Does the asking price matter?
Evidence from a natural experiment in
residential real estate

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Abstract

This paper analyses a reform whereby Real Estate Agents in Stockholm voluntarily changed the way they set the asking price for homes for sale. They changed from a *teaser price* – on average 25 percent below the sales price – to an *accepted price* close to the market value. Accepted price is defined as a price the seller is ex-ante willing to sell the home for, and should be within the Real Estate Agent's valuation range. The change occurred in central Stockholm in August 2011 and in non-central areas in January 2012. I find that setting the asking price close to the sales price decreases the sale price by five percent (about 16,000 USD) and increase the time on the market by twenty-four percent (seven days).

JEL classification:

Keywords: Real estate prices, asking prices, bidding wars, auctions.

1 Introduction

Choosing the asking price[1] for a home is a challenge for sellers and real estate agents (REAs). The can choose to advertise the home below, at, or above the market value. In Stockholm, Sweden, homes are sold at an auction where buyers place a bid to the REA over phone, text, or email. The auction lasts for days or months. It is illegal for REAs to set the asking price unrealistically low, but during most of the 2000's – the financial crisis an exception – the asking price was notoriously far below the asking price. In 2009 and 2010 the asking price was on average 25 percent below the sales price. The large deviation between listing and sales price caused a media debate about the REAs' sincerity. In early 2011, in an attempt to repair their reputation, the majority of Stockholm's REAs agreed to voluntarily and collectively reform the way they listed apartments for sale. Instead of listing homes for a low *teaser price* they listed them at the *accepted price*. The (level of the) accepted price is an agreement between the REA and the seller, shall be in line with the REA's valuation, and above the seller's ex-ante reservation price. Importantly for this paper, the reform only affects the *level* and *name* of the asking price. There are no legal consequences or effects on the auction mechanism. Buyers can still place non-binding bids below, at, or above the asking price. Sellers can still withdraw from the sale free of charge even if someone has placed a bid at or above the accepted price. The reform affected listings in central Stockholm starting August 1st, 2011 and in non-central areas starting January 1st, 2012. I study the effects of the reform on sales price and time on market. I find that listing homes at market value (accepted price) led prices to fall by five percent and time on the market to increase by twenty-four percent, compared to listing on average 25 percent below market value (teaser price). I further find that the reform caused asking prices to increase by nine percent, and the relative difference between asking price and sale price fell by sixteen percent. I use detailed transaction level data on cooperative apartment sales in Stockholm from 2005 through 2013 and employ a staggered difference-in-difference regression to deduce the effect.

Due to the endogeniety issues it is hard to empirically study the role of the asking price in the real estate market. To the best of my knowledge this is the first paper to study a natural experiment directly affecting only the asking price. Yavas and Yang (1995) employ a two-stage regression and find that increasing the asking price will increase the time on the market for mid-price houses. They do not find an effect for cheap or expensive houses. Kang and Gardner (1989) find that overpriced homes takes longer to sell. Anglin, Rutherford, and Springer (2003) find that increasing the asking price increase time on the market. There is evidence for *irrational overbidding* in non real estate auctions, see for example Malmendier and Lee (2011)[2].

Han and Strange (2012) use a one-period search model to study the effect of the asking price on sales price. They find that if a house price boom is sufficiently strong, setting a low asking price

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[1] I will use the terms asking price, listing price, and asking price interchangeably

[2] However Einav, Kuchler, Levin, and Sundaresan (accepted) find that the irrational overbidding in online auctions has since gone away.

will not reduce the buyers search intensity but will result in more bidding wars, hence increasing the average sales price. If the boom is weaker, however, the search intensity will decrease with the asking price, thus reducing the sales price. Using a survey they further find that reducing the asking price by 10 percent increase the number of bidders by 4 percent. Other models treat the asking price as a trigger price where a sale is immediate and further bidding is not possible, see for example Lester, Visschers, and Wolthoff (2013).

Contrary to my results Björklund, Dadzie, and Wilhelmsson (2006) find that a higher asking price will increase both the price and time on the market. They also study Stockholm, but for an earlier time period (1999-2002) and have a much smaller sample size, and use a hedonic regression. Levitt and Syverson (2008) find that better informed agents leave their homes on the market 9.5 days longer and sell their homes for 4 percent more than comparable homes .

The paper is organized as follows. Section 2 describes the Swedish real estate market and the reform, Section 3 the data, and Section 4 the empirical strategy and results. I leave verifying the crucial assumptions of the model, descriptive and summary statistics, to Section 5. Section 6 concludes.

2 Stockholm residential real estate, the sales process and the reform

Ownable apartments in Sweden are cooperatives (coops) in which each "owner" is a shareholder in the coop. Attached to each coop-share is the right to live in a certain apartment owned by the coop, as long as the monthly coop fee is paid. The monthly coop fee is used to cover building maintenance, heating, debt etcetera. The coop statues are heavily regulated by law (Bostadsrättlagen) and as a result there is a minimal amount of due diligence required when purchasing a coop. The due diligence is usually limited to checking the annual report of the coop and a visual check of the state of the apartment[3].

2.1 Real estate agents and the sales process

A Swedish REA is hired and paid for by the seller, but is bound by law to safeguard the interests of both the buyer and the seller (§8, Riksdagen (2011)). The payment to the REA is contingent on the property actually being sold and is commission based, either a fixed percentage (for example 3 percent) of the sales price or a fixed payment and then a percentage above a certain threshold (for example SEK 40,000 + 5 percent for prices above SEK 2,000,000). If the seller is not willing to sell the REA will not get paid, contrary to other markets where there might be a penalty cost to withdraw the sale if the bid is high enough. Most contracts with REAs prohibits the seller to

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[3]There are still a few, older, coops that are subject to other laws.

hire another REA within 3-6 months after the first attempt at selling the home.

The homes are advertised in local newspapers and online on sites like `Hemnet.se` and `Blocket.se`. The properties are usually listed 3-10 days before the first scheduled viewing, which is a Sunday afternoon. There are one or two additional viewings on the prior Thursday or the following Monday or Tuesday evening. The viewings are open house without a prior sign-up requirement, but sometimes people arrange private pre-viewings with the REA before the first open house viewing.

The sales process is similar to an English outcry auction, with a few exceptions: The bidding can start at any time, and is commonly done by sending a text message, email or placing a phone call to the REA. Each bidder gets assigned an anonymous bidder id that is communicated along with the bid to the other bidders and the seller. The REA will reveal the identity behind the anonymous bidder id's to the winning bidder upon request. The bids are not binding for neither the buyer nor the seller; a bidder can withdraw his bid at any time, and the seller might choose not to sell to the highest bidder. In neither case is there is a monetary withdrawal cost until the binding sales contract is signed.

2.2 The reform

Since the early 2000's there has been a debate in Sweden about the REAs skills and sincerity. Specifically the fact that the final sales prices of apartments in Stockholm greatly exceeded the asking prices in the advertisements has attracted a great deal of attention, and lead the media to use the term *teaser price* [4]. Following this debate – possibly in fear of regulation – the Swedish Real Estate Agents Trade Association (Mäklarsamfundet) hired two researchers to analyse the occurrence and potential remedies of bait prices. Using empirical data from 2007 and surveys conducted in 2008, the researchers (Gunnelin and Lind, 2008) find that Stockholm based REAs set the asking price 30-40 percent below the expected market value in anticipation of a bidding war. They further find that the media attention this caused has hurt the reputation of the REAs. None of the REAs could come up with a viable alternative to bait-prices.

To improve the reputation of the REAs their Trade Association coordinated a change in the initial asking price, from a low bid starting point (teaser price) to something they choose to call *accepted price*. In total 40 REAs – comprising 80 percent of the market – agreed on the reform, see appendix A for a list of participating REAs. That the reform didn't have a 100 percent take-up rate means that the effects I find are underestimated. The reform affected apartments listed in central Stockholm (see figure 2 for a map) starting August 1st 2011. Accepted price is explained to the buyers as:

Accepted price means the advertised price is at a level which the seller is willing to accept as final price. If there are multiple bids, however, bidding might occur and the price might go higher. The

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[4]The Swedish word "lockpris" translates into teaser price or bait price.

seller and the real estate agent will jointly agree on the level of the accepted price which is also within the real estate agent's valuation of the home. Although an accepted price is advertised the seller has the legal right to review any offers, which means the seller has the right to choose whether to sell the home, to whom and at what price."[5].

