ERASMUS UNIVERSITY ROTTERDAM
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# Gift Taxation and the Housing Market
## Analyzing the Effect of the Home Purchase Gift Tax Exemption on House Prices in the Netherlands

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## Abstract

The increase in the Gift Tax Exemption for Owner-Occupied Homes (HGTE) from € 50 000 to € 100 000, implemented in 2017 in the Netherlands, has triggered a strong increase in both the number and size of gifts used to purchase homes. In the current housing market, characterized by soaring prices and fierce competition among home-seekers, favourable tax treatment of gifts used for down payments could potentially increase house prices even further. To date, research on the relationship between inter vivos gifts and house prices has been very limited. In this paper, the impact of the structural HGTE increase on house prices is estimated using two different identification strategies. First, a DID-design exploiting regional variation in the treatment intensity of the HGTE shows a modest and insignificant price increase of 1.81 percent for the structural reform in 2017, and a negligible effect for the temporary scheme in 2014. Second, a comparison between the Dutch house price trend and an estimated Synthetic Control based on other European countries shows no discernable effect at all. These results suggest that a rise in wealth transfers due to lower gift taxes does not affect house prices, or at least not enough to be empirically distinguishable from other housing market factors.

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# 1. Introduction

In recent years, strong price increases on the Dutch housing market have led to growing concerns among politicians. Price-to-income ratios, which are a benchmark for housing affordability, as well as selling times, which indicate housing scarcity, are showing strong signs of overheating. As a result, the Dutch national government is currently taking a more proactive, leading role to ensure an appropriate supply of new houses (DNB, 2019). In the meantime, the Dutch government is still raising housing demand by implicitly subsidizing homeownership through several tax policies. One of these policies is the Gift Tax Exemption for Owner-Occupied Homes (HGTE), which has been structurally increased from € 50 000 to € 100 000 in the Netherlands at the start of 2017. This tax exemption - in popular speech often called the "jubelton" (*the joyful ton*) - gives households aged between 18 and 39 the opportunity to receive a tax-free gift up to € 100 000 (often given by parents) that can be used for mortgage repayments, home renovations, or the purchase of a new house. The goal of this scheme was to reduce mortgage debt in the aftermath of the financial crisis of 2010. However, there has been a growing chorus of criticism aimed at this policy measure recently. Not only could the gift tax exemption lead to an adverse effect in terms of unequal opportunities on the housing market, it could also have adverse price effects (Lennartz and Vrieselaar, 2017; Van Vijfeijken, 2019). For instance, according to the Dutch Central Bank (2019), the HGTE increase has contributed to a rising trend of house sales without an accompanying mortgage. In the current "booming" housing market, with fierce competition among home-seekers and an inelastic housing supply (CPB, 2017), a tax-favoured treatment of gifts for home purchases could drive up house prices even further. For this reason, I investigate the following research question:

*Has the permanent increase in the Gift Tax Exemption for Owner-Occupied Homes (HGTE) from € 50 000 to € 100 000, introduced on 1 January 2017, led to higher house prices in the Netherlands?*

In this paper, I demonstrate that the twofold increase in the HGTE has triggered a strong surge in the number of gifts. Using this specific tax exemption, a total of 24 000 gifts were transferred in 2017, with an aggregate gross value of € 1.5 billion. To examine whether this rise in gifts used for home purchases has had an effect on house prices, two different identification strategies are employed. First, a DID-design exploiting regional differences in the average age of home buyers, which indicates the exposure to the treatment, shows a modest and insignificant price increase of 1.81 percent. Performing the same analysis for the temporary HGTE increase that occurred between 2013q4 and 2014q4, no discernable price effect is found. The second identification strategy is an international comparison using the state-of-the-art Synthetic Control Method designed by Abadie *et al.* (2010; 2015). It appears that the house price trend in the Netherlands can be reproduced by a weighted combination of the house price dynamics of Spain, France, Bulgaria, Portugal, and Hungary. This "Synthetic Netherlands" operates as an estimate of the counterfactual: what would have happened to the Dutch housing market had the HGTE not been increased in 2017. The resulting analysis shows that the trajectory of housing prices in the Netherlands and its synthetic counterpart do not differ after the policy intervention, suggesting that the Home Purchase Gift Tax Exemption has a negligible price effect. The fact that both research methods led to similar findings further reinforce this conclusion.

This paper contributes to the literature on both gift taxes and house prices in several ways. First, whereas a vast body of literature investigates the effect of fiscal policy changes like property taxes (see e.g. Lutz, 2015; Bradley, 2017; Elinder and Persson, 2017), real estate transfer taxes (e.g. Kopczuk and Munroe, 2015; Slemrod *et al.,* 2017; Best and Kleven, 2018), and mortgage interest deduction (e.g. Poterba, 1984; Hilber and Turner, 2014; Damen *et al.,* 2016) on house prices, the impact of gift tax reforms on the housing market has not received much attention. In fact, this is the first empirical paper to study the effect of a gift tax exemption - exclusively designed for homeowners - on house prices. In one closely related study, however, Bellettini *et al.* (2013) estimate the price effect of a total gift tax abolition, and find a substantial increase of 5 percent in real estate prices. Second, there has not been any evaluation of the structural Gift Tax Exemption for Owner-Occupied Homes. This study sheds some light on the housing market consequences of this major tax reform. Finally, this paper contributes to a limited but growing number of studies which apply the innovative Synthetic Control Method to analyze the housing market. For instance, Gautier *et al.* (2009) assess the impact of the murder of Theo van Gogh, a famous Dutch journalist, on the price of homes in specific neighborhoods in Amsterdam. Bauer *et al.* (2017) investigate the local housing market consequences of the closure of multiple power plants in Germany, and Propheter (2020) uses a Synthetic Control to examine the price effects of a new basketball arena on nearby properties in California.

The remainder of this paper is structured as follows. Section 2 provides a concise review of academic literature concerning the relationship between inter vivos gifts, gift taxes and the housing market. Section 3 presents the Dutch gift tax, in particular the Gift Tax Exemption for Owner-Occupied Homes. In section 4, the methodology and data are discussed for both the regional treatment intensity analysis and the European Synthetic Control Method. Section 5 presents the results of the empirical analyses, along with several robustness checks. Finally, Section 6 concludes.

# 2. Literature Review

The vast majority of studies in the field of inter vivos gifts and gift taxes are related to bequests and inheritance taxation. A natural starting point for the literature review on gifts is therefore the question why people choose to transfer wealth. In the seminal paper of Becker (1974) about the economic theory of social interactions, wealth transfers are explained by altruism. Parents (or other donors) care about the well-being of their children (or other recipients). This implies an inverse relationship between the donor's willingness to transfer wealth and the recipient's income or initial wealth. In addition to the altruism motive, Bernheim *et al.* (1986) introduced the *strategic bequest motive* which describes exchange as another important motivation for wealth transfers. They empirically find that bequests are often used as compensation for services rendered by recipients, like attention from their children which they measure by the number of family visits and phone calls. Focusing on inter vivos gifts only, the studies of Cox (1987) and Cox and Rank (1992) investigate whether the altruism motive or the exchange motive predominates. Their results speak in favour of the latter. The probability of receiving an intergenerational gift is positively related to the degree to which children take care of their parents. This is consistent with the exchange motive. Furthermore, Cox finds a positive relationship between recipient earnings and the transferred amount, which contradicts with the altruism motive. Employing the US Panel Study of Income Dynamics, Altonji *et al.* (1997) also strongly reject the role of altruism in the rationale of gifts.

A third and final incentive for inter vivos giving relies on the link between estate or inheritance taxes and gift taxes. As Poterba (2001) describes, an increase in the effective bequest tax rate makes strategic inter vivos gifts relatively more attractive. There is strong empirical evidence - mainly from studies conducted in the United States - that the timing of wealth transfers is indeed responsive to the prevailing effective estate and gift tax rates. Bernheim *et al*. (2001) find that households who expect smaller future bequest taxes, reduce their lifetime gifts, as compared to household who expect less tax-favoured future bequests. Similarly, Page (2003) estimates a positive relation between bequest tax rates and the level of inter vivos gifts. This is particularly true among older households: a one percentage point increase in the marginal bequest tax rate is associated with an additional rise in desired gifts around $ 4 000. Joulfaian (2004) uses time series data on gifts made over a period of 65 years and likewise finds tax minimization seems to be an important consideration in the timing of intergenerational wealth transfers. His analysis focusses purely on the tax treatment of lifetime gifts, and the findings suggest that gifts are highly elastic regarding taxes, especially in the short run. Thus, besides the altruism motive and the exchange motive, substitution between bequests and gifts caused by differences in the taxation of wealth transfers is also an important motivation for inter vivos gifts.

A corresponding strand of literature examines whether affluent households truly exploit the opportunity to reduce their estate tax liability by making taxable lifetime gifts (Poterba, 2001; McGarry, 2001). It has been established that, despite the strong effect of estate taxes on inter vivos gifts, parents (or other donors) often fail to take full advantage of such a tax optimizing bequest strategy. According to Poterba, only 45 percent of wealthy elderly households in the US used tax-free lifetime gifts to substantially reduce the bequest tax they eventually have to pay. One reason for this inadequate tax planning could be the donor's lack of foresight in combination with the failure to consider the favorable tax consequences of giving. In chapter 8 of the influential book *The Mirrlees Review* (Boadway *et al.*, 2010) about the optimal design of wealth transfer taxation in the UK, it is argued that a desired tax system should not provide such tax avoidance opportunities. According to *The Mirrlees Review*, this problem could be solved by replacing the current inheritance and gift tax with a broader donee-based-tax, which is based on the total sum of wealth transferred to the recipient over the course of her lifetime. Note that such a tax system may have higher administrative and compliance costs due to the recording of everyone's lifetime gifts.[1]

Turning to the economic literature concerning the relationship between (parental) inter vivos gifts and the housing market. This limited field of research dates as far back as the '90s, when Engelhardt and Mayer (1994) started to wonder to what extent family wealth transfers were used as part of the down payment for home purchases. Their results suggest gift receiving households may be purchasing more expensive homes. The important underlying mechanism is based on the existence of serious credit constraints. Wealth transfers could alleviate these credit constraints and reduce the negative effect of capital market imperfections. In their follow-up study (Engelhardt and Mayer, 1998), they focus on gifts to first-time home buyers in 18 US cities and identify that recipients are able to reach certain down payment thresholds (earlier), which allows them to purchase higher-

[1] For an extensive review of the economic principles of wealth transfer taxation, see Boadway *et al.* (2010) and Kopczuk (2013). In this paper, however, I will not address normative claims about the optimal level of gift taxes.

priced dwellings. Interestingly, they mention that such gifts could reduce the degree to which otherwise credit constrained households are crowded out of the owner-occupied housing market, hence sustaining the upward trend in house prices. In line with previous findings, Guiso and Japelli (2002) also emphasize the role of gifts in relaxing borrowing constraints and conclude gifts have a strong positive effect on the value of the acquired house. Luea (2008) makes a distinction between the impact of financial help, which is received more frequently and in smaller shares, and substantial lifetime gifts. She finds that only the latter has a positive and significant impact on housing demand. More recently, a similar study based on Japanese household data indicates that the rise in the home purchase price only applies to younger home buyers (Yukutake *et al*., 2015).

The important connection between taxation and borrowing constraints is also discussed with respect to the Dutch housing market (Swank *et al.*, 2003). According to this theoretical paper, the effect of tax-preferred treatment of owner-occupied housing (e.g., the tax treatment of gifts to home buyers) depends crucially on the price elasticity of housing supply. Helderman and Mulder (2007) also focus on the Dutch housing market. They employ the Netherlands Kinship Panel Study and suggest that parental gift-giving, in combination with other housing market factors, play a considerable role in the intergenerational transmission of homeownership. Moreover, Mulder and Smits (2013) exploit the same dataset and find, as expected, that parental homeownership appears to be crucial to the likelihood of intergenerational gift giving. However, the parents of homeowners do not seem to favour gifts specially intended for home purchases over other financial transfers. Lastly, the study of Hochstenbach and Boterman (2015) shows that parental wealth transfers can induce gentrification in specific neighborhoods in Amsterdam, as it allows young people with affluent backgrounds to outbid other households.

Overall, a strong relationship between receiving gifts and housing demand has been established in the literature. Inter vivos gifts allow otherwise credit constrained households to purchase more expensive homes. Nonetheless, the real question is whether this surge in individual housing demand could drive up house prices on an aggregate level. Unfortunately, there has been little research on this direct relationship between gifts for home purchases and rising house prices. To the best of my knowledge, there exists only one earlier study which actually estimates the effect of inter vivos gift taxes on house prices. Bellettini *et al.* (2013) and the companion paper Bellettini *et al.* (2017) study the housing market consequences of a major tax reform enacted in 2001 in Italy.

First, they illustrate theoretically that a lower gift and bequest tax, *ceteris paribus*, leads to higher house prices because the net-of-tax value of each gift increases. As a result, altruistic donors (e.g., parents) are more inclined to transfer wealth instead of using it for own consumption purposes, which generates a positive income effect for the recipients and therefore a positive effect on housing demand.[2] In addition, they test these theoretical predictions by exploiting the abolition of the Italian gift and inheritance tax in 2001. The results of their reduced-form regression analysis, based on prices of average size dwellings in 13 large Italian cities between 1993 and 2004, show that the tax reform is associated with a large increase in real estate donations and a cumulative increase in house prices of about 5 percent between 2001 and 2004. One should be very cautious, however, with interpretating this estimate as a causal effect. Just as the researchers state themselves, a major identification problem arises due to the absence of a control group. In fact, their empirical strategy simply relies on a before-after comparison with city fixed-effects, several controls, and city-specific time trends.[3]

Evidently, the Italian housing market and the level of real estate donations are not fully comparable with the situation in the Netherlands. The Italian situation also differs with regard to the scale of the tax reform; a complete abolition of both the gift tax and the inheritance tax. Though, it would still be interesting to make a comparison with the findings of Bellettini *et al.* (2013). In particular, considering their potential identification problems due to the before-after comparison. Moreover, the fact that pre-reform statutory tax rates in Italy were lower than current statutory gift tax rates in the Netherlands, implies that the Dutch tax exemption (which I will discuss in the next section) leads to a relatively stronger decline in the effective tax rates.

[2] The model of Bellettini *et al.* (2013) is built on the assumption that homeowners can either sell their houses on the market, or altruistically donate them to another generation. In this case, gifts only consist of real estate donations.

[3] Besides the effect of the actual abolition of the gift and inheritance tax in 2001, Bellettini *et al.* (2013) also estimate an announcement effect during the two years before the implementation (the tax reform was announced in 1999). They find a negative announcement effect on real estate donations, which makes sense because donors will postpone their gifts until the gift tax is effectively zero. However, they also find a positive announcement effect on house prices, which is, remarkably, even higher than the aforementioned 5 percent increase after 2001. According to the study, a price effect of the tax reform materializes before the actual enactment because the announcement of a gift tax decrease causes a positive wealth effect for recipients via their lifetime budget constraints. This seems rather far-fetched; I would argue that such a strong pretreatment effect indicates an unobserved underlying upward trend in house prices instead.

## 3. The Dutch Gift Tax Exemption for Owner-Occupied Homes

In this section, I first provide some background information on the Dutch gift tax and then discuss the temporary tax reform in 2013 and 2014, and the structural tax reform in 2017, and their effect on the number and magnitude of inter vivos gifts, which will be referred as "gifts" from now on.

Most OECD countries (26 of 35) tax wealth transfers using different types of estate (levied on the wealth of the deceased donor), inheritance or gift taxes (levied on the beneficiaries), but few countries raise as much tax revenue as the Netherlands (European Commission, 2014). While inheritance and gift taxes in Europe raise, on average, 0.39 percent of the total tax revenue, in the Netherlands the relative importance of these taxes is 0.59 percent. Only Belgium, France, and Finland raise more tax revenues (as a share of their GDP) than the Netherlands, following the data in 2012. As these percentages show, revenue from gift taxation accounts only for a small share of a country's total tax revenue. This low revenue level reflects that the gift tax base is often narrowed by exemptions and tax avoidance opportunities (OECD, 2018).

The Netherlands levies a gift tax on the recipient, whereby the tax base consists of the value of all gifts (above a certain exempt threshold) and the applicable tax rate depends on the relationship between the donor and recipient, as well as the magnitude of the gift. Since 2010, a so-called "double progressive gift tax" applies involving a low marginal rate of 10 percent regarding the first bracket up to € 120 000, and a high marginal tax rate of 20 percent regarding gifts above this threshold. Figure A1 in the Appendix presents an overview of the Dutch gift tax system and, in particular, the evolution of the Gift Tax Exemption for Owner-Occupied Homes (HGTE).[4]

At the start of 2010, the Dutch government introduced a one-off tax exemption for parental gifts up to € 50 000 which could be used by first-degree descendants between the age of 18 and 39 to purchase a house. One year later, this gift tax exemption for owner-occupied homes could also be applied to pay down mortgage debt and perform home renovations. Remarkably, the HGTE was temporarily increased to roughly € 100 000 in the 4$^{th}$ quarter of 2013. This temporary increase was accompanied by dropping both the age restriction and the parent-child requirement. The main reason behind this temporary policy change was encouraging households to pay down their

[4] I will use the terms "Gift Tax Exemption for Owner-Occupied Homes", "Home Purchase Gift Tax Exemption", and the abbreviation "HGTE" interchangeably throughout this paper.

