Transforming vacant retail to housing:

Experiences from owners and house prices in Rotterdam, The Netherlands

Gijs Buitenhuis, Feb 2020
Master Thesis

Abstract

The Netherlands has a large housing shortage while retail vacancy is rising. A potential partial solution for both issues is the transformation of vacant retail stores into housing. As this type of transformation is relatively new, little is known about how to stimulate market parties. The municipality of Rotterdam pioneered and introduced a set of tools to stimulate retail store transformations in three areas. Firstly, the experiences with the tools were analysed qualitatively through interviewing 37 retail store owners who underwent transformation. Secondly, we researched whether the stimulated transformations contributed to neighbourhood revitalization by estimating the external price effects of the stimulated transformations on surrounding houses. A hedonic difference in difference model comparing a target and control area is used. It is found that the introduction of a transformation manager and architectural subsidy were decisive in the transformation effort. Three shortcomings were identified: overall awareness of the tools, communication of the municipality and long permit application procedures. No significant price effect has been found, which may be because of limited availability of data.

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Preface

As I am writing the preface of this thesis, the realization sets in that this marks the end of my academic career in Groningen. During the last years I have learned a great deal and can honestly say that I loved the MSc Real Estate programme. It is therefore a pity that it is coming to an end. Researching a topic that has no solidified place in academic literature yet, is both an adventure and a challenge. It led me to work with municipal employees and interview owners of retail stores, which was very insightful. It even has led to me to fantasize about working in the 'transformation' business as it will become an increasingly important aspect of urban redevelopment. I want to first express my gratitude to Mark van Duijn as he guided me throughout the entire period in a constructive and pleasant way. Without his guidance I might have stranded, as the path ahead was unclear at times. Secondly, I want to thank Kim Nguyen of the municipality of Rotterdam for going on this journey with me and providing the data and introductions. Thirdly, I want to thank my girlfriend and parents, as they were always willing to listen to me rambling on about retail store transformation. I hope reading this thesis may be educative to you, the reader, and add to our knowledge on how to stimulate retail store transformations and the external effects on surrounding house prices they may have.

1 Introduction

1.1 Motivation

The Netherlands is in the midst of a housing crisis. The number of owner-occupied houses for sale has reached an all-time low in the first quarter of 2021, pushing house price upwards (NVM, 2021). The Stec group (2020) estimates that there is a shortage of over 300.000 houses and 240.000 residential properties in Dutch inner cities alone. As a result, house prices have surged to all time high levels; the average purchase price for a house has increased from €230.194 in 2015 to €386.174 in 2021 (CBS, 2021).[1] This has led to multiple 'housing protests' as it has become difficult for starters, single-income households and teachers with median salaries to purchase homes (Kleinjan, 2018; NOS, 2020; Van der waals, 2020).

At the same time, a lot of retail stores have become vacant as the brick-and-mortar retail market has been under pressure for years because of increased online consumption. All branches of physical retail in the Netherlands, apart from supermarkets, have seen a 10% decline in demanded floor space since 2011 (Stec group, 2020). The vacancy rate of the main shopping streets of the fifteen largest inner cities has increased to 15% in 2021, double of what it was in 2018 (Exterkate, 2022). The Retail Agenda (2021) expects that 20 to 40% of clothing, shoes and sports stores will close because of large revenue losses due to the Covid crisis and online competition (Retailagenda, 2021). Based on these scenarios, the corona crisis will potentially lead to 275,000 to 550,000 m² of additional vacant floor space (Exterkate, 2022). As vacancy has a lot of negative external effect and these main shopping streets are located in the city centres, degradation of the inner cities is a serious threat for its communities.

There is a silver lining as, through transformation, retail store vacancy could be a partial solution to the current housing shortage. As the shortage of housing is expected to increase to over 400.000 in 2024 (NOS, 2021), municipalities are advised to help and stimulate this type of transformation (Ossokina et al., 2017).[2] While 75% of municipalities in the Netherlands have a surplus of retail floor space (Stec group, 2020), in only 25% of these municipalities transformations of retail stores into housing have started (Stec group, 2020). This has to do with practical, legal and financial difficulties of this redevelopment (Colliers, 2020). However, as retail rents have been decreasing for years, and residential rents keep increasing, the financial feasibility is becoming larger and larger (RTL Nieuws, 2021).

1.2 Literature overview

The consensus in earlier literature is that vacancy has negative effects on its surroundings. Remøy and Van Der Voordt (2007) argue that the vacancy of office buildings presents problems of insecurity and

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[1] Other factors (i.e. low mortgage interest rates) also have part in this.
[2] Not every location is suited for transformation.

social uncertainty for the surrounding neighbourhood as it may lead to criminality, ranging from vandalism, break-ins, illegal occupancy to fires. The negative effect is even larger with retail vacancy, as the vacancy of even a small number of stores can have an impact on the surrounding area (van der Wal et al., 2016). Then there is the aesthetic downside of vacancy. The inhabitants of Arnhem, a large city in the Netherlands, were asked what they did not like aesthetically about their city; vacancy was the most common answer (Gert van Putten *et al.*, 2015). Vacancy can thus be seen as a disamenity, as it has (in)direct negative effects for the surrounding community.

Many researchers find positive effects from the removal of disamenities. For example, Zhang *et al.*, 2020 find that the redevelopment of an outdated shopping centre has a positive external effect on nearby house prices. Van Duijn *et al.*, (2016) find positive external effect as a result of the redevelopment of abandoned industrial heritage sites into new uses on the surrounding house prices. Similarly, Kramers (2018) finds that the transformation of vacant offices into housing has a positive effect on surrounding house prices. In line with this, Leonard *et al.*, (2017) find that rehabilitation projects of foreclosed properties have a profound positive effect on surrounding house prices.

However, such redevelopments do not necessarily happen on their own. When a market outcome is undesirable from a social perspective and transformation is desired, municipalities may need to entice or stimulate market participants to certain behaviour. The different forms of policies aimed at stimulating office transformations in the Netherlands are studied qualitatively in (Rodenhuis, 2012). Rodenhuis finds that, according to industry experts, making it easier to change the zoning plan is the most effective and feasible steering instrument for the government to drive transformation. Similarly, Mainali *et al.*, (2019) evaluated policy tools used to stimulate deep renovation of residential building in the Netherlands and finds that financial tools are strong instruments in incentivizing market participants to certain behaviour. Finding the right set of policy tools, however, is not always easy (Bali et al., 2021).

As the field of knowledge on transformations from retail to housing is new, the literature provides no policies stimulating retail store transformation. This research aims to address this gap in the literature by qualitatively analysing a set of policy tools, introduced to stimulate retail store transformation, as experienced by owners of the transformed stores. The findings of this research could thus guide municipalities in their efforts forming policies aimed at stimulating and facilitating retail store transformations. Also, while the external effects of the redevelopment of abandoned industrial sites (van Duijn et al., 2016) and the transformation of vacant office buildings (Kramers, 2018) on surrounding house prices have been researched, the external effects of the transformation of (vacant) retail stores into housing on its surrounding are unknown. Therefore, this paper will address a second gap in the literature by researching whether transformations of (vacant) stores into housing can contribute to neighbourhood revitalization by investigating the external effects of transformation on nearby house

prices. These findings can potentially substantiate the political argument to make efforts to stimulate retail store transformation.

1.3 Case selection

To research this, the city of Rotterdam, Netherlands is chosen to function as a case study. Rotterdam is chosen because it is a large municipality which took proactive approach to transform (vacant) retail stores early on. This is because in 2017 the municipality of Rotterdam adopted the Retail Memorandum in which it laid out how the municipality sees the future of its retail stores. In three areas, the municipality aimed to restrengthen its retail cores by actively stimulating the transformation of vacant, dilapidated, and unmarketable retail stores in secondary shopping streets. To accomplish this, a variety of tools were introduced. Together these policies form the *retail transformation approach*. As a result of the retail transformation approach, the municipality was actively involved in 93 retail store transformations between 2018-2020.[3] Because of the (semi) large scale and the pro-active attitude towards transformations it is well suited to act as a case study. To gain first-hand knowledge of the entire process the author interned with the municipality of Rotterdam.

1.4 Research problem statement

As has become clear in introduction and the review of the literature, the transformation of retail stores into housing is a very relevant topic for the real estate industry as well as society. The aim of this study is to fill two gaps in the literature by analysing the experiences with a set of tools, introduced to stimulate retail store transformation, and seeing if these transformations have contributed to the quality of the area. These research goals led to the following research questions:

Qualitative research question:

How do the owners of transformed properties experience the policy tools used to stimulate the transformation of (vacant) retail stores into housing?

Quantitative research question:

What is the external effect of the transformation of (vacant) retail store to housing on surrounding house prices?

In order to answer this, the following subquestions will be answered:
1. What are the barriers to transforming (vacant) retail into housing and which policy tools could be implemented to stimulate retail store transformation?

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[3] Most stores were vacant, however, some were dilapidated or otherwise not future proof. Thus we use "(vacant) store".

2. How is the transformation process perceived with respect to the level of awareness, the municipal communication, and the environmental permit, by the owners of transformed retail stores in Rotterdam, The Netherlands?

3. How are house prices connected with transforming (vacant) properties into housing according to the academic literature?

4. What is the association between transforming (vacant) retail into housing and surrounding house prices in Rotterdam, The Netherlands?

The first sub question will be answered by researching the barriers of retail store transformation. Academic literature, market reports as well as municipal documents will be researched. Secondly, to determine which tools can be implemented to stimulate transformation of retail stores into housing, a case study is performed, and structured interviews are conducted with respondents who have experienced these tools aimed at stimulating this type of transformation.

The second sub question will be answered by asking the respondents of the interview about their experiences with the transformation process. The focus will be on identifying the shortcomings of the overall transformation process and the role of the policy tools. The focus is put on the three shortcomings that were mentioned most often. Both question 1 and 2 have a qualitative basis which will be researched following the guidelines of qualitative research by (Hennink et al., 2020).

The third sub question will be answered through academic literature research. The factors influencing house prices will be determined, with a specific attention to neighbourhood revitalization through redevelopment and transformation. For this, the database of the university of Groningen will be used.

The fourth sub question will be answered through quantitative research and the construction of a hedonic difference-in-difference framework. Target and control groups, dependent on their proximity to a completed transformation, will be separated using QGIS after which real estate transactions before, during and after the transformations will be used to analyse the effect of said transformations on surrounding house prices.

1.5 Reading guide

The remainder of this research is structured as follows: Chapter 2 discusses the context of retail store transformation focussing on the Netherlands. After discussing the barriers and the policy tools introduced to alleviate those barriers, qualitative expectations are formed. Chapter 3 will discuss the available literature on the types of policy tools as well as theory on house price formation. Building on this theory, a hypothesis is formed on the effect of retail store transformation on house prices. Chapter 4 discusses the proposed methodology to answer the sub questions while chapter 5 discusses which data is used. Chapter 6 discusses the qualitative and quantitative results. Chapter 7 concludes the research and discusses the limitations and recommendations for future research will be given.