It is important to highlight that reform didn't change anything in the auction- or sales process[6]. In particular; although the seller is supposed to be ex-ante willing to sell the apartment at the accepted price, he is not bound to sell at that price. Further, buyers are still able to bid below, at, or above the accepted price, and to withdraw their bids without any cost. In essence, the reform only changed the *name and level* of the initial bid starting point[7]. For additional clarity figure 1 shows examples on how the online advertisements might look for the two different asking prices.

[INSERT FIGURE 1 ABOUT HERE]

During the fall of 2011 the REAs agreed to start using accepted price also for non-central Stockholm County homes starting January 1st, 2012. The reform was first introduced in central Stockholm because this was an area with more stable differences between listing and sales price (Gunnelin and Lind, 2008), and the REAs didn't anticipate any large effects on neither price nor time on market.

3   Data

I use transaction level data purchased from Mäklarstatistik AB, covering residential coop apartment transactions in and around central Stockholm from 2005-01-01 through 2014-03-31. Mäklarstatistik collects data from real estate agents and Statistics Sweden (SCB) and cover about 80 percent of the market. I have data for those congregations (the urban version of a parish) that are located just inside and just outside of central Stockholm. Figure 2 plots the data on a map of Stockholm, color coded so that red are central and blue are non-central. The full sample contains 118,338 transactions, but because some data are missing for some transactions, the analysis will use about $55,000\text{-}80,000$ transactions.

[INSERT FIGURE 2 ABOUT HERE]

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[5]Translation by the author, the untranslated wording is: "Accepterat pris innebär att priset som anges i bostadsannonsen ligger på en nivå som säljaren är villig att acceptera som slutpris. Om flera bud finns kan dock budgivning förekomma och priset bli högre. Säljaren och mäklaren kommer gemensamt fram till nivån på det accepterade priset som även ligger inom ramen för mäklarens värdering av bostaden. Även om ett Accepterat pris är angett råder enligt lag alltid fri prövningsrätt för säljaren vilket innebär att denne har rätt att själv välja om bostaden ska säljas, till vem och till vilket pris." Source: www.svenskfast.se

[6]There might be informational effects, however, since the accepted price means that the seller reveals his reservation price, and it also provides a better guess for the final sales price.

[7]Note the difference between the accepted price used in the reform and the suggested bait price remedy suggested by Gunnelin and Lind (2008). In the latter the seller is bound to sell while in former he is not.

At the transaction level, the data contains information about the following parameters: listing date and time, contract signing date, sales date, move in date, asking price, sales price, size in square meters, size in number of rooms, which floor of the building the apartment is located on, the number of floors in the building, the year of counstruction of the building, the monthly fee to the coop, the percent share of the coop, GPS-coordinates, street name and number, apartment number, zip-code, congregation and municipality. Some transactions lack certain parameters.

As additional covariates I calculated the distance to the closest subway stop as well as distance to the Central Business District (CBD). To this end I manually collected the GPS-coordinates for every subway stop exit in Stockholm using `kartor.eniro.se`, as well as the GPS-coordinate of Stureplan in central Stockholm.

A general problem in real estate transaction data – also present in this dataset – is the lack of a reliable *quality* parameter. The unobserved quality could be a combination of factors like the view from the kitchen (a view of the sea might be preferred to a highway view) as well as the condition of the kitchen/bathrooms/floors, the floor layout, etcetera[8]. In the data, a completely renovated apartment may look exactly the same as an apartment in very poor condition, even though the cost of the renovations will probably be priced in the final sales price. I only have data for successful sales and there is thus survivorship bias in the data.

3.1 Proxy for type of asking price

I do not have information about the type of asking price used – whether the apartment was listed using accepted price or using bid starting price – and I will have to proxy for this. As a proxy I will use listing date interacted with region: by treating all transactions sold within Stockholm after August 1st 2011, and all transactions in non-central Stockholm from January 1st 2012, as being sold with accepted price. This proxy is not perfect. I have anecdotal evidence from talking to REAs that some central apartments were listed as accepted price already in the spring of 2011, prior to the official reform date. Similarly apartments were listed with accepted price in non-central Stockholm in the fall of 2011. Even to this date not all apartments in Stockholm are listed as accepted price, although the vast majority are. This proxy-imperfection will look like partial compliance to the regressions and, if anything, it will generate *underestimated* of the reform. In section 5.1, I show that the combination of date and region actually does a good job in proxying the type of asking price used.

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[8]The standard way to limit the importance of missing variables that are constant over time is to use repeat-sales methods, but this would require unique apartment ID's that I don't have.

4 Empirical Strategy and Results

The dataset spans 9.25 years and I use time fixed effects to take time trends into account. The two reform dates are captured by one dummy each. Apart from this the specification is a standard Difference-in-difference (DiD) regression[9].

To see the effect of the reform on the key dependent variables I run the regression separately and independently for $Y_{i,t} = log(SalesPrice)$ and $Y_{i,t} = log(TOM)$. It is possible that the effect on the asking price goes via TOM or vice versa, but without more detailed data the exact mechanism is hard to verify. To check the validity of the proxy, in section 5.1 I will run the regression for for $Y_{i,t} = log(ListingPrice)$ and $Y_{i,t} = PricePremium\left(= \frac{SalesPrice - ListingPrice}{ListingPrice}\right)$. I estimate the model using Ordinary Least Squares. The Standard Errors are clustered at the address level, but the result hold up also if I cluster at the zip code- or even congregation level.

The model is

$$
\begin{aligned}
Y_{i,t} &= \alpha + \beta X + \theta central + \xi_1 year_t + \xi_2 moy_m \\
&+ \gamma_1 \cdot R_1 \cdot central + \gamma_2 \cdot R_2 \cdot (1 - central) + u_{i,t}
\end{aligned}
\tag{1}
$$

where the intercept, α, is the average Y for a non-central apartment before the reforms. The coefficients in the vector β measures the loadings on the structural characteristics described in the vector X (size, monthly fee, et cetera...). The coefficient on $central$, θ, captures the location effect not due to the reform (for example that central apartments are more expensive than non-central, all else constant). $year_t$ are year fixed effects used to pick up long-term trends in the data that we don't want to be captured by the γ's, and moy_m are month-of-the year fixed effects to pick up any intra-year seasonality. The model use alternating control groups: for the first reform we compare central to non-central, and for the second reform we compare non-central to central. R_1 and R_2 are fixed effects set to 1 after the 1st and 2nd reform, respectively. The parameters of interest are the coefficients for the first and the second reforms, $R_1 \cdot central$ and $R_2 \cdot (1 - central)$ respectively[10]. The coefficient γ_1 measures the change in Y due to the first reform, and γ_2 captures the effect of the second reform, provided we assume that homes both inside and outside of central Stockholm did not appreciate at different rates for other reasons than the reform.

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[9]The standard one reform and two time periods DiD model looks something like $Y = \alpha + \beta X + \delta R + \theta central + \gamma \cdot R \cdot central + u$

[10]Note the $(1-central)$ in the second interaction term. This is used in order to facilitate interpreting the effects of the second reform (so that a positive effects has positive number). I use alternating control groups in the regressions and $(1 - central)$ is equivalent to interacting with $NonCentral$.

4.1 Effects on sales price

Column (1) of Table I presents the results of the two reforms on the natural logarithm of the sales price. We see that the first, central Stockholm, reform has a significant negative impact of prices: central (reformed) apartments fall 4.9 percent in price relative to non-central apartments. The average price of an apartment in the sample is 2.6 MSEK ($\approx 320,000$ USD) and 4.9 percent of this is about 130,000 SEK ($\approx 16,000$ USD). The second reform also have a significant effect with non-central (reformed) apartments falling 1.4 percent in value relative to central apartments.

