

Tax-exempted intergenerational transfers: do they reduce household indebtedness?

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abstract

We study whether an extension of a tax exemption on intergenerational transfers increases mortgage voluntary repayments using a population mortgage loan level data (LLD) collected by the Dutch National Bank (DNB). We rely on a reform that extends the tax exemption on intergenerational transfers to isolate the casual effects. This exogenous extension of tax exemption on intergenerational transfers has increased the mortgage voluntary repayment. We find that during the period of the extension, mortgage voluntary repayments have significantly increased by 26% to 53%.

Keywords: indebtedness, voluntary repayments, intergenerational transfers

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1. Introduction

Individual's decision of purchasing home (with mortgage) may well be affected by the available and expected intergenerational transfers. Relying on the positive correlation between individual's homeownership and parental financial support, a sizeable amount of existing paper interpret this as evidence that credit market imperfections delay people purchasing house, because of down-payment requirement. Tax policies on intergenerational transfers is an important determinant of the extent that transfers from parents can take, and therefore affect one's decision for homeownership, as well as the plan for amortization of existing mortgage.

We study whether an extension of a tax exemption on intergenerational transfers stimulates voluntary repayment (or early payment, as frequently used in some financial news and literature) of existing mortgage using a (nearly) population administrative panel data for the Netherlands. As in majority of countries, for most of the households, the purchase of a house is always using mortgage. Among existing literature (Green and Shoven, 1986; Krainer and Laderman, 2011), as well as in financial industry practice, there has been substantive discussion and financial risk models on how other macro factors, specially interest rate, affect voluntary repayment (rate) of existing mortgage. Little is known, however, about the importance of the effect of policy change of tax exemption on intergenerational transfers on existing mortgage voluntary repayment. This study contributes to fulfill this gap.

We face a number of complicating issues. One is the fact that intergenerational transfer is potentially caused by the need of mortgage down-payment or amortization repayment, making intergenerational transfer (partly) endogenous to the mortgage payment. Our identification strategy allows giving a causal interpretation to intergenerational transfer and mortgage (voluntary) repayment. For this purpose, we use a policy change of tax exemption on intergenerational transfers, which enacted on the fourth quarter of 2013 and ended on the fourth quarter of 2014 (later we also use the form 2014q4 to indicate the quarter and year). During the policy extension period, the amount and the source of tax-free intergenerational transfers were extended, and the upper limit of beneficiary's maximum age restriction was dropped.

There are two pathways that intergenerational transfers affect likelihood of having homeownership (with mortgage) and the value of purchased house. In the first pathway, the intergenerational transfers from family members alleviate down-payment constraints. The literature using US data shows that intergenerational transfers lead to earlier purchases of more expensive homes with higher down payment (Engelhardt and Mayer, 1998; Guiso and Japelli 2002; Luea, 2008).³ Households that receive transfers may use them as the substitution for their own savings, or increase the budget of the house they plan to buy (or purchase the same budgeted house at an earlier date). Institutional regimes and social norms varies across countries. Analyses based on Europe data show weak or no evidence that transfers from parents facilitate children home ownership.⁴ The second pathway

³ Mayer and Engelhardt (1996) reports that around 22 percent intergenerational transfers are used as down payment to purchase a home, and the average transfers occupy around 50 percent of the required down payment. Duffy and Roche (2007) find that between 2000 to 2004, around one-third of households receive an inter vivos transfer and the transfer represented 21 percent of the down payment. For Italy, Guiso and Japelli (2002) report that around 16 per cent of individuals report receiving a gift or financial support earmarked for real estate purchase.

⁴ For Italy, Guiso and Japelli (2002) find that transfers (bequests and inter vivos gifts) have only a small impact on the time spent saving for a down payment. Using a large administrative database in Denmark, Kolodziejczyk and Leth-Petersen (2013) find little evidence that intergenerational transfers are used to support home ownership. There is no evidence that parents transfer resources to children to facilitate home ownership, or insure against labour market shocks around the time that home ownership is entered into. For the Netherlands, around 9% of individuals report receiving financial support for home ownership from parents (Mulder & Smits 2013).

is that the (lump-sum) intergenerational transfer may be annuitized and then used for monthly scheduled mortgage repayment, or simply directly used for a lump-sum voluntary repayment (thereby reducing the remaining mortgage repayments they face). For this pathway, evidence on the impact of intergenerational transfers is more limited.

Our main results show that the policy extension of the tax exemption on intergenerational transfers increase the mortgage voluntary repayment by around 330 euros when cast in terms of unconditional margin, and 3,400 euros when cast in terms of conditional margin. In comparison with the average unconditional voluntary repayment 660 euro per house and unconditional voluntary repayment 21,000 euro per house, on average, it implies a relative large and significant positive casual effect, a 51% and 16% increase on the voluntary repayment respectively. We also find strong effects when we measure the extension impact through the voluntary repayment rate (using a binary indicator for whether one makes voluntary repayment). We find that the probability of making voluntary repayment increases by 29% during the policy extension period. This main finding is robust to checks when we narrow sample period. We also consider alternative definition of the policy extension.