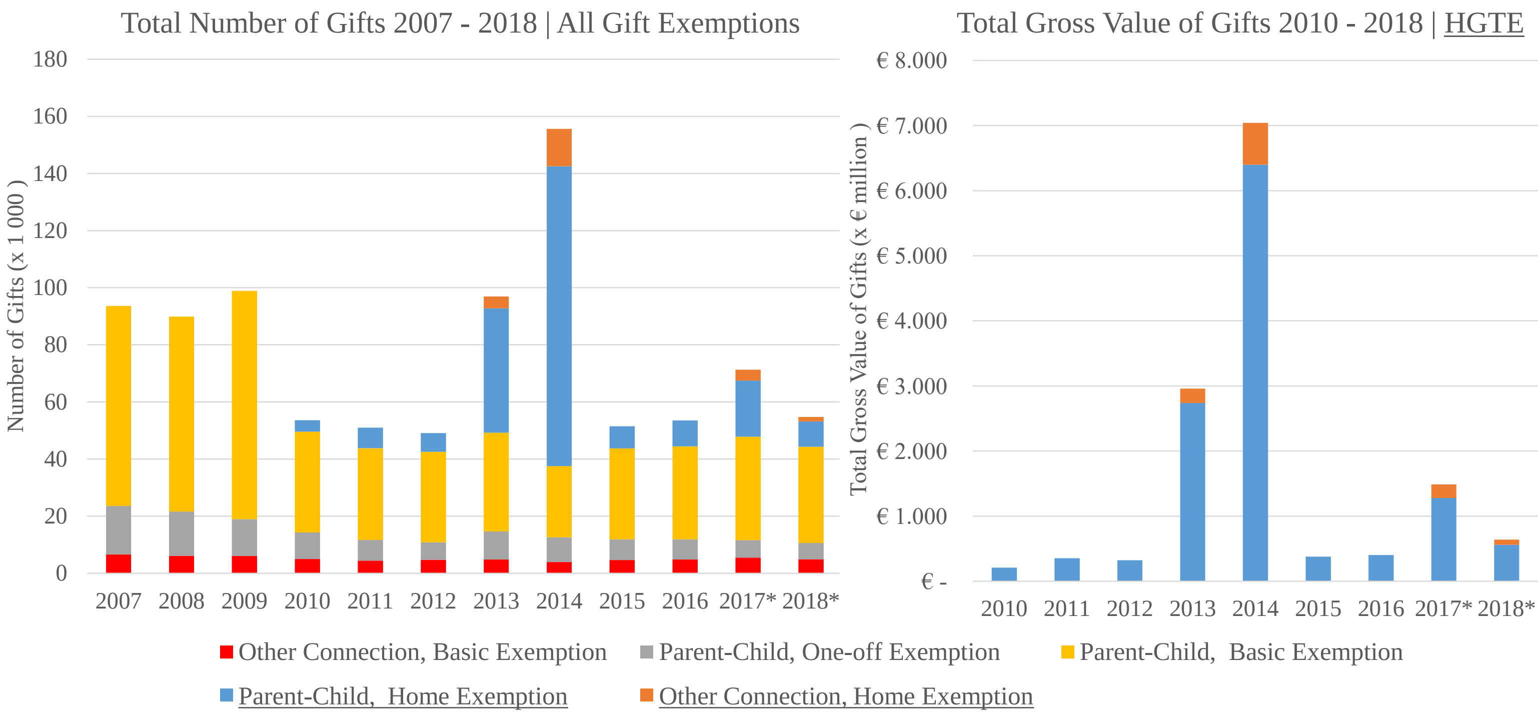
mortgage debt, because underwater mortgages had become a real problem since the global financial crisis of 2008. According to Statistics Netherlands (2014), more than 1.4 million Dutch households had a mortgage debt that exceeded the value of their own home at the start of 2013. In 2015, the one-off gift tax exemption was reverted to its initial value of € 50 000 and the required parent-child relationship and the maximum age limit were restored. After an interval of two years, the Dutch government decided to increase the Gift Tax Exemption for Owner-Occupied Homes to € 100 000 again, although this time permanently. This structural twofold increase in the HGTE, which was implemented on 1 January 2017, is the policy intervention of interest in this paper.

As reported by the Ministry of Finance, the structural HGTE extension has two intended goals (Netherlands Court of Audit, 2017). First, reducing the overall mortgage debts of households, as the tax-free gifts can be used for mortgage repayments. Second, to reduce the number of households facing negative home equity (*i.e.*, underwater mortgages). The Dutch housing market is characterized by a relatively high rate of homeownership and a high level of mortgage debt, which increases the volatility of house prices and its linkage with the real economy (DNB, 2019). As a result, economic busts like the financial crisis of the late 2000s could be amplified, deepening the downturn in housing and credit markets and worsening the problems of underwater mortgages.

In contrast to the temporary scheme in 2013 and 2014, the permanent HGTE increase has maintained the age restriction; only recipients aged between 18 and 39 are eligible. Similar to the temporary scheme, the relationship between the donor and donee is irrelevant. To illustrate the influence of both the temporary and the permanent HGTE increase, Figure 1 shows recently published data on gifts (with tax-registration) from 2007 to 2018 in the Netherlands (Statistics Netherlands, 2021).[5] On the left, the total number of gifts classified per type of exemption is shown. Until the gift tax reform in 2010, the basic *parent-child exemption* (yellow) of circa € 5 000 is, by far, the most used exemption. From 2010 onwards, the introduction of the Home Purchase Gift Tax Exemption is clearly visible (blue and orange). The figure on the right presents the total gross value only of the HGTE gifts, which emphasizes the magnitude of gifts coming from parents relative to gifts coming from other connections.

[5] Note that the figures for 2017 and 2018 are preliminary, because fiscal arrangements concerning gifts can take 3 years before being registered. Especially the displayed gifts in 2018 can be underreported.

Figure 1. Gifts (with tax-registration) in the Netherlands | National Data




Most strikingly, both the temporary HGTE increase in 2013-2014 and the structural HGTE increase in 2017 have been very popular. In particular, the peak in the number and total gross value of home purchase gifts in 2014 is exceptional. It may seem that the temporary HGTE policy in 2013 and 2014 has been considerably more popular than the permanent HGTE policy enacted in 2017. However, there is a fundamental difference in the underlying use of both gift tax exemptions. Recall that gifts can be used to pay down mortgage debt, improve and maintain an owned dwelling, and - make a down payment to - purchase a home. This research focusses on the effect of the latter.

Unfortunately, the actual use of the HGTE is not available in the national gift data, though it can partially be detected by analyzing the characteristics of recipients. Figure A2 in the Appendix shows the total gross value of HGTE gifts exclusively transferred to tenants. Logically, gifts to tenants will probably be used to purchase an owner-occupied home in the near future, as they presumably do not have any mortgage debt or large renovation plans. Therefore, Figure A2 provides a better impression of the differences between the temporary and the structural HGTE regarding gifts used for home purchases. By comparing Figure 1 and Figure A2, it clearly stands out that the impact of both tax policies do not differ as much as it could seem earlier (note the discrepancy between the gifts in 2013 and 2017 in both figures).

Figure 2. Wealth Characteristics Gifts

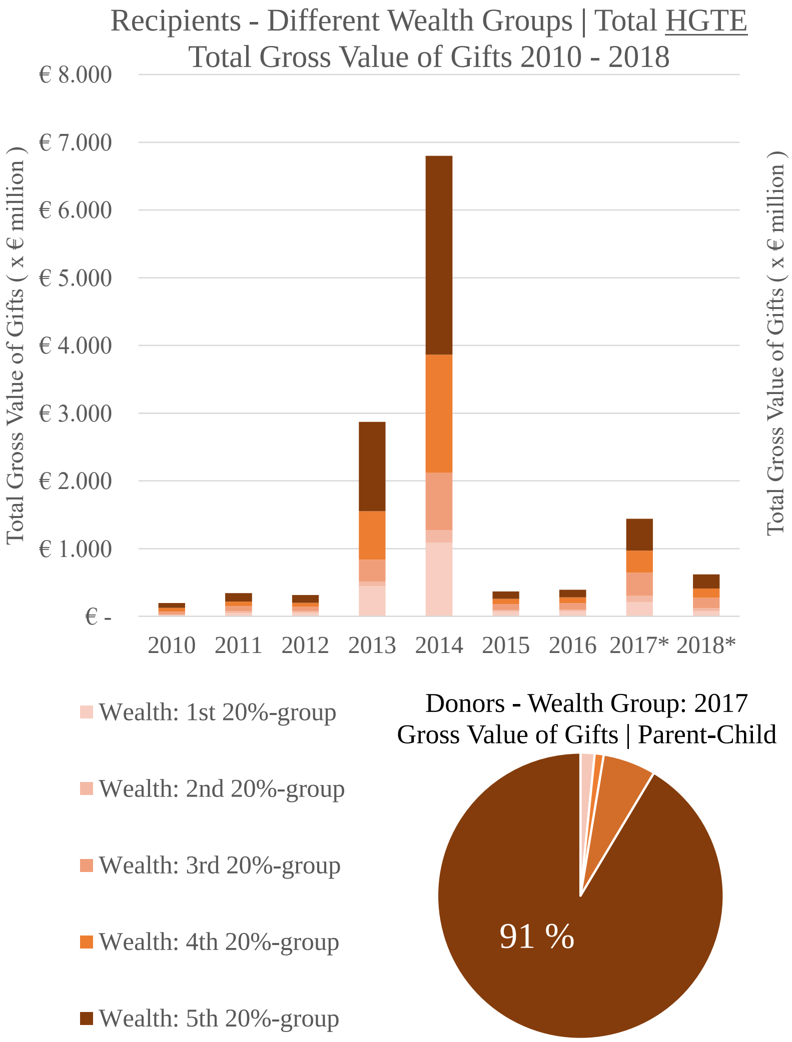
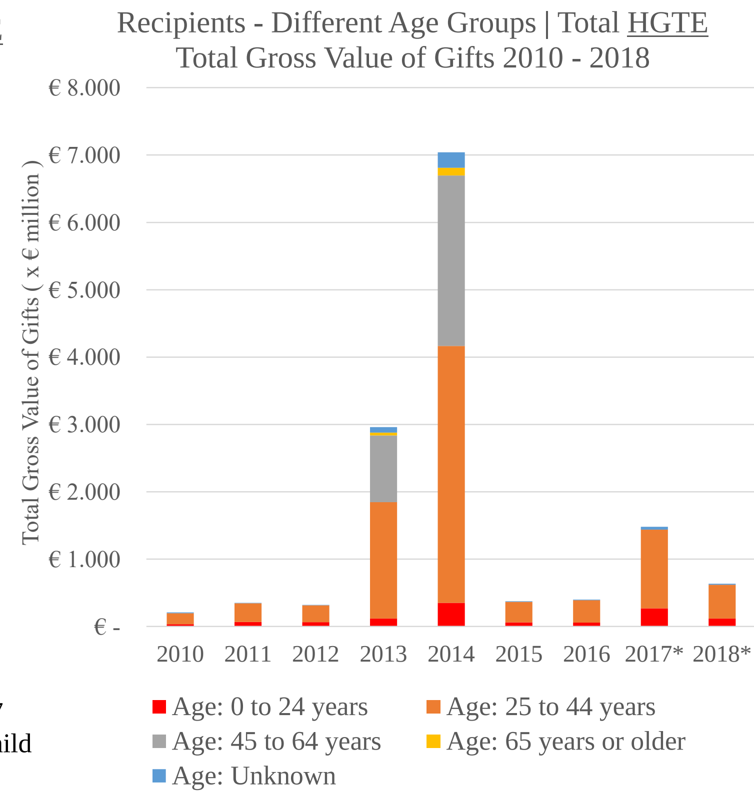



Figure 3. Age Characteristics Gifts




This difference between both tax changes is also highlighted in Figure A3 in the Appendix. Whereas in 2014 only 12 percent of the total gross HGTE was donated to renters, which indicates home purchases, in 2017 this percentage was more than tripled. The main reason why relatively more people in 2017 used HGTE gifts to purchase a home, as opposed to mortgage repayments or house renovations, lies in the fact that the eligible age of 18 to 39 years old was reinforced. This recipient's age restriction did not exist in the temporary scheme. As Figure 3 demonstrates, a large share of the recipients in 2013 and 2014 was older than 45 (grey). In accordance with the findings of an earlier evaluation of the temporary HGTE increase (Netherlands Court of Audit, 2017), most young households who received such gift used it to purchase a home, whereas older households mainly made mortgage repayments. Furthermore, Figure 2 describes the wealth characteristics of HGTE beneficiaries. When looking at the Dutch wealth distribution, the largest proportion of home purchase gifts are transferred to the top 40 percent. Not surprisingly, the donor belongs nine out of ten times to the wealthiest 20 percent (as shown in the pie chart).[6] Taken together, Figure 2 endorses the view that the Gift Tax Exemption for Owner-Occupied Homes is a tax advantage which is mainly used by the more affluent households.

To provide an insight into the weight of the HGTE increase on the housing market, I present the following *back-of-the-envelope* calculation. In 2017, the gift tax exemption has been applied roughly 24 000 times, with a corresponding total gross value of almost € 1.5 billion (see Figure 1). The average and the median gross value of a gift were respectively € 63 200 and € 50 000 (Statistics Netherlands, 2021). In addition, in 2017 a total of 241 860 owner-occupied homes were sold. Assuming that half of all recipients employed the HGTE gift to purchase a home, which is in accordance with the policy evaluation of the Netherlands Court of Audit (2017)[7], then approximately 5 percent of all house sales in 2017 involved a tax-free gift of on average € 63 200. In 2016, before the permanent HGTE increase, the gift tax exemption was applied 9 100 times, with a substantially lower average gross value of € 44 600 per gift. Under the same assumptions, this means 4 550 households had received financial help from their parents for purchasing a home. In total, 214 793 owner-occupied homes were sold in 2016. As a result, only 2.1 percent of all house sales in 2016 involved a tax-free gift, which was also almost twenty thousand euros lower than the average home purchase gift in 2017.

Thus, the surge in home purchase gifts, triggered by the permanent HGTE increase in 2017 is substantial and could have had an effect on the housing market. The impact of the temporary policy change in 2013 and 2014 was even more outstanding, although the timing of both schemes should also be considered when looking at its effect on house prices. While the Dutch housing market in 2013 was just starting to recover from the aftermath of the global financial crisis, in more recent years the market conditions have totally changed. Nowadays, indicators of growing scarcity, like

[6] This result is in line with a CPB study of Groot *et al.* (2019). They examine the effect of gifts and bequests, as well as associated wealth transfer taxes, on the wealth inequality in the Netherlands. Their results suggest that inheritances and gifts have a very small effect on wealth inequality because the donating - older - generation are on average more affluent than the receiving - younger - generation. In fact, wealth is just passed down from one generation to the next.
[7] This study estimates that during 2014; roughly 25 percent of all recipients aged between 30 - 40, 50 percent of all recipients aged between 20 - 30, and finally 70 percent of people younger than 20, used the gift to purchase a home.

house selling times and the difference between selling and asking prices, show a large degree of overheating in the Dutch housing market (DNB, 2019). The recent trend of growing supply shortages, low interest rate levels and private investors who increasingly turn to the housing market (*e.g.*, buy to let investments), play an important role in the current house price boom. Especially amid such tight market conditions, with fierce competition among home-seekers, a tax-favoured treatment of gifts used for home purchases could be driving up house prices. For this reason, the initial hypothesis of this paper is that the Gift Tax Exemption for Owner-Occupied Homes increase to € 100 000 had a more profound effect on housing prices in recent years (since 2017), than during 2013 and 2014.

# 4. Data & Methodology

## 4.1 Regional Treatment Intensity Analysis

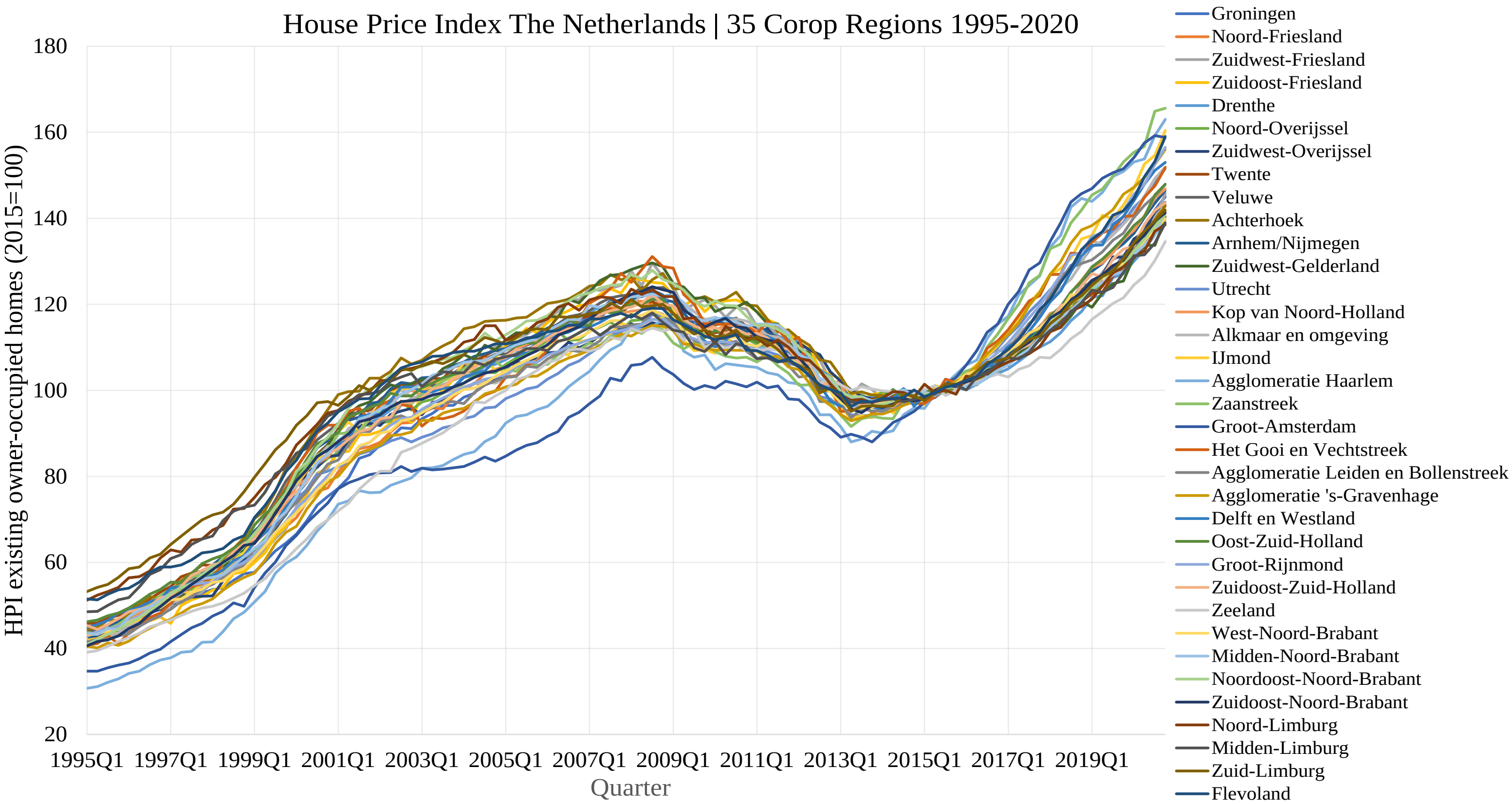
To investigate the effect of a reduction in the effective gift tax rate - due to an extension of the tax exemption - on house prices, I perform two different empirical analyses. This section first describes the methodology and data used for the regional research design, which is based on local differences in the exposure to the HGTE increase within the Netherlands. Subsequently, I discuss the Synthetic Control Method and the European sample which I employ in my second analysis.