2   Context

The transformation of retail stores into housing is becoming a more and more common phenomena. However, as it is still relatively new research subject, it is useful to elaborate on the context of transformation. Therefore, a contextual chapter discussing the barriers of transformation, the legal context, and how the city of Rotterdam strategically developed policy tools to stimulate this process are included. Lastly, this chapter will form expectations regarding the impact the introduced policy tools will have on the transformation goal of the municipality.

2.1   Barriers of retail store transformation

As The Dutch Cooperative Association of Real Estate Brokers and Appraisers (NVM, 2021b) researched number of square meters that potentially could be transformed, they also researched the barriers of transformation. They asked realtors in five large municipalities (Breda, Enschede, Maastricht, Deventer, Eindhoven) to assess the transformation potential of vacant stores. The realtors assessed that transformation has potential for a quarter of the vacant retail stores (14% promising, and 11% very promising) and considered 68% of the stores to be difficult or impossible to transform. In the event of a negative assessment, the realtor was asked what limitations or barriers resulted in the negative assessment.[4] The findings are displayed in table 1.

Table 1 – Reasons prohibiting transformation (NVM, 2021b).

Reason transformation of retail store into housing is not promising	%
The zoning plan does not offer possibilities for change of function to housing/ the municipality is not open to change the zoning to residential	66%
The transformation costs would be disproportionately high for transformation	63%
The house is located in a main shopping street where living is very undesirable	51%
There is not enough daylight (object is for example located exclusively in a basement)	46%
The owner of the house does not want a transformation	46%
The object lies outside the city limits	10%

While the Dutch Cooperative Association of Real Estate Brokers and Appraisers researched the potential of transformation and the reasons why transformation was not possible, according to realtors, the municipality of Rotterdam researched the barriers of transformation, as perceived by store owners. The municipality finds that the largest barrier of transformation is the complexity and the lack of knowledge with regards to the legislation and procedures (Gemeente Rotterdam, 2017). The transformation of a retail store into housing is perceived as a complicated and time-consuming process

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[4] A retail store can have several restrictive characteristics.

by retail store owners and that applicants are in need of information on the environmental permit process (*omgevingsvergunning)* (Gemeente Rotterdam, 2017). They also find that the physical limitations of the buildings and high costs associated with transformation discourage investments (Gemeente Rotterdam, 2017). Thus, if the municipality of Rotterdam wants to make an area future-proof by stimulating transformations, it should try to alleviate these barriers.

2.2   Legal aspects of transformation

In terms of legal feasibility of transformation, the zoning plan is of importance. In most cases, retail stores will have a 'mixed' or 'retail' function in the zoning plan, which does not allow living. Thus, one cannot transform a retail store into a house or apartment without making the necessary planological changes. Even when municipalities are willing to change the zoning plan, legal aspects can prohibit or slow down transformation. Namely, existing retail buildings are not designed to also serve as residences. As a result, structural changes may be required, which will almost always require obtaining an environmental permit (*omgevingsvegunning)* for the construction activity. The permit has to fit within the Building decree 2012 (*Bouwbesluit 2012*). The Buildings Decree 2012 includes the legal requirements for the safe, healthy, useful, energy-efficient and environmentally friendly (re)construction, use and demolition of buildings (Rijksdienst voor Ondernemend Nederland, no date). The requirements for soundproofing the façade and providing access to natural light, for example, are different for retail and living functions. Also, as creating (new) parking places might be unfeasible, the parking requirement for new houses can be a barrier. It is the responsibility of the owner of the 'to be transformed stores' to comply with the rules of the Buildings Decree and to be able to demonstrate this. In most situations, the municipality, is responsible for enforcing the Buildings Decree. This is done through the obligatory environmental permit.

2.3   Rotterdam: Retail transformation approach

A municipality that is willing to change the zoning plan and accommodate retail store transformations is the municipality of Rotterdam. In the summer of 2017, the Rotterdam City Council adopted the Retail Memorandum (*detailshandelsnota*) (Gemeente Rotterdam, 2017). This note describes how the municipality of Rotterdam sees the future for stores and shopping areas in the city. In the 'future-proof shopping areas', areas the municipality deems healthy in terms of supply and demand, the municipality stimulates and supports plans to improve the shopping area. In areas where a development in a different direction seems more logical (for example, if there is a long-term and structural vacancy of stores), the municipality is committed to give retail stores a different function, through transformation (Gemeente Rotterdam, 2017). The three areas in which the outdated or vacant or stores were to be transformed are the Boulevard Zuid, Noorderboulevard and the area Katendrechtse Lagedijk (figure 1).
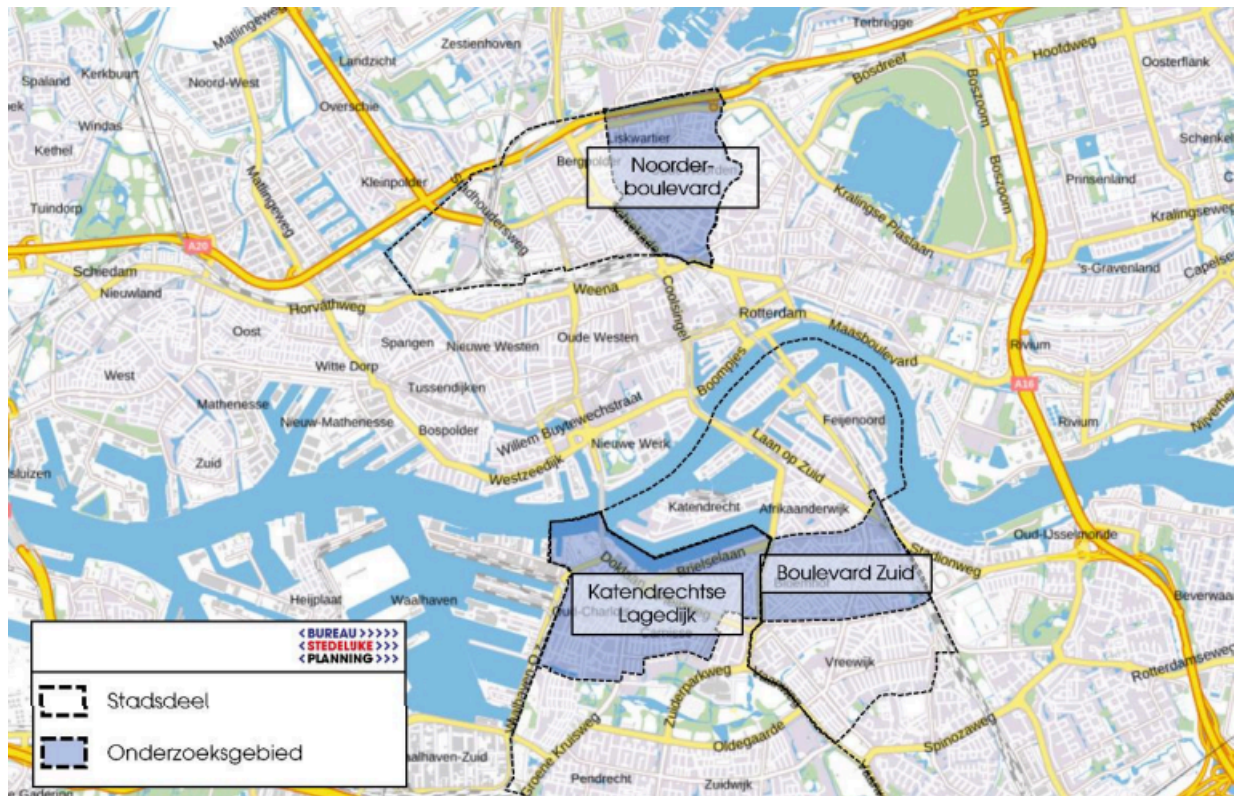
Figure 1 - Overview of the transformation areas in Rotterdam. Source: Bureau Stedelijke Planning

The two main goals were to increase the liveability of the dilapidated areas and to strengthen the economic functioning of the core retail areas. To achieve this, the municipality wanted to concentrate the retail area by actively stimulating private owners of (vacant) stores outside the envisioned 'core' to transform their (vacant) store to a new function. The goal of the municipality was to complete a large number of transformations in the designated areas. In an earlier pilot, the aforementioned barriers of transformation were identified (Gemeente Rotterdam, 2017). To alleviate these barriers the municipality introduced informational, organizational, and financial policy tools. Together these policies form the retail transformation approach. An overview of the different policy tools introduced by the municipality of Rotterdam is displayed in table 2.

Table 2 - Tools introduced by the municipality of Rotterdam to stimulate retail store transformation

Category	Policy Tool
Organizational tools	1. Transformation manager 2. Conversations between municipality and owner 3. Assistance with environmental permit
Informational tools	4. Transformation congress 5. Transformation masterclasses 6. Information market 7. Website

	8. Route map environmental permit	
Financial tools	9. Application for architectural research (funded by municipality)	
	10. Employ architect (funded by municipality)	

Informational tools

In order to get the market moving, a communication campaign took place. This included letters sent to owners of vacant properties, an annual transformation conference, transformation masterclasses as a follow-up of the conferences, information markets allowing parties to get to know each other, a website 'Ondernemen010' with information and inspirational videos and a Roadmap indicating the 5 steps route one has to take to obtain an environmental permit. The transformation conference, masterclasses and information markets were mainly intended for larger real estate owners and corporations and not so much for private owners.

Organizational tools

A dedicated transformation-manager was deployed in all three areas, also known as the as 'the human approach'. His role was to initiate contact (physically or through the telephone) with the store owners and ask about the plan regarding their vacant store. If they were open to the idea of transformation, he would provide the owners with the right introductions. The transformation manager would keep in contact with all owners in his area, monitoring the progress. The transformation-manager could set up an appointment with the municipality where an employee would help with the permit application process. Additionally, the municipality created an 'expert pool' consisting of an architect, a technical construction expert and a financial expert. This expert pool should be able to quickly determine whether transformation would be feasible.

Financial tools

The municipality made subsidies available that could be used to hire one of the architects from the expert pool to make an initial drawing, worth €1000. Additionally, the municipality made subsidies available to be used for a "quick-scan" in which the technical (*bouwkundig*) and financial feasibility of transformation was researched. The maximum subsidy was €5000 per person.

2.4   Qualitative expectations

As the barriers as well as the tools introduced to alleviate these barriers are discussed, it is fitting to form expectations. Per category of the introduced tools, an expectation is formed.

As the municipality of Rotterdam finds that a lack of knowledge on the relevant procedures is one of the main barriers of transformation, an information campaign is expected to positively contribute to the goal of transformation.

1. *The owners of the transformed properties perceived that the informational tools were decisive to the transformation goal.*

Organizational tools such as a transformation-manager who actively seeks contact with the owners of (vacant) stores, pointing out the available resources, such as assistance with the permit procedure, is expected to contribute to the transformation goal.

2. *The owners of the transformed properties perceived that the organizational tools were decisive to the transformation goal.*

As the municipality of Rotterdam (2017) and The Dutch Cooperative Association of Real Estate Brokers and Appraisers (2021) find that the cost of transformation is perceived as a barrier, monetary incentives could be assumed to contribute to the transformation goal.