[INSERT TABLE I ABOUT HERE]

The magnitude and significance of the second reform is less than that of the first reform. One possible explanation for the weaker results is contagion in the use of accepted price from central to non-central Stockholm before the second reform. Recall that the reform was voluntary by the REAs. If there is pre-treatment of non-central Stockholm (reform-contagion from central Stockholm prior to the official reform date in non-central Stockholm), the effects of the second reform should be smaller than those of the first reform. (If there was early adoption of accepted price before the reform in non-central Stockholm, the first reform will also be underestimated by equation 1)

We further see in column (1) of table I that a central apartment costs 33 percent more than a non-central apartment all else equal. Adding another square meter to the apartment increase it's sales price price by 1.3 percent, another room by 7 percent, a monthly coop fee of 1,000 SEK extra decrease the price by 5.3 percent, an apartment being situated 1 floor higher up in the building is 2 percent more expensive, and being in a building with one more floor increase price by 0.8 percent. The effects of being in an old building, far from the central business district and far from the subway are significant but small (remember we already control for central/non-central). The model can explain about 83 percent of sales prices.

Column (2) of table I shows the same regression when using data from 2010-2012. By excluding sales that are far away in time from the reforms, we get rid of potential effects due to events not related to the reforms. Here we get significant effects on prices at the 0.1 percent level for both reforms. Prices fall by 5 percent from the first reform and 2.1 percent from the second reform, relative to non-central and central Stockholm respectively.

4.2 Effects on Time On Market (TOM)

Column (1) in Table II presents the results of the two reforms on TOM: TOM increase by 24 percent from the first reform and 17 percent from the second reform, significant at the 0.1 percent level. Using only sales near the reforms in time, column (2) shows that effect of the first reform is 23 percent and the second reform is then 21 percent. The average time to sell an apartment in

the sample is 27 days, increasing this by 24 percent would mean it takes another week to sell the apartment.

[INSERT TABLE II ABOUT HERE]

Central apartments sell 9 percent quicker than non-central, apartments with one more room sell 5 percent quicker than those with one less room, and apartments with a monthly coop fee of 1,000 SEK ($\approx$ 120 USD) more sell 6 percent slower than those with a lower fee. The effect of the other parameters is small, although sometimes significant. The explanatory power of the model is small, 6.2 percent in column (1), which is not too surprising as the due diligence time is similar for all types of apartments. Interestingly, it seems the major factors driving the sales price of the apartments are also large drivers of TOM: apartments that are located in central Stockholm or have one more room are more expensive and sell quicker than those not. Apartments with a higher fee are cheaper and sell slower than those with a lower fee.

5 Verifying assumptions and some robustness checks

This section discuss the assumptions made in the model, does some robustness checks, as well as present some the summary statistics of the dataset.

5.1 Is the asking price type proxy valid?

There is no parameter in the data for weather the apartment was sold using bid starting price or accepted price, and to cope with this I proxy for the listing type by assuming that apartments listed in a a region that has undergone the reform was sold using accepted price, and those that hadnt undergone the reform was sold using bid starting price. To verify that this proxy actually works I will do two things. First, I will plot the share of apartments that increase in value more than 15 percent. The idea is that if an apartment is sold using accepted price the asking price will be close to the sales price (that's the whole idea with the reform), whilst if it was listed as bid starting price they will go up on average 20 percent. Second, I will run the DiD specification on the asking price as well as the relative price increase. Because the reform was supposed to affect these variables it makes sense to verify that our model actually captures this.

If an apartment is sold far above the asking price it is probable that it has not gone through the reform and is listed with a bid starting price. By looking at the share of transactions selling at a high price-premium we can thus get a rough idea about the adoption rate of accepted price, all else constant. Figure 3 plots the share of apartments that have a sale price more than 15 percent above the asking price. We see that the share of apartments selling for more than 15 percent above the asking price started falling already before the reform in the winter of 2011. This fall affects both central and non-central apartments, however, and is probably more due to the Euro-crisis

rather than early adoption of accepted price[11]. Comparing the plots for central and non-central Stockholm we see that they are parallel but with one exception: when only central Stockholm had been reformed in the fall of 2011. This is a good motivation for using the proxy.

[INSERT FIGURE 3 ABOUT HERE]

In table III we run the DID specification in equations (1) and (??), but with the asking price as dependent variable. The aim of the reform is to directly affect the asking price upwards, so it is not surprising that we find an increase in the asking price by 9.3 percent from the first reform and 8.7 percent for the second reform. In table IV we see the price premium (percentual increase in price from listing to sale). If the reform works we expect the price premium to fall after the reform, and we see in column (1) of this table that this is also the case: by 16 percent from the first reform and 12 percent from the second reform. The effect of the reform on asking price and price premium are significant at the 0.1 percent level for all four specifications of the model.

[INSERT TABLES III and IV ABOUT HERE]

Judging from both the price premium over time and the regressions, it seems that the proxy for type of asking price used is robust.

5.2 The Parallel trend assumption

In order to motivate the parallel trends assumption crucial for a difference-in-difference methodology, figure 4 plots averages (without controlling for anything) over time for sales price, time on market, asking price, and the relative difference between sales price and asking price. When I make the same plot for the relevant covariates the lines are parallel. The pre- and post reform trends for sales price and TOM are pretty parallel for central and non-central Stockholm. The possible exception being the financial crisis[12] and the time around the introduction of a 85 percent Loan-To-Value (LTV) cap on mortgages[13].

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[11]Irish long-term bonds spiked in the summer of 2011, Spanish in the winter of 2012 and Greek in the spring of 2012. Source: ECB, http://www.ecb.europa.eu/stats/services/downloads/html/index.en.html

[12]At the time of the Lehman collapse – September 15, 2008 – the sales price fell by about 10 percent in both central and non-central Stockholm although in absolute terms they fell more in central Stockholm. Listing prices fell marginally and and TOM almost doubled, for both central and non-central apartments. During the financial crisis market uncertainty, risk aversion, and tighter credit constraints spread also to Sweden. One way to rationalize the result that prices fell relatively more in central than non-central Stockholm is to argue that the marginal home buyer might have choosen to buy just outside of central Stockholm where prices were about 30 percent lower all else equal, in an effort to reduce the mortgage size.

[13]The introduction of the 85 percent LTV-cap on October 1, 2010, by the Swedish Financial Authorities was made in an attempt to reduce mortgage growth rates and restrain the build up of a real estate bubble. The LTV-cap was discussed a lot prior to its introduction and many banks started complying with the rule before the last date. The fall in price of central relative to non-central apartments that we observe in figure 4 during the first half of 2010 might well have been driven by the LTV-cap. We see no effect on TOM.

[INSERT FIGURE 4 ABOUT HERE]

We see in figure 4 that, in terms of plain averages, sales prices had been falling in central stockholm relative to non-central since the end of 2010 (perhaps to the uncertainty induced by the Euro-crisis?). This trend keeps going after the first reform date, but there is a break in the trend after the second reform: after both regions has gone throgh the reform they are again pretty parallel. Time on the market increased both inside and outside of central Stockholm leading up to the first reform, and tapers off after the second reform. The absolute difference between central and non-central suggests that it took longer time to sell in central Stockholm during the time period when accepted price was only used there and not in non-central Stockholm.

The asking price is significantly higher in central Stockholm relative to non-central when only central Stockholm had gone through with the reform (between the two reform dates). That the asking price increase faster in central than non-central Stockholm is a further verification that the proxy we use for accepted price - date and "centrality" - is at least not totally arbitrary . The relative price increase has a shape that by construction is very similar to that in figure 3. The absolute difference between central and non-central has been falling since early 2011 peaking at the time between the reforms. (Again, this is good news in terms of the proxy we use).

5.3 Robustness: placebo reforms

When using DiD it is important to verify that the effect captured by the reform only occur at the time of the actual reforms, which is captured by R_1 and R_2 in equation 1. The way to test this is to run the regression for "placebo" dates. In figure 5, I run equation 1 for each *reform half year* (January-July and August-December rather than the normal half years January-June and July-December)[14]. I plot the estimates and 99.9 percent confidence intervals of γ_1 in figure 5. The value at the first reform (August 2011) is same value as in column (1) in tables I-IV. At any point in time the interpretation of the line in the graph should be: the change in the dependent variable for central relative to non-central Stockholm in the following reform half year. The financial crisis is the cause of the large deviations in the early sample.