Statistics Netherlands publishes data on the price development of existing dwellings on several geographical scales. In order to analyze differences in the impact of gifts on local housing markets, I use their Corop dataset which consists of the House Price Index for 40 regions in the Netherlands. The House Price Index of existing own homes (HPI), available from the first quarter of 1995 until the last quarter of 2020, is calculated by comparing the selling prices in the period under review to the most recent property values (WOZ) of the dwellings sold. This technique is known as the *Selling Price Appraisal Ratio* (SPAR) method.[8] Furthermore, this index with base year 2015, relies on the complete registration of purchased existing dwellings for every Corop region.

A Corop region (designed for statistical purposes) includes one or more contiguous municipalities in a province, which is convenient because most home-seekers search within their local housing market. From the total sample of 40 Corop regions, the HPI of 5 smaller regions exhibit rather wide confidence intervals caused by an insufficient number of quarterly home purchases (*i.e.*, *Oost-Groningen*, *Delfzijl en Omgeving*, *Noord-Drenthe*, *Zuidoost-Drenthe* and *Zeeuws-Vlaanderen*). For this reason, I merge these Corop regions by using data from the entire provinces of *Groningen*, *Drenthe*, and *Zeeland* instead. The final dataset consists of the HPI (2015=100) from 1995q1 until 2020q4 for 35 regions in the Netherlands. Figure 4 shows these regions and plots the house price trends of the entire dataset. As this figure suggests, over the last 20 years the amplitude of the Dutch house price cycle has been substantial. Moreover, the recent upswing in house prices occurred in every Corop region, although some regions experienced stronger price fluctuations than others.

[8] Note that some earlier papers concerning house prices use the *average purchase price* instead of the HPI as dependent variable. However, the change in average house prices is not a proper indicator of price developments because it does not take into account the type (and quality) of dwellings that are sold from one quarter to another, and across regions.

Figure 4. Trends in Regional House Prices




In the study *Tightness in the Housing Market* (2020), recently published by Statistics Netherlands in collaboration with the Netherlands' Cadastre Agency, several housing market indicators are established. One of these measures is the average home purchase age of every single municipality in the Netherlands, available from 1995 to 2019. In case of multiple buyers (couples), the age of the youngest purchaser is used. Because regional data on wealth transfers is not available, I use regional variation in the average age of home buyers, from this unique dataset, as an indirect measure of the extent of HGTE gifts. As discussed in the previous chapter (see Figure 3), age is an important characteristic regarding the recipients of Home Purchase Gift Tax Exemption gifts. Especially when considering the reintroduced age limit of 40. Furthermore, according to Statistics Netherlands (2021), the largest share of the total gross value of HGTE gifts in 2017 (€ 0.5 billion of the total amount of € 1.5 billion), was transferred to people aged between 25 and 30. These young people are also the most likely to put the gift towards home purchases, as they probably do not have any mortgage debt (yet). As a result, the municipal average home purchase age can be classified as an accurate indicator of the level of home purchase gifts. The lower the average home purchase age in a given region, the higher the so-called exposure to the HGTE increase. Another strong indicator for the prevalence of HGTE gifts is household wealth (as shown in Figure 2 in the previous chapter). However, comparing the house price growth in more affluent regions with less affluent regions leads to major endogeneity issues. Evidently, not only the level of home purchase gifts is higher in more prosperous regions, but also numerous factors that are related to house price dynamics. Reassuringly, there does not seem to be a similar direct relationship between the regional average home purchase age and local house prices.

In order to estimate the mean purchase age for every Corop region, I calculate a weighted average by linking municipality *m* to the associated Corop region *i*, based on the total housing stock in every municipality for every quarter *t* from 1995q1 to 2019q4.[9]

$$Purchase\ Age_{it} = \frac{\sum_{it}(\ Average\ Purchase\ Age_{mt}\ \times\ Housing\ Stock_{mt})}{\sum_{it}(\ Housing\ Stock_{mt})}$$

$$t = Quarterly\ \{1995q1\ \text{-}\ 2019q4\}$$
$$i = Corop\ region\ \{1, 35\}$$
$$m = Municipality\ \{1, 633\}$$

Clearly, the HGTE increase on 1 January 2017 occurred in all 35 Corop regions in the Netherlands, which implies that no pure control region exists without any treatment. However, as described by Angrist and Pischke (2008), variation in treatment intensity - a lower average home purchase age - across regions and over time, can be exploited in a Differences-in-Differences design. Therefore, I ranked all 35 Corop regions from the on average youngest home buyers until the oldest home buyers. The 15 regions with an average home purchase age below 40 years old (the HGTE age limit) are labeled as treatment group, and the other 20 regions are labelled as control group. Table 1 shows this treatment intensity ranking, including the treatment and control group division.

[9] The total number of municipalities has steadily been declining from 633 in 1995 down to 355 in 2019. This is not, however, an issue regarding the weighted average calculation because disappearing municipalities get a weight of zero, and the newly formed municipality immediately receives a higher weight due to the following housing stock increase.

Table 1.

Treatment Ranking | average home purchase age

| Ranking | Corop Region | Purchase Age |
|---|---|---|
| 1 | Zaanstreek | 37.4 |
| 2 | Zuidoost-Zuid-Holland | 38.1 |
| 3 | Groot-Amsterdam | 38.5 |
| 4 | Oost-Zuid-Holland | 38.5 |
| 5 | Groot-Rijnmond | 38.7 |
| 6 | Flevoland | 38.8 |
| 7 | Zuidoost-Noord-Brabant | 38.9 |
| 8 | Twente | 39.1 |
| 9 | Utrecht | 39.3 |
| 10 | Midden-Noord-Brabant | 39.3 |
| 11 | Noord-Limburg | 39.6 |
| 12 | Delft en Westland | 39.6 |
| 13 | Noord-Overijssel | 39.6 |
| 14 | West-Noord-Brabant | 39.7 |
| 15 | IJmond | 39.8 |
| 16 | Noordoost-Noord-Brabant | 40.0 |
| 17 | Zuidwest-Gelderland | 40.0 |
| 18 | Midden-Limburg | 40.1 |
| 19 | Zuid-Limburg | 40.2 |
| 20 | Agglomeratie Leiden en Bollenstreek | 40.2 |
| 21 | Zuidwest-Overijssel | 40.3 |
| 22 | Agglomeratie 's-Gravenhage | 40.3 |
| 23 | Arnhem/Nijmegen | 40.4 |
| 24 | Noord-Friesland | 40.6 |
| 25 | Kop van Noord-Holland | 40.8 |
| 26 | Veluwe | 40.9 |
| 27 | Zeeland | 41.1 |
| 28 | Groningen | 41.2 |
| 29 | Agglomeratie Haarlem | 41.4 |
| 30 | Alkmaar en omgeving | 41.5 |
| 31 | Het Gooi en Vechtstreek | 42.0 |
| 32 | Zuidwest-Friesland | 42.0 |
| 33 | Zuidoost-Friesland | 42.0 |
| 34 | Drenthe | 42.5 |
| 35 | Achterhoek | 42.7 |

Table 2.

Regional Characteristics | summary statistics and balancing test

| Variable | (1) Top 15 Treatment regions | (2) Lowest 20 Control regions | T-test Difference in means (1) - (2) |
|---|---|---|---|
| HPI (2015=100) | 92.54 | 93.14 | - 0.604 |
| *Quarterly figures* | | | |
| Purchase Age | 35.1 | 36.6 | - 1.510 *** |
| Population | 570 954 | 399 154 | 171 800 *** |
| Housing Stock | 238 992 | 167 507 | 71 485 *** |
| GDP per Capita (€ quarterly) | 8 223 | 7 015 | 1 206 *** |
| *Annual figures* | | | |
| Age group 15 - 44 (%) | 41.7 | 39.6 | 2.065 *** |
| Age group 65 - 79 (%) | 10.8 | 11.8 | - 0.997 *** |
| Population Density (km$^2$) | 790 | 691 | 99.227 ** |
| Housing Density (km$^2$) | 338 | 301 | 36.307 * |
| Household Size | 2.32 | 2.30 | 0.018 * |
| Housing Mobility (per 1000 residents) | 95.9 | 96.1 | - 0.239 |
| Share Owner Occupied Housing (%) | 56.2 | 59.8 | - 3.659 *** |
| Share Rental Housing (%) | 42.4 | 38.6 | 3.825 *** |
| Disposable Income Households (€) | 39 290 | 39 086 | 204 |
| Wealth Homeowners (€) | 124 372 | 135 898 | - 11 525** |
| Property Value (€ WOZ-value) | 174 123 | 175 793 | - 1 669 |
| Regions | 15 | 20 | |
| Observations | 1320 | 1760 | |

*Notes* Table 1: The regional home purchase age is calculated as a housing supply weighted-average of municipal data from 2017q1 until 2019q4 published by Statistics Netherlands in collaboration with the Netherlands' Cadastre Agency. The 35 Corop regions are ranked from the on average youngest home buyers to the oldest home buyers whereby the 15 regions with a mean home purchase age below 40 years old (the eligible HGTE age in 2017) are considered as Treatment group and the other 20 regions as Control group.

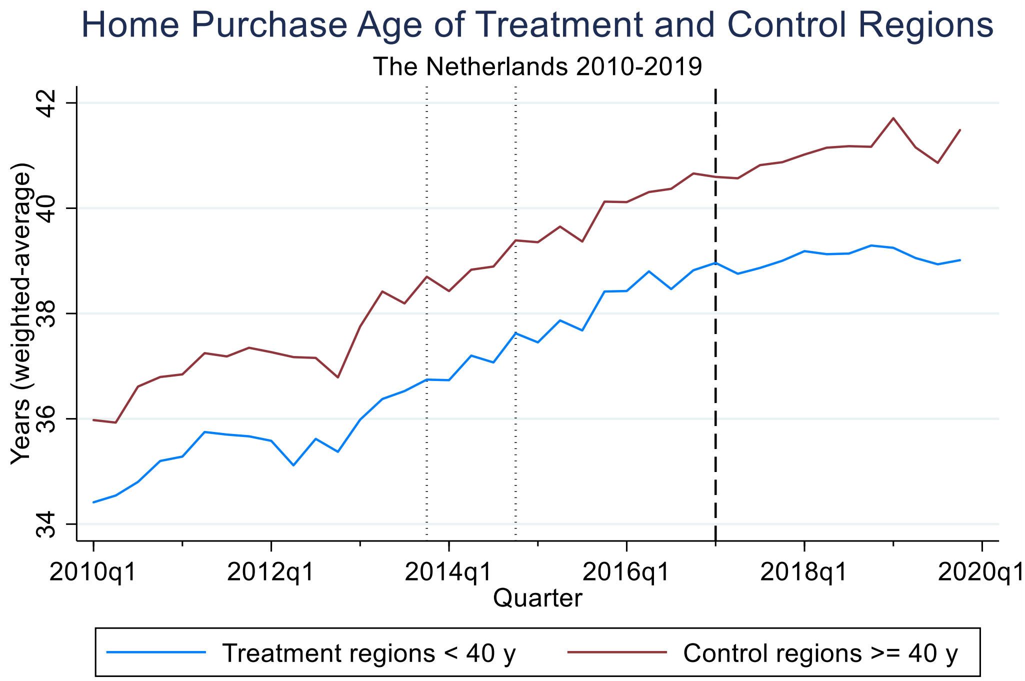
*Notes* Table 2: This table presents regional characteristics before the structural HGTE increase in 2017 for the 15 treatment regions and the 20 control regions. All variables are averaged from 1995 until 2016 except for Population (2002 - 2016), Housing Share (2006 - 2016), Disposable Income and Wealth Homeowners (2011 - 2016) and Property Value (1997 - 2016). The last column shows the balancing t-test results of the difference in means of the housing market statistics with *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

As Table 1 demonstrates, the treatment intensity ranking varies from the *Zaanstreek*, which has an average purchase age of 37 year and 5 months, down to the *Achterhoek*, which has with 42 years and 10 months the on average oldest home buyers. In addition to the House Price Index, the regional dataset also contains quarterly control variables such as population size and the total housing stock, and a variety of annual regional characteristics (Appendix A lists the data sources). In order to compare some key regional housing market characteristics between the treatment and control group, Table 2 shows summary statistics and performs pretreatment *balancing tests* (before 2017).

In general, the treatment group consists of larger regions (*e.g.*, the provinces *Flevoland* and *Utrecht*, and the agglomerations *Groot-Amsterdam* and *Groot-Rijnmond*), with an on average higher population and correspondingly a higher number of dwellings. For this reason, it is crucial to control for changes in housing demand (like population growth) and changes in housing supply (like the housing stock). Furthermore, note that the top 15 treatment regions seem to have a higher degree of urbanization, including a significantly higher population density, housing density and share of rental housing. Nonetheless, the homeowners in the 20 control regions have on average more wealth, which is in accordance with their relatively more ageing population (*e.g.*, see the variable Age Group 65 -79). Lastly, key housing market variables such as the pretreatment HPI, housing mobility, disposable income of households and the property values do not significantly differ between both groups, which is reassuring for this treatment intensity design.

Figure 4 on the next page plots the home purchase age trend for both the top 15 regions with the highest treatment intensity, and the lowest 20 regions with a lower exposure to the HGTE increase. This figure clearly shows the tendency of young people moving out their parental home later in life. Besides, the declined affordability of housing, especially for starters, also plays an important role in the hike of the mean purchase age. Surprisingly, the mean purchase age seems to be plateauing around the age of 39 after 2017. This is especially the case for the treatment regions. I do not think, however, that this outcome is related to the structural HGTE in 2017, because social and demographic factors are far more important drivers of this trend than a limited number of gifts.

Figure 5. Treatment Intensity Indicator




Note: Corop-grouping based on the mean home purchase age: youngest 15 vs oldest 20 Corop regions

In order to assess the effect of the structural increase in the HGTE in 2017 on house prices in the Netherlands, using differences in treatment intensity between the top 15 treatment regions and the bottom 20 control regions, I estimate the following Differences-in-Differences (DiD) equation:

$$(1) \quad HPI_{it} = \alpha + \lambda D_i + \gamma T_t + \beta(D_i \times T_t) + \delta X_{it} + \varepsilon_{it} \, ,$$

$$D = \{0,1\} \; T = \{0,1\}$$

Where $HPI_{it}$ is the House Price Index of existing owner-occupied dwellings with 2015 as base year for Corop-region $i$ at quarter $t$. The $D_i$ group dummy takes the value of 1 for the top 15 treatment regions with the on average youngest home buyers, and 0 for the other 20 control regions. The $T_t$ time dummy switches on for observation from 2017q1 onward (the structural increase of the HGTE). The DID-estimate is given by coefficient $\beta$ relating to interaction term $(D_i \times T_t)$. Furthermore, $X_{it}$ is a vector of region- and time- varying covariaties including the population and the total housing stock in thousands and GDP per Capita in EUR. Finally $\varepsilon_{it}$ denotes the error term.

## 4.2 European Synthetic Control Method

One major drawback of the previous discussed regional treatment intensity strategy is the absence of a pure control group which does not receive any treatment. Therefore, this second empirical analysis uses a set of comparative European countries, which did not implement a change in the gift tax, to construct a weighted Synthetic Control.

As in any comparative case study, the choice of valid control units is crucial. However, it would be difficult to choose a single country - or a simple average of a several countries - that provides a good comparison for the house price trend in the Netherlands. A solution regarding this problem is the Synthetic Control Method; introduced by Abadie and Gardeazabal (2003) and further refined in Abadie, Diamond and Hainmueller (2010; 2015). In a recent survey published in the *Journal of Economic Perspectives*, Athey and Imbens (2017) describe the Synthetic Control Method as arguably the most important innovation in the policy evaluation literature in the last 15 years. What makes the Synthetic Control attractive, as compared to a regular DID-design, is that it provides a data-driven estimate of the counterfactual of what would have been observed in the Netherlands in the absence of the HGTE increase. In addition, the Synthetic Control relaxes the common trend assumption, as it allows the effects of unobserved confounders on house prices to vary over time by weighting the control group. Therefore, the calculated "Synthetic Netherlands" tries to match the pretreatment trend of the Netherlands as much as possible, using a weighted combination coming from a sample of control countries, which is called the donor pool.

