Public bank 1

4. What would give you an incentive to become more energy efficient?

Question 1 and 4 were intended to directly relate to research question A and B, respectively. Research question C was not asked directly to the respondents but is rather the focus of the research project as a whole. The purpose of question 5 and 6 is to provide a snapshot of the barriers and potential solutions the respondents perceive in relation to energy efficiency measures and their financing. Question 2 and 3 (appendix 1) were removed as they had less direct relevance to the research study.

The interviews were carried out by the two authors, in online meetings and over the telephone and lasted 15–45 min. The questions were used to guide the semi-structured interviews. Notes were simultaneously taken, and key quotes were double-checked by a rephrasing of questions. In addition to interviewing the public and private housing companies' representatives, one interview was carried out with a representative of a municipality joint bank. The representative of a municipality joint bank was asked question 1 and 4, but also more open questions where the representative filled a role as an informant rather than a respondent.

2.2 Company selection bias

The companies were selected using two protocols. Public housing companies were selected based on their participation in the national transdisciplinary research network, SIRen. Private housing companies were selected based on company size. The ten largest private housing companies, by total housing area, were contacted for interviews. Of all contacted companies five public and five private companies responded, one public and one private company chose to submit written answers to the interview questions.

The respondents do not give a representative account of the Swedish building stock. For the private companies, the protocol of focusing on the largest housing companies needs to be kept in mind when reading this article. The business models of the largest housing companies are different from the rest of the private housing companies. The largest private housing companies are more expansive and have acquisition strategies. They own more buildings that were built during the Million homes program era 1960–1975 (Hall & Vidén, 2005), and they own more buildings where lower-income inhabitant groups live, compared with the other private housing companies, see Tables 2

Table 2 Ownership characteristics of the interviewed companies in Sweden by separation in construction eras, within overarching ownership groups. Percentages larger than 40% in bold for visualization of ownership profiles *Source data*: Mangold et al. (2022)

	Older than 1945 (%)	1945–1960 (%)	1960–1975 (%)	Built after 1975 (%)	Missing data (%)	Total living space [Mm^2][a]
All private companies	20	17	34	25	4	45.6
Private c. 1	8	5	**60**	26	0	0.867
Private c. 2	8	7	**57**	22	6	1.520
Private c. 3	1	6	**79**	7	6	2.520
Private c. 4	0	12	**65**	20	3	1.538
Private c. 5	8	24	**47**	18	3	1.652
All public companies	5	19	**44**	29	4	46.3
Public c. 1	0	6	**46**	**43**	5	0.303
Public c. 2	0	6	**84**	7	3	0.745
Public c. 3	3	20	**58**	20	0	0.352
Public c. 4	8	24	**44**	12	13	0.551
Public c. 5	3	30	**49**	17	0	1.455
Resident owned	16	17	27	37	3	75.2
Grand total	17	18	32	30	4	182

[a]Mega square meter

and 3. Relevant to notice is that the building portfolios of public housing companies and the ten largest private housing companies are comparable in terms of construction era and tenants' income levels.

The protocol for company selection was designed to provide information about housing companies' access to capital markets. In the private sector, the largest housing companies have more possibilities for issuing bonds and have novel access to capital markets. All public housing companies go through a common system for access to capital markets, the protocol for selecting public housing companies rather focused on public companies' part of the national transdisciplinary research network SIRen with an aspiration to use novel techniques for energy efficiency as well as funding.

2.3 Company profiles

Even though the public and private housing companies in this study have similar ownership, in regard to building age groups, there are differences in the served population groups and geographic focus, see Tables 3 and 4, respectively. These differences are the results of different preconditions and heterogeneity in business models.

Private company 1 is an international real estate company with its headquarter in Sweden. They pioneered the "concept renovation" strategy. During the last years, they have focused on expanding their internationalization of real estate ownership.

Private company 2 is owned by Swedish pension funds. They focus their ownership on multi-family buildings outside of the largest three cities in Sweden and have an ownership strategy characterised by transactional ownership.

Table 3 Ownership characteristics of the interviewed companies in Sweden by separation into residents in median income deciles, within overarching ownership groups. Percentages larger than 10% in bold for visualization of ownership profiles

