Incentives for energy efficiency measures in post-war multi-family dwellings

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Licentiate Thesis
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Stockholm 2011
Acknowledgement

I wish to thank my supervisor Professor Hans Lind and assistant supervisor Dr Kristina Grange for guidance, support, patience and inspiration. I would also like to thank the members of the reference group for interesting discussions and valuable input.

This work builds on the contribution of those who have been kind enough to share their knowledge with me. I would therefore like to thank the people that I have had the pleasure to interview and the survey respondents – this would not have been possible without you.

Grateful thoughts go to friends and colleagues at KTH, whose comments and support have been important and appreciated, and to family and friends, who have had patience with me and given me strength and inspiration – thank you.

I would also like to thank the Centre for Energy and Resource Efficiency in the Built Environment (CERBOF) for financial support.

Stockholm, May 2011
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Overview

Introduction
Energy efficiency is an important question to society as well as to individuals and firms. Improving energy efficiency in the building sector is considered an important means to climate mitigation. For real estate owners energy is also a central expenditure item and reducing energy consumption may directly reduce operation costs while at the same time serve as insurance against future energy price increases. Since new buildings only add a few percent annually to the building stock, the potential to reduce total energy consumption primarily lies within the existing building stock. The building stock is ageing and the post-war part of the stock that is in need of renovation is growing. This has been suggested as a window of opportunity to improve energy efficiency, but so far the results have been few. Several factors have been put forward to explain the so called energy efficiency gap – the difference between actual and optimal energy efficiency – one of which is split incentives. What adds to complexity in this case is that distinct differences have been observed in the level of ambition between the real estate companies that have renovated so far. Some companies have undertaken extensive renovation and energy efficiency measures, whereas other companies have done little more than urgent maintenance measures. It seems that real estate owners in general don’t have strong economic incentives to improve energy efficiency in connection to renovation – but what can then explain the differences between strategies?

This licentiate thesis examines the incentives among real estate owners to improve energy efficiency, particularly in post-war, multi-family buildings in need of renovation. The purpose is to add knowledge about decisions concerning measures that increase energy efficiency in terms of incentives, barriers and different motives for real estate owners’ strategies and actions.

Method
To analyze the questions above, an empirical investigation has been conducted, based on interviews and a survey on real estate owners’ views on, attitudes towards and actions for renovating and improving energy efficiency. There is also a theoretical part that analyzes the matter of split incentives through simulations of how costs, benefits and ultimately incentives change for tenant and landlord if energy consumption is moved from an inclusive rent to an exclusive rent with individual metering and charging.

The thesis consists of three papers, one of which is co-authored with Hans Lind and Kristina Grange. The first paper presents the results from an interview based study on real estate owners’ views on and attitudes towards renovation and energy efficiency. These findings are developed further in the second paper, where a number of hypotheses are tested concerning views and attitudes in different types of real estate companies are presented. The last paper presents the theoretical discussion about a particular case of split incentives concerning tenants and landlords. The distribution of costs, benefits and incentives are examined through simulated transitions from inclusive rent to exclusive rent with individual metering and charging.
Results
Real estate companies do not have the same approach to energy efficiency matters. Rather they can be divided into (at least) three ideal types relating to their level of energy efficiency ambition, but not simply according to the public-private ownership divide. The least ambitious company type is driven mainly by regulatory and economic motives and only carries out energy efficiency improvements that are profitable in a short-term perspective. The next level of ambition can be found with the company type that does “a little extra” and is partly driven by a sense of responsibility for the environment. This company type calculates profitability with a little longer time perspective or accounts for positive side effects for the company, such as good publicity. The most ambitious type carries out an extensive amount of energy efficiency improvements, and doing so is motivated partly by long term economic reasons but mostly by some other factor, which may include direct political directives.

The more ambitious companies do more extensive energy efficiency work, and are more forward planning than are less ambitious companies. They also to a higher extent need to motivate energy efficiency investments by other reasons than economy and regulations. Less ambitious companies place more emphasis on transaction costs, competing investments and financing problems than do more ambitious companies. There is no indication that perception of uncertainty, risk or profitability, or the use of calculation methods differ with respect to ambition level.

If real estate owner and tenant could find ways to negotiate over possible gains from improving energy efficiency and/or installing individual metering and charging, some of the split incentives could be avoided.

Discussion
The absence of strong economic incentives and the heterogeneity among real estate companies may make it difficult to address the companies with policy measures that aim to increase the level of energy efficiency in the building sector. On the other hand, given that energy is correctly priced, considering external effects of energy consumption, the current level of energy efficiency may be optimal from a social point of view. Resources are, as is well known, scarce, and careful consideration should be given to how they are spent to ensure that the marginal social cost of reducing energy consumption does not exceed the marginal social benefit from the reduction. In the case of individual metering for example, there is a risk that real estate owners over-invest in energy efficiency if they don’t consider the (possible) lower energy consumption achieved through individual metering before calculating the profitability of energy efficiency measures.

Conclusion
Real estate owners lack strong economic incentives to invest in energy efficiency in multi-family buildings and the level of investment is dependent on the different motivations real estate companies have. One important conclusion is that the heterogeneity between companies that was exposed in the interviews and survey implies that they will not respond similarly to policy stimuli. The heterogeneity should thus be considered when designing policy measures
so that public and company resources can be allocated as efficiently as possible, as there are many challenges facing owners of post-war residential buildings. Another conclusion is that from an economic point of view it is important to take the interaction between different measures into account, e.g. between physical measures and measures focusing on changing household behavior.
Paper 1: Incentives for Improving Energy Efficiency When Renovating Large-Scale Housing Estates: A Case Study of the Swedish Million Homes Programme

The aim of this paper\(^1\) is to explore the views and actions of real estate companies regarding renovation and energy efficiency improvements. Interviews were carried out with private and public housing companies, and based on the interview results the companies were categorized according to level of ambition in energy efficiency matters.