3. *The owners of the transformed properties perceived that the financial tools were decisive to the transformation goal.*

3   Theoretical framework & literature review

To analyse the experiences of the owners with the tools introduced by municipality to stimulate transformations, understanding is needed on the types of governmental policy available to help achieve policy goals. Therefore, in the first paragraph the different types of governmental policy tools are classified. Thereafter, literature that researched similar types of policy tools is discussed. Secondly, we want to see if the stimulated transformations have contributed to the retention or increase of the quality of the areas. This is done by researching the external effects of the transformations on house prices and thus relevant price formation theories as well empirical findings are discussed.

3.1   Policy tools

When a market outcome is deemed socially undesirable, governments or municipalities can decide to act. This is because sometimes the costs outweigh the benefits for the private sector, but not for the public sector (Arcadis, 2008). Policy tools, also known as policy instruments, are the techniques of governing that contribute to achieving policy goals (Bali et al., 2021). Vedung (1998) defined policy tools as 'the set of techniques by which governmental authorities wield their power in attempting to ensure support and affect social change'. Policy tools have been studied in many policy-related fields, including governance and public administration studies, as well as numerous broader disciplines such as for example economics, social welfare, and real estate studies (Hood, 2007).

An often used model classifying policy tools is that of Hood (1983). In "The tools of Government" Hood advanced the study of policy tools by constructing a parsimonious model classifying four types of policy instrument: nodality (which can be interpreted as 'information'), authority (regulations), treasure (subsidies and taxes), and organization (bureaucratic tools). Howlett (2000), altered the model by distinguishing between 'substantive' and 'procedural' tools (figure 2). Substantive tools are used to directly affect policy outcomes such as regulation or subsidies whereas procedural tools are used to affect policy processes and outcomes indirectly but significantly. This model can help analysing policy tools as well as 'mixes' of tools.

		Governing Resource and Target Need			
		Information	**Authority**	**Treasure**	**Organization**
Purpose of Tool	**Substantive**	Public information campaign	Independent regulatory agencies	Subsidies and grants	Public enterprises
	Procedural	Official secrets acts	Administrative advisory committees	Interest group funding	Government re-organizations

Figure 2 - Classification of governance tools by Howlett (2000) based on Hood (1983)

Choosing the right tools to reach a desired goal is not always easy. Firstly, during tool selection the political, social, and economic context should be taken into consideration. This makes the task not a simple technical operation (Bali et al., 2021). Secondly, the choice would be simpler if all benefits and costs were known and not influenced by context, and the policy goals were clear. However, in real world situations unclarities arise, the clarity of the goals diminish and it occurs that the policy tools mismatch the policy goals (Howlett, 2019). Thirdly, certain combinations of tools do not work together as well as other combinations of tools (Bali et al., 2021). Thus, understanding the context of the policy goal and its corresponding barriers is important to create and select effective policy tools. The tools introduced by the municipality of Rotterdam to stimulate transformations, can be categorized as substantive information- and treasure tools (public information campaign and subsidies, respectively).[5] Bali *et al.*, (2021) find that procedural tools play a more crucial role in public policymaking than is commonly acknowledged and deserve more systematic research into their workings. Often the effectiveness of substantive tools depends on the appropriate use of complementary procedural tools (Bali et al., 2021). For example, a widely used substantive tool such as the value added tax, is very reliant on complex procedural arrangements that determine the tax rate, how revenues are shared across jurisdictions etc. This is an especially important finding, in the context of our research, as both the perceived barriers as well as the transformation of retail stores itself, are largely of procedural nature. In line with this,

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[5] The transformation manager is, in this context, considered more as an informational tool than as a bureaucratic administrational tool.

While no research has been done into effective policy tools aimed at stimulating retail store transformation, Rodenhuis (2012) conducted a graduate study on effective policies stimulating (vacant) office transformation in the Netherlands. The transformation of offices can be complex and costly process as the structural, legal, and functional aspects have to adhere to the Building Decree. A panel of professionals, including developers, investors, financiers, provinces, and municipalities, evaluated the various options to stimulate transformation. According to experts, the application for an environmental permit is considered as a bottleneck as it is a slow process. Making it easier to change the zoning plan is the most effective and feasible steering instrument for the government to drive transformation. A proactive approach to structural visioning and an area-oriented strategy are also highly recognized by the market. Furthermore, the market views more realistic depreciation by office owners to an effective instrument. Rodenhuis (2012) concludes that the government and the market have a joint role to play.

Another subject where the market can be stimulated to reach a socially desirable outcome is the energy efficiency of residential buildings. Mainali *et al.*, (2019) evaluate the policy tools used for promoting deep renovation (decreasing the energy consumption through renovation) of residential buildings in the Netherlands. Mainali *et al.*, (2019) distinguish between regulatory, informational, technical/organizational tools and financial tools. Mainali *et al.*, (2019) find that the financial tools are strong instruments in stimulating market participants to certain behaviour. Also, Mainali *et al.*, (2019) finds that although it is difficult to quantify the impact of informational support tools, their importance in creating a synergetic effect with other policies cannot be overlooked. Similarly, Mellross et al., (2012) researched local municipal policies aimed at accelerating the transformation of the building sector. One of their conclusion is that regulation is only one tool, and that programs raising awareness, educating consumers, and rewarding early adopters should not be overlooked.

3.2   Real estate price formation

The tools introduced by the municipality of Rotterdam were introduced to stimulate the transformation of retail stores that were not futureproof with the goal to retain or increase the quality of the areas. The potential positive externalities that occurred as a result of the transformations are intangible and do not have an observable market value. In academic literature, however, house prices are often used as a proxy for the quality of the area. Thus, to see if the transformations contributed to the revitalization of these areas, we research to what extent these transformations have had an effect on the surrounding house prices. To this end, we discuss house price formation with a focus on the different functions of land, the role of vacancy and redevelopment. The value of real estate is based on a variety of factors. Given the macroeconomic setting, such as GDP per capita and mortgage interest rates, real estate prices will be formed based on (local) supply and demand. Through supply and demand land is allocated to the person

or sector that has the highest willingness to pay.[6] The willingness to pay for a piece of land, a house or a retail store is largely influenced by its location. Von Thunen (1842) was the first to realize that prices for agricultural land are partially determined by the distance to the central business district (CBD). Subsequently, the bid rent curve was created. This theory argues that as one moves away from the CBD, rents decrease as transportation costs increase. Alonso (1960), altered the model to include the more modern functions: retail, office and residential. In figure 3, the modern bid-rent curve is displayed. Here retail, office and residential functions compete for land. Teulings *et al.*, 2017 confirm this retail bid rent curve as they find that urban retail areas have a pronounced centre where the number of visitors (footfall) is the highest, resulting in the highest willingness to pay. As one moves away from the centre, revenues decrease and thus rents decrease.
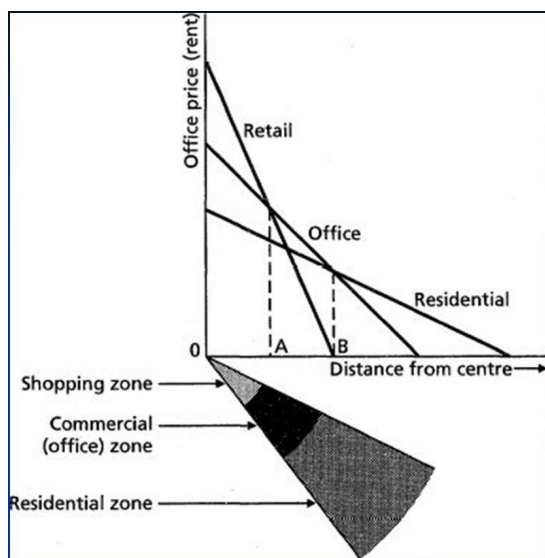

Figure 3 the von Thunen (1826) – Alonso (1964) bid-rent model

This model, however, is over-simplified as it treats real estate as a homogeneous good which price depends solely on distance to the CBD. Real estate, however, is a heterogenous product. Unlike a homogeneous good such as a can of Coca Cola, every house is different as it is made up off a variety of characteristics and is never located at the exact same location as another house or store. Rosen (1974), argues that the implicit price of a heterogenous product, like a house, is related to the value of the underlying characteristics of which that heterogenous products consists of. He argues that the price of a house is derived by adding up its individual characteristics. The characteristics of a house can be broadly separated into two main categories: structural and locational attributes. Structural attributes are the physical characteristics specific to a house, such as size, maintenance condition, the presence of a garden, building age, presence of daylight, floor space, floor level, number of bedrooms, car parking facilities and types of house ownership and so (Adair et al., 1996; Camagni et al., 2006; Mok et al.,

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[6] Exceptions aside.

1995; Tse et al., 2000). Locational attributes are characteristics of an area or neighbourhood, and not specific to a house.

Locational attributes, also known as externalities, can positively or negatively influence the quality of the neighbourhood, depending on the cost or benefit created (Orford, 1997). For example, as people generally appreciate nature, a park in the neighbourhood improves the quality of the environment, which leads to a positive effect on surrounding house prices (Jim et al., 2009). But also the proximity to functional places such as a train station (Henneberry, 1998) or sports stadiums (Tu, 2005), have positive external price effects. Being in the vicinity of retail stores can have both positive and negative externalities. Positive externalities of being close to stores include significant time savings, lower travel costs, and increased convenience (Addae-Dapaah et al., 2010). Stores, on the other hand, can also be a source of negative externalities for local residents, because of noise and traffic pollution (Addae-Dapaah et al., 2010). Additionally, even a small number of vacant stores can have an negative impact on the surrounding area (Van der Wal *et al.*, 2016). Thus, externalities can influence house prices as they are considered as amenities or disamenities.

The consensus in the literature is that vacancy is considered as a disamenity.[7] For example, Remøy *et al.*, (2009) argue that office vacancy has a negative effect on safety, image and the vacancy of surrounding offices. Furthermore, vacant properties will deter (market) investment in the surrounding area (Duncan et al., 1975), and a concentration of structurally vacant offices leads to impoverishment of the area (Remøy, 2010). This potentially decreases the liveability and social safety of the area, thus becoming a societal problem (Planbureau voor de Leefomgeving, 2020). As the quality of the vicinity can affect the price per square meter of a house for more than 50% (Visser et al., 2006), vacancy can put downwards pressure on the surrounding house prices.

Because of increased online consumption and the covid-19 pandemic the profitability of some stores decreases such that they become vacant (Retailagenda, 2021). When the supply of retail stores exceeds the demand for retail stores, retail rents decrease. As revenues are generally lower in secondary locations, retail store vacancy locates at the edges of the shopping area (Ossokina *et al.,* 2017). As retail rents become more comparable with office and residential rents, vacancy should, in the long run, lead to transformations to other uses (Ossokina *et al.,* 2017; Teulings *et al.*, 2017) This process is displayed in figure 4.