Income decile	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	10 (%)	Missing data (%)	Area [Mm^2]
All private companies	8	8	9	9	**10**	**10**	9	7	5	5	20	45.6
Private c. 1	0	0	6	**30**	**25**	**15**	2	5	3	1	14	0.867
Private c. 2	**12**	9	**11**	**24**	7	9	6	4	2	2	15	1.52
Private c. 3	**20**	**30**	**19**	7	4	2	2	3	1	4	9	2.52
Private c. 4	5	9	8	**15**	**15**	**16**	**15**	6	1	3	6	1.54
Private c. 5	6	**15**	**14**	**11**	**18**	8	7	4	2	5	10	1.65
All public companies	**13**	**15**	**13**	**13**	**12**	9	6	5	3	3	9	46.3
Public c. 1	0	1	**12**	**27**	**27**	**11**	9	0	0	0	11	0.303
Public c. 2	0	**17**	**43**	**21**	8	6	0	1	0	0	3	0.745
Public c. 3	**18**	**30**	**14**	9	5	3	3	4	1	2	10	0.352
Public c. 4	**34**	**22**	7	**16**	6	6	1	2	4	1	1	0.551
Public c. 5	7	**19**	**12**	**16**	**11**	**10**	8	9	2	0	6	1.46
Resident owned	1	1	1	3	6	9	**13**	**15**	**15**	**19**	15	75.2
Grand total[a]	6	7	7	7	8	9	10	10	9	11	17	182

Source data: Mangold et al. (2022)

[a]The Grand total is not evenly distributed because income deciles are derived based on population and building median income is positively correlated with living space per person

Table 4 Ownership characteristics of the interviewed companies in Sweden by separation into geographic focus, within overarching ownership groups. Percentages larger than 30% in bold for visualization of ownership profiles *Source data*: Mangold et al. (2022)

	Smaller cities and rural municipalities (%)	Larger cities (%)	The three largest cities in Sweden (%)	Missing data (%)
All private companies	14.1	29.6	**35.8**	20.5
Private c. 1	4.03	0.86	**81.6**	13.52
Private c. 2	3.70	**64.5**	17.0	14.8
Private c. 3	10.9	**38.4**	**42.1**	8.57
Private c. 4	0.18	12.5	**81.6**	5.70
Private c. 5	6.33	**47.0**	**36.7**	9.98
All public companies	17.9	**34.1**	**39.4**	8.64
Public c. 1	0.00	0.00	**88.6**	11.4
Public c. 2	0.00	0.00	**96.7**	3.44
Public c. 3	**80.5**	5.36	4.37	9.78
Public c. 4	0.43	**91.8**	6.6	1.25
Public c. 5	0.00	0.00	**93.9**	6.13
Resident owned	9.31	24.4	**50.8**	15.5
Grand total	12.8	28.0	**42.8**	16.5

Private company 3 is an international real estate company with headquarter outside of Sweden. During the last years the company has acquired two larger Swedish private multi-family housing companies.

Private company 4 is a family business that originally focused on shipping but expanded its business to include real estate ownership.

Private company 5 is owned by Swedish pension funds. Their ownership strategy is to have broad geographical coverage in their multi-family housing ownership.

Public company 1 operates in a municipality close to one of Sweden's three largest cities. The municipality has few disadvantaged areas and the economy of the municipality, and the municipal housing company is comparatively solid.

Public company 2 owns buildings in an area that was built almost entirely during the Million homes program era (1960–1975) as a suburb of one of Sweden's three largest cities. As a consequence, the public housing company faced renovation needs that increased simultaneously across a large segment of its building portfolio. The suburb is one of the areas officially identified as disadvantaged by the Swedish police.

Public company 3 is the municipal housing company in a more rural and former industrial municipality. Inhabitants are comparatively economically disadvantaged.

Public company 4 owns buildings in a medium size city and municipality. A large portion of the most economically disadvantaged groups lives in the multi-family buildings owned by Public company 4.

Public company 5 owns buildings in one Sweden's three largest cities. The ownership is comparatively diverse in the dimensions of time of construction and the socio-economic profile of the inhabitants.

3 Results

The outcome of the interviews is presented in the following section as the authors' interpretations of the interviewees' answers. Sometimes citations are used to convey interviewees' specific messages or phrasing.

3.1 Question 1. What financing solutions do you use to raise the necessary capital for investments in, for example, renovation and energy renovation measures?

Private company 1 emphasizes the strength in having a broad palette of funding sources, and reports to be using all possible sources. However, at the moment, the capital market is giving the most beneficial terms. Attractive prices with long maturity for larger volumes are key aspects.

Private company 2 mainly uses funding from the capital market for renovation projects. They also issue green bonds.

Private company 3 see the capital market as the best option right now. However, they still have a lot of older bank loans that have not yet matured.

Private company 4 only has bank loans. For them it is a matter of protecting their brand name, to not get funds from the capital market. They say that it is difficult to get green bank loans. There are uncertainties in the definitions of what is green enough to qualify for green loans.

Private company 5 are issuing green bonds for energy renovation measures. They also use bank loans and regular bonds for acquiring and renovating real estate.

Public company 1 finances renovation through loans. The calculation for investment is based on increased income from rents, negotiated with the tenants' association as a result of standard raising measures such as additional windowpanes. They have an equity ratio of 35%, but still need to borrow money for renovation and energy efficiency measures.

