Taming a Monstrous Hybrid: Social Welfare Effects of Privatizing Public Housing in Sweden

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Abstract

Within the Swedish housing sector, sales of public housing to private actors have been an occurring phenomenon for almost three decades, but the effects of such privatizations on social welfare are still subject to political debate. In this thesis, I evaluate how privatization in the contemporary Swedish housing market affect social welfare through its effects on criminality, citizen satisfaction and economic inequality. A fixed-effects regression model with finite distributed lags, and a panel dataset with 290 Swedish municipalities over the years 2013-2018, allow me to study the causal effects of privatization on the chosen parameters of social welfare. I find that privatizations show a negligible aggregate effect on criminality after the first two years, but lead to a decreased aggregate level of criminality when the effects are studied over a three year period. The results further show that privatization leads to increased perceived quality of housing, but also to potential long-term increases in economic inequality. The results shed light on whether the gains of reduced public ownership can outweigh its potential losses within the Swedish housing system, and contributes with new empirical evidence on how privatization affects social welfare in the context of the Swedish contemporary housing market.

Contents

Acknowledgements

1   Introduction

Broadly defined, privatization is the process during which a government sells state-owned enterprises or assets to private economic actors. The reasons for privatization are numerous; the objective may be (i) to raise government revenues or free resources for re-allocation to other political goals, (ii) to increase economic efficiency in production and allocation, (iii) to strengthen the private sector-involvement and decrease state-involvement in the national economy and (iv) to improve the financial health within the public sector, through increased competition and promotion of market-discipline within state-owned enterprises (Megginson & Netter, 2001; Sheshinski & López-Calva, 2003). However, as pointed out by e.g. Megginson and Netter, some of these objectives may be in conflict with other political goals of the modern welfare state, such as the promotion of social welfare.

In the early 1990s, the Swedish public housing sector underwent large neoliberal reforms. During the three decades that followed, the Swedish housing sector have "gradually become one of the most liberal market-governed housing markets in the Western world" (Lind & Lundström, 2007). One consequence of the reforms was privatization, as public housing companies began to sell rental properties to private actors. The effects of the reforms and the subsequent privatizations are still subject to debate. While some scholars, e.g. Hedin, Clark, Lundholm, and Malmberg (2012a) and Hedin, Clark, Lundholm, and Malmberg (2012b), argue that the Swedish housing sector have been thoroughly liberalized, for better or worse, others challenge this idea. Christophers (2013) claim that the patchy liberalization of the Swedish housing sector has turned the system into an inefficient hybrid, neither sufficiently liberalised nor centralized. The result is a weak system that fails to produce social welfare, and instead contributes to the creation and production of socio-economic inequalities - Christophers goes as far as labeling the system a *monstrous hybrid.*[1] Regardless of their view of the Swedish system as neoliberal or hybrid, most scholars agree that the current housing policy in Sweden is a failure from a social welfare perspective (Hedin et al., 2012b; Lind, 2015b).

In this thesis, I will empirically analyse the social welfare effects of privatization of public housing in Sweden. The studied outcome variables measure different aspects of social welfare; criminality, subjective satisfaction and economic inequality. The analysis is performed using a combined panel data regression model with fixed-effects and a finite distributed lag model, on a panel dataset from the 290 Swedish municipalities between 2013 and 2018. The lagged independent variables allow me to capture effects that appear after with a lag of two and three years.

Economic theory and the existing empirical evidence indicate that in imperfect markets, the outcomes of public and private housing management do differ with regards to efficiency and investments in social welfare. In the end, it is however the structure of the market, and the resulting incentives for profit maximizing firms, that decide whether privatization will lead to increased or decreased social welfare. The results from my study will therefore give an indication how the structure and regulations on the

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[1]The term *monstrous hybrid* was first coined by Jacobs (1992) to describe systems where a mix of state and market mechanisms produce an inefficient and unstable outcome, and later used in the context of housing by e.g. Blessing (2012), Christophers (2013) and Clapham (2018).

Swedish housing market affects the incentives of public and private actors, and how this translate into social welfare outcomes.

I find significant effects of privatization on criminality, municipality satisfaction and relative poverty. Privatization is predicted to increase the level of criminality in the same year, but lead to decreased criminality in the subsequent year(s). The total effect of a deviation in public ownership on total criminality does not seem to be different from zero when studied over two years, but is positive after three years. My results further suggest that decreased levels of public ownership is associated with increased satisfaction with housing, but also with decreases in the general municipality satisfaction and the subjective feeling of safety. Finally, I find suggestive evidence that a deviation in the level of privatization leads to increased economic inequality on the long term.

My study contributes to the existing body of research through adding new evidence on the effects of privatization in the context of the contemporary Swedish housing market on important parameters of social welfare. With regards to policy relevance, my findings indicate that privatization in the contemporary housing market may not only be negative from a social welfare perspective. Instead of debating whether or not privatization should be limited, policy makers could capture the benefits of privatization and focus their attention on mitigating its negative effects.

The remainder of this thesis will be organised as follows: Section 2 gives a historical background to the privatizations on the Swedish housing market and explain the concept of the Swedish public housing, section 3 summarizes key economic theories on privatization and reviews relevant empirical literature for our topic, and section 4 describe the data and variables used in the analysis. I outline my empirical strategy in section 5, present the main results in section 6, and add results from further analyses and robustness checks in section 7. Section 8 discusses the findings and comments on their validity. Section 9 concludes.

2 Background

2.1 Allmännyttan - the Swedish municipal housing companies

The word "allmännytta" ("the general good" or "the public interest") is a Swedish expression that refers to state-owned goods that all citizens can benefit from. "Allmännyttan" is most commonly used to describe the Swedish public housing sector, or the stock of apartments owned by the public housing companies. The "allmännyttiga" housing companies are fundamentally different from both private housing companies and the type of social housing solutions that exist in other European countries. Firstly, the "allmännyttiga" housing companies are non-profit organizations. Secondly, they are almost without exceptions owned and managed by Swedish municipalities. Thirdly, the right to consume the "allmännyttan" housing is equal for all groups of citizens - including, but not targeted at, groups with special needs or difficulties. Finally, the rents within the "allmännyttan" sector serve as the legal benchmark for rent-levels within the entire Swedish rented housing sector.[2]

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[2]See Chapter 12, Section 55 of the Land Code, SFS 2002:103.

2.2 Public housing and the construction of the welfare state

The first municipality owned housing companies appeared in Sweden around the 1930s. The government wished to transfer the responsibility for public housing provision and other housing policy tasks to the municipalities, but were aware that many of the municipalities did not have sufficient resources or instruments to do so without taking on large financial risks. To enable and encourage investments in public housing, the government started to grant special loans, combined with rent allowances, to municipalities who carried out such investments. In certain cases, new construction was managed by housing companies that were monitored or owned by the municipality. The financial support from the government was conditional on certain prerequisites of not-for-profit character for these companies, such as limited dividends on owner's equity and reasonable compensation to managers and workers. Additionally, the company had to be either controlled or owned by the municipality. These companies were the precursors of today's "allmännyttiga" municipal housing companies (Hedman, 2008).

After the Second World War, the importance of the municipal housing companies grew. Eager to construct a strong welfare state, the government outlined ambitious goals for the national housing policy. "Good housing for everyone" was the overarching aim of the policies. The municipal housing companies, together with the large financial support they received to build public housing, became instrumental elements in the construction of the Swedish welfare state (Boverket, 2009).

By 1974, several rounds of consolidations had greatly increased the financial and institutional strength of Swedish municipalities. The government now deemed them strong enough to take on full responsibility for pursuing regional housing politics, and decided that financial support would thereafter only be given to housing companies which were owned and controlled by a municipality. Legally, the term used to describe a non-profit public housing company, "allmännyttan", was now reserved for the municipality owned housing companies. This settled the important role of the municipal housing companies in the national housing policy (Hedman, 2008).

2.3 Liberalization, privatization and its consequences

In the early 1990s, Sweden was hit by a severe financial crisis. To regain control over the rapidly increasing public debt and restore confidence in the Swedish economy, the state were forced to cut down on government spending. As a consequence, the government made radical changes to the Swedish housing policy, which deeply affected the municipal housing companies. At the time, political consensus prevailed that the goal of achieving a high and stable housing standard had been met and that the financial costs of subsidizing the public housing sector subsidies had grown too large (Hedman, 2008).[3] In other words, the municipal housing companies had played out their special role as key instruments in the housing policies, and the Swedish housing sector were to to adopt a more market-oriented approach.

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[3]As an illustration, total housing subsidies had risen from SEK 13 billion in 1987 to than SEK 33 billion in 1993.

In 1991, the government removed the state housing loans and reduced the financial support to municipal housing companies. The ultimate financial risks, previously taken by the state, were instead passed on to the actors at the market; the housing companies and the house-owners. The municipal housing companies had to compete in a level playing field with the private housing companies, under the same conditions with regard to finance, tax regulations and subsidies. The new direction for the municipal housing companies were marked by a focus on economic efficiency and businesslike practices (Boverket, 2009).

With the liberalization reforms, the government lost the financial incentives that had previously been used to control housing politics at the local level (Hedman, 2008). With the new market conditions, the municipalities had (and still have) less clear incentives to keep their not-for-profit housing companies. It is up to each municipality to decide whether they find it worthwhile to keep their housing company - as a policy instrument, as a source of (limited) revenues for the municipality, or both. If a municipality does not have economic or ideological reasons to keep the housing company, the state cannot stop them from selling all or parts of their apartment stock. The latter is also what have happened to some extent; since the early 1990s, a number of municipalities have chosen to sell their public houses, partly or entirely. Buyers are either private housing companies who will keep renting out the apartments, or cooperatives of citizens who wish to convert the property into tenant-owned apartments.

According to Andersson (2013), the decision to open up for privatization of the public housing stock had heterogeneous effects across the Swedish municipalities. The municipalities in which the decision had no or small effects were predominantly ruled by a Social Democratic majority. The municipalities in which the decision had a large effect, e.g. substantial parts or all of the public housing was sold for private renting or tenure conversion, more often had a liberal/ conservative majority. As Blomé (2012b) points out, the level of privatization also differed regionally; about 45 percent of the privatization took place in Stockholm and surrounding municipalities, whereas much smaller volumes were sold in e.g. Gothenburg and Malmö.

Despite their unwillingness/incapability to finance the municipal housing companies, the state still considered the not-for-profit housing an important part of the Swedish welfare structure. In the years after 1992, when it became clear that the liberalisation of the public housing market had led to rapidly increasing privatization of the public housing stock, the Social Democrat government (who had come back into power in 1996) implemented a number of laws and regulations to slow down the development. One such example was the 1999 "Stop law", a temporary law stating that the general state support and subsidies could be withdrawn for a municipaloty if their housing company sold their public housing (Allmännyttan.se). The effect of the "stop law" was immediate; the selling of municipality housing company owned apartments decreased from about 24 000 sold apartments in year 2000, to about 3000 sold in 2003. In 2002, the "stop law" expired and was replaced by the permanent law "Act on Non-Profit Housing Companies" (Allbolagen). With the new law, the government could no longer use financial measures to punish municipalities who privatized their public housing apartments. Instead, privatization was kept under control through a new regulation, which stated that municipalities must seek permission

from higher instances before selling any housing. In 2007 however, this requirement was abolished by the conservative block that had come into power, resulting in increased selling again during the subsequent years; for example, 12 000 apartments were sold in 2008 (Public Housing Sweden).

The legislative conditions for the municipal housing companies were permanently settled in 2011. The law implemented in 2011 states explicitly that the municipal housing companies must operate with "businesslike" principles, and be subject to requirements on profitability and returns, like any private housing company. The main task of the municipal housing companies is still to provide and manage housing in the form of rental apartments, but the law of 2011 brought many important changes. For example, the municipality can no longer demand that its housing companies undertake investments that are deemed financially unprofitable. Moreover, each municipality needed to develop ownership directives; to clarify the role and purpose of the housing company, and make a clear difference between the management of the municipality vs. the housing company (Public Housing Sweden).

To sum up, the reforms of the early 1990s marked the end of the privileged position of the municipal housing companies at the Swedish housing market. State-involvement decreased and the housing sector was liberalized. The last legislative change regarding the role of the municipal housing companies was thus carried out in 2011, and marked the end of more than a decade of reforms of the housing system.

Regardless of their view of the Swedish system as entirely liberalized or not, most scholars agree that the current housing policy in Sweden is a failure from a social perspective (Hedin et al., 2012b; Lind, 2015b). As Lind (2014) points out, it has become increasingly difficult for low-income households to enter the housing market that during the last two decades; the permanent scarcity of rental apartments allows for landlords in most areas to choose households with higher and more stable incomes. In parallel, the prices on owned housing is high and for taking loans, the bank has requirements that few low-income households can fulfill. In other words, the system does not contribute to fulfilling the goal of Swedish housing policy - "providing affordable, quality housing for all".

The privatization of "allmännyttan" have given rise to a long and heated debate in Sweden. On one side, it has been argued that efficiency and liberal markets is the key to long-term sustainability and innovation in the housing sector, and that only full liberalization will lead to a balanced system; the remaining islands of regulation hinders the market from being efficient and needs to be removed for the system to function properly (Christophers, 2013). On the other side, many examples show that private companies do not always contribute to the social welfare, even within the regulated Swedish system. Critics of privatization claim that the liberalization needs to be partly or fully reversed, and state control re-introduced through subsidies and regulations, to restore the Swedish housing system to its well-functioning form of the 1950s and 1960s (Lind, 2015b). A common feature of the debate is that it has been held almost exclusively on ideological and theoretical arguments, sometimes backed by anecdotal evidence. This is maybe inevitable, since the empirical evidence on the welfare effects of privatizing public housing is scarce in the Swedish context.

3 Literature review

In this section, I will present the broader theoretical framework that I use for analysing the effects of privatization, and the theoretical predictions for the case of the Swedish housing market. I then move on to reviewing the empirical literature that have studied the effects of liberalization and privatization on the Swedish housing market. Based on the theoretical and empirical literature review, I outline hypotheses about the outcomes from my study. Last, I state the purpose of the thesis and how the study contributes with new evidence to the existing literature.

3.1 Theoretical framework

I will begin by reviewing the theoretical literature on how ownership affects firm-behavior, in order to understand the forces that may drive firm-behavior and social welfare outcomes in the Swedish housing market.

3.1.1 Ownership and efficiency

Within economic theory, the idea that private ownership is superior to public ownership in terms of economic efficiency and profitability has been influential for centuries. In 1776, Adam Smith claimed that if European monarchies would sell state-owned land, the revenues from investing that income elsewhere would exceed any future revenues from owning the land, and moreover that the privatized property would become "well improved and well cultivated" (Smith, 1776). Since then, the importance of ownership have been addressed and studied in a vast literature (Sheshinski & López-Calva, 2003). Economic theorists have established several mechanisms that explain theoretically why such improvements in efficiency and profitability would occur, and more importantly; under which conditions. The claimed advantages of private ownership is based on a fundamental economic principle, stated in the First Welfare Theorem; in the absence of market failures, a competitive equilibrium leads to a pareto optimal resource allocation and outcome. Following the logic of the theorem, state ownership may be desirable in the case of a market failure that needs to be corrected, while privatization leads to increased efficiency in well functioning markets, or in markets where the failures stem from state ownership (Megginson & Netter, 2001; Sheshinski & López-Calva, 2003).

Another important theoretical view within the literature on ownership efficiency emphasizes the importance of agency problems - how a change in ownership affects firm objectives, contracting and incentives. Shapiro and Willig (1990) outline a model for how public ownership may distort the objective function that a firm's managers seek to maximize. A private firm is run with the goal of profit-maximization, and the managers usually do not have incentives to deviate from that goal. In the public firm, the goal is less clear, since the objectives of the owner (the government) naturally go beyond pure efficiency and profit-making. Moreover, managers of public firms are themselves often pursuing a political career in parallel, and will incorporate their personal and/or political agenda in the objective function of the public firm - such as redistribution to interest groups, maximization of employment and political prestige (Sheshinski & López-Calva, 2003). The function that the public firm maximizes is thus a weighted

average of government objectives, efficiency, welfare and political/personal goals of its managers. The resulting profitability is therefore lower in the public firm. Moreover, Kornai (1986) emphasize the importance of the so-called soft budget constraint problem. As opposed to a private firm, the public firm is ultimately backed by the government and thus lacks a credible threat of bankruptcy. This allows for managers in public firms to include personal objectives in the firm goals at the cost of efficiency, without fear of losing their position. In sum, the efficiency and profitability objectives of the public firm is more sensitive to distortion than in the privately owned firm.

Contracting difficulties is another source of discrepancy in efficiency between public and private firms: publicly owned firms suffer from a larger costs of incomplete contracting and weak incentives (Laffont & Tirole, 1991; Megginson & Netter, 2001; Shleifer, 1998). As mentioned, the government has a broader set of goals than just profit-maximization, and in addition, the importance given to different areas of policy may also change when the administration is replaced after an election. Even if the government and the citizens of a nation decide that profit maximization is the only goal of the public firm, is therefore more difficult for the government to formulate clear managerial goals, commit to these goals and tie manager incentives to them, compared to the capitalist firm with its well-defined and consistent goal of profit-maximization.[4] To summarize, a different incentive scheme, combined with limited contracting and monitoring ability, limits the efficiency and profitability of public firms.

Taken together, microeconomic theory predicts that, in the absence of market failures, private firms will achieve higher profitability than public firms.

3.1.2 Ownership and social welfare

The debate on whether public or private ownership is preferable become more complex if other aspects than pure profitability and efficiency are taken into account. In most societies, economic profits and efficiency are not the only concerns - social welfare objectives are an equally important aspect of policy. Critics of privatization therefore argue that, precisely because the government owned firms do take more factors into account than only profit-maximization, they are more likely to successfully promote social welfare. The underlying assumption is that the promotion of social welfare has positive externalities, that are not taken into account in the objective functions of private firms, which thus results in a market failure (Shapiro & Willig, 1990).

The most obvious example of this is the public sector; markets for public and quasi-public goods are controlled (all or in part) by the government, to ensure that enough of the public goods are provided at a reasonable cost and quality to its citizens. Clearly, these operations do not have profitability as their only goal, but rather to correct the market failure that would lead private firms to underproduce these goods in a free market (Oakland, 1974; Vickers & Yarrow, 1991).

One option for governments who wish to reap the benefits in terms of cost-efficiency in the competitive

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[4]For example, when describing his personal experiences from governmental decision making, Stiglitz (1998) report that bargaining dilemmas, information costs and problems of commitment were indeed substantial obstacles to the implementation of pareto-efficient policy improvements.

market, without risking that private firms exploit their market power in a way that harms the social welfare, is to contract out the provision of a public good to private firms. The idea is that the contract will be written so that the private firm cannot avoid to include social welfare in their profit function. If it is possible to write a complete contract, the outcome in terms of welfare and quality from contracting out the task to a private firm versus public firm will then not differ. However, the nature of the goods and services that governments want can often not be fully specified. Hart, Shleifer, and Vishny (1997) discuss the potential costs and benefits of private firm contracting in such situations. Their starting point is that the provider of the good or service can choose to invest in either quality improvements or cost reductions, but neither of these innovations are fully contractible. Moreover, in the case of a private firm, the government will only see the outcome of the innovations. The public firm has, as previously noted, weak incentives to engage in profit-maximization activities, which in this case will lead to limited investments in neither of the innovations. The private firm, on the other hand, has strong incentives to invest in cost cutting; because of its immediate effect on profits, and because they can ignore the adverse effects on (non-contractible) quality. If investments in quality-enhancing innovation lead to increased revenues, however, the private firm will also invest in quality improvements. But, the private firm's incentive to engage in cost-reducing innovations tend to be stronger, since the gains from cost-cutting are immediate and the adverse effects on quality are not taken into account. The choice of whether to let the public or private firm provide the public good thus depends on the relative size of the negative consequences of cost-cutting on quality, the possibilities of contracting on quality aspects, and the incentives of public companies to invest in quality-improving innovations. The general conclusion is that private contracting is generally more cost-efficient, but with uncertain outcomes in terms of quality. Theoretically, as argued by e.g. Shleifer (1998), private firm inability to address social welfare goals such as quality can be solved through government contracting and regulation. Critics however, emphasize that some aspects of quality and welfare will always remain difficult to contract upon, or too costly to monitor properly (Hart et al., 1997; Vickers & Yarrow, 1991).