Let $J + 1$ be the number of European countries in my donor pool, indexed by $j$, and let $j = 1$ denote the Netherlands (the treated unit). The countries in the sample are observed from 2005q1 to 2020q3, with 2017q1 as the moment of treatment. There is a sufficient number of pretreatment periods, which is required for a credible Synthetic Control estimation. Synthetic Netherlands is constructed as a weighted average of the control countries $j = 2, \dots, J + 1$, represented by a vector of *country weights* $W = w_2, \dots, w_{j+1}$, with $0 \leq w_j \leq 1$. The sum of all country weights in the Synthetic Control is always one, which is a safeguard against extrapolation. Furthermore, let $X_1$ be a $(k \times 1)$ vector containing the values of the housing market characteristics of the Netherlands, which I aim to match as closely as possible, and let $X_0$ be the $(k \times j)$ matrix consisting the pretreatment housing market characteristics for the donor pool. In addition, it is important that the strongest predictors of house prices receive the largest *variable weights* $V$, so that the resulting Synthetic Control is the best possible fit of the Netherlands based on the underlying housing market characteristics. Taken together, the *variable weights V* and the *country weights W* are jointly chosen so that they minimize the Mean Squared Prediction Error (MSPE). Following Abadie *et al.* (2010) and Andersson (2019), I select the Synthetic Control, *W**, that minimizes the difference between the pretreatment characteristics of the Netherlands and the Synthetic Control (given by the vector $X_1 - X_0$ for the *$m_{th}$ variable*) based on a number of key predictors and the outcome variable itself: [10]

$$\sum_{m=1}^{k} v_m \left(X_{1m} - X_{0m}W\right)^2$$

Turning to the Synthetic Control *sample selection*, as discussed by Abadie (2021) in a forhtcoming paper, it is crucial that the donor pool consists of countries with similar characteristics as the Netherlands. A too sizeable donor pool consisting of dissimilar units which are chosen without scrutiny, could lead to overfitting and interpolation bias, resulting in a biased Synthetic Control. Second, the control countries should not have implemented a similar gift tax reform or other related tax policy measures during the research period. For this reason, I exclude countries which introduced or abolished gift taxation. The third and final remark focusses on house price cycles. Countries that experienced large idiosyncratic shocks in the development of house prices, such as housing market bubbles, should also be omitted if the same shock did not occur in the Netherlands.

From the sample of 28 European countries, I exclude countries based on both data issues (1) and the aforementioned Synthetic Control criteria: (2) and (3).[11] (1) First, Cyprus and Malta are excluded due to their small size and their distinctive housing market characteristics. Subsequently Croatia, Poland and Romania are omitted because of missing data in both GDP per capita and mortgage interest rates. (2) Countries with related tax policies are excluded. Therefore, Italy (reintroduced the gift tax in 2006), Slovenia, Latvia (new gift tax in respectively 2007 and 2010) and Austria, Norway and the Czech Republic (Gift tax abolition in respectively 2014, 2008 and

[10] The Synthetic Control is calculated using the *Synth Stata Package* developed by Abadie, Diamond and Hainmueller (2011). I constructed the Synthetic Control with the *Nested Allopt* specification, which provides a robustness check by running the optimalization procedure three times using three different starting points. This calculation method takes the most computing time, but also produces the best fitting weights.

[11] Greece does not publish House Price Index data and is therefore omitted.

2014) are excluded from the donor pool (European Commission, 2014; EY, 2020). Finally, I omit Ireland because of idiosyncratic shock problems due to the collapsed housing bubble.[12] The remaining donor pool, which I will address as the "Full European Sample", consists of 16 countries: *i.e.*, Belgium, Luxembourg, France, Germany, Denmark, Austria, Norway, Sweden, Finland, Iceland, the United Kingdom, Bulgaria, Estonia, Spain, Lithuania, Hungary, Portugal and Slovakia.

The last criterium (3) relies on economical and housing market similarities. To construct Synthetic Netherlands using the closest comparative units, I drop the Eastern- and Southern Europe countries. In the end, the remaining Northwestern European donor pool, which I will address as the "Restricted European Sample", consists of 9 countries: *i.e.,* Belgium, Luxembourg, France, Germany, Denmark, Austria, Norway, Sweden, Finland, Iceland, the United Kingdom.

The dependent variable in the Synthetic Control Analysis is, again, the House Price Index (published by Eurostat; 2015 = 100), however this time representing the house prices of both new and existing dwellings. Additionally, I use the Deflated HPI, which is the ratio between the nominal HPI and an index of consumer price inflation, to check the robustness of my results regarding real house prices. The house price trends for the full European sample are plotted in Figure 6 (on the next page). Overall, there is substantial heterogeneity in the price developments across Europe. In particular, when looking at the impact of the global financial crisis. While some countries - for example Sweden - show a steady increase in house prices, others - especially Spain and Bulgaria, but also the Netherlands - demonstrate a far more volatile, *bust and boom,* house price cycle. Furthermore, it strikes that several countries experienced a relatively stronger price increase than the Netherlands, most notably the recent house price surge in Hungary.

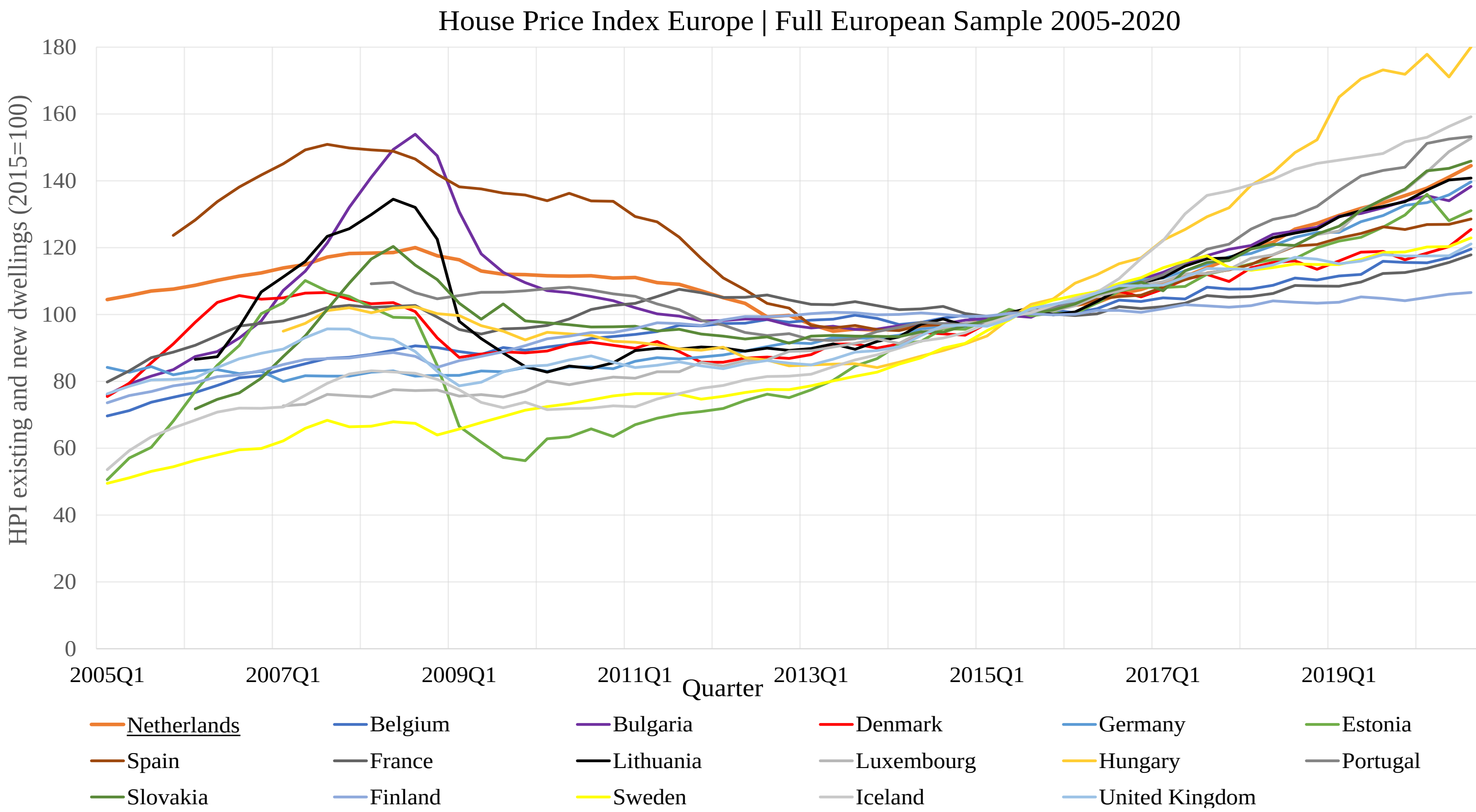
The Synthetic Control country weights are calculated on the basis of several key house price predictors. There is a vast literature of European cross-country panel studies investigating the fundamental drivers of house prices (e.g. Englund and Ioannides, 1997; Tsatsaronis and Zhu, 2004; Jacobsen and Nauw, 2005; Égert and Mihaljek, 2007; McQuinn and O'Reilly, 2008; Andrews, 2010; Caldera and Johansson, 2013).[13] On the demand side of the housing market, the established factors are disposable household income and household wealth, real interest rates, bank credit,

[12] In addition, Ireland has experienced unique GDP per Capita growth rate as a result of its favorable tax environment.
[13] For an elaborate review of empirical studies on predictors of house prices, see the OECD paper by Girouard *et al.* (2006). In addition, see Geng (2018) for recent findings regarding the fundamental drivers of house prices.

unemployment, fiscal subsidies on homeownership and demographic factors like population growth and the population ageing. On the supply side, housing construction - especially construction costs, the availability of land and the profitability of the construction business -, the housing stock, and improvements in housing quality are the main factors affecting house prices. Lastly, general inflation, inflation expectations and institutional housing market characteristics also play an important role in house price dynamics.

I provide a list of all variables employed in the European Synthetic Control analysis in Appendix A, along with data sources. The used predictors of house prices are: GDP per Capita, unemployment rate, the total population and active population aged between 15 and 64, the mortgage interest rate, the harmonized consumer price index, and the annual residential construction as percentage of national GDP. Finally, I will test the influence and predictive power of these covariates in Section 5.

Figure 6. Trends in National House Prices



# 5. Results & Robustness Checks

## 5.1 Regional Treatment Intensity Analysis

Figure 5 shows the DID-design where the light dotted lines from 2013q4 to 2014q4 represent the temporary HGTE increase. The dark dashed line indicates the start of the permanent HGTE. It is remarkable that the pretreatment trend of the Corop regions with younger home buyers is almost the same as that of the control group with older home buyers. Based on Figure 5, the common trend assumption (CTA) seems to hold up reasonably for the entire pretreatment period. Only during the financial crisis and the housing market collapse that followed, did the control group seem to experience a slightly larger house price decline in relative terms. After 2017q1, the house prices of owner-occupied homes rose more vigorously in the treatment regions.

Figure 7. DID-design based on Regional Differences in the Treatment Intensity of the HGTE

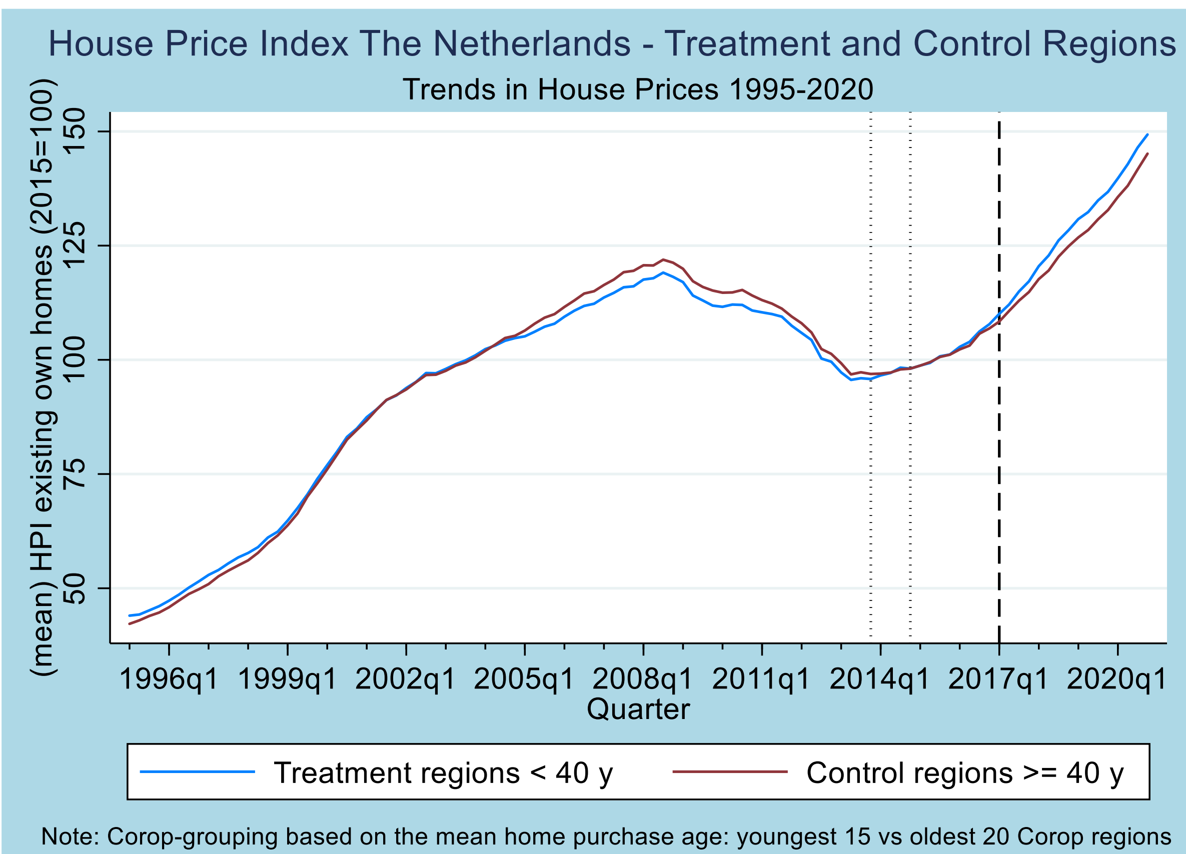


Table 3. Results DID-design based on Regional Treatment Intensity Differences

The Effect of the Structural HGTE increase in 2017 on House Prices in the Netherlands

| | (1) Basic | (2) Population | (3) Supply | (4) GDP Capita |
|---|---|---|---|---|
| HGTE_2017 | 4.008 | 2.296 | 1.806 | 1.758 |
| | (3.219) | (2.652) | (2.339) | (2.125) |
| Population | | 0.131*** | 0.308*** | 0.290*** |
| | | (0.034) | (0.067) | (0.066) |
| HousingStock | | | -0.371*** | -0.327*** |
| | | | (0.121) | (0.109) |
| GDP_Capita | | | | -0.000176 |
| | | | | (0.001) |
| N | 3640 | 2660 | 2660 | 2520 |
| adj. R-sq | 0.969 | 0.901 | 0.913 | 0.888 |

Standard errors in parentheses
Standard errors clustered at Corop-level. DID-design based on regional treatment intensity
* p<0.10, ** p<0.05, *** p<0.01

*Notes*: This table presents the estimated effect of the permanent increase in the Gift Tax Exemption for owner-occupied Homes from € 50 000 to € 100 000 at the start of 2017 on the HPI (2015=100) of existing dwellings in the Netherlands. The DID-design exploits regional variation in the treatment exposure to the HGTE by comparing the 15 Corop-regions with an average home purchase below 40 years old (the eligible HGTE age in 2017) with the other 20 Corop-regions with home buyers on average older than 40. Column (1) shows the basic model without any regional covariates. Model (2) controls for population growth, measured as the total population at the start of every quarter (in thousands; available from 2002q1 until 2020q4). Model (3) adds the total housing stock (in thousands; both owner-occupied as rental dwellings) to control for changes in the housing supply. Finally, Column (4) includes quarterly GDP per Capita (in euros; available until 2019q4) calculated as 1/4$^{th}$ of annual GDP per Capita.

Table 3 contains the regression results from the DID-equation (1), as discussed in section 4.1 . The treatment intensity effect of the structural increase in the Home Purchase Gift Tax Exemption is given by HGTE_2017. The notes below the table explain the 4 different models which have been estimated, each adding an additional covariate to control for differences between the Corop regions which change over time.[14] The first column denotes the most basic DID-specification without any control variables. As a result, the naïve HGTE coefficient of 4.0 in model (1) simply estimates the difference between the treatment and control group HPI trend after 2017q1, as shown in Figure 5.

[14] See Appendix A for a description of the control variables, including source references.

After adding population growth in the *Population* model (2), the HGTE coefficient is almost halved. Population (in thousands) has a significant positive effect on house prices. This is in accordance with the economic literature, such as the comprehensive study of Égert and Mihaljek (2007). Demographic factors on the demand side of the housing market, such as the population, are identified as important determinants of housing prices. Indeed, after studying the population trend for different Corop areas, it appears that the top 15 treatment regions had stronger population growth after 2017, meaning that the initial coefficient in the *Basic* model was biased upwards.

Additionally, the *Supply* model (3) also checks for changes in the total housing stock. Again, it appears that the previous treatment coefficient was biased upwards. Part of the treatment intensity effect on house prices, following the GHTE increase, can be explained by changes in the housing supply. As expected, the total housing stock (in thousands), consisting of both rental and owner-occupied houses, has a negative effect on house prices. If the number of homes in a Corop region increases by 1 000, the selling price of owner-occupied homes will significantly drop by 0.37 percent as compared to the base year 2015. More surprisingly, adding the housing supply as a control, causes the HGTE coefficient to drop by half a percentage point. This would imply that the housing supply in the post-treatment period, has increased faster in the control regions as compared to the treatment regions. Taking into account that the balancing test (Table 2) showed that the top 15 treatment regions have a higher degree of urbanization, this result is in line with the findings of a recent CPB study (Michielsen *et al*., 2017) about the price elasticity of the housing supply in the Netherlands. This paper concluded that the supply elasticity is especially low in the larger cities in the *Randstad*. A study by Saiz (2010) also emphasizes the importance of local price elasticity of housing supply. Building restrictions due to geographical differences, for instance, are a crucial factor in urban development and thus in house price dynamics. For instance, the metropolitan regions of *Groot-Amsterdam* and *Groot-Rijnmond* (part of the treatment group) may have more problems with the availability of building land than rural areas as *Groningen* or *Drenthe*.