Public company 2 always borrow through the municipality's bank, which in turn raises its capital through the municipality joint bank. They see good opportunities for taking loans if there is capital available on the market since the company's debt are currently relatively low at 17% of the owned property value.

Public company 3 handle all investments in their existing stock with their own cash flow and do not intend to increase loans to do renovation or energy efficiency measures. The company takes loans through the municipalities joint bank which indirectly means borrowing from the capital market and this gives the possibility to access green bonds.

Public company 4 borrows money from the municipality intern bank and is not allowed to take loans or use external funds.

Public company 5 borrows money with their properties as collateral. Most investments are made from their own capital. They spend about 30 M€ on maintenance and 30 M€ on renovation per year. It is like an internal funding system where they borrow money for renovating the old buildings with the newer buildings as collateral.

> *Municipal joint bank 1: The companies are not allowed to borrow money, but all loans must go through the internal municipal bank, which has a total debt of 5 B€. The internal municipal bank has its own bonds with its own bond program and issues its own bonds on the market. The 15 largest municipalities have their own bond programs.*

3.2 Question 4. Do you have experience of finding financing solutions via the capital market? Alternatively, are you considering such a financing solution? For example, through the emission of so-called "Green bonds" or "social bonds"?

Private company 1 is considering starting to issue green bonds since the interest for such products is large at the moment.

Private company 2 is issuing green bonds and see a clear economic advantage in doing so. They are more sceptical towards social bonds and do not want to contribute to “social washing”.

Private company 3 mentions that green bonds are especially interesting since their business model is focused on buildings from the 60ties. They have tried to issue green bonds already.

Private company 4 is not issuing bonds and see bonds as a risk for their brand name.

Private company 5 is issuing green bonds. They also have green bank loans.

Public company 1 has experience from financing solutions from the capital market, both for new production and renovation.

Public company 2 must borrow money through the municipality joint bank and is the first company in Sweden that has been granted a so-called ‘social loan’ to a value of 10 M€.

Public company 3 does not have access to the capital market but states that this could be interesting for the entire municipality group.

Public company 4 does not borrow directly but through loans from the municipality joint bank who issues green bonds.

Public company 5 explains that a municipality group was created as a joint bank for a number of public housing companies in the municipality, but that they would do well with the municipality joint bank.

> *Municipal joint bank 1: Out of the total dept of 50B€, 11B€ are in green bonds. The municipality internal bank was the first in the world to issue green bonds. We are moving towards more and more demands from the investor side, who want to know that the money goes to something sustainable. Investors are asking for the money to go to green projects. It has evolved from 2013 to the creation of a common standard what is a green bond. We have a framework based on a Nordic standard, a ‘Nordic paper’ that the municipality joint bank has been involved in developing.*
> *There is a lot of talk about EUs taxonomy and if there is a decision, there will be a regulatory framework that regulates what is a sustainable investment. Investors may demand that it is the EU’s taxonomy requirements that apply, or they will settle for the Nordic standard.*
> *The municipality [internal bank] does not have any social bonds yet. The issue has been raised politically, but it was said at the time that it was not a priority.”*

3.3 Question 5. How do you handle energy efficiency in connection with renovations?

All private housing companies state that they carry out installation of metering and billing of heated tap water as a standard energy efficiency measure. These projects have low risk and are profitable with a high return on invest.

Private company 1. In renovation projects, energy savings is always one parameter that is considered. Examples of common energy-saving measures are: Energy systems optimization, insulated windows, photovoltaics (PVs) on the roof, etc.

Private company 2 try to merge renovation projects with energy usage reducing projects.

Private company 3. The slogan of the company strategy is: 'Stop wasting, Optimize, Improve and Invest'. Installation of volumetric billing of hot water, LED lighting, changing windows and equipment are energy efficiency measures that pay for themselves. Façade renovations and solar cells are too costly to do at the moment.

Private company 4 conducts energy efficiency assessments in every renovation project. Changes of windows, solar cells, ventilation system changes are mentioned as common projects.

Private company 5 are mentioning changing windows as a common energy efficiency measure that is profitable. They have a pot of funds available for renovations and energy efficiency projects each year.

Public company 1 does renovation of the building envelope such as energy efficiency measures on, windows, doors, additional insulation of e.g. roofs and parts that have wooden façade, but they save parts with Danish sea stone façade. Natural ventilation is converted to supply-exhaust ventilation with heat exchange. Individual metering and payment are introduced for hot water and cold water. Photovoltaics (PVs) or solar heating is installed in connection with renovation.

