Behavioral responses to wealth taxation: evidence from a Norwegian reform*

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Abstract

We analyze behavioral responses to wealth taxation, estimating the causal effects of a unique municipal wealth tax reform in Norway. We exploit variation from the single-period municipal reform reducing the marginal tax rate (MTR) on wealth *exclusively* in the northern Norwegian municipality of Bø from 0.85% to 0.35%, since 2021. Mimicking the behaviour of a tax haven, Bø represents the first municipality to unilaterally reduce the municipal wealth tax rate since the establishment of wealth taxation in Norway in 1892. We document a significant 66.6% increase in average taxable wealth in response to a 1 percentage point drop in the wealth tax rate. The elasticity of taxable wealth increases to 71.6% when focusing exclusively on wealth taxpayers. We also estimate a significant but more modest 10.3% jump in the weighted mass of wealth taxpayers in the treated municipality. Non-real effects of the reform dominate: mobility of wealthy taxpayers appears as the major behavioral response to the change in the net tax rate, accounting for a staggering 79% of the post-treatment total net wealth in the treated municipality (up from 19% in the pre-reform period). These results emerge in a context with third-party reported wealth data with negligible measurement error, limited evidence of bunching, highly enforced residence-based wealth taxation, and a low degree of out-migration rates.

Keywords: *Wealth tax; administrative data; mobility effects.*
JEL Classification: *H20; H21; H24; H26.*

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1 Introduction

Wealth taxes are under the spotlight. Although only a few OECD countries currently tax wealth (Colombia, Norway, Spain, Switzerland), the academic and political debate on the complementary role of wealth taxation in order to level the playing field is gaining momentum.

The US debate was spurred by the proposal of a progressive wealth tax by Saez and Zucman (2019), which has been subsequently evaluated by Kopczuk (2019) and Scheuer and Slemrod (2021). In the UK, a Wealth Tax Commission composed of economists, lawyers and policymakers was created in 2020 to evaluate the need for taxing wealth. The Commission concludes in its final report (Advani, Chamberlain, & Summers, 2021) that to cover public expenses due to the recent pandemics, the UK would benefit from a one-off wealth tax (hence not an annual wealth tax) instead of increasing taxation on earnings or consumption. At the global level, the Global Tax Evasion Report 2024 (Alstadsaeter, Godar, Panayiotis, & Zucman, 2023) advocates for a coordinated global minimum wealth tax on the very rich to curb inequality in wealth.

Theoretically, the rationale for taxing wealth is not clear-cut[1], since efficient taxation of all types of capital income would make it redundant (Bastani & Waldenström, 2023). Wealth taxation can, however, be deemed necessary to increase effective tax rates for the very rich (Advani, Hughson, & Summers, 2023), since taxing wealth will limit the role of unrealized capital gains at the very top of the income distribution. On these lines, Piketty, Saez, and Zucman (2023) envision the wealth tax as an important ingredient of capital taxation.

Guvenen, Kambourov, Kuruscu, Ocampo, and Chen (2023) highlight that the equivalence between taxation of wealth and capital income disappears when taking into account return heterogeneity across the distribution.[2] They show that a wealth tax, by increasing the savings response of productive entrepreneurs with respect to capital income taxation, leads to higher aggregate productivity, output, and overall welfare. Bjørneby, Markussen, and Røed (2023) estimate a positive causal relationship between wealth taxation in Norway and employment growth in firms closely held by wealth taxpayers. Focusing on the consequences for social mobility, Berg and Hebous (2021) show that wealth taxation increases mobility in labor income.

Wealth taxes do not necessarily eliminate the risk of avoidance and evasion that taxation of capital income suffers from, since capital mobility (both across jurisdictions within countries[3] and internationally) can pose problems even in well-functioning tax systems.[4]

[1] Unless we explicitely assume that we care about equal or unequal allocation of wealth *per se* as in Saez and Stantcheva (2018): in that case welfare increases by reducing inequality in wealth across the distribution.

[2] For the empirical evidence regarding return heterogeneity, see Fagereng, Guiso, Malacrino, and Pistaferri (2020); Iacono and Palagi (2023).