The contribution of this study is two-fold. First, unlike other literature that study intergenerational transfers and homeownership, we use population mortgage dataset and study a policy change that results in more tax-free intergenerational transfers and more public awareness of the importance of mortgage repayments, rather than individuals choices. Second, for the policy change the treatment group was large (the whole population), and the anticipation effects were actually absent. This provides for an ideal quasi0experimental setting.

The paper is organized as follows. In the next section, we describe Dutch household debt and sketch the institutional frame of the policy change of the tax exception on intergenerational transfers in the Netherlands. In Section 3, we introduce the data collect by the Dutch central bank and present descriptive statistics. In Section 4, we discuss the main estimation results, and Section 5 offers brief conclusions.

2. Background

2.1 Housing market and mortgage debt in the Netherlands

In the Netherlands, one mostly speaks of indebtedness in relation to mortgage debt. Financial debt is less common. The lack of a down-payment constraint, together with a generous mortgage interest deduction (MID) and high financial innovation (which made non-amortizing loans possible), has made the Netherlands one of the leading countries in the world in terms of LTV (loan to value) ratios.⁵ In international terms, the Dutch mortgage debt also stands out for a number of peculiar characteristics. The high share of interest only (IO) loans should be highlighted. Most existing loans do not amortize, as 60% of outstanding mortgage debt is IO. At mortgage/borrower level the share of fully non-amortizing borrowers is about 30%, while about half of the borrowers has a combination of IO-loans with either annuities or saving loans. The fully IO-loans are more common with elderly borrowers, who used them to cash home-equity. Also IO loans are more often being voluntarily repaid, which is relevant to our study.

Figure 1 shows household total debt and the decomposition into three types of debt over time in the Netherlands. It is noticeable that mortgage debt is the principal part of household total debt (which is around 88% to 89%), and the proportion remains relative stable. Consequently, total household debt, and its' possible negative consequences, crucially depends on the development of mortgage debt. After peaking in 2012q3, mortgage debt has declined from 2012q4 to 2014q1, resulting in a slight reduction of household total debt in this period. There are a number of reasons that can explain the reduction of household total mortgage. Firstly, since the 2013q1, it is no longer possible to take out an IO mortgage, all new mortgages are required to be fully amortised, thus reducing debt in each period. Secondly, by the middle of 2013, house prices have fallen by more than 20% compared to the peak in the middle of 2008, and number of transactions dropped too, thus reducing the contribution of the new debt production in total debt. Also, data from the cadastre show that the share of mortgage-free transactions has increased. For existing mortgages, the low deposit rate, the partial removal of fees on voluntary repayments by banks, and the temporary extended tax-exemption scheme for gifts, made voluntary repayments of mortgages debt more popular. After 2015, the mortgage debt has stayed roughly constant. In general, consumer credit stayed constant while other types of loans increase slightly, mostly due to student debt becoming more common.⁶

⁵ While before the housing crisis (started falling after the second quarter of 2008 until the fourth quarter of 2013), it was common to borrow up to 120% of the property value, the Dutch government has imposed progressively lower LTV caps starting from 2013 (when the LTV cap was fixed to 106%) to be reduced to 100% in 2018. DSTI (debt service to income) caps were also sharpened and the MID was sobered down and fully abolished for new interest-only loans (therefore stopping the production of such loans).

⁶ Because of the stop of the student subsidy. Students are only eligible to take low interest loans.