Taken together, economic theory establish that private firms will only invest in social welfare if that contributes to maximizing firm profitability.

3.1.3 Theoretical predictions for the Swedish context

Taken together, the theoretical framework on ownership-effects conclude that private ownership will lead to more efficient outcomes in terms of total welfare (profitability, efficiency, social welfare and quality), under the strong assumptions that the market is perfectly competitive, with complete contracting and without information problems. However, public ownership is often prevalent precisely because the market in question suffer from a certain degree of market failure. In many cases, privatization may therefore increase profitability, but also increase social costs from negative externalities and decreased quality. The outcome of privatization in terms of total welfare will therefore differ depending on the market situation and the level of contractability on the desired outcomes. In markets where competition is functional, externalities are small enough to make social welfare goals and private profit maximization mutually inclusive. In such markets, private ownership or contracting will promote efficiency without harming

social welfare. In more imperfect markets on the other hand, there is a risk that the higher economic efficiency of the private firm comes at the cost of the public welfare, e.g. because of externalities, excessive cost-cutting at the expense of non-contractible quality, exploitation of market power and/or misallocation of resources. In that case, and especially if the possibility to pursue personal agendas is limited due to e.g. a robust political system, public ownership may be lead to more desirable outcomes.

In the Swedish context, private housing companies should seek to maximize profits through cost-cutting, e.g. through minimizing property maintenance and not invest in quality improving projects or social projects in the neighborhood. This risk increases if the housing company buy the buildings with the aim of selling them at a higher price short thereafter. In theory, profits could also be increased through increasing rents when demand for housing is high. To a large extent, such rent increases are limited by the Swedish system of rent-control, where rents are set based on observable apartment characteristics and negotiations rather than pure demand. Nevertheless, as discussed by e.g. Lind (2015a), the system can be circumvented; through extensive renovations that increase the standard of the property and allow for subsequent rent increases. From a social welfare perspective, this is clearly not a desired outcome.

Seen from another angle, it is not obvious that private housing companies would maximize profits through cost-cutting - investments in housing quality and social projects could lead to increased profits on the medium and long term, through e.g. decreased costs of property maintenance. CSR theory suggest that investments in CSR may generate value in terms of goodwill and improved company reputation (see e.g. Margolis and Walsh, 2003), and it seems plausible that this would apply also to the housing sector.

In this section, I have provided some suggestive insights from economic theory about the effects of privatization. In the real world, however, the outcomes of privatization are filtered through complex networks of interaction between ownership, market structure, regulations and national policies, that are challenging to model. As Laffont and Tirole (1991) concludes, after a theoretical analysis of ownership-effects on efficiency and social welfare: "theory alone is unlikely to be conclusive in this respect." (p. 103). In order to understand how the mechanisms of privatization play out in specific markets and sectors, researchers must turn to empirical evidence.

3.2 Empirical evidence

In this section, I will review the existing empirical literature on privatization - in general and in the context of the Swedish housing market.

3.2.1 General evidence on the effects of privatization

In line with theoretical predictions, empirical evidence tend to find that privatized firms become more efficient, more profitable and financially healthier, with increased capital investment spending, compared to otherwise-comparable public firms (see summaries by e.g. Caves (1990); Galal, Jones, Tandon, and Vogelsang (1994); Megginson and Netter (2001); Sheshinski and López-Calva (2003). For example, Megginson, Nash, and Van Randenborgh (1994) study the financial and operating performance in 61

companies from 18 countries, before and after privatization. The results show important improvements in profitability, efficiency and growth. Further, Donahue (1989) summarized the empirical findings on effects of contracting-out public services to private firms, and concludes that it is beneficial in terms of cost-efficiency to contract with private firms, rather than providing the services themselves. With regards to the quality effect from contracting out, the evidence is mixed. Some surveys suggest that contracting out to private actors led to improved quality (Dilger, Moffett, & Struyk, 1997), whereas others report a decline or no clear effect (Comondore & Devereaux, 2009; Hodge, 2018; O'Toole Jr & Meier, 2004).

It should also be noted that, as Adam Smith suggested in 1776, the selling of state-owned enterprises and assets does indeed raise large sums of money for governments, which have often been used to reduce fiscal deficits (Megginson & Netter, 2001).

3.2.2   Evidence from the Swedish context

In this section, I will review the existing empirical literature on the effects of ownership-changes on the Swedish housing market. Previous work has focused on the two main ways in which Swedish public housing can be privatized: (i) through sales to private housing companies, thus maintaining rental as tenure-form, and (ii) through sales to a collective of citizens who transform the apartments into tenant-owned housing (bostadsrätt).

Effects of sales to private housing companies

To draw conclusions on how privatization affect the Swedish housing sector and its residents, scholars have studied how incentives and management practices vary between the public and private housing firms, and what effect such variations have had on rent levels and housing quality.

Studies by Atterhög and Lind (2004) and Atterhög (2005) show that privatization through sales to private housing companies have led to lower or unchanged rent levels at the Swedish housing market, hypothetically because of increased competition. Moreover, Atterhög (2005) finds that owner-category does not have any significant effect on housing quality, but that the variation in quality is higher in the group of private companies than among the municipal companies. He therefore concludes that the government "should probably not be too worried about the short- and medium-term effects of privatization if the buyer is carefully selected" (p. 32). Blomé (2012b) reaches similar conclusions when summarizing some pieces of anecdotal evidence from privatization; when it comes to providing social welfare and quality, there is larger variation amongst private companies than municipal ones. The source of the variation among private housing companies is likely to lie in the company strategy of each actor; whether the manager of the private company judges that investments in quality or efforts to cut costs will lead to higher profitability on the short and long term or not, and whether they aim for short-term or long-term profitability.

Case studies can give important information on how the Swedish housing market shape management practices of private housing companies. Blomé (2012b) studies a number of private housing companies

that incorporate social welfare objectives and CSR in their profit function. One such example is Stena Fastigheter. With the explicit goal of improving the living conditions of its residents through increased satisfaction and safety, Stena Fastigheter has developed a business strategy that they call "relational management". The concept includes various social initiatives and is carried out in cooperation with residents, authorities, schools and local non-profit organizations. More resources are also devoted to maintenance such as cleaning, reparations of broken windows, removing graffiti, etc. In 1996, Stena Fastigheter acquired the full stock of municipality owned apartments in the neighborhood Fisksätra in Nacka municipality, and have since then contributed to strengthening the positive development in the neighborhood (Blomé, 2012b). Landström (2017) confirms that the successful cooperation between the property owner, the municipality and the inhabitants lead to positive outcomes in the case of Fisksätra; the residents' subjective feeling of safety (perceived risk for burglary, property damages and violence) had decreased by half between 2006 and 2011, and the actual number of reported crimes show a similar decline.

The 'implicit' aim of these practices is to increase company profitability through decreased operation and management costs. In a comparative case study, Blomé (2012a) evaluates the costs and benefits of pursuing the "relational housing management" compared to a more "traditional" model of private housing management (i.e. low degree of CSR focus). The results from the comparison suggest that the CSR approach improved the company's profitability through decreasing the annual operating and maintenance cost by around 4.5 percent. Additionally, the CSR approach was advantageous in that it improved the company's goodwill and reputation in the industry, making it possible for them to acquire other municipality owned properties in socio-economic weak areas (Blomé, 2012b).

Lind and Blomé (2012) study the counter example - the case of private housing companies that do not incorporate social welfare into their profit function. One such example is the foreign investment company Acta, who acquired the majority of properties in the neigborhood Herrgården in Malmö in 2004.[5] In the case of Herrgården, the private housing company reduced property maintenance to a minimum level in order to maximize their net operating income, which resulted in housing standards equal to slum in the Swedish context.[6]

Lind and Blomé (2012) attempt to explain the rationale behind the Acta business strategy. Firstly, the situation appears to be unique; despite the availability of housing in neighbouring areas, where rents were lower and quality higher, the tenants chose to stay in the 'slum' area. Secondly, the authors claim that the negative effect that Acta's minimal-maintenance policy had on the property values in Herrgården, must have been large enough to outweigh any gains in short-run operating income. Worth mentioning is that the other private housing companies in Malmö did not pursue similar strategies, although they are assumed to exhibit profit-maximizing behavior as well, which further indicates that

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[5]Worth mentioning is that between 1997 and 2004, the properties was repeatedly transfered between different owners, whose lack of long-term management is likely to have contributed to the deprivation (Lind & Blomé, 2012).

[6]A TV program in 2008 unraveled the scandal and showed images of "an estate with bathrooms full of mold, and with cockroaches and lice in overcrowded apartments. The hallways were full of graffiti and had many broken windows. Outside there was a lot of litter and garbage."(Lind & Blomé, 2012) (p. 197).

the excessive cost-cutting in the case of Acta can not have been an economically rational strategy. The authors propose two economic explanations to the strategy of Acta; i) that the company believed it may be possible to sell the neglected property at an irrationally high price, e.g. during a later economic boom with high demand, or ii) that the decision makers in the company did not have incentives to care for long-term profitability, since they had not invested their own money in the company, and were themselves rewarded based on reported short-term profits.

As previously mentioned, there is also a risk that private housing companies overinvest in renovations, in order to motivate rent increases that would otherwise not have been possible to implement within the Swedish system of rent regulation. Boverket (2017) analyzed how large-scale renovations of rental properties affected the moving patterns of tenants. They find that indeed, renovations of rental-properties lead to increased probability that tenants move out. Poor households are more likely to move, and they move to areas with lower income and school achievements. The probability that tenants move out after renovation is higher in private companies than muncipality housing companies, which suggest that renovations is a way through which privatization can drive segregation.

Taken together, empirical and anecdotal evidence show that the profit-maximizing behavior of private housing companies can have to both positive and negative effects on welfare, depending on whether the firm's objective is long-term or short-term profit maximization. In order to reap the benefits of privatization without large welfare losses, it thus seems crucial for the municipalities to understand the profit-maximizing strategy of a potential buyer before selling any properties, and not sell if the company have a history of engaging in property investment and/or transactions for short-term profits. It may seem evident, but cases like Acta suggest that it is a challenge for municipal housing companies to correctly estimate the intentions of private housing companies beforehand (Blomé, 2012b).

Effects of conversion to home-ownership

Another research question that has received attention from scholars, is how neighborhoods and residents are affected when public housing is sold for conversion into tenant-owned apartments. The conversion of rental apartments to owned housing is often defended with the (ideological) argument that everyone has the right to own their home. According to conventional economic wisdom, home ownership in itself is beneficial for both individuals and neighborhoods. Individuals gain from faster wealth accumulation and the ability to use the property as a collateral to borrow money in case of a negative income shock. On the societal level, home ownership is said to stabilize neighborhoods and reduce crime (Sodini, Van Nieuwerburgh, Vestman, & Lilienfeld-Toal, 2017). In their study on the effect of home-ownership, Sodini et al. find that it affects households positively; ownership enables tenants to move to a better neighborhood, and leads to increased efforts at work and increased savings. However, the aggregate societal benefits when public housing is converted into home ownership is subject to debate; e.g. Hedin et al. (2012a); Magnusson and Turner (2008) argue that conversion of rental to owned apartments only benefit certain strong groups, with gentrification and social polarization as negative consequences.

3.3 Hypotheses

In this section, I use theory and evidence to predict the outcomes of privatization in the context of Swedish public housing.

The public housing companies are assumed to be less efficient and profitable than their private counterparts, and have less healthy finances, but on the upside they have the explicit objective to promote social welfare, e.g. through not-for-profit rent levels and having a long-term view on maintenance and quality investments. Private housing companies, on the other hand, will engage in profit-maximization, which results in higher profitability through increased organizational efficiency, investments in profitable projects, and cost cutting. The important question is therefore - how much does the profit-maximization objective of the private housing companies deviate from the behavior that creates social welfare?

In practice, measuring the effect of privatization on total welfare is challenging, even in the case of functioning competition; different housing companies can choose different (and unobservable) strategies for profit maximization, where investments in social welfare is more or less included. Moreover, changes in social welfare are difficult to observe and measure quantitatively. One way in which housing companies can promote social welfare is through maintenance and improvements in the quality of properties, and through investments in social projects in the neighborhood. In certain cases, such investments have resulted in measurable improvements through increased safety and decreased criminality (Blomé, 2012b; Landström, 2017). In my main analysis, I will therefore use criminality as a proxy for social welfare. For additional analysis, I will also use subjective measures of housing quality and safety that have been collected through surveys in the municipalities, and the *gini coefficient* to measure income inequality.

Drawing on the body of economic literature and empirical evidence, I hypothesize that privatization social welfare outcomes, but the direction of the effect depend on the extent to which the average private housing company in Sweden takes social welfare into account in their business model. If the majority of private housing companies invest in social welfare projects as a way of improving profitability, privatization will lead to decreased criminality and increased satisfaction. Alternatively, the revenues raised from privatization is used by the municipality for investment in social projects and crime prevention. Conversely, privatization may lead to increased criminality if a majority of private housing companies maximize profitability through cost-cutting, i.e. not investing in social projects or property quality, and the municipality revenues from privatization are not used to invest in crime prevention. The effects should primarily be observed in the type of crimes that take place in the neighborhoods, such as burglary and damage crimes.

3.4 Purpose and expected contribution

In this thesis, I aim to study how privatization of public housing have affected social welfare in contemporary Sweden. The existing evidence of the net gains or losses from privatization in the housing sector is limited and far from conclusive. To my knowledge, no empirical work have studied the effects of

housing privatization on criminality or municipality satisfaction in Sweden. Previous work that associates liberal housing policies with inequality and segregation have used observational approaches, which does not allow for isolating causal effects. Also, the final regulation for municipal housing companies was implemented in 2011. My study will therefore contribute to the existing empirical literature in three ways: (i) with new evidence on how privatization affect social welfare in the contemporary Swedish context, (ii) with evidence on the causal effects of privatization on income inequality, (iii) through studying the period of 2013 - 2018, i.e. privatization effects within the housing system as it looks today, which makes the results more relevant for contemporary policy making than older work.

4 Data

In this study, I intend to analyse the effects of privatization (ownership changes) in the Swedish housing sector. My core independent variable will be the number of apartments owned by a municipal housing company, reduced by new construction. Decreases in this variable thus indicate that the ownership of apartments from the municipal housing stock have been transferred to a non-public actor.[7] I use data from 290 Swedish municipalities and the years 2013 - 2018.

4.1 Sources

To construct the panel dataset, I combine statistics from Statistics Sweden (Statistiska Centralbyrån, SCB) and The Swedish National Council for Crime Prevention (Brottsförebyggande Rådet, Brå). All data is measured on the municipality-level.

4.2 Measuring privatization: the core independent variable

To construct my core independent variable, I use statistics on the number of registered apartments and houses per owner-category and municipality. These data are collected yearly from the national *Property Taxation Register* by Statistics Sweden. The owner-categories are derived from the juridical form in which the owner is registered in the *Property Taxation Register*.[8] The owner-category that I study is the municipal housing company, MHC.

When estimating effects of privatization, I want to avoid capturing effects from new apartment construction, which is not what I intend to measure. I therefore use data on total MHC owned apartments to create a new variable which, for each t and i, corresponds to the number of MHC owned apartments, adjusted downwards with the aggregate number of MHC owned apartments that have been constructed (and ready for tenants to move in) until time t.[9] In other words, my core independent variable measures decreases or increases in the public housing stock in the period 2013 - 2018, with respect to the size of the public housing stock in 2013. Any changes in the adjusted MHC variable should thus be attributable to ownership changes in the public housing apartments, such as privatization.[10]

Privatization can be carried out in two ways; (i) through sale from a public to a private housing company, with renting as the sustained form of tenure, or (ii) through sale from a public housing company to individual citizens, who become collective owners of the property and own the right to live in their apartment, instead of renting it. This tenure form is called the *bostadsrätt* and the collective of tenants the *bostadsrättsförening*, (BRF). To analyse the effects of privatization when it is carried out through the

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[7]Increases would indicate that the municipal housing company have bought apartments from a private actor, but this is a rare phenomenon.

[8]Categories include: the state, a municipal housing company, a cooperative, an individual citizen, a noted Swedish company, others.

[9]Data on apartment construction per municipality is reported by the municipalities themselves to Statistics Sweden.

[10]The number of MHC owned apartments cannot be adjusted upwards with the number of demolished apartments, since municipality-level data on apartment demolition is not available. All the same, the lack of data at this point is unlikely to cause large problems, since demolition of rental apartments have been a rare phenomenon in Sweden for more than a decade (Westerlund, 2016).

specific channel of conversion to BRF ownership, I will use an alternative core variable that correspond to the number of apartments owned by cooperatives of citizens (called *BRF*), reduced by aggregate construction.

Throughout the analysis, I will use the absolute numbers of MHC owned apartments as my core independent variable. To allow for generalizability across small and large municipalities, I transform all variables using the inverse hyperbolic sine (IHS)[11], after which the variables can be interpreted as log values. I thus assume that a one-percent change in the number of public houses affect the outcome variables in a similar way across municipalities. An alternative measure of privatization could have been to use the number of MHC owned per capita as the core independent variable. However, the effect from a one-percent change in the number of apartments per capita can also differ depending on population size, so this does not entirely mitigate the issue. Moreover, using the per-capita ration increases the risk that an observed decrease in apartments per capita actually reflects an increase in the municipality population.

4.3 Outcome variables

In this study, I intend to measure the effect of privatization on welfare through three outcome variables; criminality, neighborhood satisfaction and economic inequality.

4.3.1 Reported crimes

Statistics on reported crimes per 100.000 inhabitants in Swedish municipalities can be retrieved from The Swedish National Council for Crime Prevention, for the years 1996 and after.

The relevant variables from the statistics on reported crimes that I intend to use in my analysis are the following:

- Total number of crimes against the Swedish penal legislation.

- Total number of crimes against the person. (Ch. 3-7 of the Penal Code.)[12]

- Total number of crimes against property and wealth. (Ch. 8-12 of the Penal Code).[13]

- Number of theft, robbery and other crimes of stealing. (Ch. 8 of the Penal Code.)

- Number of Crimes Inflicting Damage (Ch. 12 of the Penal Code.)

I will thus analyze the effect both on the total number of reported crimes, and on the number of crimes within specific categories and chapters of the Penal Law.

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[11]The IHS transformation behaves similar to the natural logarithm, but allows to retain values of zero or negative values. In the dataset analyzed in this thesis, some of the smaller municipalities owned zero municipalities at the baseline year, and the IHS transformation allow me to keep these observations. For more detailed discussion and applications of the IHS transformation, see M. Bellemare (2018); M. F. Bellemare, Barrett, and Just (2013).

[12]Includes crimes against: Life and Health (Ch. 3), Liberty and Peace (Ch. 4), Defamation (Ch. 5), Sexual Crimes (Ch. 6), the Family (Ch. 7).

[13]Includes: Theft, Robbery and Other Crimes of Stealing (Ch. 8), Fraud and Other Dishonesty (Ch. 9), Embezzlement and Other Breaches of Trust (Ch. 10), Crimes against Creditors (Ch. 11) and Crimes Inflicting Damage (Ch. 12).

4.3.2 Municipality satisfaction

Statistics Sweden (SCB) conduct a yearly survey called the *Citizen Survey* in Swedish municipalities, where a random sample of residents (800-1200 individuals, depending on municipality size) are invited to rate the quality of their municipality as a place live on a number of parameters, such as housing, safety etc (SCB). Participation is voluntary for the municipalities and is subject to a fee.[14] In 2019, SCB reported that 272 of the 290 municipalities have participated at least once since the survey was launched the first time in 2005, and 255 municipalities have participated more than once. Since 2011, the average number of participating municipalities per year is 122.4 and on average, a municipality participated 3.6 times during the period 2011-2018. It thus seems like most municipalities find it valuable to participate in the survey, but not necessarily every year.