[3] Wilson and Wildasin (2004) reviews the theoretical literature on capital tax competition between jurisdictions. For other references on the tax competition among local governments, see Eugster and Parchet (2019); Lyytikäinen (2012)

[4] H. Kleven, Landais, Muñoz, and Stantcheva (2020) survey the literature on the topic of taxation and mobility.

This risk is however mitigated by the presence of third-party reporting of the wealth stock as is the case in Norway, since self-reporting leads to lack of information for policymakers at the top of the income and wealth distributions.

In order to inform the above debates on the potential desiredness and practical consequences of taxing wealth, in the last years there has been a surge in studies that try to estimate behavioral responses to wealth taxation (Agrawal, Foremny, & Martínez-Toledano, 2023; Brülhart, Gruber, Krapf, & Schmidheiny, 2022; Duran-Cabré, Esteller-Moré, & Mas-Montserrat, 2019; Garbinti, Goupille-Lebret, Muñoz, Stantcheva, & Zucman, 2023; K. Jakobsen, Jakobsen, Kleven, & Zucman, 2020; Londoño-Vélez & Ávila Mahecha, 2021; Ring, 2020; Seim, 2017).

While both Seim (2017) and K. Jakobsen et al. (2020) estimate net tax rate elasticities right before the abolition in Sweden (2007) and Denmark (1997), Agrawal et al. (2023) exploits municipal variation spurred by the reintroduction of wealth taxation in all regions of Spain *except* Madrid in 2011. Ring (2020) exploits municipal variation caused by the different valuation of taxable real estate between Norwegian municipalities, to estimate the effects of wealth taxation on savings, by comparing households living near municipal boundaries. Alstadsæter, Bjørneby, Kopczuk, Markussen, and Røed (2022) follow Ring (2020) in focusing purely on the effects of the Norwegian wealth tax on real active saving, hence implying a lower elasticity than for taxable wealth which generally includes avoidance and evasion responses. Table 1 provides a more comprehensive and updated overview of research on the topic of behavioral responses to wealth taxes.

Table 1: Behavioral responses to wealth taxation: an overview of the literature

Authors	Country	W. bracket	Time	Elast.	Identification
Londoño-Vélez and Ávila Mahecha (2021)	COL	top 1%	1 year	0.6-2%	Bunching at tax notch
K. Jakobsen et al. (2020)	DEN	top 1-2%	8 years	1-11%	DiD (tax schedule)
Agrawal et al. (2023)	ESP	top 1%	6 years	8-10%	DiD (municipal tax rates)
Duran-Cabré et al. (2019)	ESP	top 1%	4 years	15-32%	DiD (tax schedule)
Garbinti et al. (2023)	FRA	top 3%	5 years	0.5%	Dynamic bunching
Zoutman (2018)	HOL	n.a.	4 years	12-14%	DiD (tax schedule)
Alstadsæter, Bjørneby, et al. (2022)	NOR	top 10%	2 years	6.6%	DiD (tax schedule)
Iacono and Smedsvik (2023)	NOR	top 10%	2 years	66%	DiD (municipal tax rates)
Ring (2020)	NOR	top 10%	5 years	0.05%	Boundary DD
Seim (2017)	SWE	top 4%	n.a.	0.3%	Bunching at tax kink
Brülhart, Gruber, Krapf, and Schmidheiny (2016)	SWI	top 34%	5 years	34%	DiD (canton tax rates)
Brülhart et al. (2022)	SWI	top 34%	5 years	18-43%	DiD (canton tax rates)

Note: This table is adapted from Table 2 (page 115) in Brülhart et al. (2022), and updated with the latest references in the literature on behavioral responses to wealth taxation. It is in alphabetical order with respect to countries. Wealth bracket indicates the share of wealth owners that is affected by the reform studied. Time indicates the time horizon post-reform. Elasticity refers to the semi-elasticity of taxable wealth to changes in the tax schedule or tax rates. Notice that semi-elasticities are expressed as percentage effect on taxable wealth of a 1 percentage point wealth tax cut.

Rigorous evidence of behavioral responses to wealth taxation remains however scant due to three main reasons: (i) wealth tax is present only in a limited set of countries with high-quality data; (ii) within-country episodes of single-period reforms allowing credible identification are rare; and (iii) most reforms impact the top of the distribution where evasion is widespread.