Finally, GDP per capita (in euros) has been added to the model (4). This variable has a very small and insignificant effect on house prices, and therefore lacks any explanatory power.[15] Moreover, the HGTE coefficient hardly changes, probably because GDP per capita has increased at the same

[15] This result can be driven by regional GDP per Capita being annual data, which I have converted to quarterly figures. However, an identical analysis using annual GDP per Capita as covariate shows a similar insignificant coefficient.

rate for both the treatment and the control group, which is therefore cancelled out by the DID-design. It is not without reason that the balancing test showed that the average disposable income did not differ significantly between the two groups. In addition, the observations in 2020 are omitted in model (4) as regional GDP per Capita data are only available up to and including 2019.

Ultimately, the *Supply* model (3) can be considered as my optimal model. This model estimates a treatment intensity effect of the HGTE increase on house prices of 1.81 percent, as compared to the house prices in 2015. It is important to note that this 1.81 percent increase in the HPI is based on the top 15 regions with the on average youngest home buyers, compared to the other 20 regions. Using robust standard errors, this DID treatment intensity effect would also have been statistically significant. However, this significance disappears when the SEs are clustered at a regional level, as it is the case in Table 3 and throughout this paper. Clustering standard errors is advisable due to potential serial correlation; house prices of a region can be interrelated in two consecutive quarters.

To test my hypothesis, which stated that the temporary increase in the Home Purchase Gift Tax Exemption has an (even) smaller effect on house prices, I perform the same analysis, but now by focusing on 2013q4 to 2014q4 as treatment period. The DID-equation (1) is therefore slightly adjusted as $\beta$, which is given by GHTE_2014, measures the effect of the temporary tax reform. Table 4 shows the results, using the same 4 regression specifications. Again, the *Supply* model (3) is the most interesting. Table 4 shows that the temporary HGTE increase from € 50 000 to € 100 000, during the 5 quarters since 2013q4, had a negligibly small effect on house prices. The negative sign may seem surprising, but it only means that after controlling for population growth (positively related with the HPI), as well as housing construction (negatively related with the HPI), the control regions are experiencing a somewhat stronger price growth.

Table 4. Results DID-design based on Regional Treatment Intensity Differences

The Effect of the Temporary HGTE increase in 2014 on House Prices in the Netherlands

| | (1) Basic | (2) Population | (3) Supply | (4) GDP Capita |
|---|---|---|---|---|
| HGTE_2014 | -0.266 | -0.550 | -0.391 | -0.297 |
| | (0.809) | (0.930) | (1.025) | (0.948) |
| Population | | 0.137*** | 0.316*** | 0.297*** |
| | | (0.034) | (0.065) | (0.063) |
| HousingStock | | | -0.378*** | -0.338*** |
| | | | (0.119) | (0.106) |
| GDP_Capita | | | | -0.0000205 |
| | | | | (0.001) |
| N | 3640 | 2660 | 2660 | 2520 |
| adj. R-sq | 0.968 | 0.900 | 0.912 | 0.887 |

Standard errors in parentheses
Standard errors clustered at Corop-level. DID-design based on regional treatment intensity
* p<0.10, ** p<0.05, *** p<0.01

*Notes*: This table presents the estimated effect of the temporary increase in the Gift Tax Exemption for owner-occupied Homes from € 50 000 to € 100 000 during 2013q4 - 2014q4 on the HPI (2015=100) of existing dwellings in the Netherlands. The DID-design exploits regional variation in the treatment exposure to the HGTE by comparing the 15 Corop-regions with an average home purchase below 40 years old (the eligible HGTE age in 2017) with the other 20 Corop-regions with home buyers on average older than 40. Column (1) shows the basic model without any regional covariates. Model (2) controls for population growth, measured as the total population at the start of every quarter (in thousands; available from 2002q1 until 2020q4). Model (3) adds the total housing stock (in thousands; both owner-occupied as rental dwellings) to control for changes in the housing supply. Finally, Column (4) includes quarterly GDP per Capita (in euros; available until 2019q4) calculated as $1/4^{th}$ of annual GDP per Capita.

Finally, I performed a robustness check to test whether the common trend assumption is met in the original model: the structural HGTE increase in 2017 (as shown in Table 3). Figure 5 already gave an indication that the pretreatment trend is fairly similar for both compared groups. To check whether there are no anticipatory effects (leads) before the actual treatment takes place on January 1 2017 - which would otherwise imply a violation of the CTA - I have estimated the following DID-equation including leads:

$$HPI_{it} = \alpha + \lambda D_i + \gamma T_t + \sum_{j=0}^{q} \beta_{t-j} \left(D_i \times T_{t-j}\right) + \delta X_{it} + \varepsilon_{it} \ ,$$

$$D = \{0,1\} \quad T = \{0,1\} \quad j = \{1,8\}$$

Here *j* indicates the number of quarters before 2017q1, increasing from 1 quarter to 8 quarters. Furthermore, anticipatory effects are given by the coefficients $\beta_{t-j}$ met $j > 0$, which is estimated alongside the normal treatment coefficient $\beta_t$. In addional, other equation specifications are similar to the optimal *Supply* model (3) form Table 3. The regression results of this robustness check are displayed in Table 5.

Although the magnitude of the treatment intensity effect from Table 3 (the 1.81 percent increase in house prices, with respect to 2015) decreases slightly in all four models of Table 5, the HGTE coefficient does remain valid. Only in model (4), in which the effect of a placebo treatment is estimated 2 years before the actual policy change, does the coefficient fall below 1.5 percent. Furthermore, all four leads are an order of magnitude smaller than the treatment intensity effect of the actual HGTE increase, and they are not significant either. Consequently, there does not seem to be any substantial anticipatory effect, which implies that the CTA does not have to be rejected.

For the last robustness check, I investigated whether a slightly higher or a slightly lower cut-off (than the 40 years age limit) in the treatment intensity ranking, leads to substantially different results. Reassuringly, both a comparison between the top 14 and lowest 21 Corop regions, and a comparison between the top 16 and lowest 19 Corop regions, does not alter the estimated coefficient much.[16] To summarize, an effect of the structural HGTE scheme is noticeable, but this estimated effect is rather small and does not differ significantly from zero. The impact of the temporary scheme on the housing market is even weaker, and is hence considered to be negligible.

[16] Instead of the treatment intensity ranking based on the average purchase age as indicator, I also tested other - less favorable - indicators for the regional level of home purchase gifts, using the same DID-approach. A short summary:

- A ranking based on homeowners wealth (top17 vs lowest18) shows a HGTE treatment intensity effect of 0.16.
- A ranking based on disposable income (top17 vs lowest18) shows a HGTE treatment intensity effect of 3.84.

Table 5. Robustness Check DID-design | Test the Common Trend Assumption

Testing Leads before the actual HGTE increase in 2017 | Baseline Supply Model (3)

| | (1)<br>1Q Lead | (2)<br>2Q Lead | (3)<br>1Y Lead | (4)<br>2Y Lead |
|---|---|---|---|---|
| Lead1Q_HGTE | 0.105<br>(1.441) | | | |
| Lead2Q_HGTE | | 0.00592<br>(1.426) | | |
| Lead1Y_HGTE | | | 0.152<br>(1.309) | |
| Lead2Y_HGTE | | | | 0.113<br>(1.170) |
| HGTE_2017 | 1.687<br>(1.257) | 1.726<br>(1.270) | 1.524<br>(1.380) | 1.432<br>(1.450) |
| N | 2625 | 2590 | 2520 | 2380 |
| adj. R-sq | 0.906 | 0.900 | 0.888 | 0.875 |

Standard errors in parentheses
Standard errors clustered at Corop-level | Placebo effect 1Q, 2Q, 1Y and 2Y before 2017q1
* p<0.10, ** p<0.05, *** p<0.01

*Notes*: This table investigates whether (anticipatory) leading effects take place 1 quarter, 2 quarters, 1 year and 2 years before the actual structural HGTE increase at the start of 2017. This Placebo test is based on the Supply Model (3) in Table 3 which includes total population and housing stock as regional covariates.

## 5.2 Synthetic Control Method | Restricted European Sample

This section presents the results of the Synthetic Control based on the restricted European donor pool consisting of 9 countries. Recall that Synthetic Netherlands is constructed as a weighted average of these Northwestern European countries, so that the resulting Synthetic Netherlands best reproduces the values of the key predictors of house prices in the Netherlands, before the HGTE increase in 2017. Table 6 shows the relative importance of these house price predictors.

Table 6. Restricted Sample Synthetic Control | Analyzing the main Drivers of House Prices

Resticted European Sample (10 Countries) | Predictors of European House Prices [HPI & Deflated HPI] 2005-2020

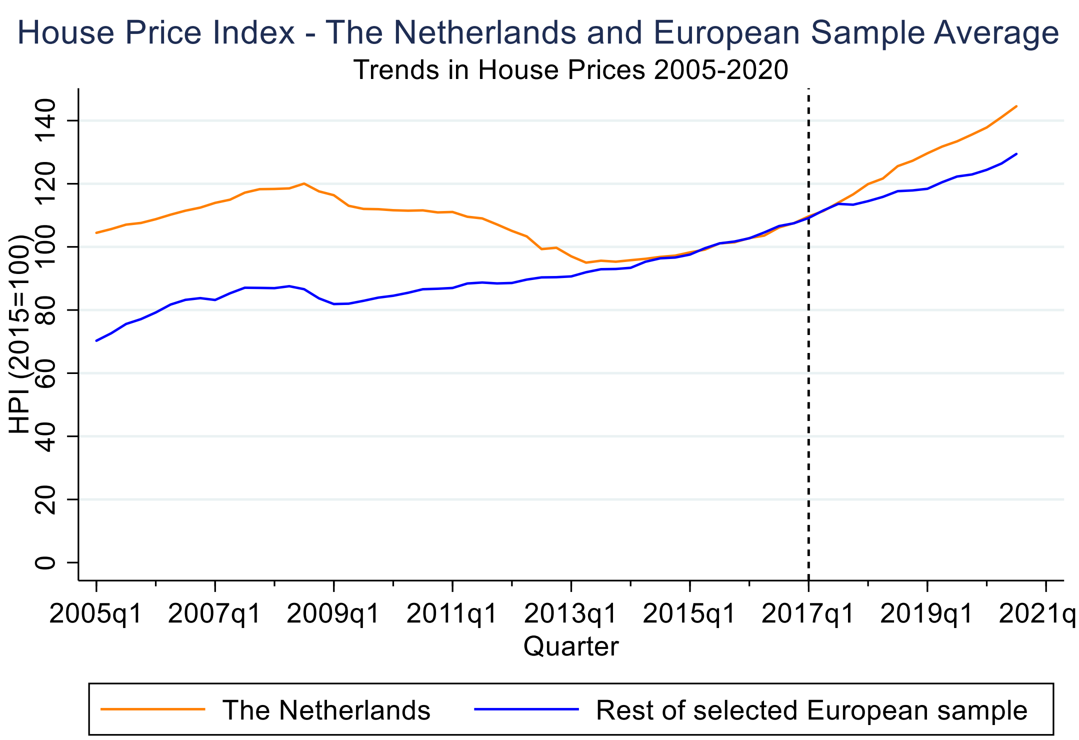
| | (1) HPI Reg | (2) HPI FE | (3) HPI DiD | (4) PreT H FE | (5) Defl Reg | (6) Defl FE | (7) Defl DiD | (8) PreT D FE |
|---|---|---|---|---|---|---|---|---|
| GDP_Capita | -0.0675 | 1.689*** | 1.651*** | 1.197** | -0.111 | 1.621** | 1.577** | 1.336** |
| | (0.049) | (0.462) | (0.478) | (0.379) | (0.067) | (0.482) | (0.501) | (0.441) |
| Unemploy~t | -3.812** | -2.388** | -2.389** | -2.883** | -3.169 | -3.247** | -3.286** | -4.074** |
| | (1.403) | (0.939) | (0.965) | (1.088) | (1.756) | (1.264) | (1.305) | (1.606) |
| M_Int_Rate | -2.509* | -3.000 | -2.770 | -1.272 | -4.277* | -1.084 | -0.808 | -0.740 |
| | (1.338) | (2.511) | (2.586) | (2.697) | (2.051) | (3.733) | (3.825) | (3.782) |
| A_Popula~n | 0.0471 | 3.116 | 2.904 | 4.752 | 0.103 | 7.152* | 7.045* | 8.672** |
| | (0.108) | (2.731) | (2.878) | (2.928) | (0.139) | (3.084) | (3.146) | (3.285) |
| CPI | 1.032*** | 0.852** | 0.849** | 0.589* | | | | |
| | (0.210) | (0.325) | (0.330) | (0.282) | | | | |
| HGTE | | | -5.069 | | | | -5.571 | |
| | | | (5.856) | | | | (5.863) | |
| N | 619 | 619 | 619 | 472 | 493 | 493 | 493 | 376 |
| adj. R-sq | 0.550 | 0.771 | 0.797 | 0.635 | 0.263 | 0.508 | 0.659 | 0.333 |

Standard errors in parentheses
Standard errors clustered at country level. Countries NL (GTEH=2017q1), BE, DK, GE, FR, LU, FI, SW, IC and the UK
* p<0.10, ** p<0.05, *** p<0.01

*Notes*: This table presents the estimated effects of various explanatory variables on house prices using the HPI for existing and new dwellings as the dependent variable in the first 4 models, and the (real) Deflated HPI as dependent variable in the last 4 models (2015=100). The Deflated HPI is missing for Iceland and the UK. Column (1) and (5) display a basic regression model. Column (2) and (6) include country fixed effects. Column (3) and (7) show a naive Differences-in-Differences model with the HGTE increase as treatment interaction term which takes the value of 1 for the Netherlands from 2017q1 onward. Finally, Column (4) and (8) replicate the Fixed Effects specification focusing on the pretreatment period 2005q1 - 2016q4. GDP per Capita (in thousands of dollars) is Purchasing Power Parity (PPP) adjusted and measured in current US $. Unemployment is measured as a percentage of the population between 15 and 74 years old. The mortgage interest rate is based on loans to households for house purchases with an original maturity of over 5 years. The active population (in millions) consists of the total amount of people between 15 and 64 years old. The Consumer Price Index (IMF) is only relevant for the regular HPI and has 2015 as base year.

The regression results in column (1) to (4) are estimated using the House Price Index (HPI) as dependent variable, and column (5) to (8) present the same specifications, however, estimated using the real HPI (which is inflation-adjusted) as dependent variable. The sample consists of the countries in the donor pool and the Netherlands (see Appendix A for a description of the variables). Model (2), (4), (6), and (8) have been estimated using country Fixed Effects and provide the best estimation. In line with the literature (Geng, 2018), GDP per capita (in thousands of dollars), population (in millions) and the CPI have a positive effect on house prices. Unemployment (percentage of population between 15 and 74) and the mortgage interest rate both denote a negative coefficient. The fact that the latter lacks significance is not surprising, as that is fairly common in econometric models (McQuinn and O'Reilly, 2008). As a result, it is still relevant to include the mortgage interest rate for calculating the Synthetic Control because this predictor varies considerably between European countries due to institutional housing market differences (Kok and Lichtenberger, 2007).

Figure 8. Restricted Sample | The Netherlands and Donor Pool Average




Note: HPI of the Netherlands (2017q1 = HGTE) and the Restricted European Donor Pool | 9 countries: BE, DK, GE, FR, LU, FI, SW, IC, UK

Lastly, the HGTE coefficient in the DID design of Model (3) and (7), based on the Netherlands as treatment group and all 9 countries in the donor pool as control group, demonstrates the result of a (naïve) Differences-in-Differences estimation. This specification would suggest that the HGTE increase causes house prices to decrease with 5 percent as compared to 2015. However, as Figure 8 illustrates, the common trend assumption in such a DID-design would not hold, resulting in a biased estimate. Hence, a basic average of the house prices in the European Sample is not informative to construct the counterfactual. For this reason, I apply the Synthetic Control Method.

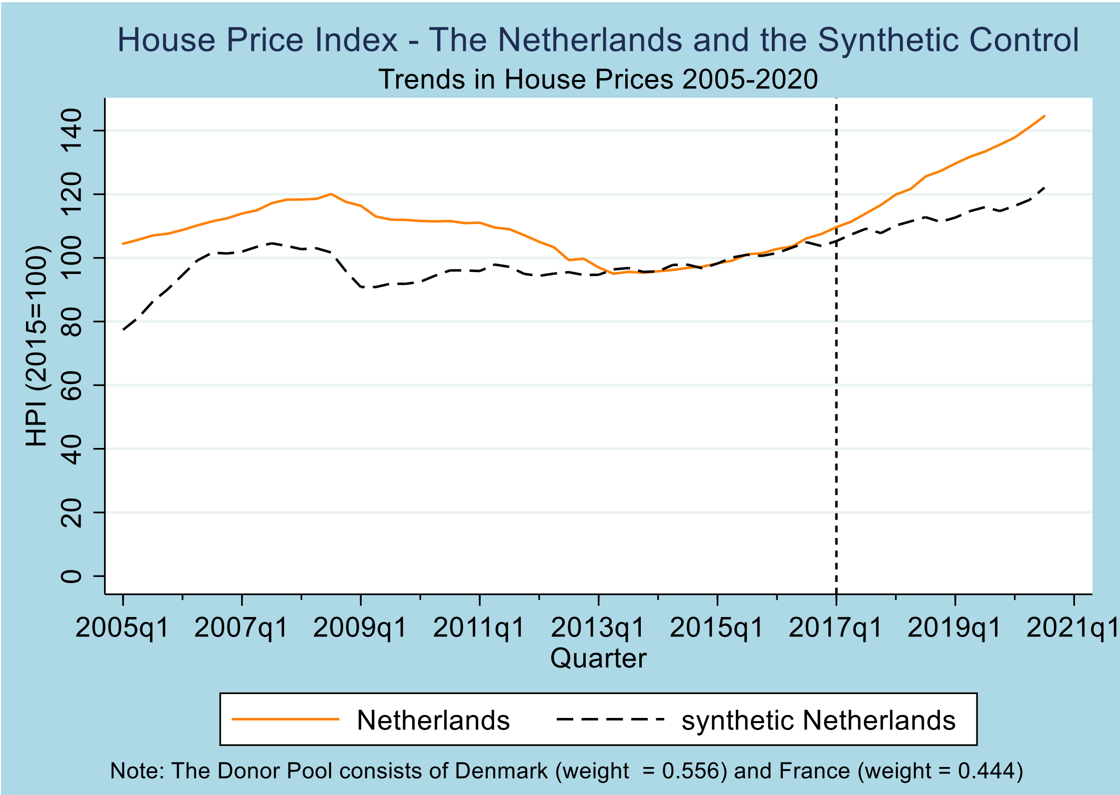
Table 7 displays the estimated country weights of Synthetic Netherlands. The weights indicate that the pretreatment HPI trend in the Netherlands can be reproduced by a weighted combination of Denmark and France. All other countries are assigned zero *W* weights. The result of the Synthetic Control Method is given in Figure 9. It shows the house price developments in the Netherlands and its synthetic counterpart from 2005 to 2020. Even though Figure 9 does a better job in approximating the pretreatment trend as compared to the restricted European sample average in Figure 8, the fit appears to be rather poor. Especially the Dutch housing market dynamics following the financial crisis (roughly 2008 – 2013) seems difficult to track by Synthetic Netherlands.