The relevant variables from the *Citizen Survey* that I intend to use for my analysis are the following:

1. General satisfaction with the municipality as a place to live.

2. General satisfaction with the housing situation in the municipality.

3. Perceived safety in the municipality.

The variables are constructed as indexed scores (0-100), based on the mean rating on a number of more detailed questions.

Last, I will use statistics on income inequality as an outcome variable. Effects on income inequality are measured through the *Gini coefficient* within municipalities. The gini coefficient takes a value between 0 and 1, where 0 is complete equality and 1 is complete inequality. The gini coefficient is used by e.g. Statistics Sweden to measure the degree of inequality in the income distribution in Swedish municipalities.

4.4 Control variables

I will use data on the municipality level to control for factors and characteristics that may otherwise affect the outcome variable and bias the estimates in my analysis.

4.4.1 General municipality control variables

- **Municipality finances.** To control for the financial health and financial results of the municipality administration, I will use data from their balance sheets and results for each year. In my analysis, I intend to control for *net income* and *solidity*. The net income gives a snapshot of the short-term profitability of the municipality, while the solidity is an indicator of the long-term financial health. Data on net income is available directly in the income statement. Using data from the balance sheet, I construct the measure of solidity using the following simple formula: $Solidity = \frac{Equity}{Total\,Assets}$.

- **Immigration.** Data on immigration from foreign countries is used to control for the potential effects of immigration on the outcome variables.

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[14]The fee covers administrative costs and varies between SEK 50.000-70.000, depending on the size of the municipality.

- **Population size.** I control for population size using data on number of inhabitants in each municipality.

4.4.2 Socio-economic control variables

- **Mean income level.** I use data on the average yearly income of municipality inhabitants to control for income effects.

- **Income distribution.** I control for relative economic wealth and poverty though using data on the share of inhabitants in each municipality that live in conditions of high and low economic standard. The indicator *low economic standard* refers to the share of inhabitants that live in households whose disposable income is at less than 60 percent of the national median. Conversely, *high economic standard* refers to the share of individuals that live in households whose disposable income is at least twice as high as the national median.

- **Educational attainment.** Effects of education are controlled for through including the average years of schooling for inhabitants in the municipality.

4.5 Data overview

In this section I illustrate how the absolute number of public housing apartments have developed over time in Swedish municipalities. Table 1 shows panel summary statistics for the main variables in the dataset.

Table 1: Summary statistics for main explanatory and outcome variables

Variable	Panel	Mean	Sd	Min	Max	Observations
MHC (adjusted)	Overall	2781	6888	0	78780	n = 1740
	Between		6896	0	77887	N = 290
	Within		178	1210	4213	T = 6
Reported crimes	Overall	9601	2796	2748	25651	n = 2030
	Between		2591	4001	22516	N = 290
	Within		1059	6197	19512	T = 7
Municipality satisfaction	Overall	60.23	6.60	41	79	n = 897
	Between		6.32	43.33	78	N = 253
	Within		1.82	53.23	67.23	T = 3.55
Gini coefficient	Overall	0.27	0.03	0.22	0.57	n = 2030
	Between		0.03	0.23	0.53	N = 290
	Within		0.01	0.22	0.38	T = 7

Notes: MHC reports the number of apartments owned by a municipal housing company, adjusted downwards in each year with the accumulated number of constructed apartments since the first year in the dataset (2013). Crimes is the total number of reported crimes against the Penal Legislation per 100.000 inhabitants. Municipality satisfaction correspond to the general perceived quality of the municipality as a place to live (indexed score 0-100). The gini coefficient captures income inequality (0-1 where 0 is complete equality and 1 is complete inequality).

To illustrate the distribution of change in the apartment stock, I compute the percentual change in the number of MHC owned variables between year 2013 and 2018 in each municipality.

The histogram in figure 1 illustrates how the magnitude of changes are distributed across municipalities. In figure 2, three outliers are removed, to allow for a closer observation of the distribution in the remaining 287 municipalities.[15]

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[15]In Berg, Lidingö and Staffanstorp, the change was +250 percent, -100 percent and -100 percent, respectively.

Figure 1: Distribution: change in number of MHC owned apartments, 2013 - 2018
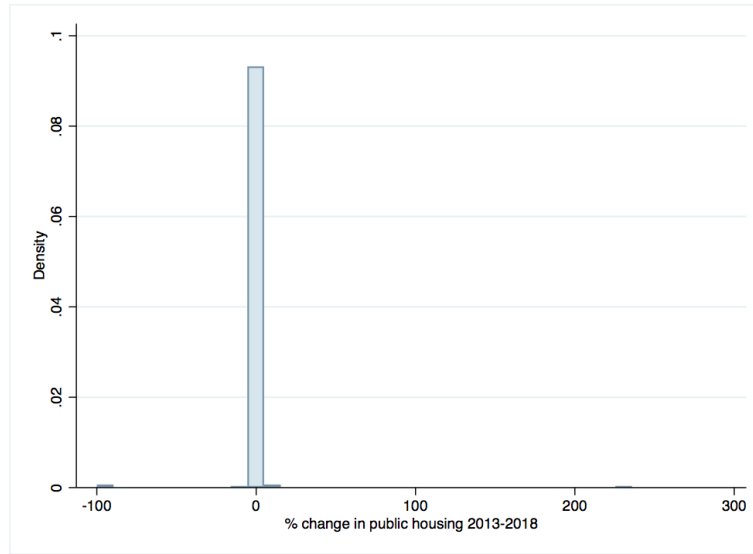
Figure 2: Distribution: change in number of MHC owned apartments, 2013 - 2018, outliers excluded
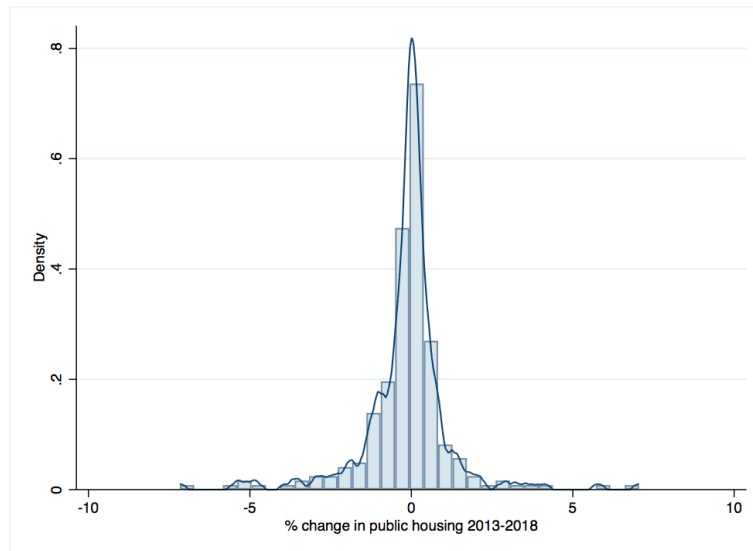
Figure 3 below, show how the weighted mean number of MHC apartments differ when adjusted and not adjusted for construction. The dashed line show that, even after adjusting downwards for new construction, the mean number of MHC owned apartments have increased over time. This development is somewhat puzzling, since the municipal housing companies do usually not acquire existing properties.[16] Probably, there is a lag or an error in the reported number of new constructed apartments. This indicates that the variable for MHC owned apartments is not a perfect measure of privatization, even when adjusted downwards with the reported number of new constructed apartments. All the same, the adjusted number of apartments is likely to be closer to the real privatization than the unadjusted number.

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[16]Torbjörn Nilsen, economist at Public Housing Sweden (Sveriges Allmännytta), phone interview 2020-04-23.

Figure 3: Weighted mean number of MHC apartments 2013-2018 - total and adjusted for construction
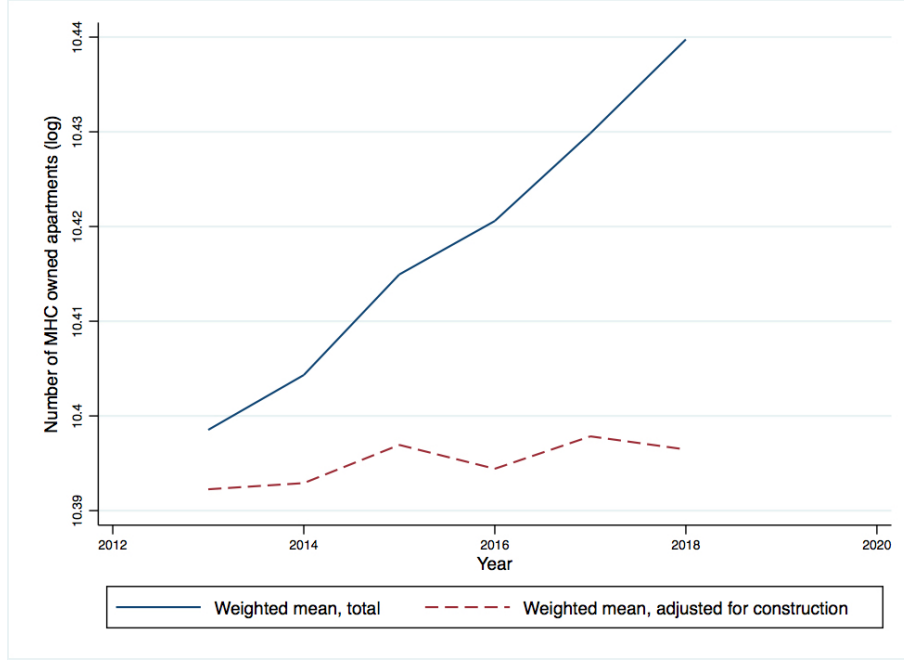
5 Empirical strategy

5.1 Baseline specification

To estimate the effect of privatization on the chosen outcome variables, I will start out with the following baseline specification:

$$y_{it} = \beta_1 MHC_{it} + a_i + u_{it} \tag{1}$$

where y_{it} is the outcome of interest in municipality i at time t and a_i capture the fixed (time-invariant) effect of the municipality. The variable MHC_{it} correspond to the core independent variable of interest: the number of apartments owned by the municipal housing company (adjusted for construction), at time t. The coefficient β_1 captures the effect of deviations in the MHC variable from its trend on the outcome variable, assuming all else equal and holding time-invariant municipality characteristics fixed. u_{it} is the idiosyncratic (time-varying) error term.

I estimate the regression using a linear fixed effects panel-data regression model. The fixed-effects model holds the long-run mean of each panel in the data fixed, so that effects of deviations in the explanatory variables from their long-run trend can be analysed.[17] For comparability, all variables are transformed using the inverse hyperbolic sine (IHS), which behaves similarly to the natural logarithm. When interpreting my results, deviations and effects in the variables are therefore measured in percentage points.

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[17]For an extensive discussion on applications of panel data methods, see Wooldridge (2009).

In this basic model, β_1 would capture the causal effect of a current-year deviation in the number of MHC owned apartments from its trend, under the assumption of strict exogeneity. In other words, all municipalities are expected to see similar effects in the outcome variable as an effect of privatization, because changes in the size of MHC are assumed to be exogenous to any changes in the outcome variable. The assumption is very strong, but serves as a starting point for the subsequent extensions of my analysis.

5.1.1 Threats to identification in the baseline model

In the baseline specification, several threats toward the identification strategy can be identified.

First, the relationship between changes in the MHC variable and the outcome variables in a municipality may be correlated with omitted variables that vary over time, i.e. that are not captured by the municipality fixed-effects. Second, privatization within each municipality may vary over time in a systematic way. Third, the effects of privatization may not appear right away, and such lagged effects are not captured by the baseline specification (model 1). Fourth, there may be a risk of reverse causation in the model. This implies that changes in the outcome variable may influence how many of the MHC owned properties that are sold, leading to biased results. The risk is mostly pronounced when estimating the effect on the crime outcome variable - criminality have been shown to have a negative effect on real estate value and prices (see e.g. Thaler (1978); Wilhelmsson and Ceccato (2015)), and deviations in the number of reported crimes are thus likely to affect the willingness or possibility of the municipality to sell their properties in the same year. However, while the risk of reverse causation should be mentioned, I do not judge it an important threat to the empirical strategy.

5.2 Extended specifications

In this section, the baseline model is extended in various ways to mitigate the aforementioned risks of bias.

5.2.1 Independent variables with one year lag

To capture lagged effects of deviations in the MHC variable from its trend, I will use a finite distributed lag (FDL) model, which includes lagged independent variables, for the remainder of the specifications.[18] To begin, I use a FDL of order one, i.e. with one year lag, which gives me model specification 2:

$$y_{it} = \beta_1 MHC_{it} + \beta_2 MHC_{it-1} + a_i + u_{it} \tag{2}$$

In model 2, β_1 captures the effect of a one-percent deviation in the number of current MHC owned apartments from its trend, on the outcome variable in the same year, holding time-invariant municipality characteristics and previous-year changes in the size of the public housing stock fixed. β_2 captures the effect of a one-percent deviation in the size of the public housing stock at time $t-1$ on the outcome variable at time t, i.e. effects of privatization in the year *after* the privatization took place, when holding

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[18]Wooldridge (2009) discusses the theory and application of FDL models in more detail.

fixed municipality characteristics and future deviations in the public housing stock. That is; β_1 and β_2 captures the isolated effects of privatization on the outcome variable in the same year and the subsequent year, respectively. Summarizing the coefficients β_1 and β_2 gives the so called *long-run propensity* (LRP) on y_{it} given a permanent increase/decrease in the MHC variable.[19]

As before, y_{it} is the outcome of interest in municipality i at time t, a_i capture the fixed (time-invariant) municipality characteristics and u_{it} is the idiosyncratic (time-varying) error term.

One issue that arises when including lagged independent variables, is that the lags may be autocorrelated, i.e. that the value of an independent variable at time t may be correlated with its value at $t - 1$ and $t - 2$. While this is worth mentioning, it should not be a large issue in the case of privatization, since the decision to privatize is likely to be more influenced by other factors (such as municipality finances, housing situation and the ideology of the municipality leaders) than previous decisions to privatize.

5.2.2 Time trends

To control for changes within the municipality that are correlated over time, I will include year fixed effects (dummy variables for each year) which will control for any such time trends. Including time fixed effects gives me the specification of model 3:

$$y_{it} = \beta_1 MHC_{it} + \beta_2 MHC_{it-1} + \theta_t + a_i + u_{it} \tag{3}$$

Where variables y_{it}, MHC_{it}, MHC_{it-1} a_i and u_{it} are interpreted as before. θ_t captures the year fixed effects. Now, β_1 capture the effects of privatization at time t on the outcome variable at time t, holding fixed the time-invariant municipality characteristics, privatization in the previous year, and time-trends. β_2 capture effects of privatization at time $t - 1$ on the outcome variable at time t, holding fixed the time-invariant municipality characteristics, privatization one year later, and time trends.

5.2.3 Observable and time-varying municipality and population characteristics

To reduce the risk of omitted variable bias, I will control for factors that are likely to affect deviations in both the independent variable and the outcome variable at the municipality level. Similarly to the core independent variable, I will include the municipality controls with a one-year lag, i.e. controlling for the characteristics at time t and $t - 1$.

There are two groups of control variables; general municipality characteristics, and socio-economic characteristics. The variables in the first group are assumed to be exogenous to privatization, but there is a risk that the variables in the second group are endogenous in the model. [20] The group of variables controlling for socio-economic characteristics of the municipality population will therefore be included separately, and interpreted with greater care.

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[19]Privatization is assumed to be permanent here, in the sense that the size of the public housing stock is not reversed back to its previous level after each period. The *long-run propensity* of the distributed lag model refers to the aggregate effects of all current and lagged variables in the model, even if the studied period only consist of two or three years.

[20]Since privatization have been shown to lead to gentrification and segregation, i.e. changes in the socio-economic composition of a population, socio-economic controls may be correlated with the core independent variable in the model.

General municipality control variables

- **The financial health of the municipality.** Shocks to profitability or changes in solidity may affect the municipality in several ways; less resources can be spent on social projects or other activities that affect the outcome variables, and the municipal housing company may be forced to sell assets to generate revenue to the municipality. I will therefore include variables for municipality net income and solidity, in order to control for any deviations in the outcome variable that is caused directly by a deviation in municipality finances from their trend.

- **Immigration.** Large and/or unexpected influx of foreign immigrants and refugees may affect outcome variables directly. Municipalities who receive refugees are granted economic support from the Swedish state to finance necessary aid to the newcomers, e.g. housing solutions and special education, so in theory the municipality finances should not be affected by this. However, the number of apartments in the housing market adapts slowlier, and large immigration shocks may therefore initially lead to overcrowding of neighborhoods. Moreover, a large increase in the share of immigrants that are received in a municipality may have other direct or indirect effects on the outcome variables, especially if the immigrants belong to to vulnerable groups; e.g. increased poverty and segregation may lead to increased criminality, or fear or racism among the municipality residents that leads to decreased satisfaction with the neighborhood. It is also possible that municipalities who choose to receive more immigrants have other uncontrollable characteristics in common which correlate systematically with regards to deviations in the MHC variable. I will therefore include control variables for immigration from foreign countries, to control for any such shocks.

- **Population size.** Changes in the municipality population size that do not stem from immigration may also have an impact on the outcome variables. Moreover, the effect of a one-percent deviation in the public housing stock may be larger in municipalities with a small population than a large, since their supply of housing is often more limited. I will therefore include a control variable for changes in population size. Any population changes in year t is highly likely to be an outcome of changes in the MHC apartment stock in the same year. Controlling for changes in population size at year t will therefore not capture effects of changes in population size on changes in the outcome variable, but rather effects of population size on the changes in the MHC variable. I will therefore control for population at time $t-2$.

Including the small set of control variables, the general municipality control variables, gives model 4; the baseline version of my preferred specification:

$$y_{it} = \beta_1 MHC_{it} + \beta_2 MHC_{it-1} + \gamma_1 \mathbf{x}_{it} + \gamma_2 \mathbf{x}_{it-1} + \theta_t + a_i + u_{it} \tag{4}$$

Where variables y_{it}, MHC_{it}, MHC_{it-1}, θ_t, a_i and u_{it} are interpreted as before. $\mathbf{x}_{it}$ and $\mathbf{x}_{it-1}$ are vectors of the current and lagged general municipality control variables (small set), capturing effects of municipality finances, immigration and and population size. β_1 now captures the effects of privatization

at time t on the outcome variable at time t, holding fixed the time-invariant municipality characteristics, privatization in the previous year, time-trends and the small set of municipality control variables. β_2 capture effects of privatization at time $t - 1$ on the outcome variable at time t, holding fixed the time-invariant municipality characteristics, privatization one year later, time trends and the small set of municipality control variables.

Socio-economic control variables

- **Income.** Mean income may affect criminality and is therefore controlled for.

- **Economic standard.** The economic distribution have been shown to affect criminality, and I will therefore control for the share of inhabitants that live in households with low and high economic standard.

- **Education.** Finally, I will control for the average years of education in the municipality population, to control for effects of education on the outcome variable.

As a final step, I include the full set of control variables, which gives model 5, the alternative, full version of my preferred specification:

$$y_{it} = \beta_1 MHC_{it} + \beta_2 MHC_{it-1} + \gamma_1 \mathbf{X}_{it} + \gamma_2 \mathbf{X}_{it-1} + \theta_t + a_i + u_{it} \tag{5}$$

where y_{it}, MHC_{it}, MHC_{it-1}, a_i and u_{it} are interpreted as before. $\mathbf{X}_{it}$ and $\mathbf{X}_{it-1}$ are vectors of the full set of control variables, capturing both general and socio-economic characteristics; effects of municipality finances, immigration, population size, mean income, share of inhabitants with low and high economic standard, and average educational attainment. θ_t captures the year fixed effects.

5.2.4 Independent variables with two years lag

To study potential effect of changes in the MHC variable that occur with a lag of two years, I will use a FDL of order two, i.e. include an additional, second year of lag in the independent variables.