We exploit variation from a non-staggered municipal wealth tax reform reducing the marginal tax rate (MTR) *exclusively* in the northern Norwegian municipality of Bø from 0.85% to 0.35%, from $1.1.2021$.[5] By doing so, we contribute to the growing literature on responses to wealth taxation, overcoming the set of limitations listed above.

(i) First, wealth taxation has a long tradition in Norway since it was introduced in 1892, and never abolished. Due to the need to tax wealth and property, tax authorities in Norway collect third-party reported wealth information resulting in administrative population-wide registers, including estimation of the value of used cars. Since 2010, the precision of wealth data delivered by Statistics Norway has increased even further, because hedonic pricing was introduced to estimate the market value of real estate properties (Fagereng, Holm, & Torstensen, 2020). Therefore, by focusing on wealth tax data in the period from 2015 to the latest available data in 2021, we rely on high-quality registers with limited measurement error.

(ii) Second, the wealth tax reform in Bø is single-period, was not reversed, and does not overlap with changes in the exemption threshold to pay the wealth tax. It therefore provides in principle credible identification to estimate net tax rate elasticities. This reform represents the first case of a municipality unilaterally reducing the municipal wealth tax rate, effectively mimicking the behavior of an offshore tax haven. Bø is located in Northern Norway and belongs to a region with a sinking population (*Nordland)*.[6] Regardless of its limited population magnitude, the reform in Bø has received notable attention from the international press. Bø was labeled a "remote tax haven" by Forbes ($12.14.2020$, "Wealthy Norwegians Are Moving To This Remote Tax Haven") and was mentioned as well in The Times ($1.5.2020$, "Tax breaks tempt wealthy Norwegians to Arctic islands"). The case of Bø has also been mentioned by the UK Wealth Tax Commission in a background paper on the Norwegian wealth tax (Banoun, 2020).[7]

(iii) Last but not least, most of the studies listed in table 1 focus on reforms that impact the very top of the distribution, where tax evasion is a more pervasive phenomenon. Exceptions are Ring (2020) for Norway and Brülhart et al. (2016, 2022) for Switzerland. We focus on a municipal wealth tax reform that solely modifies the tax rate without altering the exemption threshold, so the share of population affected will be approximately the top 10% of the wealth distribution, as in Ring (2020). This allows us to disregard (to some extent) evasion as a major confounder for the precision of the elasticity estimation.

We also innovate on previous behavioral response studies by offering the first case study of a wealth tax reform in a smaller (rural) setting. This is in principle an advantage for our identification, because it can rule out that movers to the municipality are attracted by amenities that only bigger cities can offer. The wealth tax reform can in this context also

[5] We can hypothesize that an individual with a 1 million USD (9 million NOK in 2021) in wealth tax base, would save $5,000$ USD by moving to Bø.

[6] Population predictions for Bø are available from Statistics Norway at the following page: https://www.ssb.no/kommunefakta/bo.

[7] Some preliminary results on the responses to the wealth tax changes in Bø have been shown in a master thesis by Østvik and Davik (2022). However, they conducted their analysis in 2022, when data for 2021 were not yet available from Statistics Norway. Hence they rely on imputations for the reform year. Tax returns on income and wealth for 2021 became only available in spring 2023 on the interface microdata.no.

be thought of as a measure to counteract out-migration rates and sinking population, since higher tax revenues might boost expenditure on local public services that attract families and new citizens.[8]

Our analysis is based on the following steps and results. First, our identifying assumption is supported by the hypothesis that, for wealth taxpayers residing in Norway (corresponding approximately to the top 10% of the net wealth distribution), there is no other reason to move to Bø, apart from the foreseen gain due to lower taxation on their wealth holdings. We posit a location choice model and show that being a wealth taxpayer increases the likelihood of moving to Bø from other Norwegian municipalities by 0.13%, compared to movers whose wealth lies below the exemption threshold. When zooming in on individuals with a net worth of more than 10 million NOK, the likelihood of moving to Bø increases to 1.92%.