[INSERT FIGURE 5 ABOUT HERE]

Although the graphs might look discomforting at first, they actually portray the picture of pre-treatment in the spring of 2011, a significant treatment during fall of 2011, and some late treatment during 2012 – which is exactly the same story as told by the REAs themselves. When studying the figure it useful to recall the difference in price premium (used as a proxy for asking price type) in

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[14]I choose these slightly odd time period buckets to capture to as well as possible the time period during 2011 when only central Stockholm had undergone the reform. The results seem to hold also for other choices of time-bucket like month, quarters and semi-annual. Also, using this definition the values for 1st August 2011 are the same as the values in row 1, column 1, of tables I-IV.

the bottom left corner of figure 4: accepted price was slowly introduced in central Stockholm during the spring of 2011, a sharp increase during summer 2011, and non-central Stockholm followed in the fall of 2011 and spring of 2012.

Panels A and B of figure 5 shows the effect on sales price and TOM, respectively. We see that during 2009 and 2010 central apartments increased in value by 0-2 percent and sold 0-15 percent faster than non-central. But when then reform had been decided in the spring of 2011 – and there were pre-treatment by certain REAs – the price fell and the TOM increased in central Stockholm relative to non-central. When both regions had gone through with the reform during spring of 2012, the change in sales price and TOM were pretty similar in central and non-central Stockholm.

In Panel C of figure 5 we see that the asking price increased in central relative to non-central Stockholm from 2007 to 2010, but that there was a significant jump in the growth during spring 2011 when pre-treatment occurred. The relative difference in asking prices is largest during the fall of 2011 when only central Stockholm had with-gone the reform. When both regions had been reformed there is no difference. In panel D, finally, we see the relative difference in price premiums between central and non-central Stockholm We see that during 2009 and 2010 prices increased 1-4 percent more in central than non-central Stockholm (due to bidding wars?). During spring of 2011 we see the effect of the pre-treatment: central Stockholm apartments now increased in value 10 percent less than non-central, and the effect is even larger at the time of the actual reform. After the second reform, they are pretty much constant.

5.4   Robustness: Multi-period DiD estimation

The results in this subsection have not been updated with the latest dataset.

Another way of running placebo tests it is to use a multiperiod DiD. In what follows $\tilde{Y}_{v,t}$ will denote the dependent variable Y after being de-trended using a Hodrick-Prescott filter. De-trending removes any time trend common to central and non-central Stockholm, but leaves the relative differences in Y untouched. Ideally I would like to use time fixed effects rather than a HP-filter to capture the time trend, but this generates to many coefficients to estimate and the estimates are only marginally significant. The model is now:

$$\tilde{Y}_{v,t} = \alpha + \beta X + \theta central + \gamma \cdot T_t \cdot central + u_t \tag{2}$$

T_t are time fixed effects for each *reform half year*. Because we de-trend Y we do not need to include the time fixed effects separately. The parameter of interest is the coefficient on the time fixed effects interacted with the within fixed effects, γ, which captures changes over time (relative to first time period) in the dependent variable for central Stockholm (relative to non-central): if $\gamma_t = .1$ it means that in time period t the value of being in central Stockholm instead of non-central is 10 percent higher than it was at inception.

Table VI displays the results of the model in equation 2. The effect is captured by the interaction

coefficients, γ. The γ's are presented in the table, but are more easily interpreted by when seen visually. In figure 6, hence, I plot the 95 percent confidence intervals of the γ's over time. When analysing the γ we look for episodes where consecutive values differ significantly from previous values. If two lines overlap, the γ's are not significantly different from each other, if they do not overlap they are significantly different.

In figure 6 we see that there is a large fall in sales prices and time on market (TOM) during the fall of 2008, when Lehman brothers collapsed. The only other time we have a significant change in these is during the fall of 2011, when central but not non-central Stockholm had been reformed to use accepted price. Due to the reform, prices in central Stockholm fell relative to non-central by about 4 percent (from 1.75 percent to -2.31 percent) and TOM increased by 24.6 percent (from -18.5 percent to 6.1 percent). These effects are similar to those found in the first two columns of tables I and II.

Panels A and C in figure 6 show the result on asking price and price premium respectively. As expected, the advertised price increased and the price premium decreased significantly in central Stockholm relative to non-central during fall 2011. When central Stockholm is also reformed, the effects are reversed (although the change is not immediately significant for the asking price). The probable explanation of the fact that the increase in asking price at fall 2011 is only around 5 percent – although we know from Gunnelin and Lind (2008) it ought to be more like 20-30 percent – is that we had partial contagion from central to non-central Stockholm during the fall of 2011, and the effect of this gets absorbed by the HP-filter.

5.5 Summary statistics

Table V shows the averages and standard deviations of the relevant variables before and after the reform. The average apartment is listed for 2.6 MSEK ($\approx 325,000$ USD),sells for 2.8 MSEK, and increase by 0.2 MSEK in price. It stays on the market for 27 days, has 62 square meters and 2 rooms, has a monthly fee to the coop (to cover heating, garbage, roof repairs etc) of 3,080 SEK, corresponds to a share of 2.3 percent of the coop, is built in 1949, is slightly below the third floor in a 5.2 story building, and is located 4 km from the central business district and 745 meters from the closest subway stop. The sales prices are higher, and time on market TOM is shorter, after the reform in both central and non-central Stockholm. The control variables are similar before and after treatment.

[INSERT TABLE V ABOUT HERE]

6 Conclusion

This paper is the first to use a natural experiment to analyze the effect of the asking price on the residential real estate market. Using a Difference-in-Difference methodology I find that a higher

asking price generates a lower sales price and longer time until a sale is complete. Specifically, raising the asking price from 20 percent below the market value of a home to the market value lowers the sales price by 5 percent and increase the time to sell by 24 percent.

The current data set does not allow me to see the channel through which the effects arise. One potential candidate mechanism would be that a lower initial asking price induce an *irrational overbidding*, similar to that found in on-line auctions by Malmendier and Lee (2011). Another potential mechanism is that a lower initial asking price increase the number of people showing up on the viewings in hope of getting the apartment for cheaper than it's actual market value – and if the marginal buyer's preferences are influenced by his perception of other buyers valuation of the apartment (perhaps from a resale calculation) this might increase prices. A third potential mechanism is the limit of number of homes one can visit during a week: realistically one can visit no more than 5 or 6 homes a week and in a large market one have to prioritize - in such case lowering the initial price for an apartment might be one way to increase incentives for potential buyers to visit this specific apartment[15].

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[15]A fourth potential mechanism is a random search mechanism whereby a low initial asking price increase the number of potential buyers who all have individual valuations. A larger sample of individuals with random valuations will lead to a higher price than a smaller sample.

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A   List of Real Estate Agents participating in the Reform

The following 40 Real Estate Agents were part of the voluntary reform in and around Stockholm.
In sum they have a market share of about 80 percent. Source: Email correspondence with

Berggren & Hörle	Bernkert Fastighetsförmedling
Birka Mäklare	Bjurfors
Bjurfors & Thörner AB	Bostadsagenten
Bostadsrättsspecialisten	Distriktsmäklarna
Eken Fastighetsförmedling	Ekenstam Fastighetsmäklare
ERA Sverige	Erik Olsson
Exklusiv Fastighetsförmedling	Fabergé
Fastighetsmäkleri	Fantastic Frank Fastighetsmäkleri
Fastighetsbyrån	Fredegårds Fastighetsbyrå
Gadelius Fastighetsbyrå	HusmanHagberg
I Live Stockholm Fastighetsmäkleri	Individa
Innerstadsspecialisten	Lagerlings
Living Fastighetsmäkleri	Länsförsäkringar
M.A.C.O	Magnusson Mäkleri i city
Mäklarcentrum	Mäklarhuset
Mäklarringen	Nordiska Hem Fastighetsförmedling
Norling & Partners	Notar
Oscars Fastighetsmäkleri	Per Jansson Fastighetsförmedling
RE/MAX	Skandiamäklarna
Stockholm & co	Svensk Fastighetsförmedling
Svenska Mäklargruppen	Svenska Mäklarhuset
Södermäklarna	Tegnerlunden fastighetsbyrå
Vision	Wallenberg Fastighetsförmedling
Wendell Fastighetsförmedling	Widerlöv & Co

Mäklarsamfundet.