Adding the additional lagged variables to my preferred specifications gives me models 6 and 7:

$$y_{it} = \beta_1 MHC_{it} + \beta_2 MHC_{it-1} + \beta_3 MHC_{it-2} + \gamma_1 \mathbf{x}_{it} + \gamma_2 \mathbf{x}_{it-1} + \gamma_3 \mathbf{x}_{it-2} + \theta_t + a_i + u_{it} \tag{6}$$

$$y_{it} = \beta_1 MHC_{it} + \beta_2 MHC_{it-1} + \beta_3 MHC_{it-2} + \gamma_1 \mathbf{X}_{it} + \gamma_2 \mathbf{X}_{it-1} + \gamma_3 \mathbf{X}_{it-2} + \theta_t + a_i + u_{it} \tag{7}$$

The interpretation of estimating models 6 and 7 are similar to models 4 and 5. Model 4 and 6 control for the small set of municipality characteristics, while model 5 and 7 control for the full set. The difference is that models 6 and 7 include all independent variables with both one and two years of lag. The population control variable is included with three years of lag. To obtain the long-run propensity of MHC deviations over three years in models 6 and 7, I summarize their coefficients: $LRP = \beta_1 + \beta_2 + \beta_3$.

5.3 Identifying assumptions

In order for the specifications in my empirical strategy to give unbiased estimates, a set of assumptions need to be satisfied.[21]

There must be no perfect linear relationships between the explanatory variables in the model, and each explanatory variable must exhibit some variation over time (at least for some panels). Both these assumptions are easily verifiable in Stata and are satisfied by my specifications and the data set.

The key assumption for unbiasedness of the estimates, is that of strict exogeneity or zero conditional mean. In the case of panel data regressions with fixed-effects, this implies that for each t, the mean of the idiosyncratic error is zero - conditional on both the independent variables in all time periods, and the unobserved fixed-effect. Formally, $E(u_{it}|\mathbf{X_i}, a_i) = 0$.

For this study, this implies that any unobservable municipality characteristics must not differ systematically with respect to deviations in the size of the variable MHC, or any of the other independent variables, from their mean. If the assumption of strict exogeneity is satisfied, my model estimates the causal effect of long-run mean-deviations in the number of municipality owned apartments. I argue that the assumption is sufficiently satisfied in models 4, 5, 6 and 7, where both municipality and year fixed-effects are controlled for, as well as a set of municipality control variables. The risk of bias from omitted variables remain, as well as the risk that the independent variables are correlated with their lags. While they should be mentioned, I do not deem these issues as severe threats to the conditional mean assumption.

5.4 Standard errors

For the fixed-effects regression model to produce unbiased standard errors, two conditions need to be met. First, the distribution of the standard errors must be homoskedastic. Second, there should be no within-panel serial correlation in the standard errors Wooldridge (2009). When testing these assumptions on my empirical models, results show that I cannot reject the null hypothesis that the standard errors are heteroscedastic and serially correlated.[22] In other words, neither of these two assumptions hold in my data. In all my specifications, I will therefore compute standard errors that are robust to heteroscedasticity and within-municipality serial correlation.

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[21]See Wooldridge (2002, 2009) for general theory and derivations of the assumptions for panel data fixed-effect regressions.

[22]To test for heteroscedasticity, I use the test proposed by Baum (2000), which calculates a modified Wald statistic for groupwise heteroskedasticity in the residuals of fixed-effect regression models. To test for serial correlation, I use the test proposed by Wooldridge (2002) and Drukker (2003), which identifies serial correlation in the idiosyncratic error term in panel-data models.

6 Main results

In this section, I present the results from my empirical strategy - analysis of the regression specifications 1-7 as presented in section 5.2. Full tables are presented in appendix A. MHC and MHC at $t-1$ represent the isolated effects of current and lagged deviations in MHC from its trend. LRP is the long-term propensity of deviations in MHC, i.e. the aggregate effect over a two (three) year period. The statistical significance of the LRP is assessed through an F-test for joint significance of the current and lagged MHC variables. The p-value of the F-test is presented in parenthesis.

First, I show the effect of deviations in the number of public housing apartments from its trend on deviations in my main outcome variable of interest - the total criminality (measured in number of reported crimes per 100.000 inhabitants). Subsequently, I split the outcome variable into different categories of criminality, to further analyse if certain categories are driving the results. As previously mentioned, my model captures effects of level-changes from the long term mean of the variables, i.e. decreases in public housing (privatization) that deviate from its trend in the studied time period (2013-2018). For simplicity, I will refer to such deviations in the variable for number of municipal housing company owned apartments as privatization or "ownership changes", and to its potential effects as "ownership-effects".

6.1 Ownership-effects on criminality

6.1.1 Total reported crimes

The full results from estimating regression specifications 1-5 with total reported crimes per 100.000 inhabitants as the outcome variable is presented in table 7 in appendix A.1. Summary results are presented in table 2 below.

Table 2: Ownership-effect on total reported crimes

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
MHC	0.0041	-0.0132	-0.0164	-0.0188**	-0.0165**
	(0.0045)	(0.0100)	(0.0100)	(0.0091)	(0.0083)
MHC at $t-1$		0.0270*	0.0251**	0.0181*	0.0172**
		(0.0138)	(0.0125)	(0.0098)	(0.0084)
LRP of MHC		0.0138	0.0086	-0.0007*	0.0006*
P-value		(0.149)	(0.126)	(0.079)	(0.063)
Observations	1,740	1,450	1,450	1,450	1,450
R-squared (within)	0.0001	0.0038	0.0353	0.1014	0.1250
N	290	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Controls	No	No	No	Small set	Full set

Notes: Columns 1-5 show the results of estimating the corresponding regression model specifications on the total number of reported crimes per 100.000 inhabitants. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-test is reported in parenthesis. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

The reported estimates show that privatization has a weakly statistically significant aggregate effect on total criminality when the effect is measured over two years. Stronger effects can be observed when looking at the isolated effects of privatization on outcomes in the first and second year. That said, the observed effects from privatization in the current (first) and the following (second) year are of opposite signs and offset each other. As a result, the aggregate effect of privatization on crime is close to zero in magnitude when measured over two years.

Starting with the baseline specification, Model 1, we see that a one percent deviation in the number of MHC owned apartments from its trend generates, ceteris paribus, a 0.0041 percent deviation in the level of criminality in the current year, but the estimate is not statistically significant (p=0.362). In Model 2, the lagged ($t-1$) MHC variable is added. The coefficient on the current MHC now changes direction (-0.0132), but remains statistically insignificant (p=0.186). The coefficient on the lagged MHC is 0.027 and (weakly) statistically significant (p=0.052), which suggest that a one percent deviation in public housing from its trend may lead to a 0.027 percent deviation in the level of criminality in the following year. The LRP of a deviation in MHC over two years is 0.0138, but the effects are not jointly statistically significant (F-test p=0.149).

In Model 3, year fixed-effects are also included. The current-year MHC variable remains negatively associated with crimes, with a coefficient of -0.0164, and not statistically significant (p=0.1). The coefficient on the previous-year MHC variable decreases slightly to 0.0251 but gain in statistical significance (p=0.046). The sum of the current and lagged effects of a one percent deviation in MHC on criminality is 0.0086, but they are not jointly statistically significant (F-test p=0.126).

In Model 4, the first version of my preferred specification, the small set of general municipality controls are included. The results from model 4 suggest that a one percent deviation in MHC from its trend is associated with a -0.0188 percent deviation in criminality from its trend in the current year, and the effect is statistically significant (p=0.039). The coefficient on the lagged MHC variable show that a one percent deviation in MHC from its trend leads to a 0.0181 percent deviation in total criminality in the following year, and the effect is (weakly) statistically significant (p=0.067). The long-term propensity of a trend-deviation in MHC is -0.0007 percent, and statistically significant (F-test p=0.079).

In model 5, the full set of general and socio-economic control variables are included. The results from model 4 appears to be relatively robust to the inclusion of the socio-economic controls; the magnitude of the coefficients decrease slightly and gain in statistical significance. Only the aggregate effect of the current and lagged MHC changes direction, but it remains so close to zero in magnitude that I would not interpret the change as economically significant.

In model 5, a one percent deviation in MHC from its trend generates a -0.0165 deviation in criminality in the same year (p=0.047), and a 0.0172 percent change in the subsequent year (p=0.041). The coefficients are both statistically significant. Jointly, the effects are weakly statistically significant (p=0.063), generating an aggregate effect of 0.0006. When moving from model 4 to model 5, the current MHC effect decreases more than the lagged MHC effect, which changes the long-run propensity from

negative to positive. However, the LRP is very close to zero in both models, so the economic significance of the shift is negligible.

Of the control variables, population size, mean income and the share of inhabitants with high economic standard are the variables that have a significant and negative effect on the total reported criminality. Column 5 of table 7 in appendix A.1 suggest that a one percent deviation in population size at $t-2$ may generate a deviation in criminality of -2.6221 percent two years after, a one percent deviation in mean income in the municipality is associated with a deviation in criminality of -1.7813 percent in the same year, and a deviation in the fraction of the population that live in households with high economic standard predicts deviation in criminality of -0.0673 percent in the same year. These effects seem highly reasonable; a larger population means larger tax revenues, which can be spent on e.g. crime prevention, and economic wealth is also associated with criminality.

Taken together, the results presented in table 2 (table 7 in the appendix) suggest that privatization of public housing leads to increased levels of criminality in the first year, but to decreased levels of criminality in the subsequent year. This can be interpreted as evidence that privatization may have a positive welfare effect, that starts to appear in the second year after privatization. Another possible interpretation of the results is that privatization drives some unobserved cultural gentrification in the municipality, which forces the criminal individuals to move to other municipalities. In any case, the effects from the two periods offset each other, so the total effect of privatisation on criminality over a two-year period is close to zero.

A source of bias that could remain in the model is the risk of reverse causality; if a deviation from the trend in criminality is correlated with the probability that the municipal housing company decide to sell their apartments, for example because the demand and/or the possible revenues from sales change as a result of changed criminality, the coefficient on the MHC variable may be biased. As previously mentioned, the 2011 law demand from municipal housing companies to act "businesslike", which may increase the likelihood that they act when a profitable opportunity to sell public housing arises. Such a relationship could also explain why the MHC coefficient is negative at time t. In my opinion however, the municipal housing companies are still too ideologically managed to take decisions to privatize their housing stock just because a profitable deal arises, but all the same, the risk of reverse causality should be mentioned.

The within-municipalities R^2 is 0.1014 and 0.125 in models 4 and 5, respectively. This indicates that the model is far from exhaustive in explaining the causes of criminality within the municipalities. This is not surprising; criminality is a very complex societal problem, driven by many interdependent factors. A simple econometric model, specified to capture effects of privatization on criminality, is unlikely to capture all these factors.

6.1.2 Crime categories and sub-categories

The reported crimes can be broken down into two groups of crimes; *crimes against the person* and *crimes against property*. In table 8 (appendix A.1), I report the full results from running my preferred specifications (model 4 and 5) on these two categories of crimes. To further analyse what type of crimes that are affected by privatization, I break down the property crimes into two sub-categories; *theft, robbery and other crimes of stealing* and *crimes inflicting damage*. In table 9 (appendix A.1), I report the full results from running my preferred specifications (model 4 and 5) on these two sub-groups of property crimes. The results from the analysis suggest that privatization affects criminality through the channel of reported *crimes against property*, rather than *crimes against the person*. However, only the lagged effect is statistically significant, and the long-run propensity is not statistically significant. Summary results from analysing all crime categories and sub-categories are presented in table 3 below.

Table 3: Ownership-effect on reported crimes and categories

	(1) Person	(2) Person	(3) Property	(4) Property	(5) Theft	(6) Theft	(7) Damage	(8) Damage
MHC	-0.0037	-0.0001	-0.0107	-0.0091	0.0040	0.0034	-0.0179***	-0.0175**
	(0.0086)	(0.0078)	(0.0077)	(0.0073)	(0.0038)	(0.0047)	(0.0068)	(0.0077)
MHC at $t-1$	0.0069	0.0075	0.0156*	0.0151**	0.0017	0.0012	0.0154*	0.0156**
	(0.0114)	(0.0103)	(0.0086)	(0.0072)	(0.0033)	(0.0035)	(0.0080)	(0.0074)
LRP of MHC	0.0032	0.0072	0.0049	0.006	0.0058	0.0046	-0.0024**	-0.0019**
P-value	(0.829)	(0.577)	(0.162)	(0.102)	(0.365)	(0.653)	(0.02)	(0.025)
Observations	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450
R-squared	0.1156	0.1255	0.1571	0.1691	0.3042	0.3120	0.0336	0.0359
Number of region_code	290	290	290	290	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set	Small set	Full set	Small set	Full set

Notes: Columns 1, 3, 5 and 7 show the results of estimating model 4 (small set of controls) on the reported number of person, property, theft and damage crimes, respectively. Columns 2, 4, 6 and 8 show the results of estimating model 5 (full set of controls) on the reported number of person, property, theft and damage crimes, respectively. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-test is reported in parenthesis. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

The results presented in table 3 (table 8 in the appendix) suggest that deviations in public ownership from its trend does not have an effect on deviations in the number of reported *crimes against the person*; neither in isolated periods, nor in total over the two years. Results from regressing model 4 on the variable for *crimes against the person* are presented in column 1. The coefficients on the current year and previous year MHC is of low magnitude (-0.0037 and 0.0069, respectively) and far from statistically significant (p-values of 0.666 and 0.542, respectively). The long-run propensity is also insignificant (p=0.829).

Estimating model 5 on *crimes against the person* (column 2) yields similar results; coefficients for the current and previous year MHC are small (-0.0001 and 0.0075, respectively) and not statistically significant (p-values 0.989 and 0.466). The MHC coefficients are jointly insignificant. This yields a statistically insignificant LRP of 0.0072 (p=0.577).

Columns 3 and 4 of table 8 present the results of regressing models 4 and 5 on the number of reported *crimes against property*, and show evidence of a lagged ownership effect. In model 4 (small set of municipality controls), a one percent deviation in MHC from its trend is estimated to generate a -0.0107 percent deviation in property crimes in the same year (not statistically significant, p=0.163) and a 0.156 percent deviation in the following year (weakly statistically significant, p=0.07). The joint effect is 0.0049 and not statistically significant (p=0.162).

Model 5 (full set of municipality controls) show similar results; the coefficient of on the current-year MHC variable takes the value -0.0091 and not statistically significant (p=0.214). The lagged effects of a one percent deviation in the MHC variable from its trend, however, is associated with a statistically significant deviation in the number of reported *crimes against property* with 0.0151 percent (p=0.036). The LRP is 0.006 and not jointly statistically significant (p=0.102).

As a final step in the analysis, I break down the category *crimes against property* into the two subcategories *crimes of theft* (including robbery and burglary) and *crimes inflicting damage*. The full results from regressing models 4 and 5 on the two sub-categories of the property crimes are presented in table 9 in the appendix A.1. Summary results are included in table 3 above, columns 5-8. The results indicate that the impact of privatization on criminality is driven by its effect on damage crimes; privatization has statistically significant effects on deviations in reported damage crimes both in the first and second year, and the LRP is statistically significant. The effect of privatization on the reported number of *crimes of theft* yields small and statistically insignificant results.

In model 4, the effect of a one-percent deviation in public housing from its trend on the number of reported crimes of theft is 0.0040 and 0.0017, for the first and second year respectively, but the effects are not statistically significant (p-values of 0.29 and 0.606, respectively). The LRP is 0.0058 but the MHC coefficients are not jointly statistically significant either (p=0.365). In model 5, the estimated coefficients on current and previous year MHC is 0.0034 and 0.0012, respectively, with p-values of 0.467 and 0.737. The long-run effect is 0.0046 but the effects are not jointly statistically significant (p=0.653).

The results from regressing model 4 on the number reported *crimes inflicting damage* (column 3), suggest that a one-percent deviation in public housing from its trend is associated with a statistically significant deviation of -0.0179 in the reported damage crimes in the first year (p=0.009). In the second year, the effect is 0.0154 and weakly statistically significant (p=0.055). The current and lagged MHC effects are jointly statistically significant (p=0.02) with an aggregate effect of -0.0024.

Model 5 (with the full set of controls, column 4) gives similar results; a one percent deviation in public housing predicts a -0.0175 percent deviation in reported damage crimes in the same year (p=0.024), and a 0.0156 percent deviation in the second year (p=0.036). The current and lagged MHC coefficients are jointly statistically significant (p=0.025), with an aggregate effect of -0.0019.

The results suggest that privatization of public housing mainly affects criminality in the category property crimes, and more specifically, crimes that inflict damage on property. The effect pattern reflects that of the total reported crimes; in the same year, privatization leads to increased reported property crimes

and damage crimes, but the effect become positive (i.e. leads to decreased criminality) one year after the privatization, and the two effects offset each other, resulting in a long-run propensity that is small in magnitude. The long-run propensity of MHC deviations on theft crimes is positive, while it is negative for damage crimes. These opposite effects are probably the reason why the long-run propensity on total property crimes is even smaller in magnitude.

6.2   Two-year lagged independent variables

The results from the main analysis above, show that the effects from privatization are different for changes in ownership that takes place in the current and the previous year, but that the aggregate effect of the two studied periods is negligible.

When studying the effects of privatization in isolated periods (t and $t-1$), I judge the lagged effect as a more interesting result to study, since it is unlikely that the true effects of ownership-changes would appear straight away. One could even hypothesize that any observed effects of privatization in the first period may rather be caused by turbulence that arise when ownership changes or when new management practices are implemented, and the effects in subsequent years to be the "true" effect of privatization. It would therefore be interesting to study how privatization affects reported criminality two or more years later. If privatization leads to increased crime in the first period due to turbulence and delayed effects of the new management practices, but then leads to decreased crime in all future years, then the sign on a privatization variable with two years of lag should be positive, and the long-run propensity should be positive.

To study this I will include an additional year of lag in my preferred specifications, i.e. control for all independent variables at time t, $t-1$ and $t-2$, as outlined in models 6 and 7 in my empirical strategy. Including an extra lag will further reduce the number of years in the study, and thereby increase the sensibility and reduce the reliability of the results, but the outcomes of the analysis may still give interesting indications.

The full results from regressing models 1, 2, 3, 6 and 7 with total criminality as the outcome variable are presented in table 10 in appendix A.1. Summary results are presented in table 4 below. The results suggest that the positive welfare effects from privatization may persist also in the second year after privatization, and that privatization leads to an aggregate decrease in criminality when the total effects are measured after three years.

In models 2 and 3, the magnitude and significance of the current and one-year lagged MHC coefficient appear relatively robust to including a second year of lag. The two-year lagged MHC variable has a coefficient of 0.0201 and 0.0183 in models 2 and 3, respectively (p-values 0.007 and 0.061). The aggregate MHC effect is 0.0391 in model 2 and 0.0272 in model 3, both with strong joint statistical significance (p=0.000).

In model 6 (small set of controls), the effect from a one percent deviation in public ownership from its trend lead to a -0.017 percent deviation in criminality in the same (first) year (weakly significant,

p=0.067), a 0.0197 percent deviation in the second year (significant, p=0.002) and a 0.0093 percent deviation in the third year (not significant, p=0.195). The three MHC coefficients are jointly significant (F-test p=0.012) with an aggregate effect of 0.0121 percent. The results suggest that the effects are strongest in the first two years after a privatization, but persist also three years after, and that the aggregate effect of a one-percent decrease in public ownership may lead to a 0.0121 percent decrease in the total number of reported crimes with over the following three years.