Public company 2 are reviewing their possibilities to incorporate new solutions for renovations, such as 'pipes in pipes' systems. They will compare data with how their buildings perform with the solutions they use during renovations to know which choice is most efficient and/or most appropriate.

Public company 3 are part of Sweden's public housing climate initiative and work continuously with energy efficiency improvements, ranging from window replacements, ventilation, the introduction of individual metering of water, and in some cases also electricity if household electricity is included in the rent.

Public company 4 did not answer that question but refers to the previous answers given.

Public company 5 has done energy efficiency in connection with renovation. For example, changing windows to energy-efficient windows. When renovating the roofs, they look at the possibility of installing photovoltaics (PVs). They also tried to use PVs as art decoration in a project. Supply-exhaust ventilation with heat recovery is introduced in connection with renovation. They make clear that they don't save much due to reduced operating costs, but the measures provide a better indoor environment. It is difficult to make a profit on energy savings measures, but they reason that the measures must be made to reduce the company's climate impact and improve the indoor environment. They carry out the energy efficiency measures if they initiate renovation of a building.

3.4 Question 6. What would give you an incentive to become more energy efficient?

Private company 1 states that they have an internal target set at making their entire building stock portfolio energy efficient. However, they add that governmental subsidies can speed up the process.

Private company 2 would like to be able to increase the rents to finance energy efficiency projects.

Private company 2 It is preferable if subsidies can be designed to target specific measures instead of overarching goals. To measure the effect after 3 years is problematic because it is unpredictable. … A suggestion could be a subsidy for replacement of windows area per square meter.

Private company 3 think the authorities should support specific energy efficiency measures that currently is unprofitable. They also state that they have a certain fund for energy efficiency measures every year. If there is financial support towards that fund, then more projects will happen.

Private company 4 states that simplicity and predictability in the financial supports are key. Uncertainty has a cost in itself.

Private company 4: Digitalization in the real estate sector. Research and development within this field would make it more possible for the sector to work more towards energy efficiency. E. g. how do you optimize a building stock heating, ventilation and indoor temperature using digital solutions
Private company 5: If there would be subsidies then we would use them. We are anyways making energy efficiency projects when they are profitable. … Changing façades is not amongst the measures that are profitable. It is a knowledge issue. The limited capacity is a large problem. Every building needs its own type of energy efficiency renovation
Public company 1: An important aspect is customer requirements, such as increased demands from the tenants. 'I want to live in an energy-declared class A residence. Then we are willing to pay a little extra to live in Class A.' We see in the customer surveys that environmental issues are increasingly important but [we] have not investigated the willingness to pay yet.
If there is no willingness to pay, we have to try to find governmental support programs that are governed wisely and do not lead to aberrations. Energy efficiency instruments should be good for all partners, the state, the property owner and the residents.

Public company 2 tests different methods on a small scale, to begin with, the methods that can be scaled up without major interventions in construction, and that provide good efficiency results, are presented as proposals to the Board for continued implementation.

Public company 3 think that targeted subsidies adapted to the climate zone where they are working could facilitate energy efficiency measures and reduce consumption of e.g. hot water (heated with district heating).

Public company 3: The price models that exist today for district heating, and the distribution between fixed and variable tariffs for water affect the profitability of [energy efficiency] measures that reduce consumption. So, a changed pricing model, or targeted grants that consider the pricing models at each location/company would be better.

Public company 4 make yield calculation when they work with energy efficiency, and they state that it would be good with some kind of support for energy efficiency measures that are not profitable but would be good to do. The energy efficiency measures that are done today have too little return on investment.

Public company 4: Create favourable conditions, but it does not have to be money, for example, to get rid of VAT, or permit tax reduction for renovation costs for rental housing companies [similar to the tax reductions that resident owners can make].

Public company 4: There is some folly going on from the EU, for example, individual metering of heating. It will knock down everything to do with energy efficiency. If we install energy efficiency measures, then the profit will end up with the tenant. We don't get any credit for it. The reason we invest in energy efficiency is that there is profitability in it. We can increase energy efficiency by reinforcing incentives. If we can find models to increase profitability, then we will install energy efficiency measures. It would increase our momentum. Sweden's authorities must listen to the Swedish public housing companies.
Public company 5: It is important that the subsidies will be long-term. Think strategically about what you want to benefit from. The support should not be received in advance, but afterwards. 'If you've saved this much, a reward should be given'. The housing companies know better what measures to do, rather than the Swedish National Board of Housing, Building and Planning/Government.
Public company 5: Complex problems can only be solved with trial & error by people working with the issues / in the business.
Public company 5: "Use the management method 'Tight – loose – tight', which means that you are careful when determining the goal. Then Swedish National Board of Housing, Building and Planning would get better control and also exciting materials and examples of good solutions that have succeeded."
Public company 5: We don't solve anything with grants. Applying for grants takes an unreasonably long time.
Public company 5: Remove the uncertainties in the funding. The goal is to become fossil-free.