Source: Email correspondence with Mäklarsamfundet.

Table I: Estimates of equation (1) where dep var Y is *log(sales price)*.

	ln(sale price)	ln(sale price)
γ_1: Effect of Aug2011 rfrm	-0.049***	-0.050***
	(-10.40)	(-9.97)
γ_2: Effect of Jan2012 rfrm	-0.014**	-0.021***
	(-2.72)	(-3.41)
Central	0.33***	0.34***
	(34.12)	(40.10)
Size, sqm	0.013***	0.013***
	(53.67)	(50.57)
Size, rooms	0.069***	0.057***
	(18.04)	(13.79)
Fee (kkr)	-0.053***	-0.045***
	(-16.61)	(-12.86)
Floor	0.020***	0.019***
	(28.93)	(23.08)
Floors	-0.0078***	-0.0096***
	(-5.09)	(-5.50)
Year built	-0.00084***	-0.00076***
	(-9.49)	(-8.04)
CBD (km)	-0.0039***	-0.0038***
	(-12.82)	(-13.80)
Subway (km)	0.0033***	0.0035***
	(8.80)	(11.61)
Constant	15.2***	15.4***
	(93.17)	(87.28)
Sample period	2005-2013	2010-2012
Year FE	Yes	Yes
Month of year FE	Yes	Yes
Observations	72207	29448
Adjusted R^2	0.830	0.825

t statistics in parentheses

Standard errors are clustered at the address level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table II: Estimates of equation (1) where dep var Y is $log(TOM)$.

	ln(TOM)	ln(TOM)
γ_1: Effect of Aug2011 rfrm	0.24***	0.23***
	(10.16)	(9.28)
γ_2: Effect of Jan2012 rfrm	0.17***	0.21***
	(6.53)	(6.55)
Central	-0.094***	-0.060**
	(-6.72)	(-3.19)
Size, sqm	0.0041***	0.0042***
	(11.58)	(7.73)
Size, rooms	-0.056***	-0.057***
	(-7.00)	(-4.82)
Fee (kkr)	0.058***	0.054***
	(10.64)	(6.33)
Floor	-0.0046*	-0.0081*
	(-2.05)	(-2.38)
Floors	0.0070	0.010
	(1.96)	(1.48)
Year built	0.00068**	0.00062
	(3.28)	(1.95)
CBD (km)	-0.0014***	-0.00081
	(-3.63)	(-1.41)
Subway (km)	0.0025***	0.0033***
	(5.09)	(5.10)
Constant	1.47***	1.28*
	(3.77)	(2.16)
Sample period	2005-2013	2010-2012
Year FE	Yes	Yes
Month of year FE	Yes	Yes
Observations	72008	29370
Adjusted R^2	0.062	0.040

t statistics in parentheses

Standard errors are clustered at the address level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table III: Estimates of equation (1) where dep var **Y** is **_log(listing price)_**.

	ln(listing price)	ln(listing price)
γ_1: Effect of Aug2011 rfrm	0.093***	0.077***
	(18.75)	(14.24)
γ_2: Effect of Jan2012 rfrm	0.087***	0.075***
	(16.08)	(11.76)
Central	0.22***	0.22***
	(31.33)	(30.01)
Size, sqm	0.014***	0.014***
	(66.95)	(55.89)
Size, rooms	0.051***	0.046***
	(13.93)	(10.40)
Fee (kkr)	-0.033***	-0.030***
	(-11.87)	(-9.08)
Floor	0.015***	0.015***
	(22.70)	(17.23)
Floors	-0.0098***	-0.010***
	(-6.82)	(-6.34)
Year built	0.00020*	0.00023*
	(2.49)	(2.44)
CBD (km)	-0.0071***	-0.0073***
	(-30.35)	(-28.47)
Subway (km)	-0.00059*	-0.00036
	(-2.10)	(-1.16)
Constant	13.3***	13.5***
	(88.10)	(76.93)
Sample period	2005-2013	2010-2012
Year FE	Yes	Yes
Month of year FE	Yes	Yes
Observations	53728	26643
Adjusted R^2	0.850	0.846

t statistics in parentheses

Standard errors are clustered at the address level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table IV: Estimates of equation (1) where dep var **Y** is ***rel. price increase***.

	Price increase, %	Price increase, %
γ_1: Effect of Aug2011 rfrm	-0.16***	-0.15***
	(-49.18)	(-41.06)
γ_2: Effect of Jan2012 rfrm	-0.12***	-0.12***
	(-40.40)	(-34.56)
Central	0.011***	0.013***
	(4.10)	(3.42)
Size, sqm	-0.0013***	-0.0015***
	(-22.32)	(-18.45)
Size, rooms	0.0062***	0.0078***
	(4.63)	(3.99)
Fee (kkr)	-0.0068***	-0.0046***
	(-7.24)	(-3.67)
Floor	0.0024***	0.0040***
	(6.95)	(8.42)
Floors	-0.0020***	-0.0029***
	(-4.89)	(-5.67)
Year built	-0.00047***	-0.00050***
	(-17.21)	(-12.07)
CBD (km)	0.00027***	0.00029**
	(4.17)	(3.12)
Subway (km)	-0.00098***	-0.0010***
	(-13.19)	(-9.99)
Constant	1.01***	1.21***
	(19.40)	(15.34)
Sample period	2005-2013	2010-2012
Year FE	Yes	Yes
Month of year FE	Yes	Yes
Observations	53728	26643
Adjusted R^2	0.333	0.383

t statistics in parentheses

Standard errors are clustered at the address level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table V: Summary statistics

	Whole sample		Central				Non-central			
			Before rfrm 1		After rfrm 1		Before rfrm 2		After rfrm 2	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
List price (MSEK)	2.57	1.58	2.83	1.87	3.45	1.84	1.79	0.81	2.26	0.87
Sales price (MSEK)	2.75	1.66	3.18	1.96	3.59	1.88	1.95	0.85	2.37	0.89
Price increase (MSEK)	0.24	0.32	0.42	0.40	0.12	0.25	0.25	0.27	0.12	0.18
Days on market	27	63	27	72	25	46	29	69	25	44
Size, m^2	62	28	63	33	60	29	63	22	63	22
Size, rooms	2.3	1.0	2.3	1.1	2.2	1.0	2.4	1.0	2.4	1.0
Fee to coop/month	3,080	1,332	2,829	1,386	2,827	1,315	3,317	1,250	3,451	1,213
Share of coop	2.3	2.8	2.4	2.4	2.2	2.1	2.2	3.3	2.1	3.0
Year built	1,949	31	1,937	31	1,941	33	1,961	25	1,963	26
floor	2.8	2.0	3.0	1.9	3.0	2.0	2.6	2.0	2.7	2.2
Floors in building	5.2	2.2	5.5	1.9	5.6	2.1	4.8	2.4	4.9	2.7
Dist. to CBD	3,926	3,227	2,558	4,683	2,587	972	5,472	1,264	5,417	1,190
Dist. to Subway	745	2,809	455	4,530	421	327	1,112	1,349	1,030	1,240

Note 1: Reform=1 if either a) within central Stockholm and listed on or after August 1st 2011 or b) outside of central Stockholm and listed on or after January 1st 2012.

Note 2: The large Standard deviations of distances before the reforms are due to low GPS quality reported by REAs for early transactions. This will be corrected in the next version of the paper.