Table 4: Ownership-effect on total reported crimes - two-year lagged effect included

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 6	(5) Model 7
MHC	0.0041	-0.0119	-0.0148	-0.0170*	-0.0110
	(0.0045)	(0.0092)	(0.0093)	(0.0092)	(0.0103)
MHC at $t-1$		0.0309***	0.0237***	0.0197***	0.0187**
		(0.0074)	(0.0060)	(0.0063)	(0.0080)
MHC at $t-2$		0.0201***	0.0183*	0.0093	0.0121**
		(0.0074)	(0.0097)	(0.0072)	(0.0061)
LRP of MHC		0.0391***	0.0272***	0.0121**	0.0198**
P-value		(0.000)	(0.000)	(0.012)	(0.028)
Observations	1,740	1,160	1,160	1,160	1,160
R-squared (within)	0.0001	0.0041	0.0426	0.0989	0.1302
N	290	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Controls	No	No	No	Small set	Full set

Notes: Columns 1-5 show the results of estimating the regression model specifications 1, 2, 3, 6 and 7, respectively, on the total number of reported crimes. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-test is reported in parenthesis. Robust standard errors in parentheses, clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

Turning to model 7, I observe that the results from model 6 are not entirely robust to including the full set of municipality controls. In model 7, a one percent deviation in MHC from its trend does not lead to a statistically significant deviation in criminality in the same year; -0.011 percent with p-value 0.286. Instead, both lagged MHC variables are statistically significant; a deviation of one percent in public ownership of houses from its trend, generates a 0.0187 percent deviation in criminality in the subsequent (second) year (p=0.02), and a 0.0121 percent deviation in the third year (p=0.49), and the effects are statistically significant. The MHC coefficients for the three periods are jointly statistically significant (F-test p=0.028) with a total effect magnitude of 0.0198 percent. In model 7, the results suggest that the effect of privatization is weaker in the first year, and stronger in the second and third. Another explanation could be that the socio-economic controls capture some unobserved factor that increases criminality in the same year as privatization is carried out, which in combination with the loss of precision lead to lost significance in the current MHC variable in model 7 but not in model 5.

Taken together, the results from regressing models 6 and 7 on total criminality suggest that privatizations at time $t-1$ and $t-2$ both lead to decreased numbers of reported crimes, but the significance of the isolated MHC variables is weaker than in models 4 and 5. The loss of significance may be a consequence

of the extra lag, which decreases the sample and thus the precision of the estimation. The aggregate, positive effect of deviation in the MHC variable is however significant in both models.

I would interpret these results as suggestive; when adding a second year of lag to the independent variables, the studied time period decreases to four years, which decreases the reliability of these results compared to those from models 4 and 5. That said, the effect of the two lagged privatization variables are statistically significant in model 7, and have the expected sign also in model 6. Moreover, the LRP is significant in both models. The results give important information on the direction of the effects of privatizations that took place three years earlier, and indicates that after the first year, privatization indeed seems to lead to decreased criminality.

7   Further analysis

In this section, I use my empirical strategy to analyse the effects of privatization on social welfare outcome variables that could give interesting supplementary insights; the subjective municipality satisfaction and the income inequality in the municipality. I also analyse the effect of privatization through tenant-ownership (BRF) conversion, to examine a possible mechanism. Finally I test the robustness of the results from my main analysis through excluding the set of urban municipalities from the sample.

7.1   Municipality satisfaction

I first turn to the effects of privatization on municipality satisfaction. The analysis is done through estimating regression models 1-5 on the satisfaction scores from the *Citizen Survey*. Only the municipalities that have participated in the *Citizen Survey* are included, which decreases the sample to 245 municipalities. Table 11 in appendix A.2 show the full estimated results of deviations in public housing on general satisfaction, whereas the effect with regards to satisfaction with housing and safety, specifically, are presented in table 12 in appendix A.2. Summary results from the preferred specifications 4 and 5 on all studied satisfaction categories are presented in table 5 below.

Table 5: Ownership-effect on General, Housing and Safety Satisfaction

	(1) General	(2) General	(3) Housing	(4) Housing	(5) Safety	(6) Safety
MHC	0.0041**	0.0042*	-0.0125***	-0.0107***	-0.0085**	-0.0117***
	(0.0021)	(0.0024)	(0.0038)	(0.0038)	(0.0040)	(0.0042)
MHC at $t-1$	0.0017	0.0012	-0.0021	-0.0010	0.0056**	0.0067**
	(0.0015)	(0.0017)	(0.0030)	(0.0030)	(0.0027)	(0.0029)
LRP of MHC	0.0058	0.055	-0.0146***	-0.0117**	-0.0029***	-0.0049***
P-value	(0.122)	(0.192)	(0.005)	(0.019)	(0.003)	(0.000)
Observations	645	645	645	645	645	645
R-squared	0.1559	0.1730	0.3580	0.3942	0.3474	0.3822
Number of region_code	245	245	245	245	245	245
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set	Small set	Full set

Notes: Columns 1, 3 and 5 show the results of estimating specification 4 (small set of controls) on the *Citizen Survey* score index for general municipality satisfaction, housing satisfaction and perceived safety, respectively. Columns 2, 4 and 6 show the results of estimating specification 5 (full set of controls) on the *Citizen Survey* score index for general municipality satisfaction, housing satisfaction and perceived safety, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-test is reported in parenthesis. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

The results indicate that privatization leads to decreased general satisfaction in the municipalities, but the effect is small and only significant for current-year privatization.

The results from the baseline model 1 suggest that a one percent deviation in public housing from its mean leads to a 0.0031 percent deviation in municipality satisfaction in the same year, but the estimate is not statistically significant (p=0.173). In model 2, when the MHC variable with one-year lag is added, the current-year MHC coeffient remain almost unchanged in magnitude and significance level, but the lagged effect of a one percent deviation in MHC is associated with a 0.0045 percent deviation in municipality satisfaction (p=0.001). The current and lagged MHC coefficients are jointly statistically significant (F-test p=0.005) and the aggregate effect of a MHC deviation over two years is 0.0068. When adding the year fixed effects in model 3, both the current and lagged effects increases in magnitude and significance; a one percent MHC deviation predicts a satisfaction deviation of 0.0043 percent in the first year (p=0.068) and 0.0043 in the second year (p=0.000). The coefficients are jointly statistically significant (p=0.002) and sum to a total effect of 0.0086 percent over the two years.

When adding the small set of municipality controls, in model 4, the model predicts that a one percent deviation in public ownership from its trend, leads to a 0.0041 percent deviation in municipality satisfaction in the first year (p=0.046) and a 0.0017 percent deviation in the second year (p=0.251). Only the first-year effect is statistically significant in itself, and the coefficients are no longer jointly statistically significant (p=0.122). Model 5 adds the full set of municipality control variables, which yields similar results but with weaker statistical significance. The current-year effect of a one-percent deviation in MHC is 0.0042 and decreases to a weaker statistical significance (p=0.076), whereas the lagged effect remains small (0.002) and not statistically significant (p=0.466). The joint effect of a current and lagged MHC deviation is 0.0055 and not statistically significant (p=0.192).

The observed loss of statistical significance in models 4 and 5 suggest that the municipality control

variables are more relevant than deviations in ownership for explaining lagged and aggregate deviations in municipality satisfaction. In any case, the results described above give me a hint of the direction of the effect of privatization on municipality satisfaction; that privatization decreases municipality satisfaction, especially in the same year where the effect has statistical significance. I would not exclude the hypothesis that the dissatisfaction is ideological and therefore loses significance after a year, when control variables are included which can be correlated with ideology (income etc).

A seemingly stronger predictor of the general municipality satisfaction score in the *Citizen Survey* results, is municipality solidity. A one percent increase in solidity at time t is predicted to increase current-year satisfaction with 1.1112 percent (p=0.005) in model 4 and 1.0929 (p=0.007) in model 5. Population size have a negative effect on satisfaction; population increases (decreases) that took place two years earlier is predicted to decrease (increase) municipality satisfaction with 0.7714 percent in model 4 (p=0.000) and with 0.7904 percent in model 5 (p=0.000). This seems plausible; it is possible that the municipality functions need time to adapt their services after a population increase, which leads to decreases in satisfaction during some years following such increases, or simply that the psychological feeling of e.g. safety decreases when unknown people move into the neighborhoods.

Second, I analyze the how changed ownership affect the results from the *Citizen Survey* questions that specifically concern satisfaction with housing and perceived safety. I estimate the preferred specifications (model 4 and 5) with the score for these parameters as outcome variables. The results are presented in Table 12 in the appendix A.2.

The results in column 1 and 2 indicate that deviations in public ownership of housing in a municipality do have an effect on the general satisfaction with housing, driven by current-year privatization.

Column 1 show the results from estimating model 4 (small set of controls) on the housing satisfaction as measured in the *Citizen Survey*. The results suggest that a one percent deviation in the number of MHC apartments from its trend generates a -0.0125 percent deviation of housing satisfaction from its trend in the current (first) year (p=0.001) and a -0.0021 percent deviation in the second year (p=0.492). Only the first-year effect is statistically significant in itself. The effects over two years of an MHC deviation is jointly statistically significant (F-test p=0.005) and sums to -0.0146, which indicates that privatization leads to both a direct and an aggregate increase in housing satisfaction over two years.

In model 5, a one-percent deviation in MHC from its trend is associated with a -0.0107 deviation in municipality satisfaction in the first year (p=0.005), and a -0.001 percent deviation in the second year (p=0.745). The current and lagged MHC effects are jointly statistically significant (p=0.019) and sum to -0.0117 for the two periods. Including the full set of municipality controls in model 5 thus leads to slightly decreased significance and magnitude of the aggregate effect, but the conclusion remains the same.

Turning to the results presented in column 3 and 4, the results indicate that privatization have a negative effect on perceived safety in the first year, but a positive effect in the second.

The results from regressing model 4 on the safety satisfaction score from the *Citizen Survey* results. The

results show that a one percent deviation in MHC from its mean leads to a -0.0085 percent deviation in perceived safety in the same year (p=0.037), and to a 0.0056 percent deviation in the following year (p=0.037). Both coefficients are individually as well as jointly statistically significant (F-test p=0.003) and their joint effect is -0.0029. In model 5, including the full set of control variables leads to increased magnitude and significance of the results; a one percent deviation in public ownership is associated with a -0.0117 percent deviation in perceived safety in the first year (p=0.006) and 0.0067 in the next year (p=0.0023). The joint effect is -0.0049 (p=0.000). The results indicate that privatization leads to increased perceived safety in the same year, but decreased in the next. The first-year effect is larger however, and the aggregate effect over the two year period is therefore a slight increases in perceived safety.

Taken together, the results suggest that privatization leads to decreased general municipality satisfaction, but the results are suggestive since the coefficients are only weakly statistically significant. Rather, the changes in general municipality satisfaction seems to be driven by municipality finances (that probably allow for investments that increase satisfaction), and changes in population (that probably affect satisfaction through some other unobserved channel). Further, the results suggest that satisfaction with the municipal housing situation increases when public housing is privatized, but only in the same year. Finally, the results suggest that privatization of public apartments leads to increased perceived safety in the same year, but to decreased perceived safety in the next year.

As will all statistics collected through a survey, the data collected in the *Citizen Survey* is based on subjective opinions and should therefore be interpreted with caution. The sample of citizens within each municipality who are proposed to answer the survey is random, but take-up may not be random. This risks to bias the results, if certain individual-level characteristics affect both the probability to answer the survey, and the satisfaction with the municipality. Moreover, citizens who choose to reside in a municipality may have certain preferences that influence their answers in the survey, causing bias on the municipality level. Finally, the municipality's choice to participate may be correlated with other municipality characteristics that are correlated with the survey answers. Taken together, any results obtained from analyses of the *Citizen Survey* should be interpreted with caution.

7.2 Economic inequality

A potential negative outcome of privatization of public housing, that is not implied directly by the economic theories on ownership and competition, but have been shown in empirical work on privatization of housing in Sweden, is its effects on gentrification and inequality. In this section, I will test my model specifications with the gini coefficient as outcome variable, to see if the results are in line with those observed in previous research.

To capture the effect of ownership-changes on inequality, I run my regression models 1-4 with the measured *gini coefficient* as outcome variable. The full results are presented in table 13 in Appendix A.3. Summary results are presented in table 6 below. For the analysis, I do not use the full set of municipality controls, since some of the socio-economic control variables are directly related to the outcome variables

in this section.

Table 6: Ownership-effect on economic inequality (Gini coefficient)

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
MHC	-0.0023**	-0.0019**	-0.0006	-0.0006
	(0.0009)	(0.0009)	(0.0008)	(0.0008)
MHC at $t-1$		-0.0007	-0.0011	-0.0011
		(0.0006)	(0.0012)	(0.0012)
LRP of MHC		-0.0026***	-0.0017***	-0.0017***
P-value		(0.000)	(0.001)	(0.001)
Observations	1,740	1,450	1,450	1,450
R-squared (within)	0.0025	0.0020	0.2681	0.2702
N	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Controls	No	No	No	Small set

Notes: Columns 1-4 show the results of estimating specifications 1-4 with the municipality gini coefficient as the outcome variable. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-teat is reported in parenthesis. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

The results suggest that privatization may indeed lead to increased inequality on the long term. The effect is not statistically significant for the individual periods, but the current and lagged effects are jointly significant.

The results from the baseline specification, model 1, show that a one-percent deviation in MHC from its trend is associated with a -0.0023 percent deviation in the gini coefficient from its mean in the same year (p=0.013). In model 2, a one percent deviation in MHC predicts a -0.0019 percent deviation in the gini coefficient in the first year (p=0.03), and a -0.0007 percent deviation in the second year (p=0.254). The coefficients are jointly statistically significant (F-test p=0.000) with an effect of -0.0026. In model 3, with year fixed effects, the effects from changes in public housing remain of negative sign; a one-percent deviation in the MHC coefficient is associated with gini coefficient deviation of -0.0006 in the first year and -0.0011 in the second, but none of the effects are statistically significant (p-values of 0.416 and 0.367, respectively). Nevertheless, the two effects have a joint statistically significant impact of -0.0017 percent on gini coefficient deviations (p=0.001). In model 4, where the small set of municipality control variables is added, the effects from privatization on the gini coefficient remain unchanged in magnitude and do not gain statistical significance (p-values of 0.447 and 0.364 for t and $t-1$, respectively). The effects remain jointly statistically significant (p=0.001).

Taken together, time-trends and other factors, such as immigration and municipality finances, seem to play a more important role than privatization in explaining changes in inequality in the municipalities in each isolated year. However, privatization does have an effect on inequality that is observable when summarizing the effects over time. This indicates that there are adverse effects from privatization on inequality, but that these develop slowly over time and do not appear straight away.

37

7.3 The effect of conversion to tenant-ownership (BRF)

As previously described, privatization of public housing may take the form of conversion into tenant-ownership, i.e. the property is sold by the renting company to be converted into the type of tenant-owned housing that is called *bostadsrätt* in Sweden, similar to the american *condomium* house type. *Bostadsrätt* housing implies that the tenant buys the right to reside in an apartment that belongs to a property owned by the collective of tenants, the *bostadsrättsförening* (BRF). As described in the literature review, the effect of such conversions (from now referred to as BRF conversion) is gentrification and segregation, since a certain amount of cash is needed from each tenant to buy the property from the rental company and transform it into a *bostadsrätt* property. Since a number of privatized MHC properties are converted into BRF owned properties every year, it is possible that the effects of BRF conversion drive the effects of privatization of public housing. In this section, I will therefore take a closer look at the effect of changes in the number of BRF owned apartments on the outcome variables, to verify if these are different from the main results of ownership changes, or if they may be part of explaining the main results.

For this task, I will use the empirical strategy and model specifications as outlined in section 5, but use the number of BRF owned apartments at time t and $t-1$ as the core variable. To avoid capturing effects from investments in new BRF apartments, I construct a variable that only capture the deviation in each year that do not stem from new construction. It can then be argued that these deviations must stem from ownership conversion. I will then analyse the effect of BRF conversion through regressing my updated preferred specifications (models 8 and 9, outlined below) on certain outcome variables of interest.

$$y_{it} = \beta_1 BRF_{it} + \beta_2 BRF_{it-1} + \gamma_1 \mathbf{x}_{it} + \gamma_2 \mathbf{x}_{it-1} + \theta_t + a_i + u_{it} \tag{8}$$

$$y_{it} = \beta_1 BRF_{it} + \beta_2 BRF_{it-1} + \gamma_1 \mathbf{X}_{it} + \gamma_2 \mathbf{X}_{it-1} + \theta_t + a_i + u_{it} \tag{9}$$

The interpretation of estimations of model 8 and 9 are equal to that of model 4 and 5, only that the core variable of interest is now the current and lagged number of BRF owned apartments. The fixed-effects regression then allows to capture the causal effect of deviations in the mean number of BRF apartments from their trend, on deviations in the outcome variables in the first and second year.

Important to keep in mind in this section, is that the direction of the estimated coefficients must be interpreted differently when the results are used to draw conclusions about privatization effects. In the main analysis, decreases in public ownership was interpreted as privatization. Now in this section, it is instead *increases* in the core variable (BRF ownership) that is to be interpreted as privatization.

Columns 1 and 2 in table 14 (appendix A.4) show the results of estimating models 8 and 9, respectively, with the total number of reported crimes as the outcome variable. When analyzing the effect on total criminality, the coefficients on the current and lagged BRF variable are relatively similar to the

corresponding MHC coefficients in the main results in sign and magnitude. However, none of the coefficients are statistically significant, and neither are their effects jointly statistically significant.

In model 8 (with small set of municipality controls), the results suggest that a one percent deviation in BRF conversion from its trend lead to a -0.0115 percent deviation in total criminality in the same year (p=0.618), and to a 0.0138 percent deviation in total criminality in the subsequent year (p=0.807). The aggregate effect over the two periods is 0.0023 percent (F-test p=0.836). When adding the full set of municipality controls in model 9, a one percent deviation in the BRF variable predicts a -0.0118 percent deviation in total criminality in the same year (p=0.551) and a 0.0068 deviation in the subsequent year (p=0.902). The aggregate effect size from the two periods is -0.005 (p=0.799).

The findings suggest that increased BRF owned housing and decreased MHC owned housing have opposite effects on criminality; when privatization is measured as an upwards deviation in the number of BRF apartments, privatization is predicted to decrease criminality in the first year, but increase criminality in the second. Recall that in the main analysis, privatization (defined as a downward deviation in public housing) was predicted to increase criminality in the first year, but decrease criminality in the second. However, the results lack statistical significance and should not be used as information about the direction of the effect from BRF conversion.

Columns 3 and 4 show the results of regressing models 8 and 9 on the number of reported *crimes against the person*. Here, the estimation show that the current and lagged BRF coefficients are of much larger magnitude the corresponding MHC variable coefficients, and they are also of opposite sign. Still, none of the BRF coefficients are statistically significant, neither alone nor jointly.

In model 8 (with small set of municipality controls), the results suggest that a one percent deviation in BRF conversion from its trend lead to a 0.0396 percent deviation in reported *crimes against the person* in the same year (p=0.297), and to a -0.0156 percent deviation in the subsequent year (p=0.773). The aggregate effect over the two periods is 0.0241 percent (F-test p=0.8331). When adding the full set of municipality controls in model 9, a one percent deviation in the BRF variable predicts a 0.0404 percent deviation in *crimes against the person* in the same year (p=0.297) and a -0.0158 deviation in the subsequent year (p=0.769). The aggregate effect size from the two periods is 0.0245 (p=0.274).

Columns 5 and 6 show the results of regressing models 8 and 9 on the number of reported *crimes against property*. The estimated effects of BRF conversion on property crimes are of the same sign but larger in magnitude than the corresponding MHC coefficients. Again, none of the coefficients on the current or lagged BRF variables are statistically significant. However, the aggregate effect over the two periods are jointly statistically significant. In model 8 (with small set of municipality controls), the results suggest that a one percent deviation in BRF conversion from its trend lead to a -0.0163 percent deviation in reported *crimes against property* in the same year (p=0.697), and to a 0.0561 percent deviation in the subsequent year (p=0.248). The aggregate effect over the two periods is 0.0398 percent (F-test p=0.0.037). When adding the full set of municipality controls in model 9, a one percent deviation in the BRF variable predicts a -0.0156 percent deviation in *crimes against property* in the same year (p=0.709)

and a 0.0499 deviation in the subsequent year (p=0.261). The aggregate effect size from the two periods is 0.0342 (p=0.023).