Table 7.

Country Weights of Synthetic Netherlands

| Country | Weights |
|---|---|
| Belgium | 0 |
| Denmark | 0.556 |
| Germany | 0 |
| France | 0.444 |
| Luxembourg | 0 |
| Finland | 0 |
| Sweden | 0 |
| Iceland | 0 |
| United Kingdom | 0 |

Figure 9. The Synthetic Control | Restricted European Sample




To study the differences between the fundamental house price predictors for the Netherlands, Synthetic Netherlands and a population-weighted donor pool average, Table 8 provides an extensive comparison. Recall that Synthetic Netherlands is calculated using GDP per Capita, Unemployment, the Mortgage Interest Rate, Active Population, and the CPI averaged over the entire pretreatment period. Furthermore, Residential Construction is added every two years, the mortgage interest rate is again added in 2016q4, and the outcome variable itself is added starting 6 years before the HGTE policy intervention in 2017q1. The Table notes provide further details. Although the mean predictor values of GDP per Capita, the Active Population and Residential Construction for Synthetic Netherlands are slightly closer to the values for the actual Netherlands, it appears that in almost all other cases the European weighted average provides a better estimation. This further emphasizes the findings in Figure 9: a weighted average of Denmark and France is not able to reproduce the housing market characteristics in the Netherlands. In addition, Figure A4 in Appendix B uses the Deflated HPI as outcome variable and shows a similar poor fit as Figure 9.

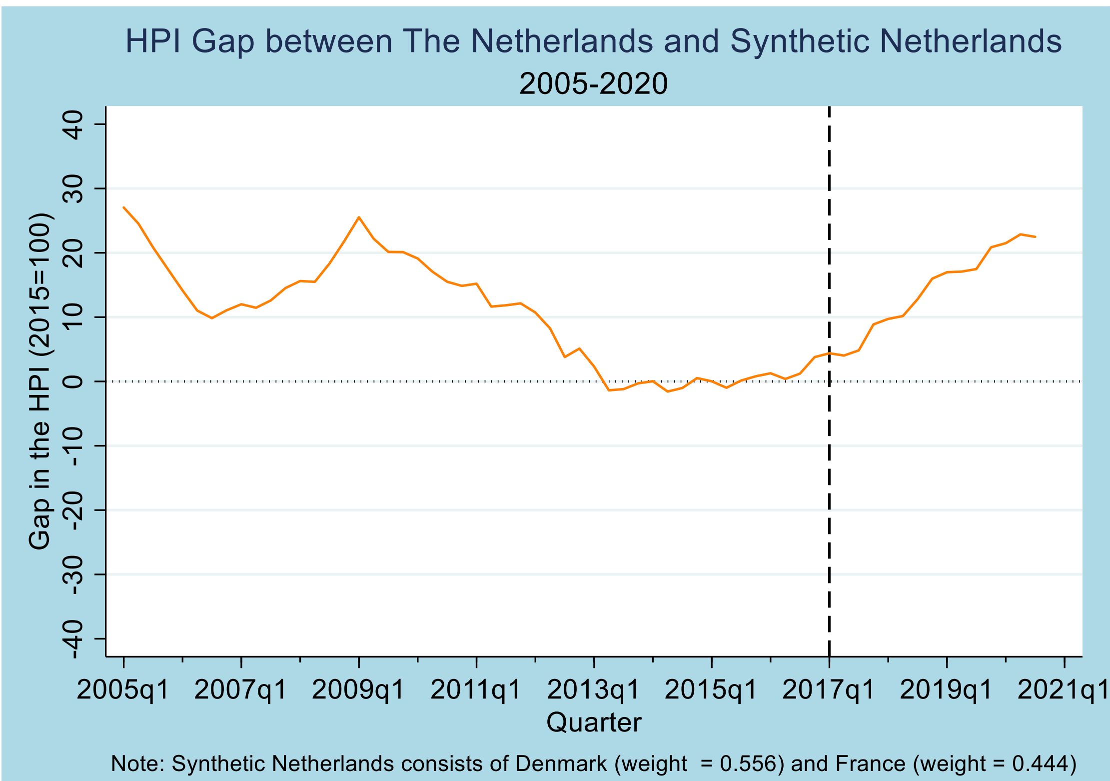
Table 8. House Prices Predictor Means before the HGTE | Restricted Donor Pool

| Variables | The Netherlands | Synthetic Netherlands | European Sample |
|---|---|---|---|
| GDP per Capita ($) | 46 1197 | 40 4206 | 39 378 |
| Unemployment (%) | 5.54 | 7.49 | 7.47 |
| Mortgage Interest Rate (%) | 4.59 | 3.98 | 4.52 |
| Mortgage Interest Rate 2016q4 (%) | 3.65 | 2.50 | 3.16 |
| Active Population (million) | 11.0 | 19.8 | 40.1 |
| CPI | 93.76 | 94.50 | 93.40 |
| Residential Construction 2007 (%) | 6.2 | 6.6 | 5.4 |
| Residential Construction 2009 (%) | 5.6 | 5.1 | 4.9 |
| Residential Construction 2010 (%) | 4.7 | 4.9 | 4.9 |
| Residential Construction 2012 (%) | 3.5 | 5.0 | 5.1 |
| Residential Construction 2014 (%) | 3.1 | 4.8 | 5.1 |
| Residential Construction 2016 (%) | 4.1 | 5.0 | 5.3 |
| HPI 2012q4 | 99.73 | 94.62 | 93.21 |
| HPI 2013q4 | 95.32 | 95.60 | 94.57 |
| HPI 2014q4 | 97.25 | 96.72 | 97.48 |
| HPI 2015q4 | 101.45 | 100.64 | 101.70 |
| HPI 2016q4 | 107.52 | 103.73 | 107.01 |

*Notes*: All variables except the outcome variable HPI (2015=100) and Residential Construction of dwellings (calculated in the 4th quarter as a percentage of annual GDP) are averaged for the entire 2005q1 - 2016q4 pretreatment period. GDP per Capita is Purchasing Power Parity (PPP) adjusted and measured in current US dollars. Unemployment is measured as a percentage of the population between 15 and 74 years old. The mortgage interest rate is based on loans to households for house purchases with an original maturity of over 5 years. The active population consists of the total amount of people between 15 and 64 years old. Consumer Price Index (IMF) has 2015 as base year. The last column reports a population-weighted average for the precisely selected 9 European countries in the Donor Pool: BE, DK, GE, FR, LU, FI, SW, IC and the UK.

Finally, Figure 10 shows the estimated gap between the Netherlands and Synthetic Netherlands, which proves again that the pretreatment trends in house prices cannot be matched. As a result of this strong discrepancy in the pretreatment course, the post-treatment effect (the estimated gap from 2017 to 2020 which increases to 22 percentage points) is not a valid treatment effect. Abadie *et al.* (2010; 2015) do not recommend using the Synthetic Control Method when the pretreatment Gap (*i.e.*, RMSPE) is too large. [17] To summarize, an international analysis based on a selected donor pool of Northwestern European countries demonstrates the uniqueness of the Dutch house price cycle. The Synthetic Control based on the best-possible weighted combination of comparative countries, which consists of Denmark and France, in fact, fails to reproduce the pretreatment house price trend for the Netherlands.

Figure 10. Synthetic Control Gap | Restricted European Sample




[17] Abadie (Forthcoming) calls this the *convex hull condition*: "If the unit affected by the intervention of interest is *extreme* in the value of a particular variable, such a value may not be closely approximated by a synthetic control".

## 5.3 Synthetic Control Method | Full European Sample

Synthetic Netherlands based on the restricted European donor pool has not been able to track the pretreatment house price trend of the Netherlands. In this section, I relax the sample selection procedure by dropping the final criteria (3), as described in section 4.2. As a result, this Synthetic Control Analysis is based on the full European donor pool consisting of 16 countries. Similar to section 5.2, Table 9 estimates the effect of the house price predictors on the HPI and the real HPI.

Table 9. Full Sample Synthetic Control | Analyzing the main Drivers of House Prices

Full European Sample (17 Countries) | Predictors of European House Prices [HPI & Deflated HPI] 2005-2020

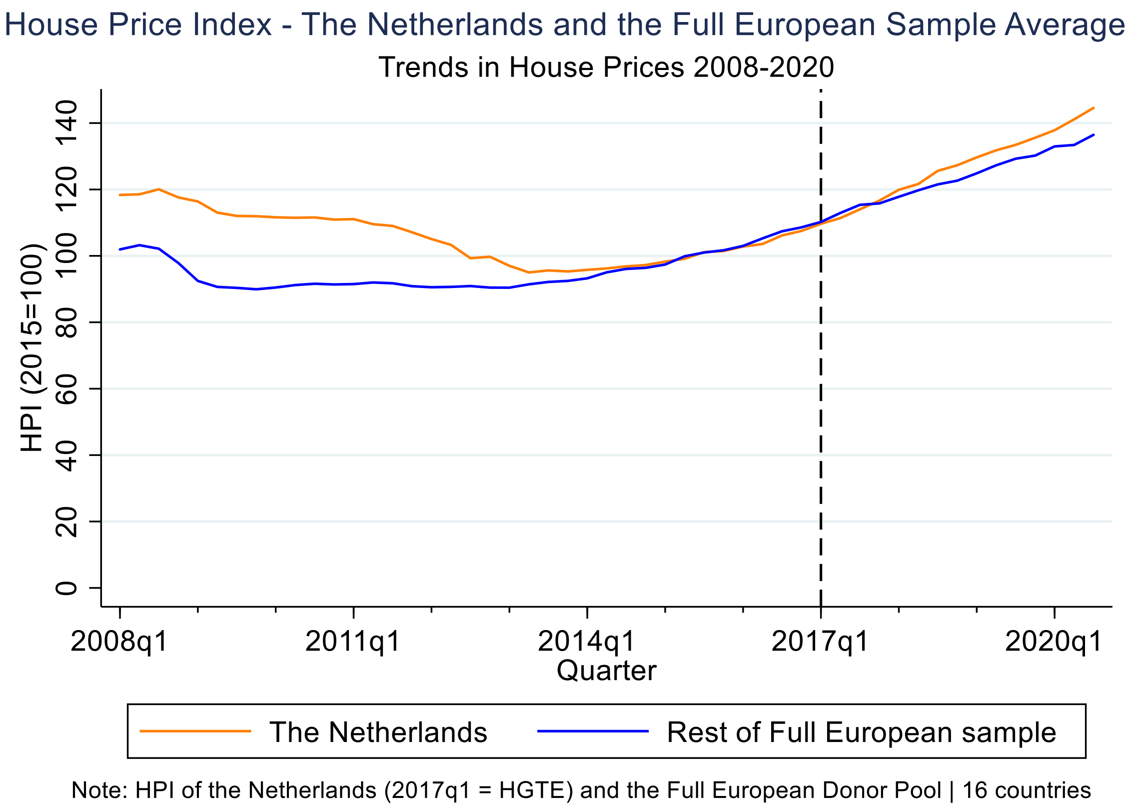
| | (1) HPI Reg | (2) HPI FE | (3) HPI DiD | (4) PreT H FE | (5) Defl Reg | (6) Defl FE | (7) Defl DiD | (8) PreT D FE |
|---|---|---|---|---|---|---|---|---|
| GDP_Capita | -0.187* | 1.838*** | 1.831*** | 1.592*** | -0.216* | 1.886*** | 1.880*** | 1.756*** |
| | (0.107) | (0.373) | (0.380) | (0.378) | (0.116) | (0.458) | (0.463) | (0.536) |
| Unemploy~t | -1.309 | -2.697*** | -2.686*** | -2.751*** | -1.188 | -3.206*** | -3.198*** | -3.399*** |
| | (0.884) | (0.268) | (0.273) | (0.256) | (0.836) | (0.245) | (0.248) | (0.309) |
| M_Int_Rate | -1.158 | -2.617 | -2.533 | -1.309 | -1.287 | -1.696 | -1.616 | -1.174 |
| | (1.067) | (2.054) | (2.096) | (2.055) | (1.300) | (2.621) | (2.672) | (2.546) |
| Population | 0.0176 | 1.838 | 1.811 | 4.486** | 0.0595 | 5.904** | 5.915** | 10.22*** |
| | (0.083) | (1.294) | (1.329) | (2.068) | (0.115) | (2.019) | (2.076) | (2.878) |
| CPI | 1.186*** | 0.937*** | 0.930*** | 0.615* | | | | |
| | (0.149) | (0.286) | (0.292) | (0.302) | | | | |
| HGTE | | | -4.039 | | | | -3.688 | |
| | | | (3.865) | | | | (3.798) | |
| N | 1024 | 1024 | 1024 | 769 | 898 | 898 | 898 | 673 |
| adj. R-sq | 0.337 | 0.764 | 0.807 | 0.630 | 0.070 | 0.638 | 0.732 | 0.652 |

Standard errors in parentheses
Standard errors clustered at country level. NL, BE, DK, GE, FR, LU, FI, SW, IC, UK + BU, ES, SP, LI, HU, PR and SK
* p<0.10, ** p<0.05, *** p<0.01

*Notes*: This table presents the estimated effects of various explanatory variables on house prices using the HPI for existing and new dwellings as the dependent variable in the first 4 models, and the (real) Deflated HPI in the last 4 models (2015=100). The Deflated HPI is missing for Iceland and the UK. Column (1) and (5) display a basic regression model. Column (2) and (6) include country and time Fixed Effects. Column (3) and (7) show a naive Differences-in-Differences model with the HGTE increase as treatment interaction term which takes the value of 1 for the Netherlands from 2017q1 onward. Finally, Column (4) and (8) replicate the Fixed Effects specification focusing on the pretreatment period 2005q1 - 2016q4. GDP per Capita (in thousands of dollars) is Purchasing Power Parity (PPP) adjusted and measured in current US $. Unemployment is measured as a percentage of the population between 15 and 74 years old. The mortgage interest rate is based on loans to households for house purchases with an original maturity of over 5 years. In contrast to the previous *restricted sample estimation*, the total population (in millions) instead of the active population is used. The CPI (Eurostat) is only relevant for the regular HPI and has 2015 as base year.

Table 9 shows that the *full European sample* coefficients of the various key drivers of house prices, are very similar to the *restricted sample*. One exception is the effect of GDP per Capita (in thousands) and population, which appear to be somewhat higher. Note that this section uses the total population as a predictor, whereas the previous section used the active population (15 - 64). Similar to the previous section, Figure 11 demonstrates the difference between the house price trend in the Netherlands, and the average of the full European sample: this time based on 16 countries. Again, the HPI trends in the European sample do not provide an accurate comparison. Table 10 displays the result of the full European sample Synthetic Control analysis. It shows that the trajectory of the Dutch HPI can best be reproduced by a convex combination of 5 European countries: *i.e.*, Spain (0.227), France (0.252), Portugal (0.195), Bulgaria (0.184) and Hungary (0.142). Notice that France again receives a positive weight in this estimation. This seems to confirm the strong association between the predictors and the HPI in both countries.[18]

Figure 11. Full Sample | The Netherlands and Donor Pool Average




[18] Figure 6, presented in the Data & Methodology section, gives some intuition of the role of each control country with a positive weight in Synthetic Netherlands. Spain and Bulgaria experienced a strong decline in house prices following the financial crisis, while Portugal and Hungary experienced a recent strong upward trend in their house price cycles.