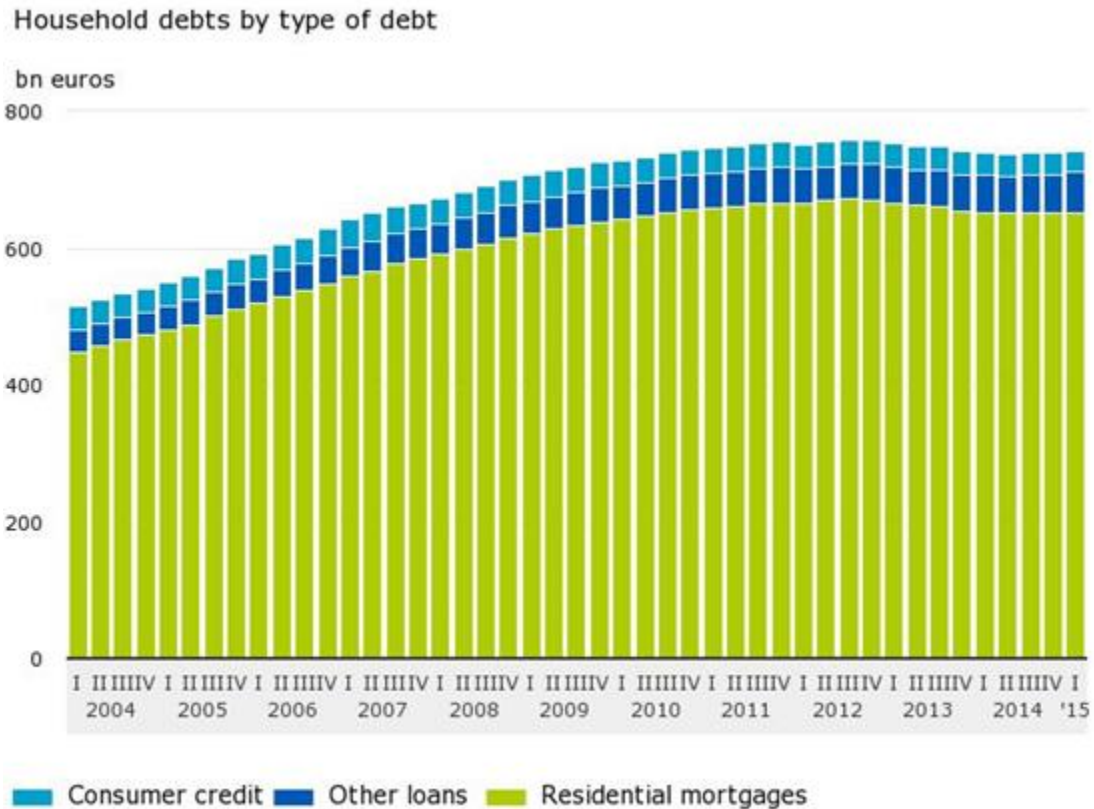


Figure 1. Household total debt and its decomposition.

2.2 Tax on intergenerational transfers and its extension

During housing crisis in the Netherlands, where prices started falling after the second quarter of 2008 until the fourth quarter of 2013, and consumption contributed negatively to economic growth. The government attempted a number of measures to reduce the negative consequences of excessive indebtedness. Among those measure, two were taken to directly reduce mortgage debt, hoping that this would reduce residual debt (for instance upon selling houses with underwater mortgages). The first was to make residual debt ‘portable’. Those selling a house with negative equity (for instance in order to go rent somewhere else) were allowed to keep part of the old loan (because of the residual debt after selling) with negative equity, and to benefit of the related mortgage interest rate deduction (MID). The second measure was to temporarily increase the tax-exemption scheme of gift, which aimed at increasing mortgage debt voluntary repayment, and is the focus of this study.

In the Netherlands inheritance are taxed. As intergenerational transfers could be a way to elude these taxes, fiscal limits to these transfers apply. Should one receive more than the amount allowed (about 6,000 euro per year), inheritance taxes apply to the excess amount. However, during the 1990’s, when household indebtedness increased due to the rise of house prices, an additional 46,000 euro one-off lump sum transfer was allowed. Therefore before and including 2013q3, for those with age below 35, 52,000 euro in total was allowed

as tax-free gift, provided the amount was being used to make a voluntary mortgage repayment,⁷ buy a new house or make home-improvements.⁸ This is the most common tax-facilitated intergenerational transfer, but not the only one, as also specific rules apply for instance to tax-payer inheriting the family business or diverting funds from one tax-facilitated savings scheme (of the past) to the other.

In the period 2013q4 and 2014q4, the regulation facilitating voluntary repayments was temporarily extended. The tax-free amount was lifted from 52,000 euro to 100,000 euro, and the transfers could be received from multiple sources (parents, relatives, friends or anyone else), and the recipient's maximum age restriction was dropped. Also a lot of publicity was given to this measure, and banks were requested to directly inform their customers with a letter. After (and including) 2015q1, the tax-free amount was shifted back to 52,000 euro, and the source of transfers is restricted to parents again. However, the recipient maximum age was raised up to age 40.

	Total tax-exempted gifts		Gifts within extended tax-exemption (2013-2014)	
	<i>number of receivers</i>	<i>amount received /10⁶</i>	<i>number of receivers</i>	<i>amount received /10⁶</i>
2012	49 803	2 724	NA	NA
2013	101 871	5 709	40 768	2 704
2014	158 930	9 400	116 325 (73.2%)	6 987 (74.3%)
2015*	50 521	3 329	NA	NA

Note: Source from Dutch tax office (belastingdienst). Business equity transfers (*bedrijfsopvolgingsregeling*) are excluded.

Table 1: Aggregate evidence on tax-facilitated intergenerational transfers

Table 1 provides aggregate evidence on the number of users of tax-exemptions scheme for intergenerational transfers and the amount being received. The left panel shows a sharp increase in users from 2012 to 2014, with a total transferred amount increasing from 2.7 to 9.4 billion euro. The right panel shows that this increase in the number and amount is almost exclusively due to transfers falling within the extended exemption that was in play in these years.

The upper-left panel of Figure 1 shows the number of users and upper-right panel shows the amount received in different classes. It shows that 2014 was the top year, and these users more often fall in the amount category above 52.000 euro that was being facilitated for the first time. Thus shifts the distribution of total transfers to the right. These trends in all transfers are largely shaped by the extended exemption, as shown in the lower-left and lower-right panel of the figure.

⁷ The remaining mortgage debt should be larger or equal to the amount received.

⁸ Investing the money on home-improvements also increase the value of a house. Though debt is not reduced directly, but the value of asset increases. If one receives tax-free inheritance, she/he can only repay mortgage debt only once in one's life time.