In short, the results suggest that there is no statistically significant BRF conversion-effect on the total number of crimes or the number of person crimes; neither an isolated effect at time t or $t-1$, nor an aggregate effect over the two-year period. There is however a jointly significant aggregate effect of BRF deviations over the two years on the number of property crimes. The direction of that effect is positive, which implies that privatization through BRF conversion leads to an increased aggregate number of property crimes when measured over two years.

When breaking down the property crime variable into the two sub-categories *crimes of theft* (including robbery and burglary) and *crimes inflicting damage*, an effect of BRF conversion can be discerned, which suggest that BRF conversion primarily affects the number of *crimes of theft*, but also has an aggregate effect on the number of *crimes inflicting damage*. The results are presented in table 15 (appendix A.4).

Columns 1 and 2 show the results of regressing models 8 and 9, respectively, on the number of *crimes of theft*. As presented in column 1, the results from model 8 (small set of controls) suggest that a one percent deviation in the number of BRF owned apartments from its mean leads to a deviation in the number of theft crimes of -0.0797 in the same year (p=0.014) and 0.1517 in the subsequent year (p=0.000). The coefficients are jointly statistically significant (F-test p=0.000) with an effect magnitude of 0.0721 over the measured two year period. The results from model 9 (full set of controls) suggest that a one percent deviation in the number of BRF owned apartments from its mean leads to a deviation in the number of theft crimes of -0.0803 in the same year (p=0.014) and 0.1489 in the subsequent year (p=0.000). The coefficients are jointly statistically significant (F-test p=0.000) with an effect magnitude of 0.0686 over a two year period.

Columns 3 and 4 show the results of regressing models 8 and 9 on the number of reported *crimes inflicting damage*. The results from model 8 suggest that a one percent deviation in the number of BRF owned apartments generates a 0.0436 percent deviation in the number of reported damage crimes in the first year (p=0.157), and a 0.0157 percent deviation in the second year (p=0.859). The joint effect is 0.0539 (p=0.044). The results from model 8 are quite robust to including the full set of municipality control variables; the estimates from model 5 suggest that a one percent deviation in the number of BRF owned apartments generates a 0.0454 percent deviation in the number of reported damage crimes in the first year (p=0.154), and a 0.0116 percent deviation in the second year (p=0.897). The aggregate effect over the two years is 0.057 and statistically significant (p=0.05).

The results presented above suggest that privatization through BRF conversion leads to an aggregate increase in the number of damage crimes, when measured over two years. This is aligned with the findings in my main analysis, where I found the same effect; privatization through decreased public housing led to increased aggregate numbers of damage crimes. For the specific category of damage crimes, it is thus possible that BRF conversion is a mechanism driving the results in the main analysis.

The results suggest that the strongest effect of BRF conversion is found in its effect on crimes of theft, robbery and burglary. This is interesting, since the general effect of privatization (MHC decreases) was observed to affect the number of damage crimes but not theft crimes, as reported in section 6. The general effect of privatization on property crimes thus differs within the category, depending on whether the buyer is a BRF or not.

Results show that when BRF apartments increase, theft crimes decrease in the same year, but increase in the next, and the total effect show an increase. With regards to damage crimes, increased BRF ownership increases criminality in both years. For some reason, the property management of a BRF appear to be less efficient in preventing theft and burglary than that of a public housing company. This seems unlikely to be a conscious business strategy, given that the "managers" of the BRF are the tenants themselves, who have strong incentives to protect their property. Another potential mechanism is gentrification; studies show that households who can afford to stay or move in following a BRF conversion are wealthier than those who live in rented housing. The increased wealth in the area may thus attract more thieves. That said, it may also be the result of incompetency, since the BRF property management is not carried out by professionals.

I now turn to the effect of BRF conversion on the results from the *Citizen Survey*, through estimating models 8 and 9 with the scores for total municipality satisfaction, housing satisfaction and safety satisfaction as the outcome variables. The results are presented in table 16 and show that BRF conversion has an effect on the general municipality satisfaction.

Results from estimating model 8 (small set of controls) suggest that a one percent deviation in BRF ownership from its mean leads to a 0.0488 percent deviation in the general municipality satisfaction in the first year (p=0.074), and a -0.0256 percent deviation in the second year (p=0.41). The current and lagged effects are jointly statistically significant, with an aggregate effect of 0.0232 percent (F-test p=0.000). The results are robust to including the full set of control variables; estimation of model 9 show that a one percent deviation in BRF ownership from its mean leads to a 0.047 percent deviation in the general municipality satisfaction in the first year (p=0.08), and a -0.0252 percent deviation in the second year (p=0.415). The current and lagged effects are jointly statistically significant, with an aggregate effect of 0.0218 percent (F-test p=0.000). The results thus suggest that privatization through BRF conversion leads to increased municipality satisfaction in the first year, and decrease satisfaction slightly in the second year, but the increase is larger in magnitude, so that BRF conversion leads to an aggregate increase in satisfaction over two years.

Deviations in the BRF variable does however not affect housing or safety satisfaction, neither in the short or long run; changes in the number of BRF owned apartments at time t nor $t-1$ does not have any individual or joint statistically significant effect on the satisfaction scores. This indicates that the effects of changes in the number of MHC owned apartments on municipality satisfaction scores, presented in the main analysis sections, are not driven by effects from BRF conversion.

Finally, I estimate the effects of BRF conversion on the outcome variables for economic inequality; I

regress my model specifications with the number of BRF owned apartments as the core explanatory variable, and the *gini coefficient* as the outcome variable. The results are presented in table 17 (appendix A.4) and suggest that BRF conversion does not have any statistically significant effect on inequality, as measured by the gini coefficient; neither in isolated periods, nor as an aggregate effect over two years.

Taken together, BRF conversion seems to have certain causal effects on criminality that are interesting to observe. However, for total criminality and all categories apart from damage crimes, the effect from BRF privatization (increases in BRF) are different from the reported effects of public housing privatization (decreases in MHC), reported in the main analysis in section 6. It therefore seems unlikely that BRF conversion would be a strong mechanism behind the effect of decreased public ownership of houses. The results do not indicate that BRF conversion would be the mechanism behind the effects from privatization on municipality satisfaction and inequality in the main analysis, either.

7.4 Excluding metropolitan areas

It is possible that certain clusters of municipalities have common characteristics that would bias or influence the results. For example, the population density, culture and socio-economic mix in urban municipalities tend to be different from that in non-urban municipalities. This between-municipality effect are not fully observable and could possibly affect the results.

As a robustness check, I will therefore exclude the three largest Swedish cities and their surrounding municipalities from the analysis. I restrict my sample by excluding the municipalities that belong to the three so-called *metropolitan areas*. Each metropolitan area, as defined by Statistics Sweden (2005), include one of the three large cities (Stockholm, Gothenburg, Malmö) and its surrounding municipalities. Stockholm metropolitan area consist of 26 municipalities, Gothenburg of 13 and Malmö of 12. Excluding the metropolitan areas leaves me with a sub-sample of 239 municipalities that can be called "non-urban". The results from regressing the two versions of my preferred specification (model 4 and 5) on this non-urban subset is presented in table 18 and 19 in Appendix A.5.

The results suggest that the main results are not entirely robust to excluding the metropolitan areas. In the restricted-sample analysis of total crime and crime categories *person crimes* and *property crimes*, the estimated effects of MHC deviations on criminality deviations in the same year, has no significance. The lagged effect of deviations in the MHC variable, however, increase both in magnitude and statistical significance in the restricted-sample analysis compared to the full-sample analysis. The long-run propensity (aggregate effects) of the current and lagged MHC effects also increase in magnitude and significance when metropolitan areas are excluded. For all three outcome variables (total, person and property crimes) the LRP is of negative sign, i.e. the aggregate effect of privatization over two years is increased criminality.

When turning to analysis of the crime sub-category analysis (i.e. property crime sub-categories *crimes of theft* and *crimes of damage*), no effect of privatization is detected in the restricted sample analysis, whereas the full-sample analysis showed a statistically significant effect of privatization on the number

of reported *crimes of damage*; both a direct effect and an aggregate effect. The results do not change direction in the restricted-sample results compared to the full sample results, i.e. the current-year privatization is associated with increased damage crimes at time t, and previous-year privatization with decreased damage crimes at time t, in both analyses.

Taken together, the full-sample analysis results reported in section 6 are not entirely robust to excluding the metropolitan regions; in the restricted sample analysis, the aggregate results differ in significance and magnitude compared to the full-sample analysis. For isolated years, the significance and magnitude differ as well, but the direction of the coefficients does not change.

The findings from the restricted-sample analysis above imply that the effects of privatization found in the full-sample analysis cannot be generalized across metropolitan and non-metropolitan areas without care. The direction of the effects in isolated periods (current and lagged) are largely similar. However, the magnitudes differ, which leads to variation in the sign of the aggregate long-run effect of privatization. From this, I would draw the conclusion that the same mechanisms are at work when public housing is privatized in metropolitan and non-metropolitan areas, but that the urban and non-urban characteristics affect the long-term outcomes of privatization and make them differ across metropolitan and non-metropolitan areas.

8 Summary and discussion

In this section, I will summarize and discuss the findings from my study. I will also evaluate the internal and external validity of the results.

8.1 Results and mechanisms

In my study on the Swedish housing market, I find evidence of an ownership-effect on several parameters of social welfare. The results indicate that the joint effect of privatization on total criminality, when measured over two years, is close to zero in magnitude and weakly significant. When expanding the model to capture effects over three years, however, privatization is shown to decrease criminality with a total effect of 0.012 percent over the period. When looking more closely at the effect in isolated years, the results indicate that privatizations are associated with increased criminality in the same (first) year, but with decreased criminality in the second (and third) year. The effects of privatization on criminality are mainly driven by its effect on reported property crimes, which is plausible; the investments and projects of housing companies are likely to have the largest impact on crimes that are tied to neighborhoods. Privatizing public housing is estimated to increase property crimes with around 0.002 percent over a two year period, where the effect in the second year seem to be driving the results. Another finding is that the lagged ownership effect persists and gains in magnitude and statistical significance when the metropolitan regions are excluded from the sample; decreases in public ownership of one percent are associated with decreases in total criminality, person crimes and property crimes of 0.03-0.04 percent. The current-year effects of privatization are not robust to excluding the metropolitan regions; privatization is still associated with increased criminality in the same year, and with increased magnitude compared to

the full-sample analysis, but the effect is not statistically significant. The aggregate effect of privatization in the restricted sample analysis suggest that privatization increases criminality over two years, apart from the theft crimes.

Taken together, my results suggest that privatization leads to unchanged or increased levels of criminality in the same year as the public housing is sold, but that the effect is reversed in the subsequent year(s). The aggregate effect is more ambiguous, and depends over how many years that the effects are measured.

As suggested by previous research, the social welfare effects of privatization of public housing can be driven by different mechanisms; the variation in management practices between housing companies, and gentrification effects. In my study, I believe that both mechanisms can be at work. It is likely that the decreases in criminality are the results of the efforts from the private housing company to prevent crime; investments in CSR and sustainable housing management have been shown to increase revenues for housing companies on the long term. The private company may thus have stronger incentives than the public to invest in social welfare, since they are more dependent on profitability for survival, and moreover they may have more financial resources to invest in crime prevention and property maintenance.

It does however not seem plausible that privatizations would lead to direct changes in criminality. Even if the buying private housing company would invest excessively in maintenance, or neglect social welfare entirely, I would not expect this to have a strong effect on criminality already in the same year. I therefore believe that the observed increase in criminality in the first year of privatization is the result of the ownership-change in itself. Possible interpretations of the result are that the effect comes from the turbulence that may follow an ownership-change, or that some kind of gentrification effect is at work that initially attracts more criminality. The current-year crime-increasing effect of privatization is not robust to excluding the metropolitan areas, which suggest that this effect is less important than the lagged effect, outside of the metropolitan context.

Another possible mechanism that could affect the social welfare outcomes from privatization, is gentrification. I control for socio-economic factors in the regressions, but it is possible that within-municipality neighborhood gentrification or unobservable cultural gentrification also lead to decreased criminality over time as a consequence of privatization.

A third alternative (or simultaneous) mechanism that could drive the effects of privatization, is municipality spending. If the revenues raised from privatization are used directly by the municipality for investment in social projects and crime prevention, this mechanism is not captured by the municipality finances control variables, and could explain why I do not observe stronger negative effects of privatization in the analysis.

Further analysis show that the general satisfaction with the municipality may decrease in the same year as privatization takes place. This can be due to concrete effects of privatization, but also because of an increase ideological dissatisfaction with the decisions of the municipality management, for example if local groups run campaigns to advocate against the privatization. It should however be noted that

he effect is only weakly significant, and there is no persisting lagged effect. When studying specific parameters of municipality satisfaction, privatization is observed to increase the residents' satisfaction with the housing situation in the same year. A puzzling finding is that privatization is associated with increased perceived safety in the same year, but decreased perceived safety in the subsequent year. This means that the perceived safety decreases when actual criminality increases, and vice versa. I cannot explain this counterintuitive effect. I would however interpret all the results from the *Citizen Survey* safety with care; as discussed in section 4.2.2, the data from the *Citizen Survey* is quite scarce, there is a risk of bias due to attrition in the data, and the measures are subjective.

The observed effect of privatization on reported criminality and subjective housing satisfaction provide evidence that in the context of the Swedish housing market, the private housing companies do not, on average, neglect investments in social welfare in their profit maximization function. Probably, the regulations and culture in Sweden have created a climate where it is more profitable for private companies to invest in CSR, than to invest in excessive cost-cutting, as suggested by Blomé (2012a). The results indicate that the average private housing company in Sweden have adapted their business model to incorporate the advantages of the so-called "relational housing management" over a traditional, low maintenance management, and that they are not only looking to maximize short-time profits.

Finally, the results suggest that privatization does not have any effect on inequality in isolated years, as measured by the gini coefficient, but an aggregate effect over two years that point to increased income inequality as a consequence of privatization. This could be interpreted as evidence that privatization does not drive segregation or inequality on the short term, but possibly over periods of two years or longer. However, local segregation may still occur; if privatization makes residents move to neighborhoods within the municipality, without leaving the municipality, this is not captured by the municipality gini-coefficient. Moreover, one year of lag is most likely not enough to capture slow moving effects like segregation.

BRF conversion is another mechanism that could drive the results of privatization. My analysis of the effects of increasing the number of BRF apartments, however, indicate that for most outcome variables, the effects of privatization through increased BRF ownership differ from the effects of privatization as measured through decreased public housing. Moreover, the BRF-results are of weaker statistical significance. Taken together, BRF conversion is not likely to be a strong driver of the main results, but it is likely to influence the results to a certain degree. A final note is that BRF conversion is not associated to any statistically significant changes in inequality in my study, which is surprising. I would however not go as far as to say that my findings directly contradict the evidence presented by e.g. Hedin et al. (2012a); Magnusson and Turner (2008); Sodini et al. (2017), who report that BRF-conversion drive gentrification and income polarization; their studies span a longer period of time, and the lack of significant results in my study may be a consequence of the short time-period studied.

8.2   Internal validity

In this section, I will discuss the internal validity of my study, i.e. evaluate how well my empirical strategy estimates the casual effect of privatization.

The main identifying assumption in my empirical approach is that deviations in public ownership from its trend is exogenous in the model. Endogeneity problems would arise if privatization is correlated with unobserved factors, that in their turn affect the outcome variables (e.g. criminality and municipality satisfaction). If privatization is endogenous, the estimated effects of privatization on the outcome variables are biased and the internal validity of the study will be low. To validate the assumption of exogeneity, I have employed various methodological tools, which I summarize below. Through using the fixed-effects panel regression, I control for time-invariant characteristics within the municipalities. The inclusion of year dummy variables controls for time trends, e.g. changes between the years that affect all municipalities similarly. The inclusion of municipality and year fixed-effects relaxes the assumption of strict exogeneity; the remaining assumption for unbiased estimates in the empirical strategy is then that privatization must be uncorrelated with the idiosyncratic error term, i.e. with regards to all time-varying omitted variables that are correlated with the outcome variable. As a final measure to limit the risk of endogeneity, I therefore include control variables for a set of time-varying factors at the municipality-level. This allows me to hold a number of observable factors fixed, that otherwise could have been sources of within-municipality endogeneity. Taken together, I control for both fixed and time-variant effects in my empirical strategy, and I therefore deem the internal validity of the study to be relatively strong.

The approach does however have limitations. For example, it is possible that the list of municipality control variables that I have included is not complete, or that some characteristics are unobservable. For instance, changes in culture, ideology or attitudes cannot be controlled for. Another limitation is that available data on municipality and housing quality is based on subjective measures. They may therefore run a higher risk of being correlated with deviations in cultural or ideological attitudes, than would have been the case if municipality and housing quality would have been determined by e.g. a group of experts.

Another threat to the internal validity of the study is the risk that some of the municipality control variables are so-called *bad controls*; they are characteristics that are correlated with the outcome variable, but that can themselves also be an outcome of the independent variables. Including them may therefore cause biased or incorrect estimates. To limit the risk of endogeneity in the control variables, I grouped the municipality controls into two sets; a smaller set, where I deem the risk of bad control bias to be very low, and one extended set, where I also include the variables with higher risk of endogeneity. Throughout the analysis, these two sets of controls produce very similar results, which indicate that there is a low risk of bad control bias in my empirical strategy, and that results from models where the full set of controls are included can be judged as reliable.

A third risk of bias that should be mentioned, is the risk that the lagged independent variables are autocorrelated. I could not look into this empirically, but it is possible that autocorrelation could explain why the effects change sign after the first year.

Lastly, it is worth addressing the risk of reverse causality my empirical approach. It is possible that changes in criminality may have an impact on the choice to privatize public housing; for example because the municipality need to free resources to invest in crime prevention. While this risk is worth keeping

in mind, I do not consider it as a direct threat to the validity of my research design; there are other, easier ways for the municipality to raise money, and the task of crime prevention is primarily managed by the Swedish police organization, whose budget is separate from the budget of the municipality administration.

An additional comment is that some caution need to be taken when drawing conclusions based on the size of my estimates. Data on privatization and crime for the same year only exist for six years in total. Due to the methodological choice of including the independent variables with one year lag, the number of years included in the preferred specification decreases to five. The sample size is still large enough to produce significant results, but ideally, in order to produce more precise and reliable causal results, the sample size would be larger. Having a small T in fixed-effects panel data regressions implies a risk of biased coefficients.[23]

8.3 External validity

In this section, I will discuss how generalizeable my results are outside the settings of this study.

I would deem my results to be very context specific. The structure and legislations of the Swedish housing market are different from most other countries; rental housing is scarce in many areas, there is no social housing, but rather focus on public housing, the role and regulations of the municipal housing companies have undergone many changes during the last decades, and privatization can be carried out through both sales to private rental companies and for conversion to tenant-owned *bostadsrätt*. Moreover, the municipal housing companies seem to have had large liberties in choosing who to sell their apartments to. In order to draw conclusions that are applicable to housing markets in other countries, the results would need to separate the effects from privatization through sales to private companies vs. BRF-conversion. Unfortunately, collecting of such data is outside the scope of this study.

Since simultaneous data on privatization and the outcome variables is missing for the years before 2013, my results can not be used with confidence to explain the effects of privatization many years back in time in Sweden. Because I use recent data on privatization, the results do however provide good evidence on how privatization of public housing affect criminality and municipality satisfaction in Swedish municipalities in a contemporary context. This is useful, after the many legislative changes that were carried out from the early 1990s, with the last change implemented in 2011, when the role of the municipal housing companies were established one last time. Until the next large change in the legislations around municipal housing companies or privatization is carried out, the results can be used to predict the future effects of privatization in Sweden.

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[23]Nickell (1981) discuss this type of bias in dynamic panel data models, and argue that in these cases, the bias is often negative. This implies that I should be careful when interpreting the effect size in my results, since they may be biased, but that I may be less likely to overstate than to understate the effects of privatization.

9 Conclusion

This thesis has studied the social welfare effects of privatization on the contemporary Swedish housing market. Using panel data from Swedish municipalities between 2013 and 2018, I have evaluated the causal effect of deviations in public housing ownership on a set of social welfare outcome parameters.