Table 10. Country Weights for Synthetic Netherlands | Full European Sample

| Country | Weights | Country | Weights |
|---|---|---|---|
| Belgium | 0 | United Kingdom | 0 |
| Denmark | 0 | Bulgaria | 0.184 |
| Germany | 0 | Estonia | 0 |
| France | 0.252 | Spain | 0.227 |
| Luxembourg | 0 | Lithuania | 0 |
| Finland | 0 | Hungary | 0.142 |
| Sweden | 0 | Portugal | 0.195 |
| Iceland | 0 | Slovakia | 0 |

Synthetic Netherlands, based on the full European sample in Figure 12, is a substantially better estimate of the Dutch HPI than the restricted European sample analysis discussed in the previous section. The typical Dutch HPI trend can, in fact, be estimated using a weighted combination of Spain, France, Bulgaria, Portugal and Hungary. Table 11 provides a comparison of the housing market factors ex-ante the HGTE increase for the Netherlands, Synthetic Netherlands, and the population-weighted average of the 16 countries in the full European donor pool. Notice, however, that the European average is closer to the Dutch predictors of GDP per Capita and Unemployment rate, than the mean predictors considering Synthetic Netherlands. This makes sense as, in addition to France, Synthetic Netherlands is constructed from mainly Southern European and Eastern European countries, while the European population-weighted average is mainly driven by large countries such as Germany and the United Kingdom (which are more comparable to the characteristics of the Netherlands). Nevertheless, these differences in fundamental housing market characteristics might indicate overfitting, which would affect my statistical inference. For this reason, I will perform a series of robustness checks at the end of this section. Finally, the CPI, Mortgage interest rate and Residential Construction averages for Synthetic Netherlands do show more affinity with the observed predictors of the actual Netherlands. This is also a major improvement with respect to the restricted European sample in the previous section.[19]

[19] To verify, I also calculated Synthetic Netherlands using the *logged* GDP per Capita as a predictor. This results in a Synthetic Control consisting of the same countries, including an identical close fit. The differences in the mean Ln( GDP per Capita) as shown in Table 11, are smaller: The Netherlands 3.83 | Synthetic NL 3.41 | European average 3.58

Figure 12. The Synthetic Control | Full European Sample

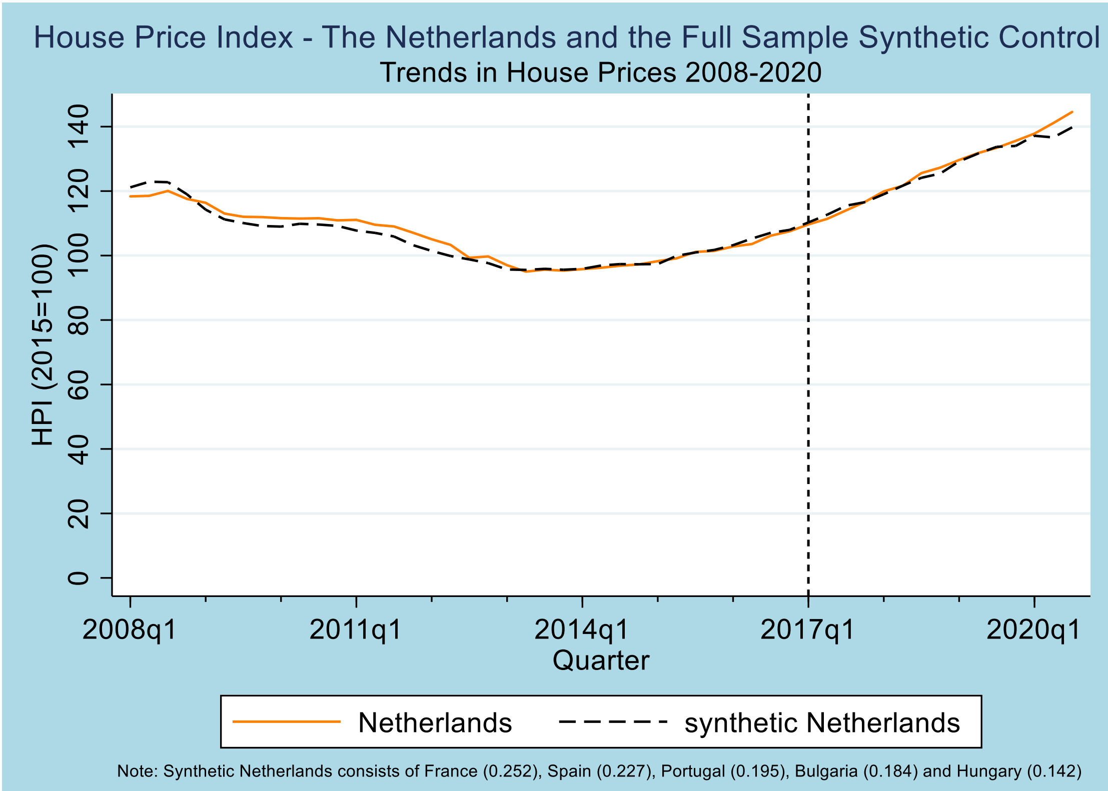


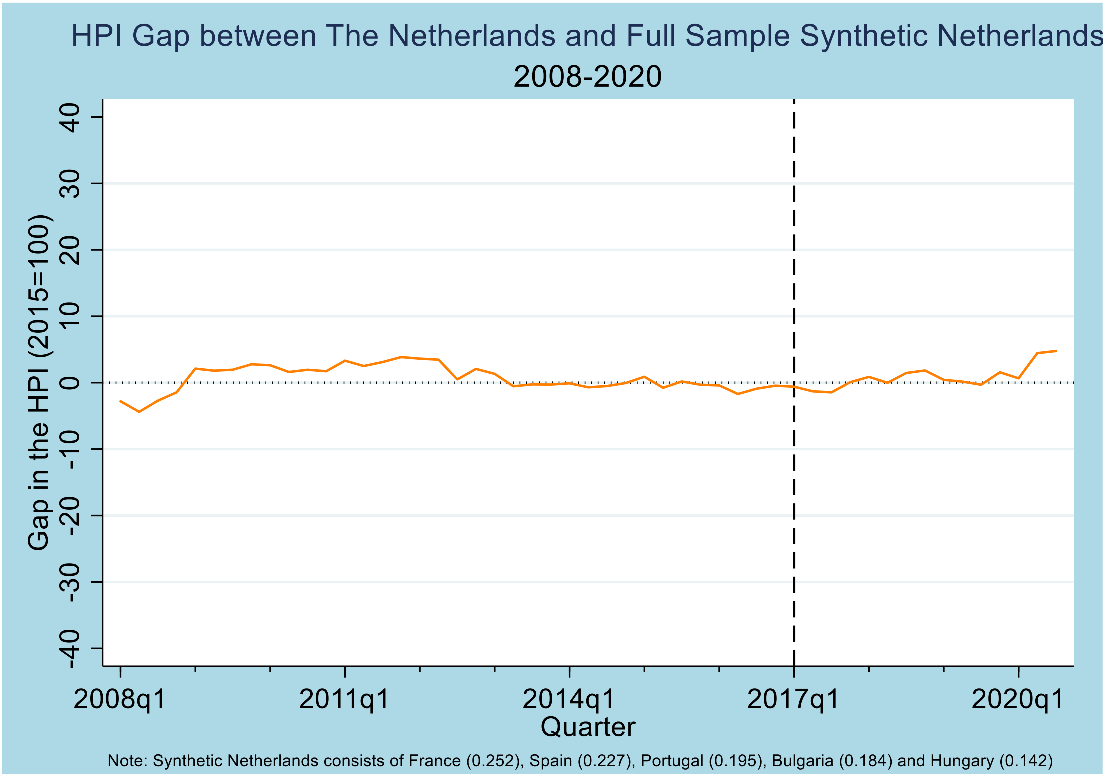

Figure 13 demonstrates the estimated treatment effect between the Netherlands and its synthetic counterpart (the gap). This figure shows that, because the trajectory of housing prices in the Netherlands and its synthetic counterpart are completely similar over the entire research period, the HGTE has no detectable effect on housing prices. Although, a small, estimated gap arises in 2020, this cannot be associated with the extension of the gift tax exemption in 2017. To summarize, it seems that the HGTE increase has a negligible price effect. Thus, the initial hypothesis, which stated that the HGTE increase to € 100 000 had a more profound effect on house prices in recent years (since 2017), than during 2013 and 2014, can be rejected. However, adding the Eastern and Southern Europe countries to the donor pool, raises the risk of overfitting. Therefore, I conclude this section with additional placebo tests.

Table 11. House Prices Predictor Means before the GTEH | Full Sample Donor Pool

| Variables | The Netherlands | Synthetic Netherlands | Full European Sample |
|---|---|---|---|
| GDP per Capita ($) | 46 1197 | 27 861 | 36 420 |
| Unemployment (%) | 5.54 | 11.52 | 9.62 |
| Mortgage Interest Rate (%) | 4.59 | 4.59 | 4.38 |
| Mortgage Interest Rate 2016q4 (%) | 3.65 | 2.95 | 2.91 |
| Total Population (million) | 16.6 | 31.7 | 53.7 |
| CPI (hicp) | 93.62 | 93.36 | 93.19 |
| Residential Construction 2007 (%) | 6.2 | 6.8 | 6.1 |
| Residential Construction 2009 (%) | 5.6 | 5.6 | 5.2 |
| Residential Construction 2010 (%) | 4.7 | 4.7 | 5.0 |
| Residential Construction 2012 (%) | 3.5 | 3.8 | 4.7 |
| Residential Construction 2014 (%) | 3.1 | 3.5 | 4.7 |
| Residential Construction 2016 (%) | 4.1 | 3.9 | 4.9 |
| HPI 2012q4 | 99.73 | 97.66 | 94.17 |
| HPI 2013q4 | 95.32 | 95.61 | 94.35 |
| HPI 2014q4 | 97.25 | 97.30 | 97.23 |
| HPI 2015q4 | 101.45 | 101.76 | 101.72 |
| HPI 2016q4 | 107.52 | 107.97 | 107.35 |

*Notes*: All variables except the outcome variable HPI (2015=100) and Residential Construction of dwellings (calculated in the 4th quarter as a percentage of annual GDP) are averaged for the entire 2008q1 - 2016q4 pretreatment period. GDP per *Capita is Purchasing Power Parity* (PPP) adjusted and measured in current US dollars. Unemployment is measured as a percentage of the population between 15 and 74 years old. The mortgage interest rate is based on loans to households for house purchases with an original maturity of over 5 years. In contrast to the previous *restricted sample estimation,* which used the active population as a predictor, this time the total population is used. Also, the Consumer Price Index with base year 2015 has a slightly different approach. In this case, the Eurostat *Harmonised Index of Consumer Prices* has been used. The last column reports a population-weighted average for the Full Sample 16 European control countries in the Donor Pool: BE, DK, GE, FR, LU, FI, SW, IC, UK and additionally BU, ES, SP, LI, HU, PR and SK.

Figure 13. Synthetic Control Gap | Full European Sample

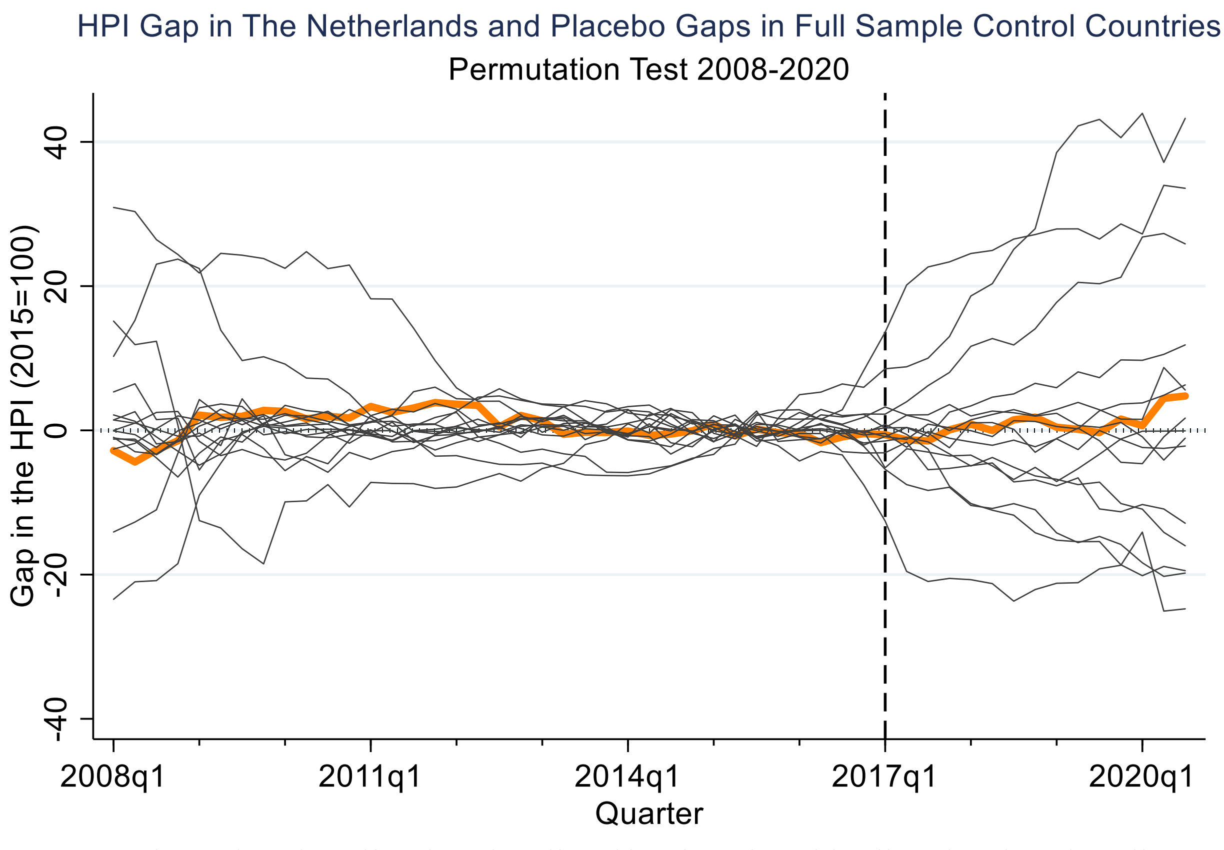



To test whether the Synthetic Control is a credible estimation of the counterfactual house price trend - in the absence of the policy intervention - and not a spurious result due to overfitting, I perform a series of robustness checks. First, I again estimate the same Synthetic Control model, but this time using the Deflated HPI as dependent variable. The results are shown in Figure A5 in Appendix B. The new synthetic control drops Hungary, which is the country with relatively the strongest price increases since 2015. Furthermore, Bulgaria receives a lower weight and Portugal receives a significantly higher weight. Despite these altered country weights, Figure A5 still shows an accurate pretreatment fit. The fact that a renewed Synthetic Netherlands shows a similar result, (even without an outlier like Hungary) is promising.

Secondly, I perform a so-called *in-time* placebo study where the moment of treatment is reassigned to another period than 2017q1. Figure A6 demonstrates this *falsification test*. The question is whether the identical trajectory of the Netherlands and its Synthetic counterpart will disappear when the latter is estimated using of a placebo treatment in 2012q1 instead of 2017q1. However, this is clearly not the case. There is a minor change in the country weights; France is assigned a weight of zero, and Lithuania and Finland are given a small weight instead. Taken together, even with an artificial treatment timing, the house price trends of the Netherlands and Synthetic Netherlands do not seem to diverge, not even in the posttreatment period (after 2017q1).

The third and final robustness check is the advanced *in-space* placebo test, which iteratively reassigns the treatment to every country in the donor pool, by shifting the Netherlands to the donor pool. This implies that the Synthetic Control calculation is repeated 16 times, establishing a distribution of estimated placebo gaps of countries that in reality did not experience a HGTE increase. The results are shown in Figure 14, whereby the gray lines denote the 16 countries in the donor pool, estimated using the same model as the baseline Synthetic Netherlands analysis, and the bold orange line represents the Netherlands. As a result, the Netherlands belongs to the countries with the best pretreatment fit (as calculated by the MSPE). In particular, there are few countries which demonstrate a smaller treatment affect than that of the Netherlands. These findings reduce the potential risk of overfitting, as many other European countries demonstrate a worse fit.

Figure 14. In-Space Placebo Test | Full European Sample



## Conclusion & Discussion

The structural twofold increase in the Gift Tax Exemption for Owner-Occupied Homes (HGTE), introduced on 1 January 2017, has triggered a strong surge in the number of inter vivos gifts in the Netherlands. In total, 24 000 gifts were transferred in 2017, with an aggregate gross value of € 1.5 billion. These gifts can be used for mortgage repayments, home renovations or to purchase a new house. Recently, the latter use gave rise to some controversy. In the current Dutch housing market with soaring prices, an inelastic housing supply and fierce competition among home-seekers, could such tax-favoured treatment of gifts for home purchases drive up house prices even further? In this paper, I address this policy question by employing both a regional analysis based on differences in treatment intensity, and an international analysis using the novel Synthetic Control Method.

The regional analysis exploits the average age of home buyers in every Dutch Corop region, as an indicator of the exposure to the HGTE increase. The DID-approach based on a comparison of the house price trends in the 15 regions with the average youngest home buyers, with the other 20 regions, shows a modest and insignificant price increase of 1.81 percent for the structural reform in 2017. The impact of the temporary HGTE increase in 2013 and 2014 on regional house prices is even smaller and can be considered negligible. Second, an international analysis based on a selected donor pool of Northwestern European countries demonstrates the uniqueness of the Dutch house price cycle, especially the house price decline following the financial crisis. The Synthetic Control based on the best-possible weighted combination of comparative countries, which consists of Denmark and France, fails to reproduce the pretreatment house price trend for the Netherlands. However, after expanding the European donor pool, the pretreatment trajectory of the Netherlands can, in fact, be reproduced by a weighted average of Spain, France, Bulgaria, Portugal and Hungary. The resulting analysis shows that the trajectory of housing prices in the Netherlands and its synthetic counterpart are completely similar, suggesting that the HGTE has a negligible price effect. Even after performing a series of *in-time* and *in-space* placebo tests, there remains a small risk of overfitting which would imply that Synthetic Netherlands is artificially matched from an oversized sample of too dissimilar countries. However, the fact that both research methods led to similar findings, reinforce the conclusion that the HGTE increase has no discernable effect.

There are some important remarks regarding both identification strategies which should be considered. Firstly, I cannot indisputably claim that the HGTE increase has absolutely zero effect on house prices. Such a causal inference requires exogenous variation in the implementation of the HGTE. However, the Dutch government introduced this policy measure to reduce the outstanding mortgage debt and underwater mortgage following the financial crisis, which is obviously linked to the house price cycle. Besides, one would need micro-data on the recipients of gifts and their specific home purchase to truly disentangle the price effect from other housing market factors.

Secondly, Abadie (forthcoming) warns that "*small effects will be indistinguishable from other shocks to the outcome variable of the selected unit, especially if the outcome variable of interest is highly volatile*". Although the house price volatility is moderate and thus manageable, the impact of the HGTE increase might be too small to detect an actual treatment effect. Approximately 5 percent of all house sales in 2017 involved a tax-free gift of on average € 63 200, which could be outweighed by other housing market shocks and therefore difficult to empirically detect.[20] Furthermore, the official evaluation of the structural HGTE increase, which will be published by the Ministry of Finance at the end of 2021, should shed some light on the actual use and the scheme's success. New studies should seize this evaluation and ideally use micro-data to truly unveil the underlying mechanism between gifts, home purchases and house prices.