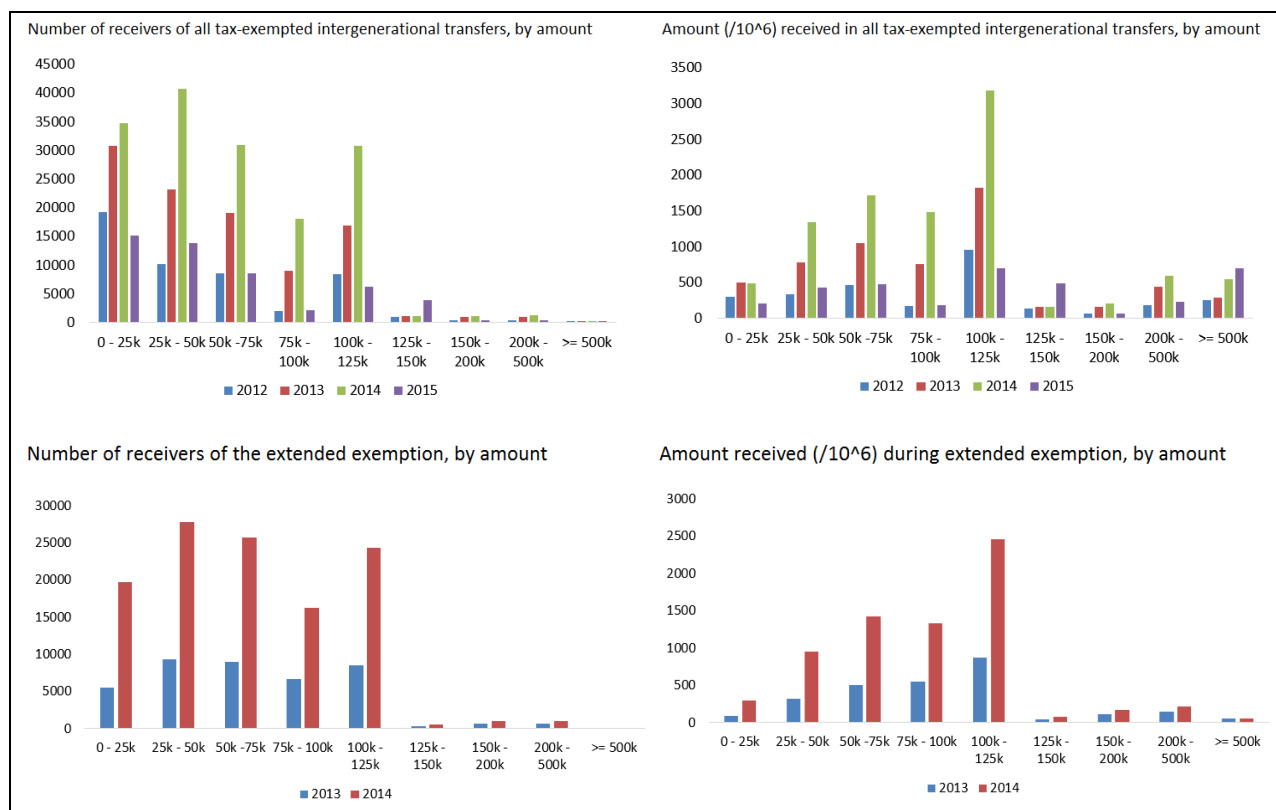


Figure 1: Total tax-exempted intergenerational transfers, users and amounts over time

3. Data and descriptive statistics

3.1 The loan level data

We use the DNB loan level data (LLD) from 2012q4 to 2016q1. The LLD is a panel dataset containing quarterly administrative records obtained using the templates that the European Central Bank (ECB) requires for accepting securitised mortgages as collateral.⁹ It collects information on around 6 million loans and 3 million borrowers (a mortgage typically consists of multiple loans), or approximately 80% of the entire Dutch mortgage portfolio. The administrative nature implies that the dataset has low measurement error for each variable of each observation. The LLD contain details and on mortgage provider, mortgage type, interest rate, participation into the mortgage guarantee (NHG), origination and maturity and current property evaluation, and all related variables that are required when applying for a mortgage. Each record includes a unique loan and borrower identifier, which allows tracking them over time if (and only if) the borrowers stay within the same bank.

⁹ In order to use a securitized mortgage as collateral, each lending institution must agree to the 100% transparency policy of the ECB and fill in the template. While the ECB only requests information on the securitised mortgages, DNB also requests that mortgage lenders report the rest of their portfolio. Dutch pension funds, small banks and insurance companies that do not securitize and foreign institutions do not participate.

The LLD also lacks some relevant and important information. We can only observe the borrowers' original income when he/she applies for the mortgage, but not the current income. The LLD contains no information on whether a borrower is a first-time buyer, or the year of inception of debt. In the data, we cannot distinguish the provenience of the money used for mortgage repayments. Intergenerational transfers, personal household savings, or some exogenous sources such as lottery winnings or normal inheritances, all qualify, but we cannot identify them. This is true for mortgage repayments and also for intergenerational transfers used as down-payment when borrowers buy a house. Furthermore, we do not directly observe voluntary repayments, and we have to derive a proxy of it using the panel nature of the data.