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[7] Vacancy can either be structural (vacant for longer than three years), long-term (between one and three years) or frictional (maximum of one year) (Locatus, 2013). A certain percentage of retail and office stock is supposed to be vacant to allow for relocations.
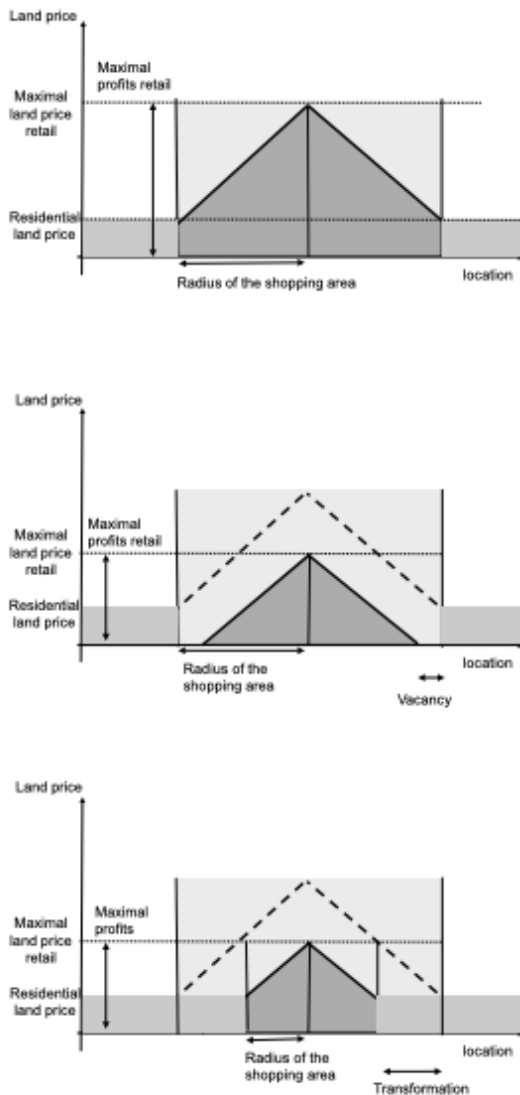
Figure 4 - Spatial model off Dutch retail area in inner city (Teulings et al. 2017).

When market participants redevelop or transform real estate into other uses it can have positive externalities. For example, Van Duijn *et al.*, (2016) researched the external effects of the redevelopment of abandoned industrial heritage sites into new uses on the surrounding house prices in the Netherlands. Using a hedonic difference-in-difference framework they compare quality-adjusted house prices of sold houses within a treatment radius and a control area. They find that before redevelopment, the sites negatively influenced surrounding house prices. They also find anticipation effects, meaning that prices increased during the redevelopment in anticipation of the positive effects as a result of the redevelopment. In larger cities, van Duijn *et al.*, (2016) find that the completion of the redevelopment of industrial sites had a positive external effect on nearby house prices. Similarly, in a graduate study Kramers (2018) finds that, controlling for house characteristics, the transformation of vacant offices into housing has positive external effects on house prices up until 1000 meters compared to houses within 1000-2000 meters from the transformation. Other than the redevelopment of vacant properties,

also the redevelopment of outdated real estate can have positive effects. Zhang *et al.*, (2020) for example find that the redevelopment of an outdated shopping centre has a positive external effect on nearby house prices up until 1000 meters. These positive external impacts, however, appear to fade quickly across location and over time.

As seen by van Duijn *et al.*, (2016), investments in the built environment could even have positive externalities before completion. Schwartz *et al.*, (2006) suggested a hypothetical timeline of the price effects as a result of large public place-based investments such as a new subsidized housing building (figure 5). It implies that public investments could increase surrounding house prices after the announcement. The model of Schwartz *et al.*, (2006) can be used to visualize the (potential) connection between the introduced policy tools, introduced to stimulate retail store transformations, and the corresponding price effects on the surrounding houses. The informational, organizational, and financial tools occur before the actual transformation commences in t=1. The goal is to research whether these tools and in extension the stimulated transformation, will have had an effect on house prices after t=3.
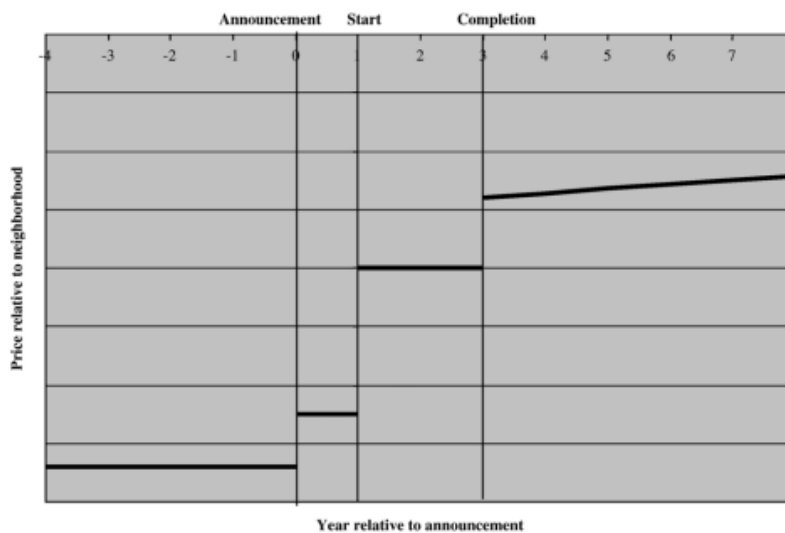
Figure 5 - Hypothetical timeline of external effects on surrounding house prices as a result of redevelopment (Schwartz et al., 2006)

3.3 Quantitative hypothesis

As vacancy is considered as eyesore for a city, which is often accompanied with a dilapidated area, and redevelopment has positive external effects, a decrease in the number of vacant stores is expected to improve the quality of the neighbourhood. This is turn is expected to increase surrounding house prices.

H1: *The transformation of (vacant) retail stores to housing leads to an increase in surrounding house prices.*

4   Methodology

The first goal of this research is to get an understanding of the experiences of the owners with the tools introduced by the municipality of Rotterdam and the overall transformation approach. To do this, a qualitative study is conducted. The second goal is to see if this set of tools contributed to neighbourhood revitalization. To this end, quantitative analysis is conducted. Firstly, the qualitatively methodology is discussed and secondly, the effect these transformations might have had on the surrounding house prices are studied quantitatively.

4.1   Qualitative methodology

Municipalities feel the need to stimulate the transformation of vacant properties. As discussed, they use various policy tools to incentivize owners to opt in for transformation. Qualitative research is performed to better understand if such and which policy tools work, and which shortcomings are encountered by interviewing property owners about their experiences with the various policy tools. Qualitative research helps to understand behaviour and opinions from the perspective of the study participants, to understand processes and context, and to study complex issues (Hennink et al., 2020).

A structured interview is chosen as it is desirable that all respondents are asked the same things and in order to avoid interviewer bias, respondents were not asked to elaborate on statements. In unstructured interviews, the participants determine the direction of the interview with the danger that not all factors of importance are discussed (Dunn, 2005). Both quantifiable, closed, questions as well open-ended questions are included in the interview guide (appendix A). The closed ended questions allow us to quantify the usage of the tools, while the open-ended questions can give in-depth knowledge of their experiences with the overall transformation approach.

Purposive sampling is used as (some) knowledge of the policy tools and the transformation process is needed. Purposive sampling means that participants who are 'information-rich' are actively recruited (Patton, 2016). Respondents were invited to participate in the interviews based on their direct experience with the retail transformation approach. Although purposive sampling is not based on probability, this does not preclude us from applying qualitative research concepts to a larger population; it simply means that statistical inference cannot be used to extrapolate the findings to a larger population, which is not the goal of qualitative research (Guest, G. et al., 2013). The respondents included in the interviews only have experience with the policy tools introduced in Rotterdam, thus the outcomes will never be completely representative of all/other municipalities. It is therefore unlikely that theoretical saturation has occurred (Hennink et al., 2020).

Furthermore, for ecological validity, all interviews were conducted in a setting that was familiar to the participants, i.e., at home. People in a familiar environment are thought to give more honest answers. Because the interviews always took place in the same setting, an interview over the phone, reliability was considered by using the methods consistently. Furthermore, using the interview guide, the participants were all given the same information before being asked for their thoughts and experiences (Scheepers et al., 2016).

4.2   Quantitative Methodology

Given the effort by the municipality to stimulate transformation of vacant properties, one may think that this type of transformation has a positive impact on the nearby environment. To test this quantitatively, one can try to find a proxy for the quality of the area. In the academic literature, house prices are often used as a feasible proxy for the quality of the area (when controlling for the structural characteristics of a house). This stream of literature leads to Rosen (1974). Rosen (1974) constructed the hedonic pricing model that argues that the price of a house is derived by adding up its individual characteristics. The underlying assumption of hedonic pricing is that "goods are valued for their utility-bearing attributes or characteristics" (Rosen, 1974). The hedonic regression model is often used in real estate literature as it able to determine the contributory relationship between a specific characteristic and the price of a house. The equation of the hedonic model is:

$$P \ = \ F \ (\ S, L, T, E)$$

Where P (price) is a function of vectors of structural characteristics (S), locational characteristics (L), time characteristics (T) and external characteristics (E). Previous literature has found the following relationships between certain characteristics and house prices.

An often-used method to measure externalities on house prices is the difference-in-difference method (Imbens and Woolbridge, 2009; van Duijn *et al.*, 2016). A difference-in-difference framework is helpful to determine the effect of a 'treatment'. It does so by comparing a target and a control group over time. The target group receives 'treatment', in this case the transformation of vacant stores stimulated or aided by the municipality. The control group does not receive treatment, in this case; has not undergone transformations stimulated by the municipality. The treatment effect, the external effect of the transformations, is the relative difference in change between the groups, before and after the treatment. The treatment effect can be measured through adding a dummy variable for the target group. This dummy variable displays the top-up effect of the target group relative to the control group. Thus, regressing real estate transactions in a hedonic difference-in-difference framework, as used in Imbens and Woolbridge (2009) and van Duijn *et al.*, (2016), allows for measuring the effect of the treatment

while controlling for other characteristics. The model of van Duijn *et al.*, (2016) is used, albeit a simplified version to better fit to this research:

$$Ln\ P_{ijt} = \beta_0 + \beta_1\ Target + \beta_2\ After + \beta_3\ Target * After + \beta_k X_{ki} + \beta_t \Psi_t + \beta_j\ \Omega_j + \varepsilon_{itj}$$

Here P_{it} is the transaction price of house *i* at time *t*. *Target* represents a dummy that is 1 if the house is part of the target group and 0 otherwise. *After* is a dummy which equals 1 for transactions in years after the transformations. X_{ki} are the structural characteristics *k* of house *i*. Ψ_t is a vector representing a dummy for each transaction year *t*. Ω_j is a dummy created for each neighbourhood *j*, capturing neighbourhood fixed effects. ε_{itj} is the error term. The coefficient of interest is β_3 representing the treatment effect, constructed with an interaction variable. The structural characteristics included in the model will be discussed in the next chapter.