The semi-structured interviews covered 16 companies of which 13 were owned by municipalities and 3 had private owners. The questions covered views on, and actions for renovation and energy efficiency measures in the 1960’s and 1970’s residential building stock. The companies were categorized using an ideal types concept, which illuminates the differences and similarities in energy efficiency ambition and strategies in order to explain earlier behavior and predict possible outcomes.

The interviews indicated that the companies differ enough to argue that they cannot all be expected to (re)act in the same way in these matters, but neither can it be argued that they all will act completely individually. Based on the results from interviews with the real estate companies, the companies have been divided into four ideal types that highlight the differences in energy efficiency ambition and strategies; the Strict Profit Maximizing Company, the Little Extra Company, the Policy Led Ambitious Company and the Administration Led Ambitious Company. The categories represent the companies’ motivations and levels of ambition to improve energy efficiency when renovating their post-war multi-family dwelling stock.

The Strict Profit Maximizing Company undertakes only those energy efficiency measures that are strictly profitable in the short run to medium run, and that has higher expected returns than competing investments. The Little Extra Company will make allowances for energy efficiency measures, motivated by e.g. other assumptions about the net operation costs or the value of goodwill. The Policy Led Ambitious Company and the Administration Led Ambitious Company have ambitious energy efficiency objectives, initiated either by the political management or by driving forces within administration. The ambitious efficiency work is motivated by internalization of external costs, a very long-run perspective or other manipulations of calculations, and does not necessarily need to fulfill profitability criterions.

The different strategies will determine how the companies respond to incentives to invest in energy efficiency, and affect the overall result in the energy efficiency work. The ideal types hence are important to have in mind when designing policies to increase energy efficiency.

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\(^1\) Co-authored with Hans Lind and Kristina Grange
Paper 2: Real estate owners’ views on renovation and energy efficiency in post-war multi-dwelling buildings

The upcoming renovations of large parts of the Swedish residential building stock have been seen as a window of opportunity to undertake energy efficiency measures, which would contribute to reaching ambitious savings objectives. In this paper the indications that building owners don’t have strong economic incentives to undertake such measures are investigated, and it is tested whether company attitudes and strategies differ with respect to level of ambition in energy efficiency matters.

The findings of paper 1 and the ideal type concept are developed and explored further in this paper. The aim is to get a more comprehensive view of the renovation and energy efficiency state in Swedish companies, as well as to test hypotheses about whether the ideal type affects the views on and strategies for energy efficiency, to get an indication of what energy efficiency investments can be expected to occur spontaneously in the existing Swedish building stock.

111 public and private companies were surveyed through a web-based questionnaire to be classified as an ideal type. Their views on renovation and energy efficiency investment related matters were then tested to see if there are differences between the companies according to their level of energy efficiency ambition.

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The hypotheses are centered around three main themes and predicted that ambitious companies would have carried out/be planning more (extensive) energy efficiency work than less ambitious companies; that less ambitious companies would perceive obstacles to be bigger than ambitious companies do; and that ambitious companies will require less from energy efficiency measures in terms of investment and its profitability.

The results indicate that renovations have started but will constitute a challenge to the companies, which may crowd out energy efficiency investments. They also indicate that the more ambitious companies do more extensive energy efficiency work and are more forward planning, but will not intervene “in excess”, in comparison with less ambitious companies. There are also indications that energy efficiency may be hindered by transaction costs, uncertainty about future energy prices, competing investments or financing, and that less ambitious companies place more emphasis on transaction costs, competing investments and financing problems than do more ambitious companies. There is no indication that the importance of economic considerations or that perceptions of uncertainty, risk or profitability differ with respect to ambition level, nor are there indications that the use of calculation methods or discount rate differs. It appears that it isn’t primarily economic or regulatory drivers that make the ambitious companies invest in energy efficiency; rather they seem to need other motives for energy efficiency investments in order to “create” profitability, whereas less ambitious companies seem to value short term profitability higher than ambitious companies do. Taken together only moderate energy efficiency investments are expected.
Paper 3: Individual metering and charging in rental housing: Creating the right incentives for energy savings?

The third paper analyzes the split incentives problem related to energy efficiency in the building sector, exemplified by individual metering and charging of heating and hot water in residential housing. Changing user behavior by individually metering and charging tenants for their use of heating and hot water has been put forward as a means to reduce energy consumption in the building sector. This would give the tenant incentives to save energy, but at the same time weakens the landlord’s incentives for improving energy efficiency in the building, since she is no longer responsible for energy costs. These split incentives problems should be possible to avoid if there is a net gain from improving energy efficiency and/or installing individual metering that could be shared between the parties.

The aim of this article is to problematize the concept of individual metering, to show through simulations that there are ways to avoid the split incentives problem involved, and to show that it should be possible to design contracts that give both landlord and tenant incentives to save energy.

Starting in a fictive situation where the tenant pays an inclusive rent to the landlord, it is studied how incentives for energy efficiency and savings are affected by investments in energy efficiency and/or individual metering, thus altering the distribution of energy cost between landlord and tenant.

The results indicate that few energy efficiency investments will manage to bear their own investment costs, given how low the present value of the energy savings is at given energy prices. The results also show how split incentives may hinder the energy efficiency investments, but that there are conditions under which such investments and/or individual metering may increase welfare for landlord, tenant or both. Without negotiations this gain will not be reached, but through co-operation this welfare gain could be split which would benefit both landlord and tenant and this should be considered when designing contracts. Finally the findings highlight the importance to take into account the interaction of different means to save energy to avoid over-investment.