The results of this analysis have some important implications for tax policy. During the 2021 Dutch general elections, many political parties advocated for reduction or even total abolition of the Home Purchase Gift Tax Exemption (*i.e.*, D66, GroenLinks, the Labour Party, the Socialist Party and the CDA). Perhaps surprisingly, their claim that the increase of the HGTE has driven up house prices - probably driven by conventional wisdom - has not been found in the paper. Nevertheless, their concerns regarding wealth inequality can still be valid. The tax advantage has particularly been used by more affluent households, which undermines the aim of gift taxes to redistribute wealth.[21] Nonetheless, the objectives of gift taxation are highly political, which makes it in the end difficult to objectively assess whether the HGTE - which contributes to unequal opportunities on the housing market between starters with different parental backgrounds - is a desirable tax policy.

[20] In comparison, Abadie *et al.* (2015) apply the Synthetic Control to estimate the impact of the German reunification in 1990 on GDP growth in West Germany, which is by no means comparable to the tax policy studied in this paper.
[21] Moreover, homeowners who experienced a home equity increase are eventually able to transfer these capital gains to their children, who have, in turn, a better chance to own a home themselves.

# Appendix A | Data Sources

Regional Treatment Intensity Analysis - 35 Corop regions in the Netherlands

- Price Index of Existing Owner-Occupied Homes from 1995q1 to 2020q4 (PBK in Dutch). Source: Statistics Netherlands (CBS). The index (2015=100) is calculated by comparing the selling prices in the period under review to the most recent property (WOZ) values of the dwellings sold: known as the Selling Price Appraisal Ratio (SPAR) method.
- Population measured at the start of every quarter. Source: Statistics Netherlands.
- Housing stock measured as the total amount of (residential) buildings, both owner-occupied as rental dwellings at the start of every quarter. Source: Statistics Netherlands. * There has been a minor statistical break in 2012 regarding the BAG-register definition of a dwelling.
- Average home purchase age, municipal data. Source: Statistics Netherlands (CBS) and the Netherlands' Cadastre Agency. Document: *Spanning op de Koopwoningmarkt* (2020).
- Annual GDP per Capita (in euros), value added at market prices of the regional economy. Source: Statistics Netherlands. Quarterly figures are interpolated linearly from annual data.
- Variety of annual regional characteristics and key figures. Source: Statistics Netherlands.

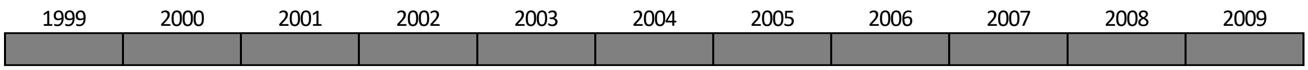
European Synthetic Control Analysis - 29 countries

- House Price Index (HPI) and the Deflated HPI of new and existing dwellings from 2005q1 to 2020q3. Source: Eurostat. The HPI (2015=100) shows the price changes of residential properties purchased by households (at market prices; self-build dwellings are excluded), independently of their final use and independently of their previous owners. The (real) deflated HPI is the ratio between the nominal HPI and an index of consumer price inflation.
- GDP per Capita is Purchasing Power Parity (PPP) adjusted and measured in current US $. Source: OECD Quarterly National Accounts (expenditure approach; seasonally adjusted).
- Unemployment rate. Source: Eurostat. Measured as percentage of total population from 15 to 74 years old and seasonally adjusted. * France uses a slightly different methodology.
- Population and Active Population of people aged between 15 and 64. Source: Eurostat.
- MFI interest rate based on loans to households for house purchases with an original maturity of over 5 years. Source: IMF Financial Statistics. * Source for DK, SW IC and UK: ECB.
- Inflation both measured as harmonized CPI (Source: IMF) and HICP (Source: Eurostat).
- Annual Residential Construction as percentage of national GDP. Source: Eurostat.

## Appendix B | Figures

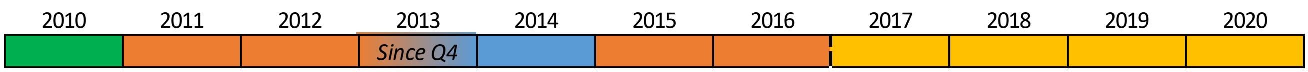
Figure A1. Overview Dutch Gift Tax

### Timeline Gift Tax and the Owner-Occupied Home Exemption in the Netherlands




*There are some* ***basic annual exemptions*** *(both ex-ante and ex-post 2010)* *± € 5.000 (parent-child)* *± € 2.000 (others)*

= **No gift tax exemption for owner-occupied homes**, merely the one-off parent-child exemption of **± € 22.000**




| ***Start of the gift tax exemption scheme ±*** | | | | *Gifts used for* | *Relationship* | *Eligible Age* |
|---|---|---|---|---|---|---|
| | = | **€ 50.000** | | Purchase | Parent-child | 18 - 39 |
| | = | **€ 50.000** | | Purchase, mortgage repayment & renovation | Parent-child | 18 - 39 |
| | = | **€ 100.000** | **temporary** | Purchase, mortgage repayment & renovation | Irrespectively | Irrespectively |
| | = | **€ 100.000** | **permanent** | Purchase, mortgage repayment & renovation | Irrespectively | 18 - 39 |

### Gift Tax Rates in the Netherlands

Rates before 2010

| *Value between ± €* | **Children** | Grandchildren | Siblings | Others |
|---|---|---|---|---|
| 0 - 22.000 | **5%** | 8% | 26% | 41% |
| up to 45.000 | **8%** | 13% | 30% | 45% |
| up to 90.000 | **12%** | 19% | 35% | 50% |
| up to 180.000 | **15%** | 24% | 39% | 54% |

** Up to 7 tax brackets, with a 4 percentage-point tax rate increase for every bracket*

Rates since 2010

| *Value between ± €* | **Children** | Grandchildren | Others |
|---|---|---|---|
| 0 - 120.000 | **10%** | 18% | 30% |
| 120.000 and above | **20%** | 36% | 40% |

** Gift tax exemptions differ every year, depening on the annual inflation rate*

*Note*: The Dutch gift tax is part of part of the Inheritance tax act. (1956) and it charges the beneficiary (the recipient) of an inter vivos wealth transfer.

Figure A2.

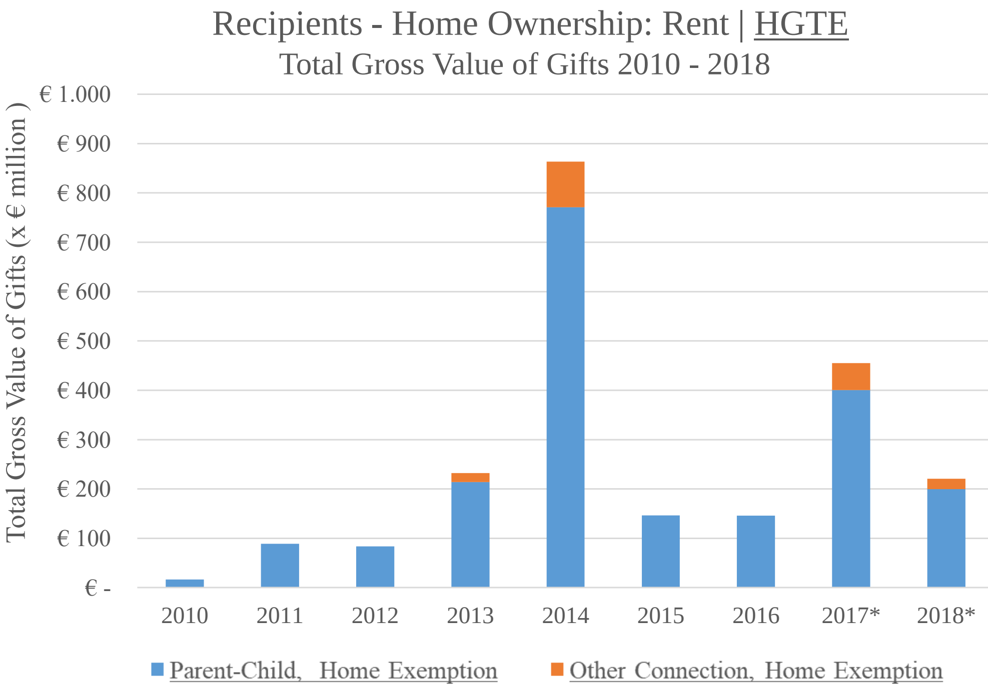



Figure A3.

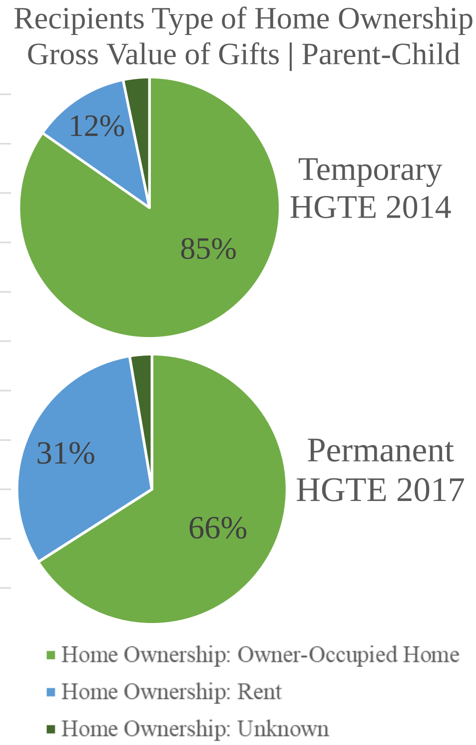



Figure A4. Deflated Synthetic Control | Restricted European Sample

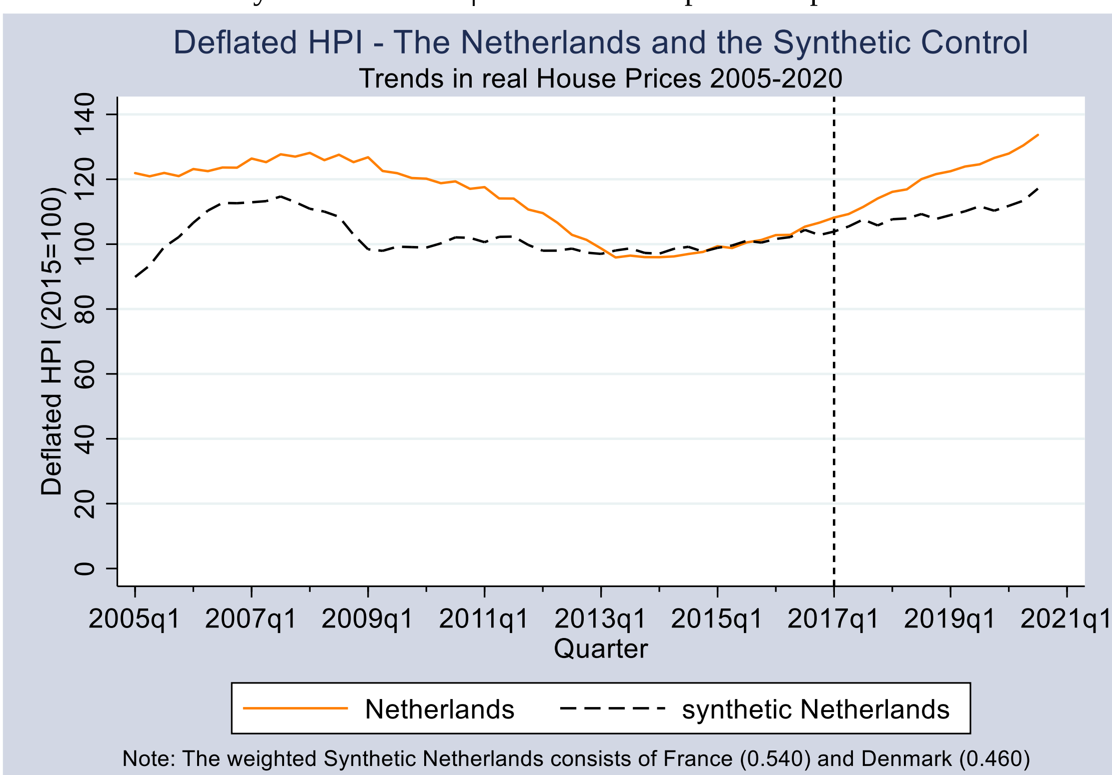


Figure A5. Deflated Synthetic Control | Full European Sample

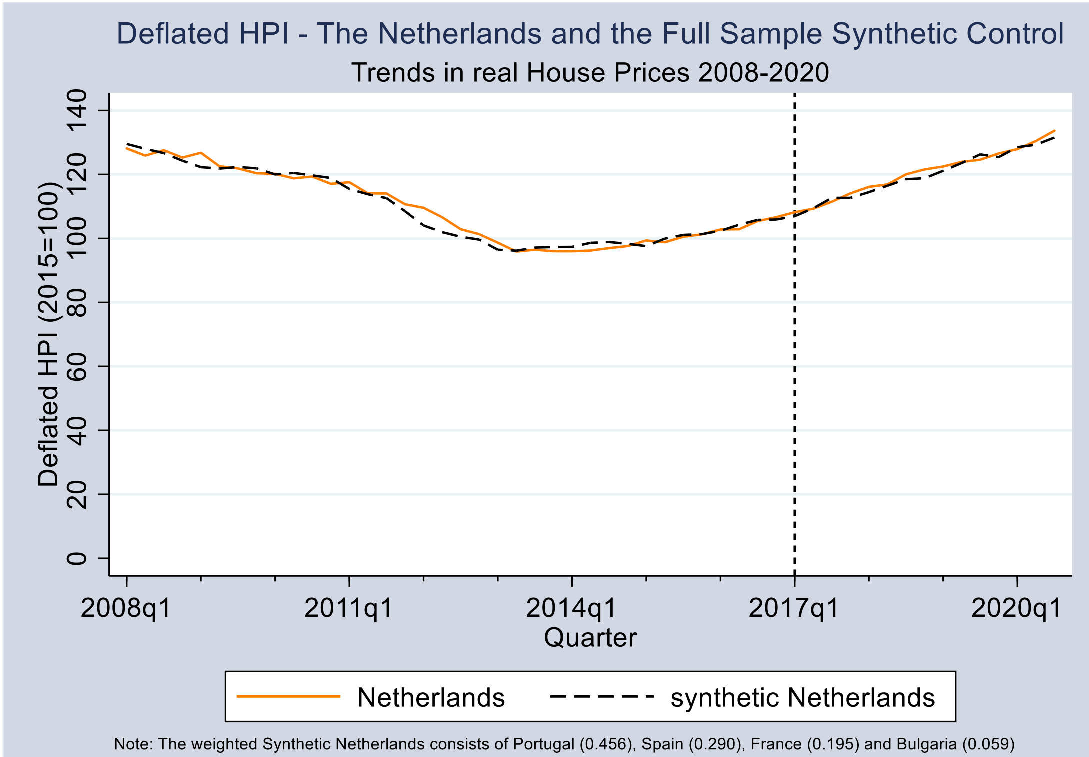
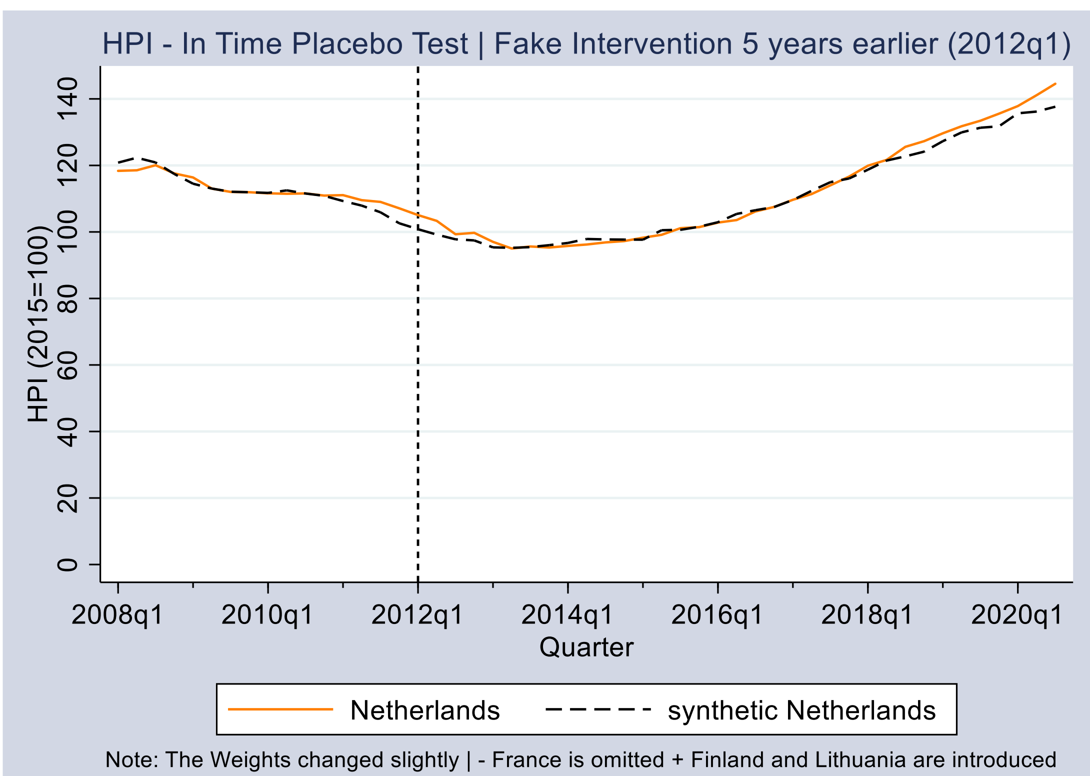



Figure A6. In-Time Placebo Test | Full European Sample



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