As there is no previous literature investigating the range of the effects of this specific type of change, the treatment area is difficult to determine precisely. Van Duijn *et al.*, (2016) find that the redevelopment of abandoned industrial heritage sites into new uses has a significant, positive, effect on house prices until 1000 meters. The influence radius of the transformations of (vacant) retail stores is expected to be smaller than that of the redevelopment of abandoned industrial heritage sites. An example of an externality that has a more local effect is that of the presence of bicycle paths. Racca and Dhanju (2006) looked at the impact of proximity to newly constructed bike paths on property prices in Delaware, USA. Racca and Dhanju (2006) find that bike paths up until 50 meters had a significant positive effect on property prices. but larger than the proximity to bicycle paths. We argue that potential buyers take the immediate vicinity into account and set the target area radius arbitrarily at 100 meters. Thus, firstly, all addresses within 100 meters of one of the transformed properties, aided or stimulated by municipal actions, will be grouped, and considered the target group. This is done using QGIS and the BAG registry. Secondly, the control group is constructed by taking all the addresses of the neighbourhoods in which the transformations took place and subsequently removing all target addresses. We then have a target group, consisting of house transactions located within 100 meters of a transformation, and a control group, consisting of the corresponding neighbourhoods excluding the houses in the target areas. As the influence radius is uncertain, two other specifications are constructed and tested. In the second specification the target area is enlarged and made up of all addresses within 250 metres of the transformations while the control group remains the neighbourhood minus target area. In the third specification the target area is set back to all addresses within 100 meters and the control group is made up of all addresses within 100 – 250 meters of the transformations.

5 Data

To conduct the qualitative and the quantitative research, access to the experiences of the owners is needed, as well as information on the locations of transformation. To this end, and to gain an understanding of the transformation process, the author interned at the municipality of Rotterdam.

5.1 Qualitative data

To answer the qualitative research questions, interviews were held. The interview guide was constructed in cooperation with Bureau Stedelijke Planning. Participants were recruited through the network of the municipality. Respondents were sent the interview guide in advance after which the interviews were conducted through telephone conversations. The group consists of 37 respondents of which 29 are private owners, two respondents represent a housing-corporation, two asset managers, two architects and one individual who lives in a transformed house, see figure 6.

The respondents are spread out over the three areas: eleven Boulevard Zuid, sixteen Katendrechtse Lagedijk, ten Noorderboulevard. The functions of their property before the transformation were: 30 commercial function ((vacant) retail store or *dienstverlening*), two offices, one restaurant, three mixed (commercial) functions and one property was used for storage.
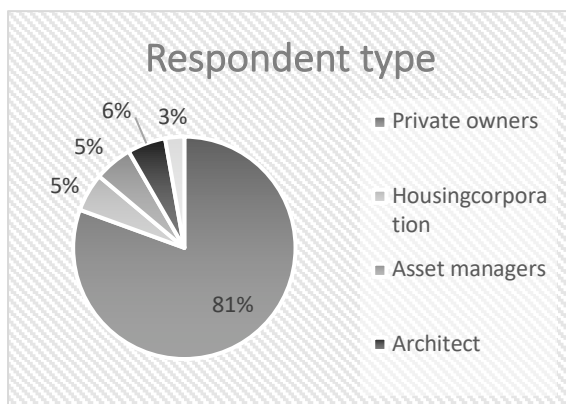

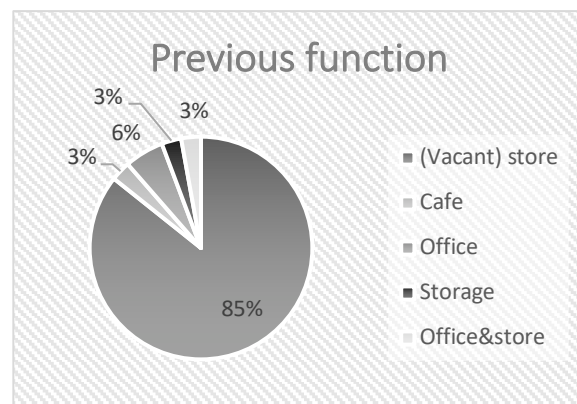*Figure 6 - Type of respondent Figure*

Figure 7 - Previous use of transformed stores

Almost all respondents (34) indicated that the new use of their house is residential, two properties were transformed to a temporary house to be demolished later, one store was transformed into a different commercial function. Out of the 37 respondents, 27 indicated that they were thinking about transformation before the municipality was involved, ten respondents indicated that the municipality or the transformation-manager initiated the idea. To give an indication of what the cost of transformation are, the investments made by respondents are displayed in table 3. The transformations range from small construction changes to completely redeveloping multiple floors.

Table 3 - The cost of transformation

Investment in €	# of respondents	in %
Will not say / Does not know	2	5%
0 – 25.000	5	14%
25.001 – 50.000	4	11%
50.001 – 100.000	10	27%
100.001 – 250.000	8	22%
250.000 +	8	22%

5.2 Quantitative data

According to documents of the transformation managers, the municipality of Rotterdam played an active role in 50 transformations in 2019.[8] The transformations stimulated or aided by the municipality of Rotterdam in 2019, displayed in figure 8, are considered the treatment. 37 stimulated transformations of 2020 are disregarded to have sufficient *After* observations.[9] The number of transformations in 2018 was too little (6) to consider 2018 as a treatment year. As discussed in the previous chapter, all addresses within 100 meters of a transformation are part of the target group (represented in yellow in figure 9 and figure 10). All addresses within the three neighbourhoods, excluding the target addresses, are the control group (represented in red in figure 9 and figure 10).[10]
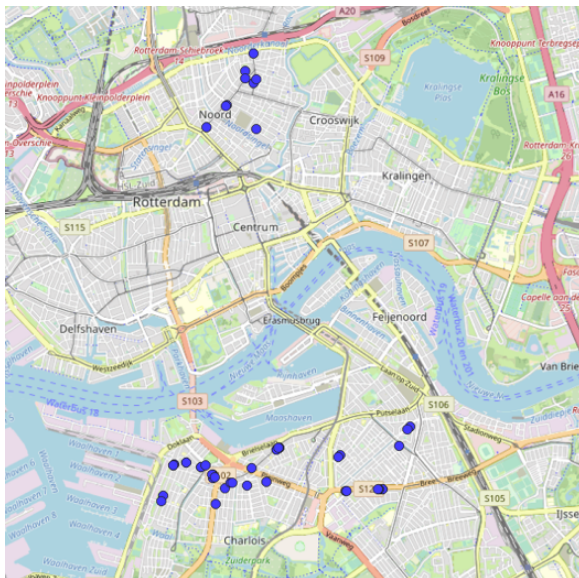
Figure 8 - Transformation locations spread out over the three neighbourhoods
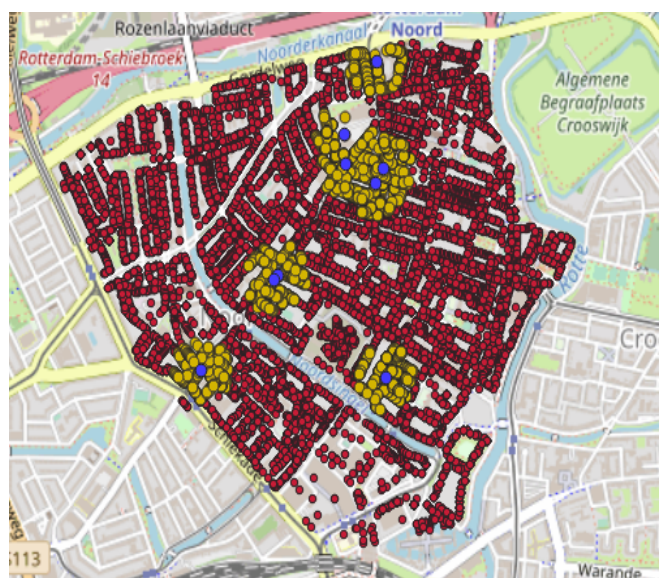
Figure 9 – Noorderboulevard: target area (yellow) & control area (red)

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[8] The number of houses/apartments created is larger than 50 as multiple can be created at one address.
[9] Transformations of which the permit application was submitted or granted are included. If the transformation of the address was in an earlier stage, it is excluded.
[10] An overview of the transformations, target and control area is given in appendix B.

Figure 8 - Boulevard Zuid + Katendrechtse Lagedijk: target area (yellow) & control area (red)

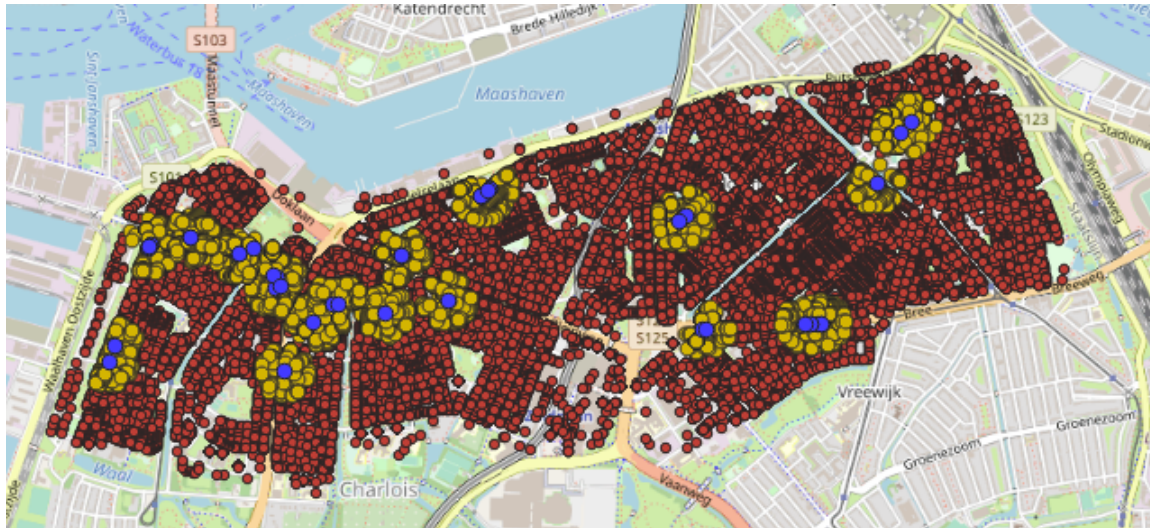The transactions used come from the NVM database, which is enabled through an NVM member. The NVM data consists of 70% of all real estate transactions and is therefore a proper sample of society. This transaction database contains information on the location (address, neighbourhood), price information as well as residential house characteristics (e.g., house type, size, maintenance). The data consists of transactions from January 2015 until March 2021, after which no newer data could be gathered. This limits us in our research as not an abundance of 'after' transactions are available. To perform the hedonic regression, the dataset containing transaction information was linked with the dataset containing the addresses of the target and control group. This enables us to omit all transactions that do not belong to either the target or control group.

The following structural characteristics are included as control variables based on van Duijn *et al.*, (2016); floor surface (in m^2), housing type, number of rooms, maintenance level inside, maintenance level outside. Year dummies are included to capture time fixed effects. Neighbourhood dummies are included to capture neighbourhood fixed effects. Unfortunately, the construction period variable is omitted as a structural characteristic as it is found that, according to the dataset, the earliest year of construction is 1980. This was suspicious as the relevant neighbourhoods were built earlier. After confirming that the construction years were incorrect, the variable was omitted. The control variables: floor surface, house type, number of rooms, maintenance level inside, maintenance level outside is checked for incorrect values. As a result, twelve observations are omitted. The descriptive statistics of the target and control group are shown in table 4. The development of the average transaction price over time and the average square meter price over time of both groups are displayed in figure 11 and 12. The treatment year is displayed as blue lines. It should be taken into account that there is little transaction data available of 2021 and that the average transaction prices and average square meter price are based on a small number of transactions (target group 6, control group 43). Ideally, we would have the year

25

2019, the moment of treatment, on the Y-axis to see the impact of the transformations on the target area compared to the control area. For this our data is insufficient.