Table VI: Regression results for identifying effect of reform

	(1) ln(Advertised Price)		(2) ln(Sale Price)		(3) Price increase, %		(4) ln(Days on market)	
β: Size, log(sqm)	0.847***	(0.0196)	0.772***	(0.0190)	-0.0942***	(0.00666)	0.210***	(0.0296)
β: Size, rooms	0.0702***	(0.00611)	0.0768***	(0.00606)	0.00836***	(0.00197)	-0.0347**	(0.0106)
β: Fee to coop, kkr	-0.0282***	(0.00653)	-0.0350***	(0.00654)	-0.00753***	(0.00164)	0.0744***	(0.00857)
β: Floor	0.0183***	(0.00109)	0.0210***	(0.00109)	0.00321***	(0.000484)	-0.00968*	(0.00375)
β: Floors in building	-0.0103***	(0.00196)	-0.0119***	(0.00198)	-0.00184***	(0.000519)	0.00375	(0.00347)
β: Year built	-0.000535**	(0.000197)	-0.000896***	(0.000190)	-0.000434***	(0.0000476)	0.000580	(0.000298)
β: Dist. to CBD, km	-0.0756***	(0.00984)	-0.0757***	(0.00931)	0.0000773	(0.00159)	-0.00265	(0.00754)
γ: within × 2008 Jan-Jul	-0.0115	(0.00887)	0.0182*	(0.00853)	0.0344***	(0.00676)	-0.116*	(0.0524)
γ: central × 2008 Aug-Dec	-0.0236*	(0.0106)	-0.0804***	(0.00955)	-0.0682***	(0.00829)	0.202***	(0.0552)
γ: central × 2009 Jan-Jul	-0.0348***	(0.00913)	-0.0283***	(0.00845)	0.00547	(0.00745)	-0.0670	(0.0518)
γ: central × 2009 Aug-Dec	-0.0137	(0.00935)	0.00262	(0.00810)	0.0180*	(0.00829)	-0.180***	(0.0502)
γ: central × 2010 Jan-Jul	-0.0134	(0.00971)	-0.0216**	(0.00799)	-0.0110	(0.00806)	-0.123*	(0.0486)
γ: central × 2010 Aug-Dec	-0.0155	(0.00868)	0.00754	(0.00794)	0.0286***	(0.00779)	-0.236***	(0.0455)
γ: central × 2011 Jan-Jul	-0.00680	(0.00896)	0.0175*	(0.00792)	0.0289***	(0.00734)	-0.185***	(0.0477)
γ: central × 2011 Aug-Dec	0.0436***	(0.00910)	-0.0231**	(0.00835)	-0.0850***	(0.00748)	0.0614	(0.0552)
γ: central × 2012 Jan-Jul	0.0183	(0.00970)	0.00387	(0.00827)	-0.0262***	(0.00745)	-0.134**	(0.0481)
γ: central × 2012 Aug-Dec	0.00566	(0.00932)	-0.00656	(0.00861)	-0.0237***	(0.00703)	0.0159	(0.0531)
γ: central × 2013 Jan-Jul	0.00318	(0.00946)	0.000687	(0.00851)	-0.0123	(0.00718)	-0.197***	(0.0452)
γ: central × 2013 Aug-Dec	0.0108	(0.00931)	0.00123	(0.00806)	-0.0200**	(0.00711)	-0.232***	(0.0484)
γ: central × 2014 Jan-Jul	0.00655	(0.00933)	-0.00145	(0.00845)	-0.0183*	(0.00733)	-0.364***	(0.0465)
θ: central	0.248***	(0.0279)	0.234***	(0.0262)	-0.0116	(0.00878)	0.129**	(0.0500)
Constant	12.21***	(0.383)	13.38***	(0.368)	1.413***	(0.0940)	0.739	(0.576)
Observations	32860		32860		32860		32653	
Adjusted R^2	0.853		0.850		0.136		0.042	

Standard errors in parentheses

These are results from running regression 2. Standard errors are clustered at the zip-code level. For better readability of the interaction coefficients γ, see Figure 6. The significance stars tests difference from zero which is not relevant for γ, where we want to see difference from previous value.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1: Online apartment advertisements - accepted price vs bid starting price

Årsta
Rämensvägen 24
Bostadsrättslägenhet
2 ROK, 50 KVM

Pris:

1 695 000

VISAS Söndag 1/6, Måndag 2/6

Årsta
Rämensvägen 24
Bostadsrättslägenhet
2 ROK, 50 KVM

Accepterat pris:

2 095 000 kr

VISAS Söndag 1/6, Måndag 2/6

Note: These are real estate advertisements from the internet, showing the implications of the *bid starting price* (left) and *accepted price* (right). The right ad is a real example, and the left is mock-up I created using an ad from a different (non-reformed) region to exemplify the reform. The only differences due to the reform is the name of the price and the level of the price. The ads include a photograph taken by a professional photographer (often the apartment have been prepared by a professional stylist), the geographical area, the address, the type of home (in this case, coop) the number of rooms and the size in square meters. The ads also include the type of price: accepted price or price, the listing price and the date of the viewings. By clicking on the ads the buyer gets to a more detailed description of the apartment.

Source: `www.svenskfast.se`, retrieved 2014–05–26.

Figure 2: Map of Stockholm, transactions and the reform.
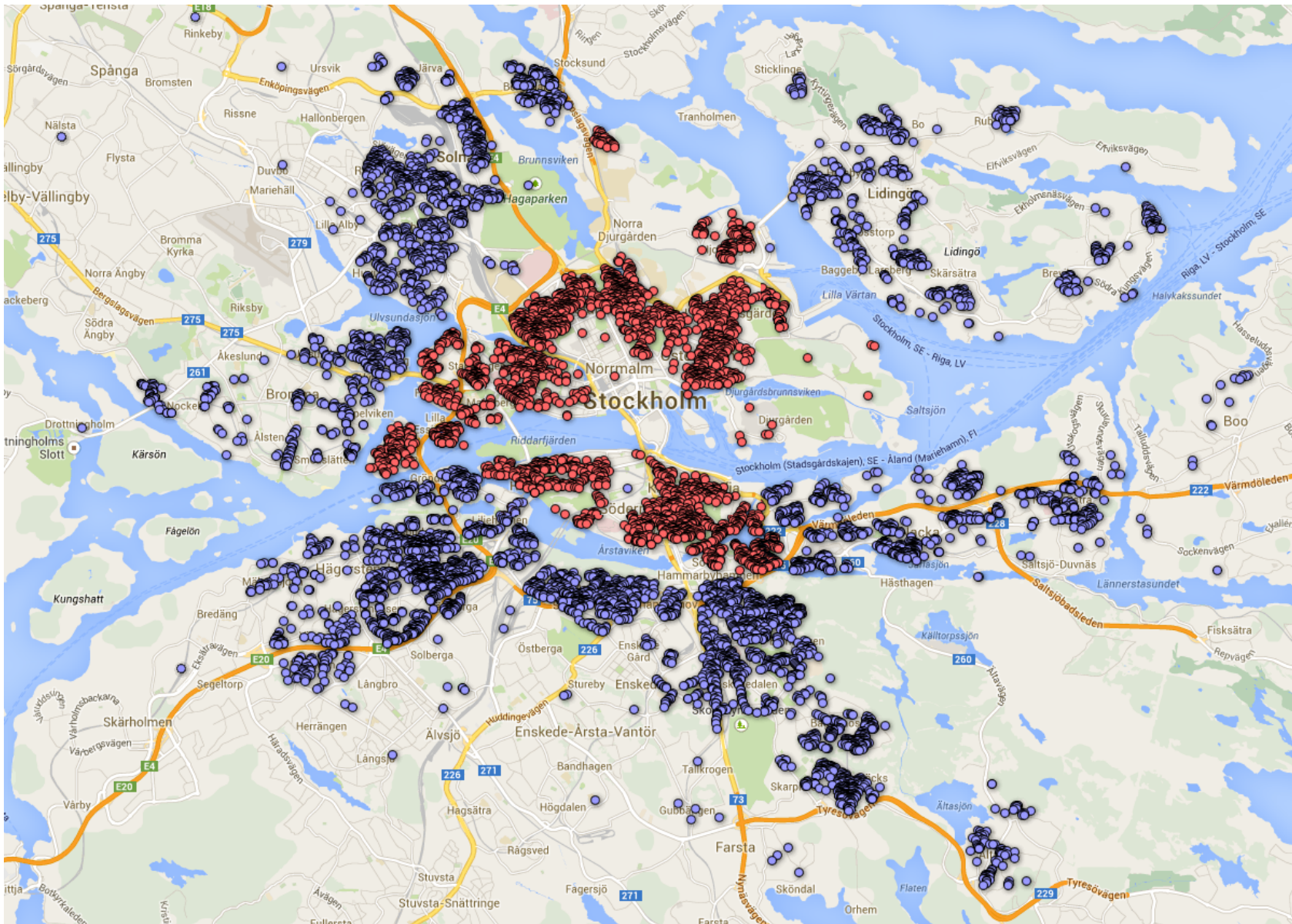
Note: This is a map of Stockholm and the purchased transactions. Transactions in red are defined as central and blue as non-central. Until August 1st 2011 most transactions were sold using *bid starting price*. On August 1st 2011, apartments listed in central was listed as a accepted price, and on January 1st 2012 accepted price was used by most REAs also for non-central sales. We have data on about 80% of the universe of transactions from 2005 through 2014-03.