Second, we scale up to the municipality level to estimate the elasticity of the stock. The results of the aggregate analysis document a significant 66.6% increase in average taxable wealth in response to a 1 percentage point drop in the wealth tax rate. Notice that this elasticity overcomes the 43% increase (after 6 years) in self-reported taxable wealth documented by Brülhart et al. (2022) for Switzerland. Switching focus, we also document a significant 10.3% jump in the mass of taxpayers (weighted by the municipality population share) in the treated municipality, in response to a 1 percentage point drop in the wealth tax rate. Subsequently, we investigate the degree of wealth group heterogeneity, and show that the elasticity of taxable wealth increases to 71.6% when focusing exclusively on wealth taxpayers (we confirm the hypothesis of wealth group heterogeneity as well in a triple difference - DDD - setting).

Next, we investigate whether the above results are driven by real accumulation responses or not. Since our focus is on the short-run behavioral effects, mobility effects emerge as predominant. We decompose the aggregate evidence and show that the fraction of total net wealth owned by movers to the municipality of Bø raises from 19% to 79% in the post-treatment years, documenting the substantial role of mobility of wealth taxpayers explaining the aggregate behavioral response.

Finally, we conduct a set of robustness checks to address: (i) standard endogeneity concerns inherent in the estimation of elasticity with respect to net tax rates; (ii) the issue of enforcement of residence requirements; (iii) the degree to which taxpayers bunch at the unique kink of the tax schedule to avoid taxation; and (iv) the hypothesis that increased municipal revenues attract new citizens to Bø independently from the advantages of lower wealth taxation.

The paper proceeds as follows. Section 2 introduces the data utilized and the major institutional details. Section 3 elaborates on our identification strategy, whilst section 4 presents the results of the aggregate analysis at the municipality level. Section 5 includes all the robustness checks, before section 6 discusses the implications of the results and

[8]For a survey of the evidence on subnational tax havens, namely local governments that practice very low tax rates on income, real estate, or financial wealth in order to attract activity from other jurisdictions, see Agrawal (2023a).

section 7 concludes.

2 Data and institutional details

Our analysis is based on Norwegian administrative tax records on wealth for the years $2015 - 2021$.[9] We focus on pre-tax wealth because we aim to estimate the effect of changes in tax rates on wealth holdings before taxation. For each adult individual i, the following definitions of gross personal wealth, debt, and the resulting net wealth are considered. All wealth variables are measured on the last day of the year (31.12).

Gross wealth [$gw_{i,t}$]: estimated personal gross wealth, including estimated market values of real and financial capital. Real capital includes the estimated market value of the primary dwellings, secondary dwellings, land, and buildings related to business activity (business assets). Financial capital includes cash, domestic deposits, foreign deposits, government and corporate bonds, bond funds and money market funds, shares in stock funds, other taxable capital abroad, and outstanding claims and receivables. [10]

Private debt [$d_{i,t}$]: private debt to Norwegian and foreign creditors (consumer debt, student debt, and long-term debt), including debt related to shares in real estate companies.

Taxable net wealth [$tnw_{i,t} = gw_{i,t} - d_{i,t}$].[11] Descriptive statistics on taxable net wealth are produced in Appendix B. At the national level, positive average net wealth grows from approximately 887 thousand Norwegian kroner in 2015 to approximately $1,394$ million kroner in 2021 (154 thousand 2021 USD, with a USD 1 = NOK 9 exchange rate), with the universe of wealth owners dropping from 934773 in 2015 to 779027 in 2021.

The latter variable $tnw_{i,t}$ constitutes the tax base and it is computed by the tax authorities by discounting market values in $gw_{i,t}$ and following the assessment rules shown in table 2. For the case of co-habiting couples (married or not), the exemption threshold doubles and the wealth tax is computed at the household level.

Table 2 shows that the tax rates have been stable at 0.85% throughout the period of analysis.[12] A rate of 0.7% is paid to the municipality of residence, topped up by a 0.15% accruing to the central state. Municipalities can in principle unilaterally modify their tax

[9] Data are retrieved from microdata.no, an online interface administered by Statistics Norway. Notice that the data is anonymized and subject to 2% bottom and top winsorization only when we retrieve graphical outputs. In all regressions instead, there is no winsorization in the underlying data. The same data access has been used by Iacono and Palagi (2023).

[10] Note that since entrepreneurs self-report private business wealth to the Norwegian tax authorities as an assessed valuation of their shares, $gw_{i,t}$ includes, therefore, a portion of unrealized capital gains on financial wealth.