Table 4 - Descriptive statistics of target & control group

| Variable	Target area: 0-100 m: 195 transactions				Control area: Neighbourhood excluding target area: 1099 transactions			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Sale price (in k euros)	197,938	87.538.323	72	520	227.992	99.557	59.5	735
Price per m²	2.217	778.144	990	4.815	2.301.505	784.552	731.707	5250
Surface (in m2)	88.513	19.111	50	151	99.126	24.627	40	265
property type(1=Yes)	.	.	.	.	.	.	.	.
Apartment	.867	.341	0	1	.786	.41	0	1
Corner house	.036	.187	0	1	.034	.18	0	1
Semi-detached house	.01	.101	0	1	.009	.095	0	1
Terraced house	.087	.283	0	1	.171	.377	0	1
# Rooms	3.482	.904	2	6	3.729	1.041	1	9
Condition inside	.	.	.	.	.	.	.	.
Excellent	.144	.352	0	1	.136	.342	0	1
Good	.728	.446	0	1	.699	.459	0	1
Good to Excellent	.036	.187	0	1	.05	.218	0	1
Moderate	.01	.101	0	1	.006	.08	0	1
Moderate to Reason~e	.01	.101	0	1	.007	.085	0	1
Poor to Moderate	0	0	0	0	.001	.03	0	1
Reasonable	.036	.187	0	1	.064	.244	0	1
Reasonable to Good	.036	.187	0	1	.037	.19	0	1
Condition outside	.	.	.	.	.	.	.	.
Excellent	.092	.29	0	1	.133	.34	0	1
Good	.836	.371	0	1	.762	.426	0	1
Good to Excellent	.046	.21	0	1	.059	.236	0	1
Moderate to Reason~e	0	0	0	0	.001	.03	0	1
Poor To Moderate	0	0	0	0	.001	.03	0	1
Reasonable	.015	.123	0	1	.019	.137	0	1
Reasonable to Good	.01	.101	0	1	.025	.158	0	1
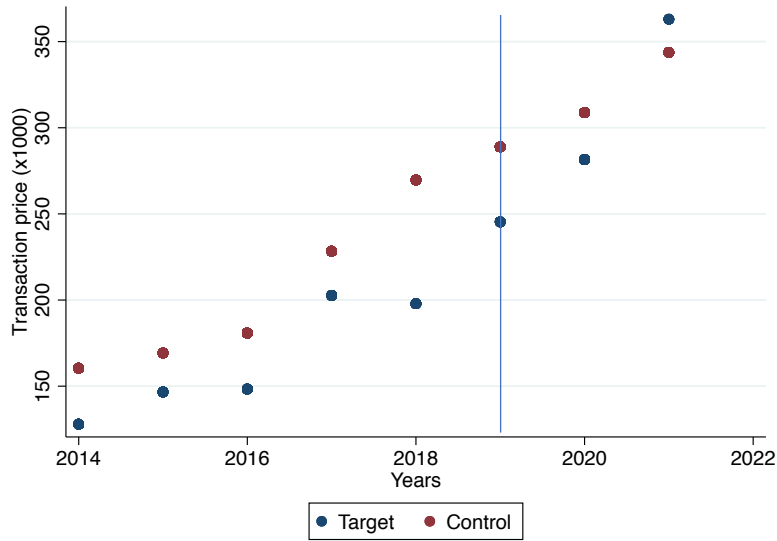
Figure 9 – Average annual transaction price throughout time in €
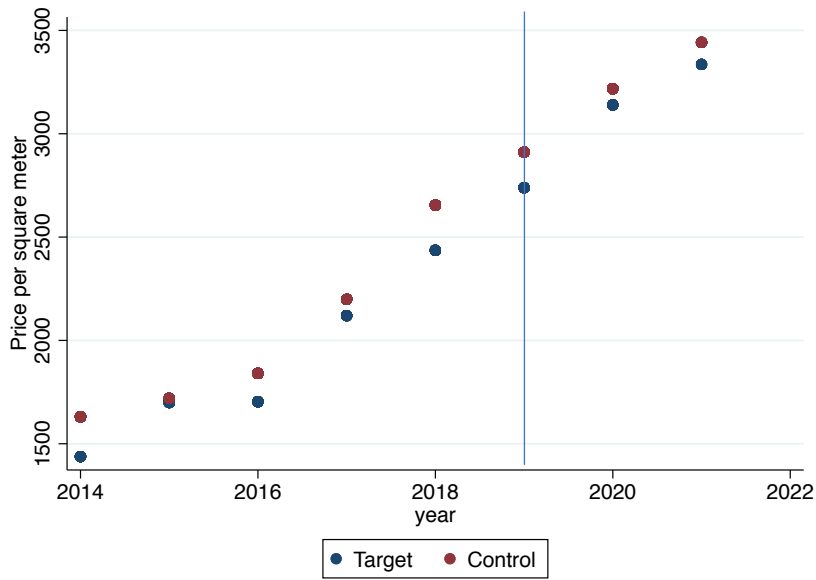

Figure 10 – Average annual square meter price throughout time in €

6   Results

This chapters discusses the findings of the qualitative and the quantitative research. Following the structure of the previous chapters, this chapter is split up in two parts. Firstly, the qualitative results are discussed, followed by the quantitative results.

6.1   Qualitative results

Table 4 gives insight in the level of awareness that is reached about the policy tools and, in extension, the transformation approach. Secondly, it displays which tools the owners considered as decisive (*doorslaggevend)* in the transformation effort. First of all, it is noteworthy that a large number of tools was relatively unknown by the respondents. If someone is not aware of the existence of a tool, he or she is not able to speak to its decisiveness. It is therefore more relevant to see what percentage of people that knew about a tool, thought it was decisive for the transformation approach. Let us call this the decisiveness factor (%). This percentage can be seen in column *** of table 5.[11]

The tool most widely known was the transformation manager, "the human approach". He was known by 73% of respondents and considered decisive in 62% of transformations. Thus, the transformation manager was considered to be decisive by 85% of respondents that knew about it (23/27 =85%). While only 11 respondents indicated that they knew about the conversations with the municipality, it was considered as decisive by 58% of those 11 respondents. The same holds for the available assistance with the environmental permit as well. The awareness was low (19%), but it was decisive for 5 out of 7. Table 5 also shows that the informational tools were barely known and consequently were, overall, not considered as decisive. This is not unexpected as the transformation congress, masterclasses and information market were not aimed at small private owners. However, the website providing information regarding the transformation process and the roadmap showing the steps to get an environmental permit, were not widely known either (22% and 0%, respectively). The availability of a subsidy to contract an architect ("architect-subsidy") for an initial drawing was known by 18 out of 37 respondents and considered as decisive in the majority of cases. The subsidy available to use for structural research of the property was known to a lesser extent and was decisive in 6 out of 11 cases. For both financial tools, the decisiveness factor was over 50% meaning that a majority experienced the tool as decisive. This is in line with Mainali *et al.*, (2019) who find that subsidies are strong instruments in stimulating behaviour. As it is recommended for qualitative studies to have a min a minimum sample size of at least 12 to reach data saturation (Braun and Clarke, 2016*;* Fugard and Potts, 2015), only the results of tool 1 and 10 are valid. This prohibits us from accepting or rejecting or the qualitative expectations regarding the impact of the tools per category.

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[11] It should be considered that in most cases the sample is small.

Table 5– The perceived awareness and decisiveness of the policy tools.
Number of respondents that knows of the tool (*), number of respondents that thought the tool was decisive (**),
the percentage of people that knows of the tool and considered it decisive (***)

Category	Policy Tool	*	in %	**	in %	***
Organizational tools	1. The transformation manager as a point of contact	27	73%	23	62%	85%
	2. Conversations between municipality and owner	11	30%	7	19%	58%
	3. Assistance with environmental permit	7	19%	5	14%	71%
Informational tools	4. Attending Transformation congress	0	0%	0	0%	0%
	5. Attending masterclasses	0	0%	0	0%	0%
	6. Attending information market	5	14%	3	8%	60%
	7. Consult website	8	22%	4	11%	50%
	8. Route map	0	0%	0	0%	0%
Financial tools	9. Application for architectural survey (funding by municipality)	11	30%	6	16%	55%
	10. Employ architect (funded by municipality)	18	49%	13	35%	72%
	11. none	3	8%	5	14%	-

Following the perceived awareness and decisiveness of the policy tools, the next section will discuss three aspects of the transformations approach that, according to the respondents, could be improved in future transformation efforts.

6.2   Shortcomings of the transformations process

The three shortcomings of the transformation approach that were mentioned the most by the respondents are the lack of awareness, the communication (of information) and the lead times of the environmental permit process. These topics are discussed by means of quotes of the respondents to display their unfiltered experiences.

Overall awareness of the transformation approach

Given the level of awareness of the tools it is no surprise that this was an issue that was raised by respondents. Apart from the transformation manager, all tools were known by less than half of the respondents. This shortcoming is discussed and substantiated by means of the quotes in table 6. As the awareness of the policy tools is important to reaching the desired policy goals (Mellross et al., 2012), more awareness will contribute to the overall success of the transformation goals.

Table 6 - Respondent quotes concerning the (lack of) awareness of the transformation approach

1	*"I heard of the transformation manager through the realtor. If the realtor had not had that tip, I would have never heard of the transformation manager. Approaching owners more proactively and see what you can do to encourage transformation, that can help."*
2	*"Make sure that this effort is more known. Was the transformation manager supposed to call owners or were we supposed to find the project ourselves? I suggest doing this pilot more actively and make better contact with owners to increase participation. The project ran for four years, and I've only heard about it one year ago. "*
3	*"Municipality could reach out to owners in a much more targeted way"*
4	*"The acquisition side (of the municipality) to make people aware of the resources and the communication needs to improve. Don't stop at leaving one note. Be clearer from the beginning to where the help is and offer help for the entire process."*

The communication and information provision regarding the transformation process

Another issue that was brought up frequently (eleven individual respondents) is that the communication and the information provision was inadequate. Respondents feel that it is unclear what the municipality offers and where the owners can go with questions (see table 7 quote 1, 2, 3). A lot of respondents indicated specifically that they would like to have been better informed regarding the cost of information and the subsidies that were available (see table 7 quote 4, 5). The quality of the informational support, its importance stressed by Mainali *et al.*, (2019), is not adequate resulting in sub optimal outcomes.