4 Discussion

This article has focused on to what extent public and private housing companies in Sweden are using funds from the capital market for renovations, energy efficiency measures, and acquisitions. This was done to analyse potential implications of existing financial instruments, partially to provide a snapshot of financialization in Sweden and partially to see what contribution capital markets have toward the energy efficiency renovation pace.

Public housing companies are supported in their access to capital markets through joint municipality banks that can issue bonds with the municipalities' assets as security. Arguably this has made it easier for smaller public housing companies to have access to capital markets than private housing companies of similar sizes. Internationally there are a number of different examples of how institutional funds from the capital market have been operationalized for public housing companies (Belotti & Arbaci, 2021; Beswick & Penny, 2018; Wijburg et al., 2018).

The joint bank issues bonds at the capital market for the municipalities with the municipalities and their infrastructure as guarantors. The municipalities that are not part of the platform are large enough to issue bonds through their own municipality banks. As of 2021 60% of the public housing companies' investments came from the joint bank, 30% came from bonds issued by the largest municipalities, 5% came from bonds issued by the European and Nordic investment banks, and 5% came from bank loans. Public housing companies have had access to capital from green bonds since 2015 via the joint bank, and the first social bonds were issued in 2021. The cost of green bonds is 0.02%-0.03% lower and the demand from investors for financing "green projects" is large. Currently, energy efficiency

projects that reach 30% energy reduction are classified as green projects and an internal committee is tasked with the oversight.

Furthermore, an aspect of financialization in Sweden is the criteria that projects and companies need to meet to qualify for green and social bonds. The authorities are and have been scrambling to come up with reasonable criteria. Arguably it has been easier to define criteria for green bonds. Social bonds are more complex as societal development targets are diverse and even political.

Amongst the interviewed larger private housing companies, there are differences in the companies' business models, renovation practices, energy efficiency strategies as well as access to the capital market. Private housing companies are a heterogeneous group. Some companies value their brand name higher and are more aware of public perception. There are also clear differences in the perspectives of long-term ownership among the largest private housing companies. To be noted is that these differences in business models are often not considered by public housing companies when interpreting how public companies must act '*commercially'* in the law about public real estate companies (Swedish Ministry of Finance, 2010).

4.1 Financial solutions for energy efficiency measures and policy

Private companies use a broad palette of funding sources and often a combination of loans and bonds from the capital market, including green bonds. When the larger private housing companies issue bonds, they do not have specified applications for which the funds are to be used. There is an overall strategy for which the funds are used which includes, renovation, acquisitions as well as energy efficiency measures. Green bonds are issued with the specific purpose of being used for "green projects". The larger private housing companies often have a yearly pot of funding for renovations and energy efficiency projects. However, there are some uncertainties about which projects can be counted as "green". Private housing companies and banks have been requesting guidance from an official taxonomy that details which rules should define sustainable investments (Lindberg & Holmestig, 2021).

> *The capital market is interested in certification. If you could certify that a building is a green building after a renovation, then that would free up capital resources. Green Building or similar certifications could be connected to the capital market. Representative of Private company 5*

Bertoli et al. (2021) found that it is difficult to finance energy efficiency projects and deeper renovations with private loans. On the contrary, our findings are instead that the capital market tends to provide capital with a lower interest rate for green bonds. One interpretation of this seeming difference is that there is a willingness to invest in green projects from financers that have larger sums to invest over longer periods of time, but when the direct costs of energy efficiency measures in detailed projects become visible then other standards are applied to scrutinize those costs.

In the interviews, there was a clear difference between private and public housing companies in their approach to energy efficiency measures. Private housing companies mainly concentrate on energy system optimization, changing windows and installing photovoltaics (PVs) and individual metering and billing of hot water, which are typical energy efficiency measures considered profitable with low risk and high return on investment. Many of the public housing companies instead spoke of investments in energy efficiency measures on the building envelope such as changing windows, doors, additional insulation of roofs and parts of façade,

which are measures with longer payback time. Many public companies also converted natural ventilation to supply-exhaust ventilation with heat exchange which also is considered a quite expensive measure with a low return on investment, while it has additional advantages such as improving the indoor environment. In some cases, individual metering was introduced on hot water and cold water and photovoltaics (PVs) or solar heating was installed.

The private housing companies made varied suggestions for energy efficiency policy for the authorities to take into account. The private companies argue that government subsidies would speed up the process, specifically aimed at energy efficiency measures that currently are unprofitable. In general, the advice focused on how subsidies could be made less complex, less bureaucratic and more predictable. However, there was also a representative that specifically requested subsidies with a broader approach that could encompass several energy efficiency measurements.