[11] The variable taxable net wealth - tnw - is computed directly by Statistics Norway based on tax returns and it is made available on microdata.no. It is described in more detail here: https://www.ssb.no/a/metadata/conceptvariable/vardok/18/nb. The same variable has been used in Iacono and Palagi (2023).

[12] Let us compare wealth taxation with taxation of capital income. Assuming a rate of return on wealth of 5%, taxing wealth at a 1% rate would correspond to taxing income from capital at a rate of 20%. This implies that the elasticity of the wealth stock to a change in the wealth tax rate of 1 p.p. should be discounted by a factor of 20 to obtain the corresponding elasticity with respect to changes in the taxation of capital income.

Table 2: The net wealth tax schedule in Norway, $2015 - 2021$

	MTR/Exemption		Tax valuation: % discount of estimated market value				
	Rates	Exemption (in 1000NOK)	Primary Home	Holiday Home	Secondary Home	Business Property	Shares
2015	0.85	1200	75	70	30	30	0
2016	0.85	1400	75	70	20	20	0
2017	0.85	1480	75	70	10	10	10
2018	0.85	1480	75	70	10	20	20
2019	0.85	1500	75	70	10	25	25
2020	0.85	1500	75	70	10	35	35
2021	0.85	1500	75	70	10	45	45

Note: This table is a reduced version of Table 1 on page 325 in Thoresen et al. (2022), tailored to the period of analysis of the current study. It shows marginal tax rates; the exemption threshold constituting the unique kink of the wealth tax schedule; and the % discount factor that is applied to the estimated market values of the different asset types: primary and secondary dwellings, holiday homes, business property, and shares.

rate, however Bø constitutes the first case ever of a Norwegian municipality that was allowed by the state to do so.

The exemption threshold gradually rises up to 2018, however it remains stable at 1500 thousand NOK from 2019 and in the subsequent years. The exemption threshold lies roughly at the $P85 - 90$ of the wealth distribution in $2015 - 2021$, according to Thoresen et al. (2022), implying that it is roughly the top 10% of the net wealth distribution paying taxes on wealth (see Halvorsen and Thoresen (2021) for an assessment of the distributional effects of wealth taxation).

In addition, valuation rules for different assets were modified in the period under analysis: the discount of the market value of secondary dwellings has been reduced to 10% since 2017, while shares and business property were discounted gradually more to incentivise portfolio diversification (45% discount in 2021 for both asset categories). As duly highlighted in Thoresen et al. (2022), valuation is based mainly on third-party reporting, with the exception of unlisted firms.

All in all, this shows that although tax rates remain stable, the taxation of wealth has gradually become less stringent than it was in the initial years of our study. In summary, the schedule of the wealth tax is designed as a flat tax with a unique kink at the exemption threshold, as in equation (1).

$$\text{wtax}_{i,t} = \tau_t \left(tnw_{i,t} - \text{Exemption}_t \right) \mathbf{1} \left[tnw_{i,t} > \text{Exemption}_t \right] \tag{1}$$

3 Identification strategy

In this section, we present the identification strategy for our quasi-natural experiment. Recall that we are trying to estimate the causal impact of the sudden wealth tax reform in the municipality of Bø (our treatment T) on the mobility of wealth taxpayers (the outcome Y_1), and on their wealth holdings. In other words, we study behavioral responses to wealth taxation by exploiting a municipal reform reducing the MTR (marginal tax rate) exclu-

sively in the municipality of Bø from 0.85% to 0.35%. We believe this municipal variation produces neat and credible identification because it is the only reform of the wealth tax rate in the period $2015 - 2021$. In addition, the exemption threshold does not vary in the period $2019 - 2021$ when the treatment hits.

3.1 Identifying assumption

Ideally, we would like to satisfy the Conditional Independence Assumption (CIA) (Rubin, 1974) implying that the expected mobility of wealthy individuals is equal for the treatment and control groups (individuals above and below the wealth tax exemption threshold), conditional on other characteristics of the municipality (X_m) that are not related to wealth tax rates:

$$(Y_0, Y_1) \perp\!\!\!\perp T \mid X_m \tag{2}$$

In other words, our strategy rests on the identifying assumption that the treatment (the reduction of the municipal wealth tax rate in Bø announced in December 2019 and in place from $1.1.2021$) is not correlated with municipality-specific covariates. This would be equivalent to stating that, for wealth taxpayers residing in Norway, there is no other reason to move to Bø, apart from the foreseen gain due to lower taxation on their wealth holdings. If this identifying assumption holds, then we can interpret the mobility effect of the reduction in the municipal wealth tax rate on the wealth of taxpayers in a causal fashion.