Table 7 – Respondent quotes concerning the overall information provision

1	*"Providing information in its entirety could be better and faster, so that more people get an idea of what the possibilities are."*
2	*"Information provision must improve. There should be a specific department where you can go with all your questions and where they make clear what they offer and take you through the entire process."*
3	*"Be clearer from the beginning where the help is and offer help for the entire process. After receiving a letter trying to contact the municipality, it took at least a year before I received a response. This should be faster, a normal person would not wait so long."*
4	*"The most important thing is a good support and explanation of the possible costs involved in the transformation. The costs of transforming the building were disappointing for me and I would have liked to have been better informed about this in advance by the municipality."*
5	*The municipality can provide more information and clearer information regarding the costs involved in a transformation, especially for a private investor.*

Environmental permit process

Another part of the transformation process that a large part of respondents perceived as having room for improvement, is the permit process. Eight individual respondents indicate that, in their opinion, it takes too long to be granted an environmental permit to start transforming (see table 8 quote 1, 2, 3). Thus, the slow process is restraining the transformation efforts. This is in line with Rodenhuis (2012), who finds that the environmental permit application is a bottleneck in the transformation of vacant offices.

Table 8 – Respondent quotes concerning the of the (permit application) process

1	*"Grant permits quicker and make the permit process less complicated"*
2	*"The problem is that permit procedures for minor interventions take too long."*
3	*"Quicker communication with the building inspector, faster permit issuance"*
4	*"Clearly indicate who you need to contact for which processes. In addition, faster processing times (doorlooptijden) must be achieved. This can be done by setting priorities and by looking carefully at who is assigned to which application. Split this up, easy applications within existing legislation can probably be dealt with much faster this way."*

Overall experience of the transformation appraoch

The transformation approach and its tools have had a significant impact as most tools were considered as decisive by the majority of people that were aware of it, albeit a small sample. As a result, 100 transformations have occurred between 2018-2020.

Although a lot of transformations have been stimulated, there is room for improvement according to the owners of retail stores who have experienced the transformation process. Some tools were unknown to the majority but were considered as decisive by the ones that were aware of it. Thus, the lack of awareness restrains the contribution of the other tools in stimulating transformation. What is also noteworthy is that a lot of the experiences and feedback given by respondents have to do with the procedural part. It appears as if the substantive tools, as classified by Howlett (2000), are not sufficiently supported by the procedural tools. For the inadequate communication of information as well as the slow permit process, more procedural support in the organization of the municipality is recognized as something that could have contributed to the transformation effort. This is in line with Bali *et al.*, (2021), who stress that the procedural tools are oftentimes neglected, but vital for the policy goal. Thus, the mix of tools, appears to be sub-optimal in this context. The respondents indicate that the appointment of specifc transformation employees, who are able to answer questions and give permissions more quickly, would contribute to the transformation goal.

6.3 Quantitative results

To see what the effects were of the stimulated transformations on the surrounding house prices, four regressions are run. The results are presented in table 8. Model 1 is the base model as described in chapter 3. Model 2 is the base model with year fixed effects included. Model 3 is the base model with year fixed effects and structural characteristics included. We see that the adjusted R-squared increases gradually, meaning that adding additional control variables increases the ability of the model to explain the influence of the variables on the dependent variable. We find the best model fit in model 4 where structural characteristics, year fixed effects, and neighbourhood fixed effects are included. Model 4 will be referred to in the coming discussion.

The *After* variable indicates that the transformations after 2019, while controlling for structural characteristics, time- and neighbourhood fixed effects, have a higher price level than the transactions before 2019. The reason that coefficient of *After* is high, while time fixed effects are included is because the year 2021 is omitted due to multicollinearity. We see that the *Target* variable has a statistically significant and negative coefficient.[12] This holds in all four models. This indicates that, while controlling for the other factors, houses in the target area sold for 2,77% less (=(exp(-0.0273) -1)*100) than houses in the control area. This indicates that the target area had a lower price level relative to the control area over the period 2014-2021. Assuming that price can be considered as a proxy for the quality of the environment, the target area is of lower quality than the control area. The *Treatment* variable is the variable of interest as it denotes the influence of the transformations of (vacant) retail stores on the surrounding house prices. The interaction variable, *Treatment*, is 1 if both *Target* and *After* are 1 and 0 otherwise. As the effect of being in the target area (*target)* and occurring after 2019 (*after)* have been accounted for, the treatment coefficient can be considered as the effect of the transformations on their surroundings. In model 1 – 3 we see that it positive and significant at the 90% level. This indicates that, after the treatment, the houses in the target area are associated with a relative price increase compared to the houses in the control area. This suggests that the negative effect of the target area, decreases after 2019. In model 4, as the neighbourhood fixed effects are included, the coefficient remains positive, but the significance disappears. Some indication is given that the target area has increased in price relative to the control area after 2019, but the results are not statistically significant. The two other specifications of the target and control areas also did not yield significant results for model 4. Thus, we do not find conclusive evidence that the transformations have had positive external effect on surrounding house prices. These findings differ from van Duijn *et al.*, (2016), Kramers (2018) and Zhang *et al.*, (2020) who find positive external effects on house prices as a result of redevelopment or transformation of vacant properties. Because no significant results were found, we cannot, yet, claim a positive or negative effect of the transformations on surrounding neighbourhood quality. The insignificance can potentially

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[12] The Target variable is 1 for addresses in the target area and 0 otherwise.

be explained by the low number of *After* observations and/or the imperfect specification of the target and control area. We elaborate further on these issues in the limitations section. Another reason for insignificance can be the additional supply of houses that placed downwards price pressure on the target area and offset any price increases, contributing to the insignificance. Intuitively, however, this is not the main issue as the demand of houses exceeds the supply tremendously on the Dutch real estate market and Rotterdam was in high demand by home searchers and by out-of-town investors (Groenendijk, 2021).

Table 9 – Estimation results for the baseline specification.

Variables	(1)	(2)	(3)	(4)
After	0.451***	0.788***	0.755***	0.729***
	(0.0231)	(0.0483)	(0.0280)	(0.0214)
Target	-0.170***	-0.190***	-0.0807***	-0.0273*
	(0.0330)	(0.0269)	(0.0173)	(0.0150)
Treatment	0.106*	0.129**	0.0678*	0.0151
	(0.0579)	(0.0529)	(0.0394)	(0.0279)
Constant	12.17***	11.94***	7.703***	7.816***
	(0.0129)	(0.0199)	(0.181)	(0.120)
Observations	1,294	1,294	1,294	1,294
Adjusted R^2	0.202	0.452	0.799	0.867
Year FE		YES	YES	YES
Structural Characteristics			YES	YES
Neighbourhood FE				YES

Robust standard errors in parentheses. ***, **, * indicating significant at 1%, 5%, 10% and respectively.

7 Conclusion

This study explored the effects of the transformation of (vacant) retail stores into houses. This study had a dual focus as it firstly, qualitatively researched the experiences with a set of policy tools introduced to stimulate transformation and secondly quantitatively researched the subsequent external effect of this transformation approach on surrounding house prices. To qualitatively analyse the experiences of the transformation, the barriers, legal context were discussed as well as a set of policy tools introduced by the municipality of Rotterdam to stimulate retail store transformation. A literature study was conducted to set forth the different types of governmental policies and relevant papers on stimulating policy efforts were discussed. Subsequently, 37 "information rich" respondents, owners who have transformed their retail store, were interviewed through the telephone. The respondents were asked which tools they knew and which tools they considered to be decisive to the transformation, as well as what shortcomings they experienced.

The main barriers of transformation as perceived by inhabitants of Rotterdam, the Netherlands were the complexity of the procedures and the cost of transformation. The set of policy tools introduced was indented to alleviate these barriers. We find that the owners of transformed stores consider the transformation manager and the subsidy for an initial architectural drawing decisive in the transformation effort. Some of the other policy tools were considered as decisive, but by a sample that was too small to form conclusions as the recommended minimum sample size of qualitative studies is twelve. This leads us to our next finding, the low awareness. When asked about the shortcomings of the transformation approach, one of the most reoccurring themes was the low awareness of the project. Multiple respondents indicated that the municipality should target retail store owners in a more targeted way. Because most tools were unknown to the majority of respondents, their potential was not reached. Further, the owners of the transformed stores experienced the communication of the municipality with regard to the transformation approach, as not optimal. Multiple respondents expressed that it was unclear what the municipality offered and where they should go for different parts of the process. Lastly, the environmental permit application is perceived as a slow process and a bottleneck to the transformation goal. While the substantive policy tools, such as the transformation manager and the subsidy, were used and experienced as decisive to the transformation approach, a lot of the feedback given by respondents has to do with the procedural part. Thus, ensuring adequate procedural backing for the smooth working of the substantive policy tools is important for the overall success. Municipalities could use these findings to their benefit when constructing a set of policy tools aimed at stimulating transformations.

The second aim of this research was to see if the transformation efforts contributed to retention or improvement of the area by quantitatively researching the external effects of the stimulated

transformations on surrounding houses. Through literature review, the underlying mechanisms of house price formation and the possible influences of vacancy and transformation were researched. The consensus in the literature is that transformation or redevelopment of vacant or abandoned properties result in positive external effects on house prices. Subsequently, through a hedonic difference-in-difference framework the potential effect of retail store transformation into housing on surrounding houses was researched quantitatively. To this end, house transactions within a target area and a control area were compared. The target area consisted of all addresses within 100 meters of the 50 transformations in 2019 and the control area consisted of all addresses of the relevant neighbourhoods excluding the target addresses (195 and 1099 transactions, respectively). As the influence radius of 100 meters was set arbitrarily, two additional specifications of target and control areas were created.

When controlling for structural characteristics, time fixed effects and neighbourhood fixed effects, the target area has a lower price level than the control area. Assuming house prices can be a proxy for the quality, this indicates that the target area is/was of lower quality. The goal was to see if the stimulated transformations could contribute to the revitalization of the area. For the first three models a positive result, significant at the 90% level, was found for the treatment variable, indicating a positive effect on house prices as a result of being within 100 meters of a transformation. The significance of the effect disappears as neighbourhood fixed effects are included. Thus, this research withholds from formulating any causal effect. The insignificance either means that there is no effect of the transformations on surrounding house price, or it can be attributed to lack of data and/or misspecification of the target and control area. No policy implications can be derived from the qualitative research at this point, but future research on this topic could prove useful in shaping urban revitalization policies.

8 Limitations and future research

While it has given us some interesting insights, this research has limitations for both the qualitative and the quantitative part and could benefit from further research. In terms of the qualitative research, the results can be biased in a variety of ways.

Firstly, the decisiveness of a large number of tools could not be established satisfactory due to the low awareness of those tools. In order to avoid interviewer bias, respondents were not asked to elaborate on statements. A semi structured interview, however, could have given a better understanding as to why a tool is perceived as decisive and to what extent. Also, respondents could have different definitions of what is "decisive" ("*doorslaggevend*"). While the contribution of the transformation manager and the subsidy for an architect can be assumed, future research into policy tools stimulating retail transformation should consider using a larger sample and including follow up questions. Secondly, the themes that emerged as shortcomings are solely from the viewing point of the owners and not from the municipality. By selecting only respondents that have undergone transformations and not including municipal employees it is possible that there is respondent bias. Nonetheless, we believe that the range of stakeholders interviewed, and the of experienced shortcomings discussed, gained us valuable insights.