The interviewed public companies, on the other hand, suggested several different energy efficiency subsidy schemes. One public housing company brings up the idea of targeted subsidies for measures suitable for different climate zones. For example, targeted grants that consider the pricing models at each location/company.

The private companies would favour the possibility to increase rents after energy-efficiency measures are implemented. Rent increases are however restricted to standard raising measures (Lind, 2015; Swedish Government., 2009). The experience of the public companies is that there is a limited willingness to pay for higher energy efficiency standards among tenants.

Some concrete suggestions from public housing companies were to reduce the Value-Added Tax (VAT) or to permit tax reduction for renovation costs for rental housing companies, similar to the tax deductions introduced in Sweden in 2008 for domestic work including repair and maintenance, modifications, extensions, that is only available for homeowners and tenants that own their apartments (Swedish Tax Agency, 2015).

> *A modification could be introduced to include the building efficiency level in the property tax paid by the owner, based on the buildings Energy Performance Certificate. By doing so, an incentive is given to the owner to invest in energy renovation measures by providing a tax deduction. Representative of Public company 4*

Some public housing companies are sceptical of the European enforcement of requirements of individual metering and payments for heating, which will not increase the incentives for making energy efficiency measures in the buildings, since the cost savings will be given to the tenants. One public company suggests that subsidies should not be received in advance, but rather as a reward after proving that energy savings are achieved.

Many public housing companies first make implementations of measures on a small scale. Then test and evaluate before scaling up successful measures and are therefore in favour of less controlled subsidies, building on trust for the companies' knowledge of what measures to implement rather than relying on "one solution fits all" decided by the authorities. Finding mechanisms for financing energy efficiency measures will have importance for reaching environmental targets (Bakaloglou & Belaïd, 2022; Belaïd & Joumni, 2020; Belaïd et al., 2018, 2021; Belotti & Arbaci, 2021).

4.2 Potential conflicts between the financial solutions and other societal targets

The Swedish Ministry of Finance (2020) expressed an interest in the opportunity that the capital market present in contributing towards energy efficiency renovations, but also a concern about the potential risk the capital market represents for the rental market. While

the largest private housing companies do raise the rent more than public housing companies in specifically the segment of the building stock where the people with the lowest average income lives (Mangold et al. 2022), it is not the financial solutions themselves that drive this development, but rather the choice of renovation measures. The largest private housing companies focus on renovation types that allow for higher or maximum rent increases.

Beyond the focus on energy efficiency policy and strategies as well as risks of rent increases due to increased capital market access, two key recommendations were made by the authors to the Swedish authorities based on the results of the interviews presented in this paper:

1. ”An investigation is needed of the risks of the impacts the capital market has on the [Swedish] housing market not just concerning ‘that short-term profit interests will impact management of real estate, in turn leading to neglected maintenance or that dwellings are renovated with the purpose of increasing rents’ (The Swedish Ministry of Finance 2020). But also due to the risks of financial bubbles when capital is easily accessible without security. The regulations placed on banks for having securities for loans have made the capital market more cost-effective than the banks.”
2. ”The law about public housing companies (2010) can be seen as anachronic. It was written in a time when access to capital was different, today the law rather gives private companies competitive advantages and forces public housing companies to sell segments of their portfolio to finance renovations of other parts. This was not the original purpose. The law should be assessed in the light of the capital market development.“

From the interviews, it has been found that public housing companies have equal, or even more, exposure to the capital market as the largest private housing companies. However, it can be argued that by being a larger actor the joint banks that represent Swedish public housing companies reduces the risks of individual public housing companies being subject to investors’ restrictions of the housing companies’ strategies. The joint bank acts as a mediator between investors and the public housing companies. The joint bank does have oversight functions that assess the financial status of the members, but there are also support functions for weaker members.

What restricts a public housing company’s possibility for making investments in renovation projects is rather the law about public housing companies (2010) which restricts how public housing companies can save funds for later usage. The law about public housing companies (2010) can force public housing companies to sell off segments of their building stock to finance the renovations in another segment. This is also illustrated by a quote by the representative of public company 5.

> *The best [public] housing companies have [a portfolio of] 25% 0-10 year-old buildings, 25% 10-20 year-old buildings, 25% 20-50 year-old buildings and 25% buildings ready for renovation. Then you never need to borrow any money for investments. Representative of Public company 5*

This is one of the drivers behind the privatization trend that exists in Sweden today. Privatization of public housing is a well-established research field of its own (Belotti & Arbaci, 2021; Bernt et al., 2017; Fields & Uffer, 2016; Lelévrier, 2021). A consequence of financialization in Sweden is that public housing companies are now regulated by both laws and the joint bank in keeping their finances in order. The joint bank is a new actor with a strict

financial role that can make it more difficult for public housing companies to argue for societal values, for which there are other laws that public housing companies should fulfil, notably the ruling of Stockholm's Court of Appeals (2013) which require public housing companies to achieve 'social cohesion in their housing areas.