3.2 Zooming in on residents of Bø and movers

To empirically test our identidying assumption, we start by providing descriptive statistics on adult residents and movers to Bø within the period under analysis $(2015 - 2021)$. We define immigrants as individuals who are residents in Bø in year t and who resided in another municipality in Norway at $t - 1$.[13] The sample of residents and movers to Bø is presented in table 3 together with descriptive demographic information.

Table 3 shows that although the tax reform is not in place before the $1.1.2021$, a relatively higher number of individuals (104) move to the municipality of Bø during 2020. This could intuitively be explained by the fact that one must reside in Bø at the beginning of 2021 to be taxed under the new regime. Notice as well that the average net wealth of movers to Bø increases dramatically from 2019 to $2020 - 2021$, while less of a dramatic jump is visible when focusing on all residents of the municipality.

At this point, however, we cannot yet infer anything regarding mobility effects because the above sample (row 4 in table 3) also includes individuals who could have moved to Bø for reasons other than the tax reform. It should be mentioned that 2020 was the year in which the COVID-19 pandemic hit Norway implying a large number of sudden lay-

[13] There is no substantial evidence of in-migration from abroad. Norway is one of the few European countries with taxation of wealth (the others being Spain and Switzerland), hence moving to Bø from most countries would not entail a reduction in the wealth tax paid.

Table 3: Residents (1st of January) and movers to Bø, 2015-2021

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Tot.(sum/avg)**
Residents (1st of January)	2124	2222	2230	2243	2233	2188	2212	15454
Avg age	55.24	55.23	55.06	54.85	55.12	55.31	55.49	55.18
Avg Net Wealth (1000 NOK)	681,22	292,80	297,33	746,39	786,19	865,65	1145,01	636,44
Movers to Bø	85	83	83	71	74	**104**	**95**	598
Avg age	35.76	39.59	38.2	41.85	39.7	45.59	39.88	40.24
Avg Net Wealth (1000 NOK)	124,6	8,4	93,2	525,07	565,2	**7177,5**	**3548,9**	1822,2

Note: This table shows the yearly number of adult residents in the municipality of Bø on the 1st of January, plus average age and net wealth in thousand NOK. Second, it shows the number of individuals who have changed their residence during the year, from another municipality in Norway (where they resided on 1.1) to Bø. We also document their average age and net wealth in thousand NOK. Note that we include only individuals above 18 years old who were alive throughout the period.

offs (Alstadsæter et al., 2020), hence some individuals might have relocated to countryside locations such as Bø and worked remotely from there.

To investigate the mobility of wealth taxpayers further, we focus now exclusively on the residents and immigrants to Bø who have paid a positive amount of wealth tax in that year (both to the central state and to the municipality). The number of wealth taxpayers for both residents and immigrants, together with their average age and net wealth is shown in table 4.

Table 4: Residents of Bø (1. Jan) and movers to Bø (only wealth taxpayers), 2015-2021

	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**Tot.(sum/avg)**
Residents wealth taxpayers (1.Jan)	167	154	145	174	180	188	240	1242
Avg age	65.73	64.5	64.81	64.98	65.67	65.57	65.46	65.28
Avg Net Wealth (1000 NOK)	4289,49	5396,65	7486,30	6821,42	6966,99	7163,29	17445,60	8524,003
Immigrant wealth taxpayers	<5	6	7	<5	<5	**26**	**13**	52
Avg age	n.a.	n.a.	n.a.	n.a.	n.a.	59.5	61.27	56.76
Avg Net Wealth (1000 NOK)	n.a.	n.a.	n.a.	n.a.	n.a.	**145000**	**69004,1**	93023,8

Note: This table shows the yearly number of residents (wealth taxpayers, on 1.1) in the municipality of Bø, together with their average age and net wealth in thousand NOK. In the second set of rows, we show the number of wealth taxpayers who become new residents of Bø during the year. We also document their average age and net wealth in thousand NOK. Due to anonymity regulations, the interface microdata.no automatically delivers a missing unit when the actual number of a table output is below 5 individuals. This applies to row 4 in 2015, 2018, and 2019. The total number of new residents wealth taxpayers is therefore only a lower bound. Note that this applies only when retrieving a table output. In other words, when running a regression the actual number of immigrant wealth taxpayers is utilized without restrictions.