3.2 Define voluntary mortgage repayments

The main variable in our study is voluntary repayments. As mentioned in Section 3.1, we cannot directly observe them directly, thus, we need to derive a proxy of voluntary repayments based on a dynamic analysis of the data. We compute the first difference of the amount of loan outstanding¹⁰ at each wave. A number of issues arise during the dynamic analysis.

First not all reductions in principals should be considered as voluntary repayments. Annuity loans are contractually repaid each period for an amount that increases over the course of the loan. Close to origination these amounts are low, while interest payments are high, while the opposite is true close to maturity. These contractual repayments must be excluded from the voluntary ones.

Second attrition is present in the data. If we were to condition the analysis on continuous presence in the data for 14 waves, our sample would shrink enormously. Also attrition might be selective, as this would typically affect the group of borrowers that are bank-shifters. At the moment, we identify individuals in the LLD using a customer number, which is not portable across banks. When a borrower moves from one bank to the other, this identifier changes. In order to solve this problem, we construct a moving panel with 5 waves each move. This is needed because if we were to use only 2 adjacent waves, we would be unable to distinguish drops in loan outstanding due to contractual or voluntary repayments. In our definition a voluntary repayment is an irregularly large drop in the principal. For example if a borrower has a linear mortgage where outstanding debt is reduced by 1,000 euro each quarter, but in a specific quarter we observe a reduction of 11,000 euro, we assign in that quarter a voluntary repayment of 10,000 euro, and a contractual repayment of 1,000 euro.¹¹

The third problem that we encounter is that due to monthly variations in interest rates and in number of days within a month, our computations of contractual repayments cannot be fully precise. This means that we observe for almost all borrowers some small monthly amounts that 'look like' voluntary repayments. However, as most banks do not allow such small voluntary repayments due to administrative costs, we change our proxy below 2,000 euro to zero.

¹⁰ This include any amounts that are secured by the mortgage and will be classed as principal in the transaction. For example if fees have been added to the loan balance and are part of the principal in the transaction these should be added. Excluding any interest arrears or penalty amounts.

¹¹ We first round the first difference of the amount of loan outstanding into its nearest number with hundred unit (e.g. 1456.78 into 1500). Then within each consecutive five waves, we find the mode of these five numbers. If the difference between first difference of the amount of loan outstanding and the corresponding mode is larger than 2,000 euro, we identify it as a voluntary mortgage repayment.

Finally, when we identify multiple voluntary repayment above the legislated threshold for yearly gifts, but below the extended fiscal threshold for one-off voluntary repayments, we do not know which repayments is the one that qualify for the one-off regulation under scrutiny.¹²

3.3 Statistics

Figure 2 summarizes the development of the main variable of interest, voluntary repayments, over the sample period. Two issues are worth noting. First, in this figure, we summarize the changes to the tax exemption scheme of the intergenerational transfers discussed in Section 1. Second, it depicts the development of the national total amount voluntary mortgage repayments for each wave.¹³ We notice that in comparison to period 2013q1 to 2013q3 (before the regulation was extended), at 2014q1, it jumps to a high level. However, in the next three quarters, it drops to almost the same level as 2013q1 to 2013q3. Later, it reaches the highest level in 2014q4, when it is the last period before the tax-free threshold was shifted from to 100,000 euro back to 52,000 euro. During the period 2015q1 to 2016q1, on average, national total amount voluntary mortgage repayments remains at a higher level than the period before the regulation was extended.

Also the aggregate number differ slightly from those reported by the tax authority and that we discussed in Section 2.2. This is perfectly plausible, and the LLD should actually deliver somewhat higher figures. This because in the LLD also the voluntary repayments that do not come from intergenerational transfers or do qualify for the tax exemption are reported. These however amount to no more than a couple of millions each year.

Figure 3 shows the voluntary repayment rates¹⁴ of different types of loans. Voluntary repayment rates vary considerably over time, and this volatility is quite consistent with that of voluntary repayment amount as shown in Figure 1. The voluntary repayment rate of IO loans is the highest, while that of annuity and linear loans, which have scheduled amortization, is the lowest.

¹² The data shows that 40% of the mortgages that makes voluntary repayment contains multiple voluntary repayments

¹³ The first wave 2012q4 is drop due to the process of identifying voluntary mortgage repayments. We have crossed checked our numbers with those reported in the yearly reports of the main Dutch banks.

¹⁴ A binary variable which take one if one makes voluntary repayment at time t.