In terms of the quantitative research, the methodology was not perfectly suited to single out the effect of the retail store transformations on the surrounding house prices. The hedonic difference-in-difference framework has proven its value when the changes in the landscape are relatively large, do not happen in the same area in overlapping time frames, and sufficient *before during* and *after* observations are available. In other words when the treatment area and its timeframe are clear. The researched context, however, does not fit that description. In terms of methodology, it is difficult to find a method that is able to effectively disentangle the effect of a lot of small changes, occurring in overlapping timeframes in the same area. Additionally, the available data formed a limitation. Because transaction data was only available until March 2021, it was chosen to not consider the transformations of 2020 as treatment to leave sufficient '*after*' observations. Because of this, and the possibility that transformations have taken place outside the scope of the retail transformation approach, the control group, where no treatment is assumed, is imperfectly specified. This will likely have created bias and affected the significance of the results. As mentioned, the additional supply is not the main cause for concern. However, it is likely that both the target and the control area are undergoing gentrification as more residents with higher incomes arrive, potentially increasing the quality. Also, investors like to invest in areas with lower price levels because of the larger potential upside. It could be argued that investment behaviour favouring the target area also influences the relative price increases between the target and control group. Because of these factors, it is difficult, if not impossible, to effectively disentangle the effect of the transformation of the

(vacant) retail stores on surrounding house prices from other (external) effects. Future research into the external price effect of transformations is needed to be confidently able to say that it has an influence on surrounding house prices. In future research, the target and control group need to be better specified. To do this, all transformations, stimulated or not, should be gathered and a suitable control area needs to be found. Ensuring sufficient *after* observations is also important. This in itself presents a difficulty as often the transformation of (vacant) retail stores into housing is an ongoing process with no clear 'end'.

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Appendix A: Interview guide

The owners were asked the following questions:

What was your involvement in the transformation process?

What was the use of your building before the transformation?

What function does the building now have after the transformation?

How did you get the idea to (possibly) transform your house into a home or other destination?

The Municipality of Rotterdam has used various means to inform house owners like you about the possibilities that transformation can offer. What resources do you know?

Which of the following resources that the Municipality of Rotterdam used did you ultimately use in the transformation, which were decisive?

What do you think went well and what can be done better in the process?

How long did the transformation process take (from start (first talks) to delivery)?

To what extent has the quality of the house improved after the transformation?

To what extent has the transformation of your house affected its value/rent increase?

Can you indicate to what extent you are satisfied with the new function of your house, and can you explain this?

Based on your experience with the transformation process, do you have any recommendations?

Appendix B - Overview of the area's

The three areas with transformations depicted as blue dots, target area yellow dots control area red dots.
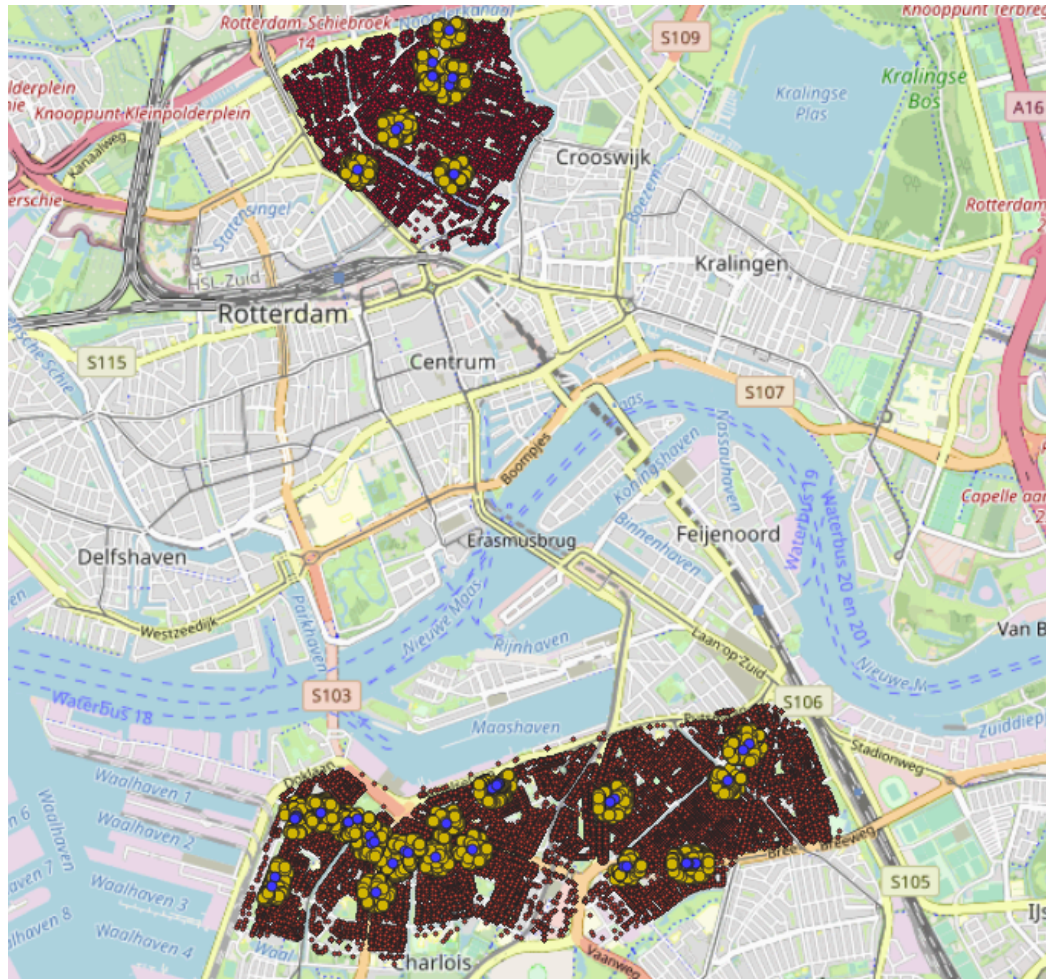
Appendix C: Syntax

```
cd "/Users/gijsbuitenhuis/Google Drive/1.THESISRE 2.0/"
import excel "/Users/gijsbuitenhuis/Google Drive/1.THESISRE 2.0/Rotterdam transacties
(better).xlsx", sheet("Sheet1") firstrow

Specification 1:
//Target = 1 if the address is within 100m of a transformation
// ControleKWZ & ControleNoord = 1 if the address is in the control areas; the neighborhood minus
the target areas

gen Control = 0
replace Control = 1 if ControleKWZ ==1 | ControleNoord ==1 & Target == 0
drop if Target == 0 & Control ==0

generate dot = date(Dateoftransaction,"DMY")
format %tdDD/NN/CCYY dot
gen year =year(dot)
generate month2 = date(Dateoftransaction, "DMY")
format %tm month2

encode District, gen(District1) // generates a variables that is the same as district but can use 1 instead
of "Charlois", allows for District to be used as dummy.
encode Neighbourhood, gen(Neighbourhood1)
encode MaintenanceLevelOutside, generate(Conditionoutside)
encode MaintenanceLevelInside, generate(Conditioninside)
encode Propertytypefromfilter, generate(propertytype)
gen Lnsaleprice = ln(Saleprice)
gen Lnsurface = ln(Surface)
gen Lnvolume = ln(Volume)
gen Postcode1 = substr(Postcode,1,4)
destring Postcode1, replace

drop if Saleprice < 5000
drop if Lnsaleprice == 0
sum Saleprice
sum Lnsaleprice
drop if Surface == 0
sum Surface
ren Salepricepersqm m2price
destring m2price, replace
sum m2price


// dummy's
gen parking = 0
replace parking = 1 if Parking == "Included"
gen Apartment = 0
replace Apartment =1 if Propertytypefromfilter == "Apartment"
gen Cornerhouse = 0
replace Cornerhouse =1 if Propertytypefromfilter == "Corner house"
gen Terracedhouse = 0
replace Terracedhouse =1 if Propertytypefromfilter == "Terraced house"
gen Semidetached = 0
```

```
replace Semidetached =1 if Propertytypefromfilter == "Semi-detached House"
replace Semidetached =1 if Propertytypefromfilter == "Semi-detached house"
gen Detached = 0
replace Detached =1 if Propertytypefromfilter == "Detached house"

gen Mainin =0 // Maintenance level inside 1 to 3
replace Mainin = 1 if MaintenanceLevelInside == "Poor"
replace Mainin = 1 if MaintenanceLevelInside == "Moderate"
replace Mainin = 1 if MaintenanceLevelInside == "Poor to Moderate"
replace Mainin = 1 if MaintenanceLevelInside == "Moderate to Reasonable"
replace Mainin = 2 if MaintenanceLevelInside == "Reasonable"
replace Mainin = 2 if MaintenanceLevelInside == "Good"
replace Mainin = 2 if MaintenanceLevelInside == "Reasonable to Good"
replace Mainin = 3 if MaintenanceLevelInside == "Good to Excellent"
replace Mainin = 3 if MaintenanceLevelInside == "Excellent"

gen Mainout =0
replace Mainout = 1 if  MaintenanceLevelOutside == "Poor"
replace Mainout = 1 if  MaintenanceLevelOutside == "Moderate"
replace Mainout = 1 if  MaintenanceLevelOutside == "Poor To Moderate"
replace Mainout = 1 if  MaintenanceLevelOutside == "Moderate to Reasonable"
replace Mainout = 2 if  MaintenanceLevelOutside == "Reasonable"
replace Mainout = 2 if  MaintenanceLevelOutside == "Good"
replace Mainout = 2 if  MaintenanceLevelOutside == "Reasonable to Good"
replace Mainout = 3 if  MaintenanceLevelOutside == "Good to Excellent"
replace Mainout = 3 if  MaintenanceLevelOutside == "Excellent"


gen Before = 0 // We want to measure the effect the transformations that occurred in 2019.
replace Before = 1 if year == 2014
replace Before = 1 if year == 2015
replace Before = 1 if year == 2016
replace Before = 1 if year == 2017
replace Before = 1 if year == 2018
gen During = 0
replace During = 1 if year == 2019
gen After = 0
replace After = 1 if year == 2020
replace After = 1 if year == 2021

gen interaction = Target*After // interaction variable also known as treatment effect.


// model 1: treatment effect
reg Lnsaleprice After Target interaction, robust

// model 2 : treatment effect + Year FE
reg Lnsaleprice After Target interaction i.year, robust

// model 3 : treatment effect + Year FE + structural characteristics

reg Lnsaleprice After Target interaction Lnsurface i.Mainin i.Mainout i.propertytype i.year, robust

// model 4 : treatment effect + Year FE + structural characteristics + Neighboorhood FE
```

reg Lnsaleprice After Target interaction Lnsurface i.Mainin i.Mainout i.propertytype i.year i.Neighbourhood1 , robust

Specification 2:
// Target = addresses within 100 meters of transformation and Control is within 100-250m
//replace Control = 1 if controle250m ==1 & Target ==0
//drop if Target == 0 & Control == 0

Run same models

Specification 3
// Target = addresses within 250m of transformation and Controle 250-outerbound neighborhood
//drop Target
//gen Target = 0
//replace Target = 1 if controle250m ==1
//replace Control = 1 if ControleKWZ ==1 | ControleNoord ==1 & Target == 0
//drop if Target == 0 & Control ==0

Run same models