First, we document a fivefold jump in the magnitude of movers for 2020, from the negligible amounts of 2018 and 2019. Second, the average net wealth of the 52 movers to Bø that pay wealth taxes is 93, 02 million NOK (10, 3 million in 2021 USD), a tenfold jump with respect to the average net wealth of all 1242 adult residents of Bø who are wealth taxpayers, owning an average of 8, 52 million NOK. It is precisely the discontinuity caused by the exemption threshold of the wealth tax schedule (being or not being a wealth taxpayer) that we intend to exploit in the next subsection.

3.3 Location choice model

We test our identification strategy by exploiting the discontinuity created by the exemption threshold between wealth taxpayers and non-payers of the wealth tax (recall that this cut-off lies approximately at the 9th decile of the net wealth distribution). To this end, we run a location choice model on the lines of H. J. Kleven, Landais, and Saez (2013).

Our sample is constituted by all individuals in Norway who move their residence at least once in the period under analysis ($2015 - 2021$), to *any* other municipality in the country. This delivers a sample of $1,631$ million individuals. What is the likelihood that the chosen municipality is Bø, conditional on the mover being a wealth taxpayer in the post-reform years, or having a net wealth above a certain threshold?

[Treatment and control groups] The restricted sample in row 4 of table 4 constitutes our treatment group and it identifies individuals who might have changed their residence to Bø precisely to pay a lower amount of taxes on their wealth. The wider control group is instead composed by individuals who did not pay any amount of wealth tax, within the sample selection defined above (all movers). This implies that the latter individuals hold an amount of gross wealth below the lowest threshold to pay any wealth tax, corresponding to $1,5$ million NOK in both 2020 and 2021 (roughly 165 thousand USD in 2021). Selecting a more restricted control group (e.g., net wealth right below the exemption threshold) would deliver a higher likelihood of moving to Bø. Our results below can therefore be interpreted as lower bound estimates.

[Treatment year] Recall that the reduction in the municipal tax on wealth was voted upon and announced by the municipality council in December 2019. Although the drop in the tax rate at the municipal level would be in place only from $1.1.2021$, wealth taxpayers who want to be subject to the new tax regime should move their residence the year before, in order to be residents of Bø from the start of the fiscal year 2021. We therefore define 2020 as the treatment year. This also implies that we omit 2019 from the analysis, as the year before the treatment. We believe that the risk of anticipation effects in 2019 is rather low because the announcement of the tax reform was done only during the last month of 2019 (precisely 19th December), hence realistically only a few individuals might have reacted to that immediately by moving their residence before the last day of the year. Another reason that supports our argument is that in the announcement it was not specified that the lower tax rate would already yield by $1.1.2020$.

[Model specification] Because the introduction of the tax cut takes place in a single municipality at a given point in time without any staggered roll-out and with limited risk of anticipation effects, we posit the canonical two-way fixed effects (TWFE) difference-in-differences model, estimated on individual-level data:

$$M_{i,t} = \delta_i + \tau_t + \omega_t + \alpha * D_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}, \tag{3}$$

where $M_{i,t}$ is a dummy identifying all individuals who have moved to Bø (row 3 of table

3), δ, τ and ω capture, respectively, individual, year and region fixed effects;[14] $X_{i,t}$ contains individual-level covariates such as age and education level; $D_{i,t}$ represents the treatment group, wealth taxpayers (or alternatively individuals with net wealth above 10 million NOK - 1,1 million USD in 2021 - approximately the top 1% of the wealth distribution) moving their residence to Bø (row 4 in table 4) in the post-treatment years. $\varepsilon_{i,t}$ is the error term. Table 5 presents the results.