The results of the analysis provide suggestive evidence that privatization may indeed have an effect on social welfare, manifested as a decrease in reported crimes and an increase in housing satisfaction. These results may be driven by the larger financial strength and efficiency of private companies as compared to public companies, which allows for the private company to invest more resources in preventing property crimes and spend more on property maintenance. Alternatively, municipalities use the resources raised from privatization to increase their spending on crime prevention and maintenance of the public housing stock. A third possibility is that privatization drives cultural gentrification, that forces criminal citizens to move. In any case, the results indicate that privatization may not only have negative effects on social welfare, as many policy makers believe. Anecdotal evidence show that privatization may also have negative consequences on social welfare, if property management and tenant relations are neglected, but the conclusions from this thesis suggest that such behavior occurs in a minority of private companies. The implications for policy from this paper is therefore that policy makers need not worry too much about privatization as a general phenomenon on the Swedish housing market, but rather focus their efforts on mitigating the problematic outcomes of privatization. For example limiting the possibility for municipalities to sell public housing to speculative private housing companies with short-term profit maximizing goals. The results of the study indicate that privatization leads to a small increase in economic inequality, as measured by the gini coefficient, and the effect does not seem to be driven by the conversion to tenant-owned housing. The finding is most likely an indicator that privatization drives inequality. In order to reap the benefits of privatization, without accepting its polarizing effects, policy makers should therefore look more into the possibility to mitigate the potential gentrifying effects of privatization, for example through regulating how large fractions of public apartments that may be privatized in a certain municipality or neighborhood.

The study faces some limitations. Most importantly, the study is limited in terms of data access; annual and statistics on housing ownership and criminality in Swedish municipalities is available only from year 2013, which leaves me with a period of five years to study. This limits the number of years of lag that can be included, and makes the results more sensitive to bias. Another limitation of my study is that it fails to provide evidence that explain what driving factors that lie behind the findings.

From a practical perspective, the short time period may however make the results from the study more interesting for policy makers. During the last two decades, many regulatory and legislative changes have been made in the housing sector that have affected the management practices and privatization decisions of the municipal housing companies, of which the latest one occurred in 2011. The time period of this study is thus set within the legislative framework that constitutes the 'reality' for the municipal and private housing companies in contemporary Sweden, and does not take into account the effects of

privatization that may have been observed under different regulatory frameworks. It can therefore be argued that the short time period of this study is positive for policy-makers who wish to use the results as basis for future decisions.

I have contributed to the existing literature with new evidence on how privatizations affect social welfare in terms of criminality, municipality satisfaction and inequality, in the contemporary Swedish housing market. I also find suggestive evidence that the effects of privatization through BRF conversion is not a main driver of the results. My thesis highlights the need for further research in several directions. Due to time constraints and limited access to data, I could not collect data for the years before 2013. Manually collecting or calculating this data would allow to study how exogenous privatization shocks through new regulations have affected social welfare. Examining the effects of specific regulations would also contribute to more thorough understanding of why privatizations have certain effects in the current Swedish housing system. Another interesting topic would be to analyse the effect of sales to private companies and include firm-level data in the analysis, to isolate which firm characteristics that are associated with positive and negative social welfare outcomes. Firm-level behavior is likely to be an important mechanism in the studies of privatization, and the result from such an investigation would be of great interest to policy makers and municipal housing companies; in the past, public housing have been sold to housing companies that mismanaged the properties and neglected its residents. Such failed transactions indicate that a framework for understanding which potential buyers of public housing that should be considered 'responsible' is necessary for local politicians to make informed decisions.

As stated earlier in this paper, scholars and policy makers from all political sides agree that the Swedish housing market is malfunctioning and currently fails in providing affordable housing to all Swedish citizens. Given the long political debate about privatization in Sweden, and the importance of a well-functioning housing market for both the macro and microeconomic welfare of a country, it should be of large interest to both scholars and policy makers to shed more light on the effects of privatization.

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A   Results from sections 6 and 7

A.1   Effect of ownership-changes on criminality

Table 7: Ownership-effect on reported crimes

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
MHC	0.0041	-0.0132	-0.0164	-0.0188**	-0.0165**
	(0.0045)	(0.0100)	(0.0100)	(0.0091)	(0.0083)
MHC at $t-1$		0.0270*	0.0251**	0.0181*	0.0172**
		(0.0138)	(0.0125)	(0.0098)	(0.0084)
LRP of MHC		0.0138	0.0086	-0.0007*	0.0006*
P-value		(0.149)	(0.126)	(0.079)	(0.063)
Year 2015			0.0345***	0.0485***	0.0746***
			(0.0076)	(0.0082)	(0.0280)
Year 2016			0.0261***	0.0556***	0.1200**
			(0.0087)	(0.0109)	(0.0555)
Year 2017			0.0179*	0.0710***	0.1756**
			(0.0107)	(0.0157)	(0.0861)
Year 2018			-0.0181	0.0668***	0.1959*
			(0.0125)	(0.0200)	(0.1140)
Solidity				-0.0425	-0.0633
				(0.0616)	(0.0655)
Solidity at $t-1$				-0.1088	-0.1100
				(0.0729)	(0.0817)
Net income				-0.0003	-0.0003
				(0.0006)	(0.0006)
Net income at $t-1$				0.0005	0.0003
				(0.0006)	(0.0006)
Immigration				0.0041	0.0041
				(0.0076)	(0.0072)
Immigration at $t-1$				-0.0076	-0.0070
				(0.0068)	(0.0071)
Population at $t-2$				-2.5840***	-2.6221***
				(0.4122)	(0.4022)
Mean income					-1.7812**
					(0.8186)
Mean income at $t-1$					0.4492
					(0.8093)
%Low econ std					0.1479
					(0.1014)
%Low econ std at $t-1$					0.1439
					(0.0951)
%High econ std					-0.0673*
					(0.0405)
%High econ std at $t-1$					-0.0009
					(0.0411)
Education					1.8295
					(1.8948)
Education at $t-1$					0.3848
					(1.7928)
Observations	1,740	1,450	1,450	1,450	1,450
R-squared (within)	0.0001	0.0038	0.0353	0.1014	0.1250
N	290	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Controls	No	No	No	Small set	Full set

Notes: Columns 1-5 show the results of estimating the corresponding regression model specifications on the total number of reported crimes per 100.000 inhabitants. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity (total effect) of MHC, p-value of the LRP F-test is reported in parenthesis. Year 2015-2018 are the year FE dummy variables. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Ownership-effect on crime categories

	(1) Person	(2) Person	(3) Property	(4) Property
MHC	-0.0037	-0.0001	-0.0107	-0.0091
	(0.0086)	(0.0078)	(0.0077)	(0.0073)
MHC at $t-1$	0.0069	0.0075	0.0156*	0.0151**
	(0.0114)	(0.0103)	(0.0086)	(0.0072)
LRP of MHC	0.0032	0.0072	0.0049	0.006
P-value	(0.829)	(0.577)	(0.162)	(0.102)
Year 2015	0.0504***	0.0599*	0.0338***	0.0642**
	(0.0117)	(0.0325)	(0.0098)	(0.0280)
Year 2016	0.1287***	0.1557**	-0.0011	0.0690
	(0.0147)	(0.0613)	(0.0139)	(0.0541)
Year 2017	0.1026***	0.1473	0.0067	0.1137
	(0.0191)	(0.0915)	(0.0184)	(0.0846)
Year 2018	0.1167***	0.1805	-0.0387	0.0919
	(0.0239)	(0.1210)	(0.0243)	(0.1113)
Solidity	0.0401	0.0451	-0.0951***	-0.1146***
	(0.0718)	(0.0778)	(0.0333)	(0.0383)
Solidity at $t-1$	-0.2525**	-0.2572*	-0.1115***	-0.1097***
	(0.1243)	(0.1344)	(0.0213)	(0.0306)
Net income	-0.0005	-0.0006	-0.0007	-0.0008
	(0.0008)	(0.0008)	(0.0007)	(0.0008)
Net income at $t-1$	0.0011	0.0010	-0.0003	-0.0005
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Immigration	0.0133	0.0109	0.0044	0.0036
	(0.0122)	(0.0121)	(0.0086)	(0.0086)
Immigration at $t-1$	0.0057	0.0059	-0.0085	-0.0091
	(0.0089)	(0.0089)	(0.0079)	(0.0081)
Population at $t-2$	-2.6952***	-2.8946***	-2.0146***	-2.0411***
	(0.4740)	(0.4868)	(0.5126)	(0.5017)
Mean income		-0.5315		-1.2114
		(0.9763)		(0.9292)
Mean income at $t-1$		0.0210		-0.0437
		(1.0110)		(0.9115)
%Low econ std		0.2088		0.0955
		(0.1308)		(0.1178)
%Low econ std at $t-1$		0.0416		0.0081
		(0.1310)		(0.1038)
%High econ std		-0.0461		-0.0921*
		(0.0501)		(0.0498)
%High econ std at $t-1$,		-0.0196		-0.0123
		(0.0528)		(0.0453)
Education		-2.9891		2.6138
		(2.2132)		(2.1689)
Education at $t-1$		1.7512		0.4167
		(2.3784)		(2.2488)
Observations	1,450	1,450	1,450	1,450
R-squared (within)	0.1156	0.1255	0.1571	0.1691
N	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set

Notes: Columns 1 and 3 show the results of estimating model 4 (the preferred specification with small set of controls) on the reported number of person crimes and property crimes, respectively. Columns 2 and 4 show the results of estimating model 5 (the preferred specification with full set of controls) on the reported number on person crimes and property crimes, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-test in parenthesis. Year 2015-2018 are the year FE dummy variables. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Ownership-effect on property crime sub-categories

	(1) Theft	(2) Theft	(3) Damage	(4) Damage
MHC	0.0040	0.0034	-0.0179***	-0.0175**
	(0.0038)	(0.0047)	(0.0068)	(0.0077)
MHC at $t-1$	0.0017	0.0012	0.0154*	0.0156**
	(0.0033)	(0.0035)	(0.0080)	(0.0074)
LRP of MHC	0.0058	0.0046	-0.0024**	-0.0019**
P-value	(0.365)	(0.653)	(0.02)	(0.025)
Year 2015	-0.0161	-0.0574*	0.0370**	0.0850*
	(0.0107)	(0.0300)	(0.0156)	(0.0453)
Year 2016	-0.1055***	-0.1792***	0.0380*	0.1405
	(0.0151)	(0.0591)	(0.0221)	(0.0852)
Year 2017	-0.1041***	-0.2200**	0.0543*	0.2112
	(0.0186)	(0.0899)	(0.0283)	(0.1289)
Year 2018	-0.1924***	-0.3495***	-0.0430	0.1591
	(0.0225)	(0.1158)	(0.0345)	(0.1724)
Solidity	-0.0676*	-0.0657	-0.0860*	-0.1022**
	(0.0353)	(0.0400)	(0.0464)	(0.0496)
Solidity at $t-1$	-0.1212**	-0.1263**	-0.1000***	-0.0936***
	(0.0615)	(0.0615)	(0.0198)	(0.0314)
Net income	-0.0005	-0.0005	0.0006	0.0006
	(0.0007)	(0.0007)	(0.0011)	(0.0011)
Net income at $t-1$	-0.0008	-0.0007	-0.0009	-0.0010
	(0.0008)	(0.0008)	(0.0011)	(0.0011)
Immigration	0.0140	0.0173**	-0.0213*	-0.0243**
	(0.0088)	(0.0084)	(0.0109)	(0.0114)
Immigration at $t-1$	-0.0053	-0.0038	-0.0031	-0.0046
	(0.0078)	(0.0081)	(0.0126)	(0.0131)
Population at $t-2$	-0.7212	-0.7244	0.6042	0.6248
	(0.4494)	(0.4648)	(0.7684)	(0.7866)
Mean income		0.1810		-0.9970
		(1.0023)		(1.2788)
Mean income at $t-1$		0.8492		-0.7200
		(0.8825)		(1.2481)
%Low econ std		0.2306**		-0.0470
		(0.1149)		(0.2025)
%Low econ std at $t-1$		-0.0084		-0.0718
		(0.1116)		(0.1676)
%High econ std		-0.0668		-0.0365
		(0.0500)		(0.0847)
%High econ std at $t-1$		0.0127		0.0004
		(0.0412)		(0.0763)
Education		2.7978		1.2008
		(2.3791)		(3.0715)
Education at $t-1$		1.0830		0.4106
		(2.5491)		(3.1440)
Observations	1,450	1,450	1,450	1,450
R-squared (within)	0.3042	0.3120	0.0336	0.0359
N	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set

Notes: Columns 1 and 3 show the results of estimating model 4 (the preferred specification with small set of controls) on the reported number of theft crimes and damage crimes, respectively. Columns 2 and 4 show the results of estimating model 5 (the preferred specification with full set of controls) on the reported number on theft crimes and damage crimes, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity of MHC, p-value of the LRP F-test is reported in parenthesis. Year 2015-2018 are the year FE dummy variables. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Ownership-effect on total reported crimes - two-year lagged effect included

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 6	(5) Model 7
MHC	0.0041	-0.0119	-0.0148	-0.0170*	-0.0110
	(0.0045)	(0.0092)	(0.0093)	(0.0092)	(0.0103)
MHC at $t-1$		0.0309***	0.0237***	0.0197***	0.0187**
		(0.0074)	(0.0060)	(0.0063)	(0.0080)
MHC at $t-2$		0.0201***	0.0183*	0.0093	0.0121**
		(0.0074)	(0.0097)	(0.0072)	(0.0061)
LRP of MHC		0.0391***	0.0272***	0.0121**	0.0198**
P-value		(0.000)	(0.000)	(0.012)	(0.028)
Year 2016			-0.0082	0.0026	0.0148
			(0.0077)	(0.0104)	(0.0453)
Year 2017			-0.0164	0.0088	0.0372
			(0.0104)	(0.0145)	(0.0906)
Year 2018			-0.0524***	-0.0106	-0.0031
			(0.0123)	(0.0194)	(0.1350)
Solidity				0.2336	0.2747
				(1.2073)	(1.2152)
Solidity at $t-1$				0.1289	0.1039
				(0.0961)	(0.0962)
Solidity at $t-2$				-0.2546**	-0.2326**
				(0.1018)	(0.0965)
Net income				-0.0008	-0.0009
				(0.0007)	(0.0007)
Net income at $t-1$				0.0004	0.0004
				(0.0008)	(0.0008)
Net income at $t-2$				0.0009	0.0008
				(0.0008)	(0.0007)
Immigration				0.0040	0.0030
				(0.0134)	(0.0151)
Immigration at $t-1$				-0.0014	-0.0024
				(0.0077)	(0.0094)
Immigration at $t-2$				-0.0024	-0.0010
				(0.0080)	(0.0081)
Population at $t-3$				-2.4170***	-2.3392***
				(0.4656)	(0.4550)
Mean income					-0.9116
					(1.0034)
Mean income at $t-1$					-1.1080
					(0.9301)
Mean income at $t-2$					1.8645**
					(0.9112)
%Low econ std					0.1282
					(0.1274)
%Low econ std at $t-1$					0.2411**
					(0.1074)
%Low econ std at $t-2$					0.1279
					(0.1135)
%High econ std					-0.0654
					(0.0494)
%High econ std at $t-1$					0.0219
					(0.0476)
%High econ std at $t-2$					-0.0937*
					(0.0498)
Education					1.4112
					(2.1163)
Education at $t-1$					2.1347
					(1.8042)
Education at $t-2$					-1.5150
					(2.5199)
Observations	1,740	1,160	1,160	1,160	1,160
R-squared (within)	0.0001	0.0041	0.0426	0.0989	0.1302
N	290	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Controls	No	No	No	Small set	Full set

Notes: Columns 1-5 show the results of estimating the regression model specifications 1, 2, 3, 6 and 7, respectively, on the total number of reported crimes. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity (total effect) of MHC (p-value of the LRP F-statistic is reported in parenthesis). Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

A.2 Effect of ownership-changes on municipality satisfaction

Table 11: Ownership-effect on General Municipality Satisfaction

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
MHC	0.0031	0.0023	0.0043*	0.0041**	0.0042*
	(0.0023)	(0.0025)	(0.0024)	(0.0021)	(0.0024)
MHC at $t-1$		0.0045***	0.0043***	0.0017	0.0012
		(0.0014)	(0.0012)	(0.0015)	(0.0017)
LRP of MHC		0.0068***	0.0086***	0.0058	0.0055
P-value		(0.005)	(0.002)	(0.122)	(0.192)
Solidity				1.1112***	1.0929***
				(0.3882)	(0.4005)
Solidity at $t-1$				0.1871	0.2031
				(0.2810)	(0.3100)
Net income				-0.0006**	-0.0006**
				(0.0003)	(0.0003)
Net income at $t-1$				0.0001	0.0000
				(0.0003)	(0.0003)
Immigration				-0.0013	-0.0000
				(0.0045)	(0.0045)
Immigration at $t-1$				-0.0040	-0.0054*
				(0.0029)	(0.0029)
Population at $t-2$				-0.7714***	-0.7904***
				(0.1923)	(0.2059)
Mean income					0.4854
					(0.3361)
Mean income at $t-1$					-0.1988
					(0.3381)
%Low econ std					-0.0123
					(0.0451)
%Low econ std at $t-1$					-0.0185
					(0.0467)
%High econ std					0.0225
					(0.0221)
%High econ std at $t-1$					-0.0175
					(0.0170)
Education					0.0928
					(1.2030)
Education at $t-1$					-1.4394
					(1.1766)
Observations	777	645	645	645	645
R-squared (within)	0.0011	0.0020	0.0543	0.1559	0.1730
Nu	247	245	245	245	245
Municipality FE	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes
Controls	No	No	No	Small set	Full set

Notes: Columns 1-5 show the results of estimating the corresponding regression model specifications 1-5 on the general municipality satisfaction score index from the *Citizen Survey*. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity (total effect) of MHC (p-value of the LRP F-statistic is reported in parenthesis). Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Ownership-effects on Housing and Safety Satisfaction

	(1) Housing	(2) Housing	(3) Safety	(4) Safety
MHC	-0.0125***	-0.0107***	-0.0085**	-0.0117***
	(0.0038)	(0.0038)	(0.0040)	(0.0042)
MHC at $t-1$	-0.0021	-0.0010	0.0056**	0.0067**
	(0.0030)	(0.0030)	(0.0027)	(0.0029)
LRP of MHC	-0.0146***	-0.0117**	-0.0029***	-0.0049***
P-value	(0.005)	(0.019)	(0.003)	(0.000)
Solidity	-0.1250	-0.1706	0.1762	0.3004
	(0.5456)	(0.5787)	(0.6297)	(0.6539)
Solidity at $t-1$	0.3243	0.3699	-0.3444	-0.5614
	(0.3461)	(0.3597)	(0.4824)	(0.5584)
Net income	-0.0001	-0.0002	-0.0009**	-0.0008**
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Net income at $t-1$	0.0003	0.0004	0.0000	0.0002
	(0.0004)	(0.0004)	(0.0005)	(0.0005)
Immigration	0.0119***	0.0066	0.0011	0.0033
	(0.0044)	(0.0046)	(0.0047)	(0.0047)
Immigration at $t-1$	-0.0113***	-0.0101***	-0.0061**	-0.0062
	(0.0035)	(0.0035)	(0.0031)	(0.0038)
Population at $t-2$	-0.3900	-0.4711*	-1.3886***	-1.1936***
	(0.2759)	(0.2766)	(0.3431)	(0.3427)
Mean income		-0.2250		0.6594
		(0.5983)		(0.5659)
Mean income at $t-1$		0.9686*		0.6338
		(0.5280)		(0.6573)
%Low econ std		-0.0879		0.0025
		(0.0752)		(0.0774)
%Low econ std at $t-1$		-0.0435		-0.0656
		(0.0683)		(0.0675)
%High econ std		-0.0315		0.0308
		(0.0310)		(0.0324)
%High econ std at $t-1$		-0.0684***		-0.0198
		(0.0247)		(0.0263)
Education		-0.5360		2.1567
		(1.6919)		(1.4895)
Education at $t-1$		0.8063		0.3868
		(1.4399)		(1.8017)
Observations	645	645	645	645
R-squared (within)	0.3580	0.3942	0.3474	0.3822
N	245	245	245	245
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set