Map "courtesy" of Google. Source: Mäklarstatistik

Figure 3: Share of transactions increasing more than 15% above listing price, to visualize the Proxy for listing price type used.
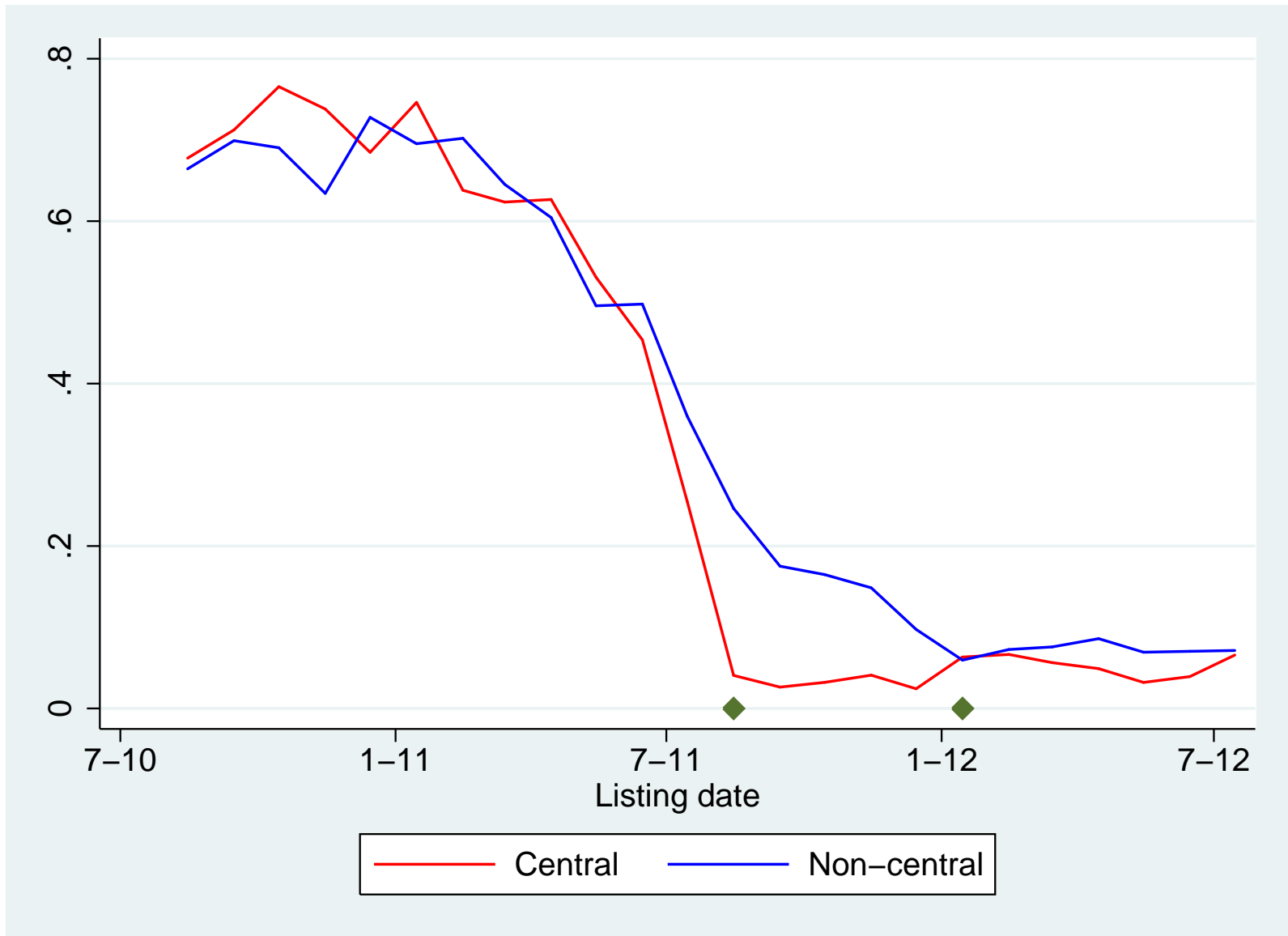
Note: This figure shows the share of apartments in central and non-central Stockholm where the sales price is more than 15% above the listing price. The green dots marks the date of the first and second reform. At the end of 2010 about 70% of all apartments - both central and non-central - increased more than 15% above the listing price. This share starts to fall in beginning of 2011. In the summer of 2011 – the time of the reform in central Stockholm – we see a huge fall in the share of central apartments. By the time of the second reform, the share of central and non-central apartments are about the same. The identifying assumptions in the regressions is based on the difference between central and non-central between the reforms.
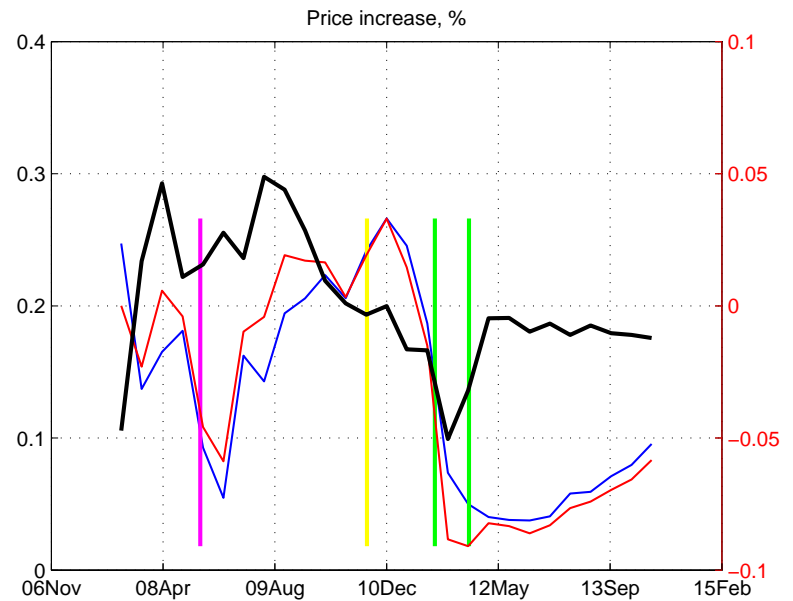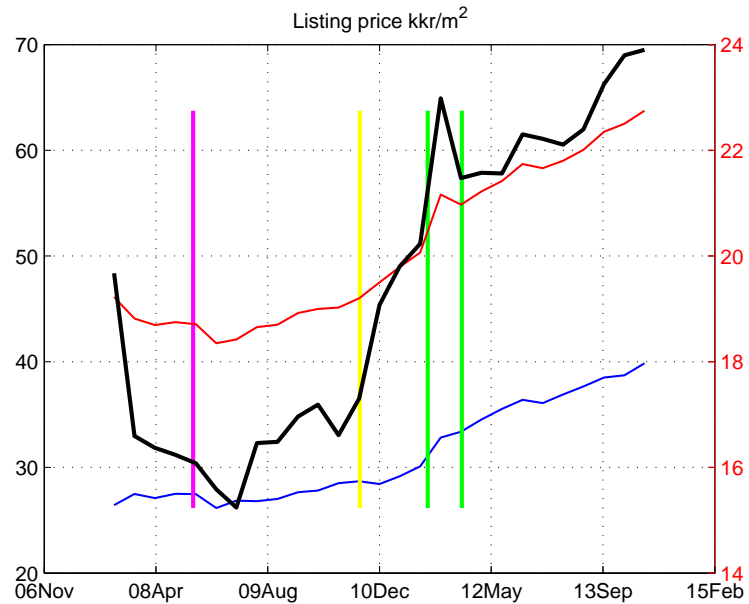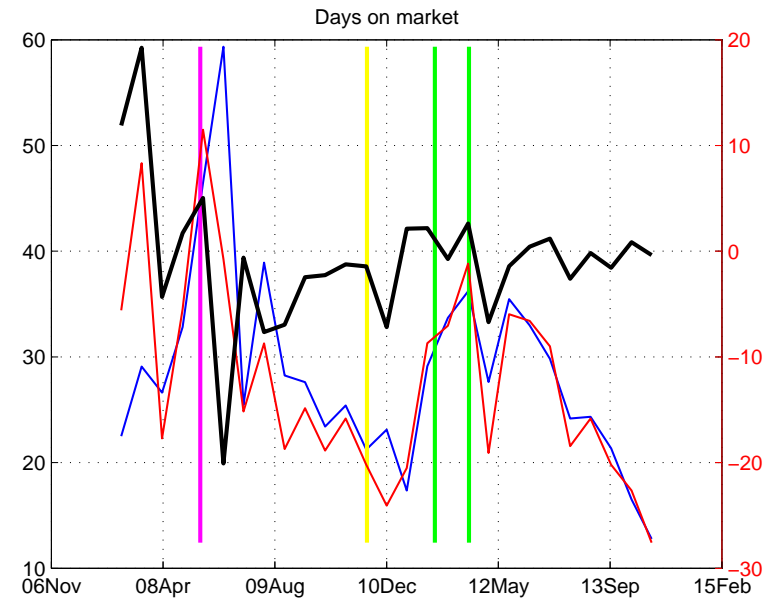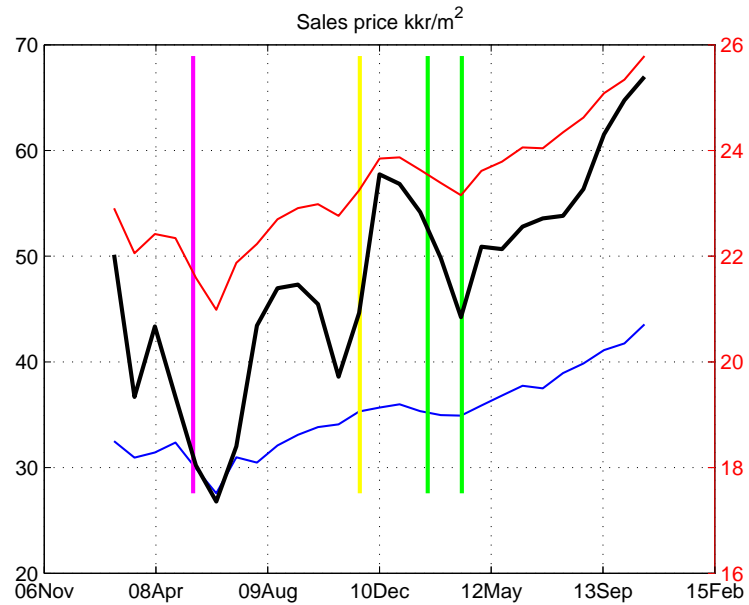
Figure 4: Parallel trends in dependent variables. The red are averages in central and the blue non-central Stockholm. The black is the absolute difference between them (right axis). The purple line indicate Lehman brothers collapse, the yellow the intro. of a 85% LTV cap, and the green lines mark the first and second reforms. Note: Quarterly mean values, not controlling for other factors.