Some private housing companies representatives stated that they fill a role that public housing companies cannot. According to the law about public real estate companies (Swedish Ministry of Finance, 2010) funds cannot be accrued for more comprehensive renovation projects. Private housing companies also argue that by only renovating when tenants move out of the apartment, the risk that people are forced to move due to increased rents after renovation projects is eliminated.

The real estate market has changed a lot in recent years due to the availability of capital from the capital market and due to the low interest rates, both nationally and internationally (Fields & Uffer, 2016; Tang et al., 2017). The law about public housing companies (Swedish Ministry of Finance, 2010) which regulates the public housing companies' investments, was written shortly after the financial crisis in 2008 when access to capital for housing companies was very different from today. The risk that public housing companies with access to public funds can undercut private housing companies is not the same today. One respondent stated that due to the entry of the capital market into municipal policy, the situation is almost the opposite:

> *For a large company, you do not go to the bank and borrow money. We are 'the city's wallet'. The city access capital with our properties [residential properties and civil properties] as security."Representative of Public company 5*

Housing markets have several historical examples of the growth of bubbles that have erupted in crises in various ways (Chen & Chiang, 2021; Tomal, 2021). The inflated housing values that contributed to the financial crisis in 2008 resulted in regulation of banks' lending to property owners (Martins et al., 2021; Tang et al., 2017). Today, the capital market is a more advantageous source of capital than banks can offer. The following quotes illustrate this:

> *They [the Banks] are bound by legal requirements on collateral [mortgage deeds, capital subscription requirements], loan-to-value ratios and shorter times for renegotiation of interest rates. This means that the banks are currently, and are also expected to be more, expensive than the capital market. The company see it as a risk that the banks' increased costs for regulations will be passed on to customers, i.e. us real estate companies. Representative of Private company 2*

There is a risk that the capital market will not be able to control the actual values of the properties. Unreliable property valuations were one of the biggest contributing factors to the financial crisis in 2008 (Martins et al., 2021). The following quote indicates that the capital market's controls of property values are poor today:

> *The market does not look at the shortcomings in the properties when making valuations. Representative of Public company 5*
>
> *"The bond market is better. You join a rating program. It is better as no further security is required. It will be cheaper. Representative of Private company 2.*

In addition to the patterns of poor controls of property values, Björkvald and Olsén (2019) argue that the procedure of renovating one apartment at a time as tenants move out and then maximizing rent increases can lead to difficulties in financing larger technical renovations and systemic effects of increased rents. Because the rent regulation only allows

increased rent for certain renovations then business models that target these specific renovation measures are promoted (Lind, 2015). Therefore, private housing companies, with short-time ownership focus on such renovations and focus less on major renovations that are required for the property itself, such as roofing, façades and sewer trunks. Consequently, these properties will end up with a renovation dept in the future.

Public company 5 states that it is a large problem if they buy properties from private housing companies that have made all renovations that allow for rent increases, according to the rent regulation system, but have failed to do the renovation to assure preservation of functions of the overall building. Issues arise when the next owner wants to carry out the more costly renovations of roofing, façades and sewer trunks.

> *They [the private companies] make quick-and-dirty-renovations that allows them to raise the rents, but no sewer trunks. If we buy properties from them then we have no possibilities to raise the rents further for the necessary renovations Representative of Public company 5*

Not yet renovated buildings, referred to as renovation mature buildings, have an economic strategic value. This is in agreement with the negative trendlines in Fig. 1. Multifamily buildings where lower income groups live are in higher renovation need on average.

> *We want there to be as much renovation need as possible when we buy a property. There the need is the greatest. You need an organization to make renovations, we have that for the financing and for the refurbishment. As poorly maintained as possible. Preferably we want to buy buildings from the 60-ties and 70-ties, make complete renovations with new floors and tiles, high standard, the bathrooms should all be tiled. That is our model. The standard procedure is that as soon as an apartment [contract] is terminated, the apartment is completely renovated, then we rent it out again Representative of Private company 3*

The municipality has a long-term ownership perspective that ideally stretches over generations. However, pension funds and private investors that are used to using the capital market to increase the value of capital resources have a very different perspective on what long-term ownership is (Wijburg et al., 2018). When quarterly reports are commonly used time perspectives, then a 5-year ownership period is long-term. This is also reflected in the choice of renovation measures made by the two groups. The largest private housing companies spoke of making measures with short payback time like energy system optimization, while the public companies stressed investments in, for example, new ventilation systems with heat recovery, which improves the indoor environment but has no or low return on invest.