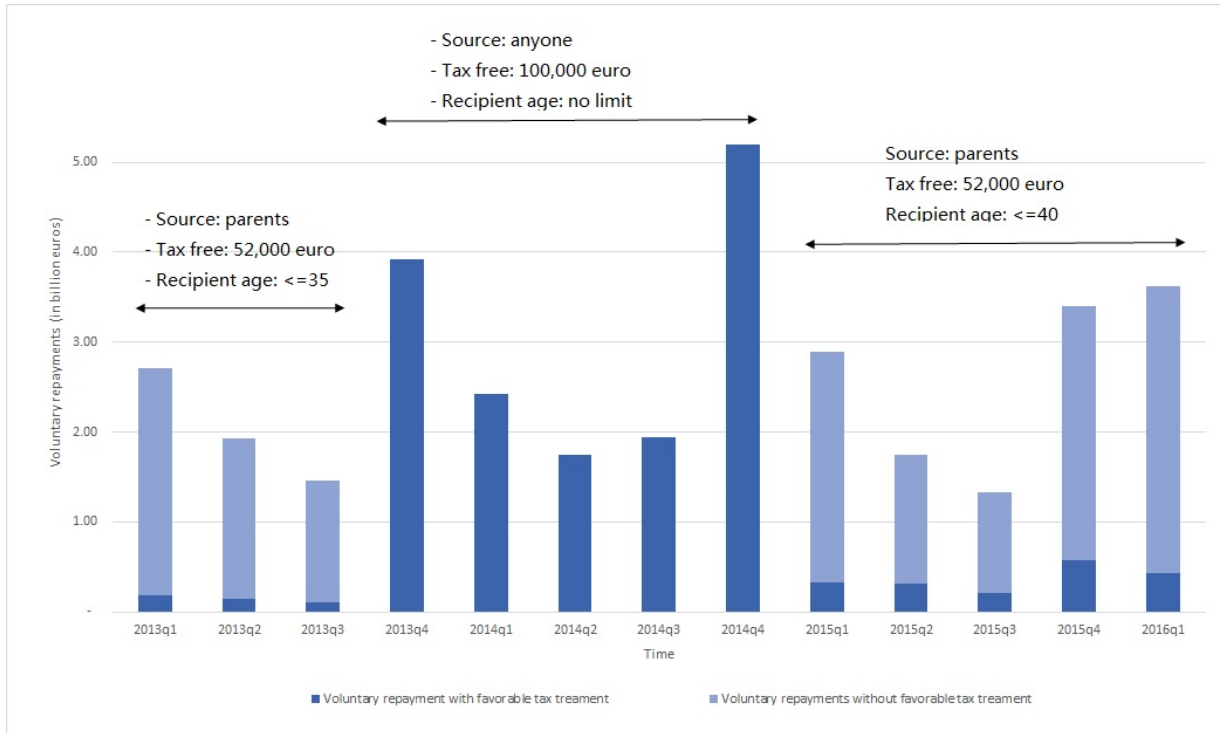


Figure 2, Development of national total amount of voluntary mortgage repayments

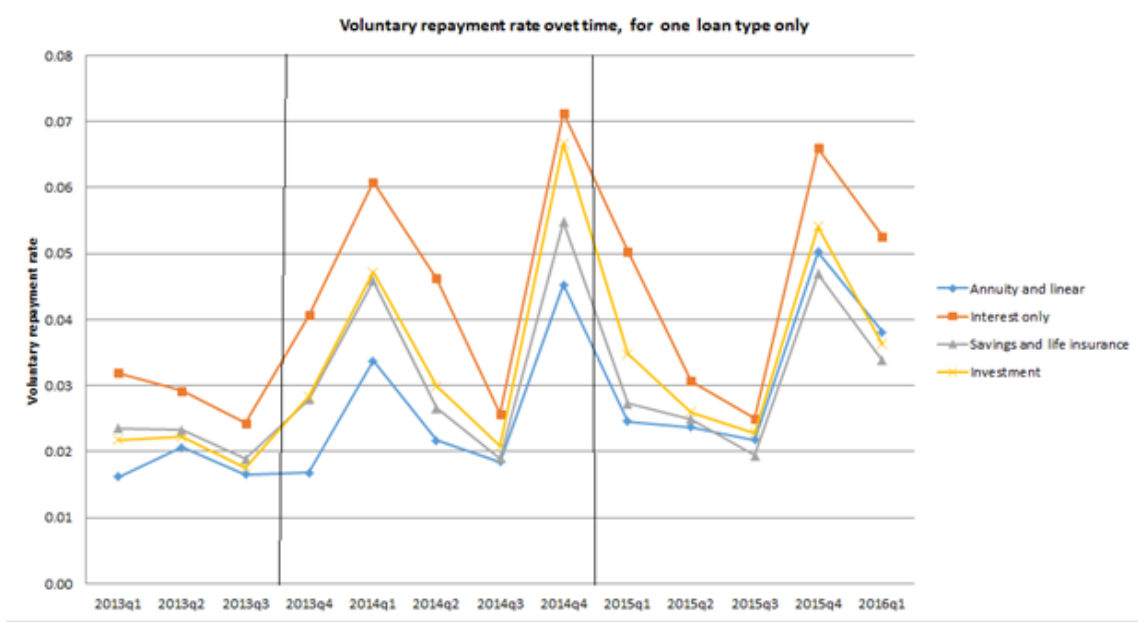


Figure 3, Voluntary repayment rate of different types of mortgage, for one loan type only