Notes: Columns 1 and 3 show the results of estimating model 4 (the preferred specification with small set of controls) on the municipality satisfaction scores for housing and safety, respectively. Columns 2 and 4 show the results of estimating model 5 (the preferred specification with full set of controls) on the municipality satisfaction scores for housing and safety, respectively. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity (total effect) of MHC (p-value of the LRP F-statistic is reported in parenthesis). Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

A.3 Effects of ownership-changes on inequality

Table 13: Ownership-effect on economic inequality (Gini coefficient)

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
MHC	-0.0023**	-0.0019**	-0.0006	-0.0006
	(0.0009)	(0.0009)	(0.0008)	(0.0008)
MHC at $t-1$		-0.0007	-0.0011	-0.0011
		(0.0006)	(0.0012)	(0.0012)
LRP of MHC		-0.0026***	-0.0017***	-0.0017***
P-$value$		(0.000)	(0.001)	(0.001)
Solidity				-0.0059***
				(0.0020)
Solidity at $t-1$				0.0028
				(0.0024)
Net income				0.0000
				(0.0001)
Net income at $t-1$				0.0000
				(0.0001)
Immigration				-0.0002
				(0.0006)
Immigration at $t-1$				-0.0010*
				(0.0006)
Population at $t-2$				-0.0078
				(0.0316)
Observations	1,740	1,450	1,450	1,450
R-squared (within)	0.0025	0.0020	0.2681	0.2702
N	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Controls	No	No	No	Small set

Notes: Columns 1-4 show the results of estimating specifications 1-4 with the municipality gini coefficient as the outcome variable. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. LRP of MHC is the long-run propensity (total effect) of MHC (p-value of the LRP F-statistic is reported in parenthesis). Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Robust standard errors in parentheses, clustered at the municipality level. *** p<0.01, ** p<0.05, * p<0.1

A.4 The effect of conversion to tenant-ownership (BRF)

Table 14: BRF-conversion effect on reported crimes and categories

	(1) Total	(2) Total	(3) Person	(4) Person	(5) Property	(6) Property
BRF	-0.0115	-0.0118	0.0396	0.0404	-0.0163	-0.0156
	(0.0230)	(0.0198)	(0.0380)	(0.0386)	(0.0418)	(0.0418)
BRF at $t-1$	0.0138	0.0068	-0.0156	-0.0158	0.0561	0.0499
	(0.0563)	(0.0551)	(0.0539)	(0.0538)	(0.0484)	(0.0444)
LRP of BRF	0.0023	-0.005	0.0241	0.0245	0.0398**	0.0342**
P-value	(0.836)	(0.799)	(0.331)	(0.274)	(0.037)	(0.023)
Solidity	-0.0417	-0.0628	0.0404	0.0454	-0.0926**	-0.1125***
	(0.0622)	(0.0660)	(0.0722)	(0.0781)	(0.0357)	(0.0402)
Solidity at $t-1$	-0.1095	-0.1104	-0.2522**	-0.2568*	-0.1116***	-0.1082***
	(0.0728)	(0.0820)	(0.1245)	(0.1343)	(0.0215)	(0.0306)
Net income	-0.0004	-0.0004	-0.0005	-0.0006	-0.0008	-0.0009
	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Net income at $t-1$	0.0005	0.0003	0.0012	0.0010	-0.0003	-0.0005
	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Immigration	0.0043	0.0043	0.0132	0.0108	0.0044	0.0034
	(0.0077)	(0.0073)	(0.0122)	(0.0121)	(0.0085)	(0.0086)
Immigration at $t-1$	-0.0079	-0.0072	0.0052	0.0055	-0.0092	-0.0096
	(0.0068)	(0.0071)	(0.0089)	(0.0089)	(0.0078)	(0.0080)
Population at $t-2$	-2.6005***	-2.6497***	-2.6650***	-2.8665***	-1.9994***	-2.0404***
	(0.4158)	(0.4086)	(0.4722)	(0.4839)	(0.5190)	(0.5125)
Mean income		-1.8049**		-0.5110		-1.2015
		(0.8171)		(0.9756)		(0.9339)
Mean income at $t-1$		0.4980		-0.0089		0.0306
		(0.8032)		(1.0150)		(0.9203)
%Low econ std		0.1461		0.2070		0.0867
		(0.1006)		(0.1305)		(0.1165)
%Low econ std at $t-1$		0.1481		0.0406		0.0134
		(0.0950)		(0.1308)		(0.1031)
%High econ std		-0.0691*		-0.0455		-0.0937*
		(0.0407)		(0.0499)		(0.0501)
%High econ std at $t-1$		0.0006		-0.0201		-0.0138
		(0.0400)		(0.0528)		(0.0452)
Education		1.8257		-3.0373		2.3707
		(1.8521)		(2.2268)		(2.1612)
Education at $t-1$		0.2455		1.8658		0.3826
		(1.7813)		(2.3698)		(2.2640)
Observations	1,450	1,450	1,450	1,450	1,450	1,450
R-squared (within)	0.0995	0.1234	0.1164	0.1264	0.1587	0.1701
N	290	290	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set	Small set	Full set

Notes: Columns 1, 3 and 5 show the results of estimating model 8 (small set of controls) on the reported number of total crimes, person crimes and property crimes, respectively. Columns 2, 4 and 6 show the results of estimating model 9 (full set of controls) on the reported number on total crimes, person crimes and property crimes, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

Table 15: BRF conversion effect on property crime sub-categories

	(1) Theft	(2) Theft	(3) Damage	(4) Damage
BRF	-0.0797**	-0.0803**	0.0436	0.0454
	(0.0323)	(0.0326)	(0.0307)	(0.0318)
BRF at $t-1$	0.1517***	0.1489***	0.0157	0.0116
	(0.0317)	(0.0285)	(0.0881)	(0.0898)
LRP of BRF	0.0721***	0.0686***	0.0593**	0.057*
P-value	(0.000)	(0.000)	(0.044)	(0.05)
Solidity	-0.0626	-0.0610	-0.0840*	-0.0999**
	(0.0386)	(0.0427)	(0.0462)	(0.0493)
Solidity at $t-1$	-0.1208*	-0.1218*	-0.0998***	-0.0927***
	(0.0625)	(0.0623)	(0.0197)	(0.0319)
Net income	-0.0005	-0.0006	0.0006	0.0006
	(0.0008)	(0.0008)	(0.0011)	(0.0011)
Net income at $t-1$	-0.0008	-0.0007	-0.0009	-0.0010
	(0.0008)	(0.0008)	(0.0011)	(0.0011)
Immigration	0.0137	0.0164**	-0.0213*	-0.0245**
	(0.0085)	(0.0081)	(0.0109)	(0.0112)
Immigration at $t-1$	-0.0061	-0.0041	-0.0042	-0.0057
	(0.0076)	(0.0080)	(0.0128)	(0.0134)
Population at $t-2$	-0.6884	-0.7141	0.6691	0.6774
	(0.4572)	(0.4777)	(0.7730)	(0.7913)
Mean income		0.2207		-0.9521
		(1.0134)		(1.2743)
Mean income at $t-1$		1.0122		-0.7174
		(0.8952)		(1.2522)
%Low econ std		0.2123*		-0.0499
		(0.1128)		(0.2020)
%Low econ std at $t-1$		-0.0002		-0.0739
		(0.1091)		(0.1687)
%High econ std		-0.0689		-0.0372
		(0.0496)		(0.0834)
%High econ std at $t-1$		0.0067		-0.0028
		(0.0424)		(0.0767)
Education		2.2000		0.9357
		(2.3319)		(3.0187)
Education at $t-1$		1.0660		0.4624
		(2.5721)		(3.1237)
Observations	1,450	1,450	1,450	1,450
R-squared (within)	0.3153	0.3224	0.0349	0.0371
N	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set

Notes: Columns 1 and 3 show the results of estimating model 8 (small set of controls) on the reported number of theft crimes and damage crimes, respectively. Columns 2 and 4 show the results of estimating model 9 (full set of controls) on the reported number on theft crimes and damage crimes, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

Table 16: BRF conversion effect on municipality satisfaction

	(1) General	(2) General	(3) Housing	(4) Housing	(5) Safety	(6) Safety
BRF	0.0488*	0.0470*	0.0296	0.0424	0.0626	0.0592
	(0.0272)	(0.0267)	(0.0374)	(0.0356)	(0.0507)	(0.0468)
BRF at $t-1$	-0.0256	-0.0252	-0.0192	-0.0337	-0.0762	-0.0654
	(0.0310)	(0.0308)	(0.0437)	(0.0419)	(0.0576)	(0.0536)
LRP of BRF	0.0232***	0.0218***	0.0104	0.0086	-0.0136	-0.0062
P-value	(0.000)	(0.000)	(0.315)	(0.194)	(0.397)	(0.447)
Solidity	1.1203***	1.1096***	-0.1037	-0.1441	0.2209	0.3403
	(0.3888)	(0.3992)	(0.5463)	(0.5816)	(0.6193)	(0.6447)
Solidity at $t-1$	0.1772	0.1857	0.3013	0.3516	-0.3720	-0.5728
	(0.2861)	(0.3110)	(0.3485)	(0.3621)	(0.4841)	(0.5551)
Net income	-0.0006**	-0.0006**	-0.0001	-0.0001	-0.0009**	-0.0009**
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Net income at $t-1$	0.0001	0.0000	0.0003	0.0004	0.0001	0.0003
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0005)	(0.0004)
Immigration	-0.0014	-0.0001	0.0116***	0.0060	0.0010	0.0030
	(0.0045)	(0.0045)	(0.0044)	(0.0046)	(0.0046)	(0.0047)
Immigration at $t-1$	-0.0044	-0.0056*	-0.0117***	-0.0103***	-0.0065**	-0.0065*
	(0.0028)	(0.0028)	(0.0035)	(0.0035)	(0.0031)	(0.0039)
Population at $t-2$	-0.6982***	-0.7053***	-0.3435	-0.4261	-1.3716***	-1.1737***
	(0.1876)	(0.2002)	(0.2839)	(0.2844)	(0.3414)	(0.3457)
Mean income		0.4981		-0.3017		0.5723
		(0.3336)		(0.5982)		(0.5642)
Mean income at $t-1$		-0.1977		1.0228*		0.7029
		(0.3352)		(0.5243)		(0.6617)
%Low econ std		-0.0141		-0.0922		-0.0123
		(0.0443)		(0.0740)		(0.0758)
%Low econ std at $t-1$		-0.0138		-0.0429		-0.0585
		(0.0459)		(0.0674)		(0.0661)
%High econ std		0.0245		-0.0311		0.0308
		(0.0221)		(0.0311)		(0.0324)
%High econ std at $t-1$		-0.0164		-0.0703***		-0.0208
		(0.0171)		(0.0248)		(0.0267)
Education		0.0255		-0.6154		2.0386
		(1.2088)		(1.6815)		(1.4969)
Education at $t-1$		-1.1710		0.8184		0.2165
		(1.1598)		(1.4381)		(1.8192)
Observations	645	645	645	645	645	645
R-squared (within)	0.1671	0.1829	0.3558	0.3936	0.3474	0.3807
N	245	245	245	245	245	245
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set	Small set	Full set

Notes: Columns 1, 3 and 5 show the results from estimating model 8 (small set of controls) on the *Citizen Survey* scores for general satisfaction, housing satisfaction and safety satisfaction, respectively. Columns 2, 4 and 6 show the results from estimating model 9 (full set of controls) on the *Citizen Survey* scores for general satisfaction, housing satisfaction and safety satisfaction, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.

*** p<0.01, ** p<0.05, * p<0.1

Table 17: BRF conversion effect on economic inequality

	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4
BRF	0.0019	-0.0015	-0.0027	-0.0025
	(0.0028)	(0.0026)	(0.0022)	(0.0023)
BRF at $t-1$		0.0034*	0.0034	0.0035
		(0.0020)	(0.0023)	(0.0023)
LRP of BRF		0.0019	0.0008	0.0009
P-value		(0.241)	(0.26)	(0.254)
Solidity				-0.0059***
				(0.0020)
Solidity at $t-1$				0.0028
				(0.0024)
Net income				0.0000
				(0.0001)
Net income at $t-1$				0.0000
				(0.0001)
Immigration				-0.0002
				(0.0006)
Immigration at $t-1$				-0.0010*
				(0.0006)
Population at $t-1$				-0.0053
				(0.0320)
Observations	1,740	1,450	1,450	1,450
R-squared	0.0005	0.0010	0.2680	0.2702
Number of region_code	290	290	290	290
Municipality FE	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Controls	No	No	No	Small set

Notes: Columns 1 - 4 show the results of estimating the models 1-4 with the BRF variable as core explanatory variable, and the gini coefficient as outcome variable. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Robust standard errors in parentheses, clustered at the municipality level.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

A.5 Excluding metropolitan areas

Table 18: Ownership-effect on criminality - metropolitan areas excluded

	(1) Total	(2) Total	(3) Person	(4) Person	(5) Property	(6) Property
MHC	-0.1329	-0.0920	-0.0772	-0.0505	-0.0867	-0.0531
	(0.1200)	(0.1156)	(0.0974)	(0.0929)	(0.1146)	(0.1141)
MHC at $t-1$	0.0412***	0.0346***	0.0348**	0.0300**	0.0341***	0.0302**
	(0.0099)	(0.0103)	(0.0150)	(0.0149)	(0.0118)	(0.0124)
LRP of MHC	-0.0918***	-0.0573***	-0.0424**	-0.0205*	-0.0525***	-0.0229**
P-value	(0.000)	(0.004)	(0.039)	(0.096)	(0.005)	(0.032)
Solidity	-0.0504	-0.0728	0.0394	0.0461	-0.1032***	-0.1195***
	(0.0441)	(0.0506)	(0.0681)	(0.0761)	(0.0216)	(0.0343)
Solidity at $t-1$	-0.1096*	-0.1182	-0.2554**	-0.2652**	-0.1115***	-0.1237***
	(0.0611)	(0.0728)	(0.1193)	(0.1316)	(0.0105)	(0.0269)
Net income	-0.0004	-0.0006	-0.0006	-0.0007	-0.0006	-0.0008
	(0.0007)	(0.0007)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Net income at $t-1$	0.0004	0.0002	0.0009	0.0007	-0.0003	-0.0005
	(0.0007)	(0.0007)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Immigration	0.0189**	0.0197**	0.0207	0.0192	0.0213**	0.0228**
	(0.0086)	(0.0088)	(0.0167)	(0.0169)	(0.0094)	(0.0102)
Immigration at $t-1$	-0.0075	-0.0080	0.0038	0.0041	-0.0082	-0.0097
	(0.0082)	(0.0085)	(0.0109)	(0.0111)	(0.0109)	(0.0113)
Population at $t-2$	-2.7815***	-3.0323***	-2.9327***	-3.2988***	-2.4117***	-2.5404***
	(0.4901)	(0.4684)	(0.5702)	(0.5908)	(0.6368)	(0.6248)
Mean income		-1.8327*		-0.5239		-0.8390
		(0.9707)		(1.1785)		(1.1010)
Mean income at $t-1$		0.4075		0.1640		-0.3378
		(0.9325)		(1.2125)		(1.0203)
%Low econ std		0.2092*		0.2498		0.1739
		(0.1190)		(0.1582)		(0.1393)
%Low econ std at $t-1$		0.2045		0.0841		0.0644
		(0.1260)		(0.1803)		(0.1361)
%High econ std		-0.0610		-0.0367		-0.0877*
		(0.0427)		(0.0521)		(0.0528)
%High econ std at $t-1$		-0.0075		-0.0112		-0.0238
		(0.0437)		(0.0553)		(0.0480)
Education		2.0304		-2.4631		2.3888
		(2.1127)		(2.4180)		(2.4375)
Education at $t-1$		0.7442		1.6163		1.4423
		(1.9034)		(2.5750)		(2.3861)
Observations	1,195	1,195	1,195	1,195	1,195	1,195
R-squared (within)	0.0915	0.1221	0.1242	0.1336	0.1268	0.1425
N	239	239	239	239	239	239
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set	Small set	Full set
Subsample	Non-urban	Non-urban	Non-urban	Non-urban	Non-urban	Non-urban

Notes: Columns 1, 3 and 5 show the results of estimating model 6 (small set of controls) on the reported number of total crimes, person crimes and property crimes, respectively. Columns 2, 4 and 6 show the results of estimating model 7 (full set of controls) on the reported number on total crimes, person crimes and property crimes, respectively. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1

Table 19: Ownership-effect on crime categories - metropolitan areas excluded

	(1) Theft	(2) Theft	(3) Damage	(4) Damage
MHC	0.0527	0.0691	-0.0603	-0.0361
	(0.0780)	(0.0792)	(0.1438)	(0.1433)
MHC at $t-1$	0.0031	-0.0016	0.0221	0.0196
	(0.0087)	(0.0098)	(0.0143)	(0.0146)
LRP of MHC	0.0559	0.0675	-0.0381	-0.0165
P-value	(0.764)	(0.66)	(0.209)	(0.358)
Solidity	-0.0610**	-0.0498	-0.1072**	-0.1231**
	(0.0302)	(0.0378)	(0.0427)	(0.0516)
Solidity at $t-1$	-0.1277**	-0.1451***	-0.0923**	-0.1034**
	(0.0520)	(0.0544)	(0.0363)	(0.0433)
Net income	-0.0000	-0.0001	0.0006	0.0005
	(0.0009)	(0.0009)	(0.0012)	(0.0012)
Net income at $t-1$	-0.0007	-0.0006	-0.0008	-0.0010
	(0.0009)	(0.0009)	(0.0012)	(0.0012)
Immigration	0.0298***	0.0348***	-0.0081	-0.0069
	(0.0097)	(0.0104)	(0.0136)	(0.0147)
Immigration at $t-1$,	-0.0024	-0.0012	-0.0117	-0.0108
	(0.0106)	(0.0111)	(0.0145)	(0.0147)
Population at $t-2$,	-0.5286	-0.5458	-0.2577	-0.4127
	(0.5639)	(0.5855)	(0.9601)	(0.9818)
Mean income		0.9179		-0.8786
		(1.1413)		(1.4643)
Mean income at $t-1$		0.3011		-0.1960
		(0.9996)		(1.3727)
%Low econ std		0.2771**		0.1328
		(0.1367)		(0.2193)
%Low econ std at $t-1$		-0.0714		0.1690
		(0.1457)		(0.2020)
%High econ std		-0.0696		-0.0275
		(0.0527)		(0.0885)
%High econ std at $t-1$		0.0013		-0.0054
		(0.0434)		(0.0782)
Education		2.9874		0.9262
		(2.5808)		(3.1919)
Education at $t-1$		1.4055		2.6219
		(2.7120)		(3.2358)
Observations	1,195	1,195	1,195	1,195
R-squared (within)	0.2692	0.2783	0.0245	0.0299
N	239	239	239	239
Municipality FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Controls	Small set	Full set	Small set	Full set
Subsample	Non-urban	Non-urban	Non-urban	Non-urban

Notes: Columns 1 and 3 show the results of estimating model 6 (small set of controls) on the number of reported crimes of theft and damage, respectively. Columns 2 and 4 show the results of estimating model 7 (full set of controls) on the number of reported crimes of theft and damage. All variables are IHS transformed. MHC is the number of apartments owned by the municipal housing company. Solidity and net income are measures of the financial health and economic performance in the municipality administration. Immigration measures the net inflow of immigrants from foreign countries into the municipality in a certain year. Population is the number of inhabitants in the municipality. Mean income refers to the average net income from work and capital in the municipality households. Low and high economic standard measure the fraction of municipality inhabitants that live in a household with incomes of less than 60 percent and more than 200 percent of the national median, respectively. Education is the mean number of years of schooling among the municipality inhabitants. Robust standard errors in parentheses, clustered at the municipality level.
*** p<0.01, ** p<0.05, * p<0.1