> We see ourselves as an eternal owner of properties. We will own more than 5 years. We do what is best for the properties in the long run. Representative of Private company 3

5 Conclusion

Respondents, CEOs and CFOs, from five public and five of the largest private housing companies in Sweden were interviewed during the spring of 2021 about their company's access to capital markets and their strategies for financing energy efficiency measures and renovations. In this article, we have found that capital market funds are currently most

commonly used by the Swedish public and the largest private housing companies for financing renovations, energy efficiency measures and acquisitions of new housing.

The contribution of this article has been to provide a snapshot of financialization in Sweden. Capital market funding is vide spread among public housing companies in Sweden. A difference between the private and public housing companies is that smaller public housing companies are assisted in their access to the capital markets by a joint bank for public housing companies. This shields the public housing companies from restrictions and dependencies from capital market investors to some extent as the joint bank negotiates with investors and has support functions for weaker members. When asked about restrictions on investments, public housing companies' representatives focus on the legal framework that restricts the assumption of too much debt as well as the accumulation of capital for future renovations, which can force them to sell segments of their building stock to finance more costly renovations. Bonds are less costly compared to bank loans, and green bonds are 0.02–0.03 percentage points less costly than conventional bonds.

Financialization in Sweden has meant that housing companies need to meet criteria to get access to less expensive funding. The housing companies perceive these criteria as unclear and request clarity as to what can be counted as 'green' projects. This uncertainty is a problem for banks as well as the green bond programs. Furthermore, control systems that investigate the values of building portfolios as security for bonds are poor. This is stated clearly in the interviews and also illustrated in that green bonds are less expensive than conventional bonds even though, when more control systems are in place, energy efficiency projects with specified measures and deep energy efficiency renovations are more difficult to finance. A conclusion is that governmental control systems over the capital market issuing bonds for the housing market could be needed to avert future housing bubbles.

Reducing complex systems development to a range of simple criteria is a core problem for the process of financialization. The Swedish authorities have been struggling to define criteria for green bonds. Criteria for social bonds are now being developed. Arguably criteria for social bonds will require even more reduction of complexity when focusing on societal development.

An additional consequence of financialization in Sweden is that public housing companies are now regulated by both laws and the joint bank in keeping their finances in line. This has forced some public housing companies with many buildings in need of renovation to sell housing segments to get funds from the joint bank for renovating other segments. This is not a 'new' development as the laws for municipal housing companies predate the financialization process. However, the joint bank is a new actor with a strict financial role that can make it more difficult for public housing companies to argue for societal values, for which there are other laws that public housing companies should fulfil.

There is a difference in the time perspective between public and private housing companies, which is reflected in the renovation measures implemented. Private companies spoke of measures with short payback time, whereas public companies focus on investments in building envelope and ventilation systems securing the technical functions of the buildings, which typically have a much longer payback time.

5.1 Future research

Future research should focus on potential breaking points or structural weaknesses in the ongoing trend of increasing institutional investments in the housing sector. As identified in this article, there are signs that oversights into the actual quality of the housing

properties are poor amongst institutional investors. Social housing or housing for the most economically disadvantaged is disproportionately exposed to increasing investments from institutional investments from the capital market.

For the Swedish context, there is a need to broaden the analysis for policy development that facilitates for long-term investments by public housing companies. The current law about public housing companies restricts how much a public housing company can save for later usage. Potential solutions that could be developed are joint or company specific renovation funds.

Appendix 1 Interview questions

Questions translated to English

1. What financing solutions do you use to raise the necessary capital for investments in, for example, renovation and energy renovation measures?
2. What financial solutions do you see?
3. How do you see the possibility of using loans from banks?
4. Do you have experience of finding financing solutions via the capital market? Alternatively, are you considering such a financing solution? For example, through the emission of so-called "Green bonds" or "social bonds"?
5. How do you handle energy efficiency in connection with renovations?
6. What would give you an incentive to become more energy efficient?

Original questions in Swedish

1. Vilka finansieringslösningar använder ni för att få fram nödvändigt kapital till investeringar i exempelvis renoverings- och energirenoveringsåtgärder?
2. Vilka finansieringsmöjligheter ser ni?
3. Hur ser ni på möjligheten till finansiering genom banklån?
4. Har ni erfarenhet av att hitta finansieringslösningar via kapitalmarknaden? Alternativt överväger ni en sådan finansieringslösning? Tex genom emission av s.k.”gröna obligationer” eller”sociala obligationer”. 4.1 Om ja, vad är främsta skälet till att ni väljer en sådan finansieringslösning?
5. Hur hanterar ni energieffektivisering i samband med renovering?
6. Vad skulle ge er incitament att energieffektivisera i högre grad?

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