4. Empirical findings

4.1 Modelling approach

In this section, we set up a diff-in-diff strategy in order to identify the effect of the extended tax exemption on voluntary repayments. First, recall that in the period 2013q1 to 2013q3 and before, a person with age smaller or equal to 35 could receive 52,000 euro tax-free from parents for debt repayment. Second, in the period 2013q4 to 2014q4, the regulation was extended, by removing the age restriction and by allowing one to receive 100,000 euro tax-free from anyone. Third, in the period 2015q1 to 2016q1, a person aged 40 or younger could receive 52,000 euro for tax-free again only from her/his parents. We can thus define two treatment indicators. Let $treatment1_{it}$ denote the eligibility to the tax exemption from parents below the 52,000 euro threshold (tax exemption regime I), and let $treatment2_{it}$ denote the eligibility to the tax exemption from anyone below the 100,000 euro threshold (tax exemption regime II).¹⁵ These two variables are the main variables of interest in the following regression equation:

$$y_{it} = \beta_0 + \beta_1 treatment1_{it} + \beta_2 treatment2_{it} + \beta_3 D1_{(age \leq 35)} + \beta_4 D2_{(36 \leq age \leq 40)} + \beta_5 X_{it} + \varepsilon_{it}$$

(1)

where y_{it} is voluntary mortgage repayments, which is defined in Section 3.2. $D1_{(age \leq 35)}$ and $D2_{(36 \leq age \leq 40)}$ are the dummy variable for the corresponding age group, respectively. Time effects are captured by the quarterly macro mortgage interest rates that are included in X_{it} . X_{it} also contains a set of other explanatory informative variables, such as age, cohort dummies and all other relevant information collected during mortgage application.

4.2 Main estimation results

Table 2 displays main results when we estimate Equation (1). First focus on column (1), where we estimate the extensive margin of the tax exemption regime I ($treatment1_{it}$) and II ($treatment2_{it}$). We see that after we condition on all available information, the estimated coefficients on $treatment1_{it}$ and $treatment2_{it}$ show that the tax exemption regime I and II both have positive and significant (only for tax exemption regime II) effect on individual's voluntary mortgage repayments. The extension of the tax exemption regime during the period 2013q4 to 2014q4 increase the mortgage voluntary repayments by 336 euros, which is precisely estimated, despite the mortgage voluntary repayments being infrequent. Comparing these estimates to a base amount of voluntary repayment 660 euro (the average voluntary repayment using the entire sample), the coefficients imply that those tax exemption regime II results in a 51% increase in mortgage voluntary repayments.

Column (2) displays the results when estimating the extensive margin of the tax exemption regime I and II. In this specification, we restrict our sample conditional on those who makes mortgage voluntary repayments (mortgage voluntary repayment is larger than 2,000 euros as specified in Section 3). Again it shows a positive significant effect of tax exemption regime II on voluntary repayments. Given the conditional average voluntary

¹⁵ $treatment1_{it}$ and $treatment2_{it}$ are exclusive event under our definition.

mortgage repayments is 21,373 (the average voluntary repayment using the conditional sample), the estimate of 3,367 implies that those who are eligible to tax exemption regime II experienced a 16% increase in voluntary mortgage repayments. However, the coefficient of tax exemption regime I under this specification becomes negative and insignificant.

It is also interesting to examine whether the tax exemption regime I and II also increase voluntary repayment rate. Column (3) uses the binary indicator for whether one makes voluntary repayment as dependent variable. We find that tax exemption regime II increase the probability of making voluntary repayment by 0.86 percentage points. Comparing these estimates to a base transition rate of 3.0 percentage points (the average predicted rate of the model using the entire sample), the coefficients imply that the those who are eligible to tax exemption regime II experienced a 29% increases in the voluntary repayment due to the extension of the tax exemption regimes.

Other controls have significant effects on mortgage voluntary repayments too, although there are some inconsistency in the sign of estimates across three specifications. For instance, the coefficient of dummy for self-employment suggests that in comparison with wage-employed, self-employed are more likely to make voluntary repayment when estimating extensive margin (Column (2)), while the finding is contrary when estimating the voluntary repayment rate (Column (3)). The amount of voluntary repayment are more likely to be associated with house covered by National Mortgage Guarantee (NHG)¹⁶, while rate of making voluntary repayment is less likely to be associated with house covered by NHG. (Conditional) Voluntary repayment is positively with correlated with time to maturity, but negatively correlated with loan age. There is evidence that payment frequency, interest type, banks and provinces impact voluntary repayment (rate), even though the those dummies are not all significant.

4.3 Robustness Checks

We have shown that we arrive consistent conclusions when using different specifications for the tax exemption regime I and II effect on voluntary mortgage repayments. In this subsection, we subject our estimates to a number of additional specifications.