Figure 5: Placebo reforms: moving the date of the first reform from August 2007 through August 2013 while keeping the second reform one *reform half year* after the first reform.

Figure 6: Multiperiod DiD. The figure plots the 95% confidence intervals for the coefficients γ_t on the interaction terms $T_t \cdot central$ in equatuion X, for different dep vars. The interpretation is the change in the value of the dep var for central relative to non-central Stockholm in the current time period.
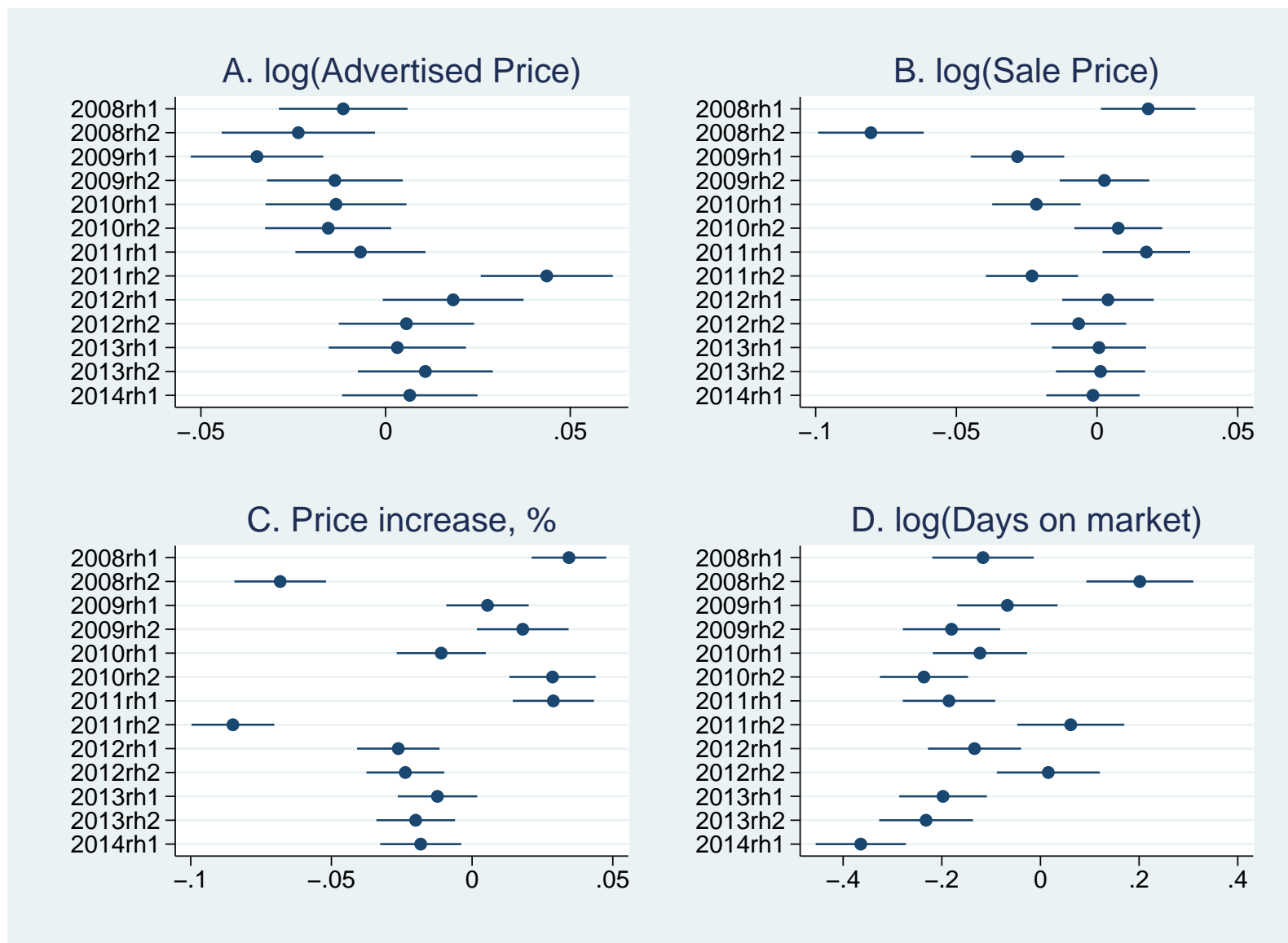
Note: Lehman brothers filed for bankruptcy September 15 2008, and accepterat pris (the reform) was introduced in central stockholm on august 1st 2011 and in non-central Stockholm January 1st 2012. rh means regulatory half year: rh1 is Jan-Jul and rh2 is Aug-Dec.