Table 2 presents the results of a number of additional robustness tests. In panel A, we restrict sample to the period 2013q1 to 2016q1 (hence excluding the first period from 2013q1 to 2013q3). We find that the coefficient of $treatment1_{it}$ is not significant in two out of three cases, while the coefficients of $treatment2_{it}$ remains significant. The size of coefficient estimates also increases, but there are no great surprises compared to Table 1, when considering the fact that level of voluntary mortgage repayments is also higher in the period 2013q1 to 2016q1 (as indicated in Figure 1). Panel B provides the estimation results using an alternative independent variable relating to the concept of the additional effect of tax exemption regime II over tax exemption regime I. We define a new main independent variables of interest, which equals the difference between $treatment2_{it}$ and $treatment1_{it}$. The results confirm that there is additional effect of tax exemption regime II over tax exemption regime I.

¹⁶ NHG helps one to take out a mortgage that is affordable and responsible from the start. And if one runs into problems meeting your payments due to circumstances beyond your control, the NHG may provide a safety net for you and your mortgage lender.

5. Conclusions

In this paper, we identified the causal effect of tax exemption regime on the intergenerational transfer: an extension of a tax exemption regime leads to more mortgage voluntary repayment, hence less household debt. In particular, to solve the issue of potential endogeneity of intergenerational transfer, we utilize the unanticipated tax exemption regime in 2013q4 to 2014q4 as a quasi-natural experiment and we investigate the causal relation between generous tax exemption regime and intergenerational transfer. This empirical result is robust to a large range of sensitivity and specification changes.

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	(1)	(2)	(3)
	Volun. repayments	Volun. Repayments >=2000	Indicator for volun. repayments
Treatment I	28.54 (18.41)	-296.1 (387.5)	0.000863* (0.000484)
Treatment II	336.0*** (13.74)	3,367*** (342.5)	0.00835*** (0.000361)
Dummy for age<=35	-20.25 (44.22)	2,936** (1,144)	-0.00184 (0.00116)
Dummy for 35<=age<=40	5.943 (25.92)	1,726*** (650.2)	-0.000780 (0.000682)
Macro interest rate	-118.7*** (16.03)	2,808*** (418.4)	-0.0113*** (0.000421)
Age	-351.4 (259.6)	-30,810*** (7,377)	0.00764 (0.00683)
Age squared	9.805 (7.296)	843.6*** (205.5)	-0.000174 (0.000192)
Age cube	-0.0918 (0.0671)	-7.533*** (1.874)	0.000 0.000
Dummy for self-employed	29.53 (20.16)	4,183*** (480.3)	-0.00461*** (0.000530)
Dummy for other labor status	177.5*** (49.60)	2,896** (1,206)	0.000515 (0.00130)
Dummy for missing labor status	164.6*** (16.28)	2,655*** (408.2)	0.00340*** (0.000428)
Implied household income	-1.08e-07 (1.38e-06)	0.000415 (0.000319)	-0.000 (0.000)
Indicator for missing income	-93.82*** (24.36)	-779.4 (601.3)	-0.00300*** (0.000641)
Dummy for covered by NHG	-56.65*** (19.47)	4,142*** (611.2)	-0.00961*** (0.000512)
Original LTV	-1.172*** (0.239)	26.48*** (5.617)	-0.000156*** (6.29e-06)
Current regional house value	0.00349*** (4.33e-05)	0.0473*** (0.000930)	5.58*10^-8*** (1.14*10^-8)
Share of IO loans	-561.6*** (46.38)	-23,215*** (1,146)	0.00914*** (0.00122)
Share of saving loans	-620.1*** (46.87)	-26,534*** (1,169)	0.00937*** (0.00123)
Share of IO investment loans	-541.7*** (52.88)	-20,523*** (1,365)	0.00705*** (0.00139)

Share of other loans	-1,785 (1,138)	NA NA	-0.0437 (0.0299)
Time to maturity	1.646** (0.667)	76.80*** (17.06)	0.000 0.000
Age of the loan	-37.09*** (1.938)	-174.1*** (49.78)	-0.00156*** 0.000
Indicator for payment frequency	-1,232 (1,420)	NA NA	-0.0329 (0.0374)
Indicator for payment frequency	895.4*** (268.0)	13,495** (5,396)	0.0177** (0.00705)
Indicator for payment frequency	4,076*** (840.2)	4,891 (9,827)	0.106*** (0.0221)
Constant	5,850* (3,025)	411,410*** (86,756)	-0.0453 (0.0796)
Dummies for interest type	Included	Included	Included
Dummies for banks	Included	Included	Included
Dummies for guarantee provider	Included	Included	Included
Dummies for cohorts	Included	Included	Included
Dummies for provinces	Included	Included	Included
Observations	5,578,944	169,698	5,578,944

Table 2: Estimation results of voluntary repayment under different specifications

	(1) Volun. repayments	(2) Volun. Repayments ≥ 2000	(3) Indicator for volun. repayments
<i>Panel A</i>			
treatment1	35.66*** (26.09)	-570.8 (488.9)	0.000207 (0.000822)
treatment2	466.6*** (28.63)	4417*** (503.6)	0.0136*** (0.000902)
<i>Panel B</i>			
shift	335.9*** (10.93)	4,362*** (231.5)	0.00794*** (0.000333)

Table 3: Robustness checks under different specifications