Table 5: Location choice model: results

Treatment group:	Wealth taxpayers - top 10% (1 − 4)				-	High net wealth - top 1% (5 − 8)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{i_t}	0.00116	0.0013	0.00129	**0.00132**	0.01365	0.01956	0.01956	**0.01928**
Robust SEs	0.00021	0.00054	0.00054	0.00054	0.00283	0.00723	0.00723	0.00714
P-values	0.00***	0.0171**	0.0177**	0.0144**	0.00***	0.00683***	0.00684***	0.00698***
Individual FE	NO	YES	YES	YES	NO	YES	YES	YES
Time FE	NO	YES	YES	YES	NO	YES	YES	YES
Controls	NO	NO	YES	YES	NO	NO	YES	YES
Region FE	NO	NO	NO	YES	NO	NO	NO	YES
Obs.	1631480	1631480	1631480	1631480	1631480	1631480	1631480	1631480

Note: This table presents the results of the canonical TWFE DiD model that we run on all movers. We run four different specifications by introducing stepwise FEs for individual, time, region, and controls. In columns (1 − 4), the treatment group is individuals who move to Bø and who pay a positive amount of wealth tax to the state and municipality. In columns (5 − 8), the treatment group becomes individuals with net wealth higher than 10 million NOK. Robust standard errors. Significance * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[Results] The results from columns (1 − 4) in table 5 are robust to the different specifications, introducing stepwise FEs for individual, time, region, and controls. Column 4 indicates that in the post-treatment years, being a wealth taxpayer increases the likelihood of moving to Bø by 0.13%, compared to movers whose wealth lies below the exemption threshold. When zooming in on individuals with a net worth of more than 10 million NOK, the likelihood of moving to Bø increases to 1.92%. This is expected because for these individuals, a drop in the marginal tax rate implies a higher post-tax net wealth. All in all, this constitutes a rather low likelihood, highlighting that moving to Bø is not necessarily a likely outcome for the ultra-wealthy individuals residing in Norway.

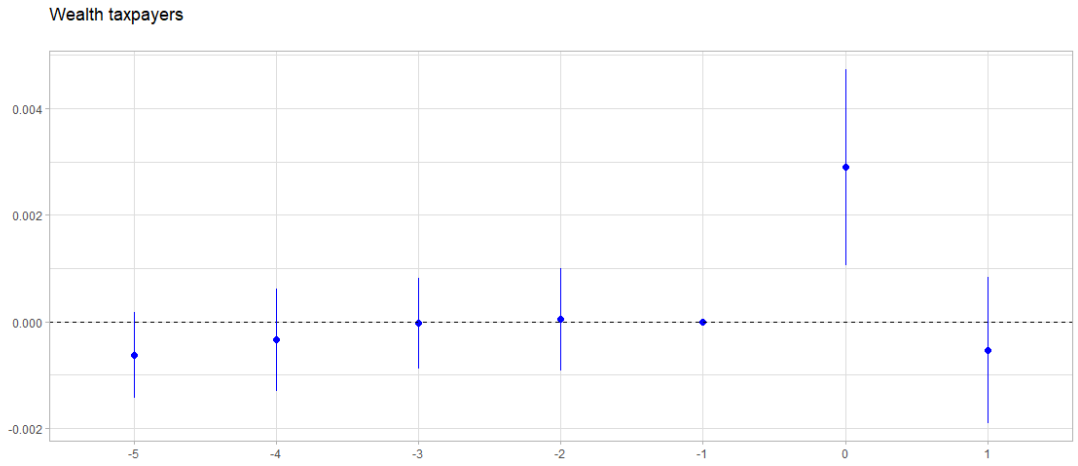
To inspect internal validity further, we create a time-to-treatment variable to set up an event study related to the above TWFE specification. This will allow us to test the hypothesis of parallel trends. In other words, we wish to test whether the increased likelihood of moving to Bø for wealth taxpayers starts before the treatment year or not. Define the time-to-treatment variable y representing the leads and lags of the treatment dummy D (following the same procedure as in Cunningham (2021)) and rewrite the above difference-in-differences model as follows:

$$M_{i,t} = \delta_i + \tau_t + D_i \cdot \left[\sum_{y=-5}^{-2} \theta_y \cdot \mathbf{1}(y = t - 2020) + \sum_{y=0}^{1} \beta_y \cdot \mathbf{1}(y = t - 2020) \right] + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (4)$$

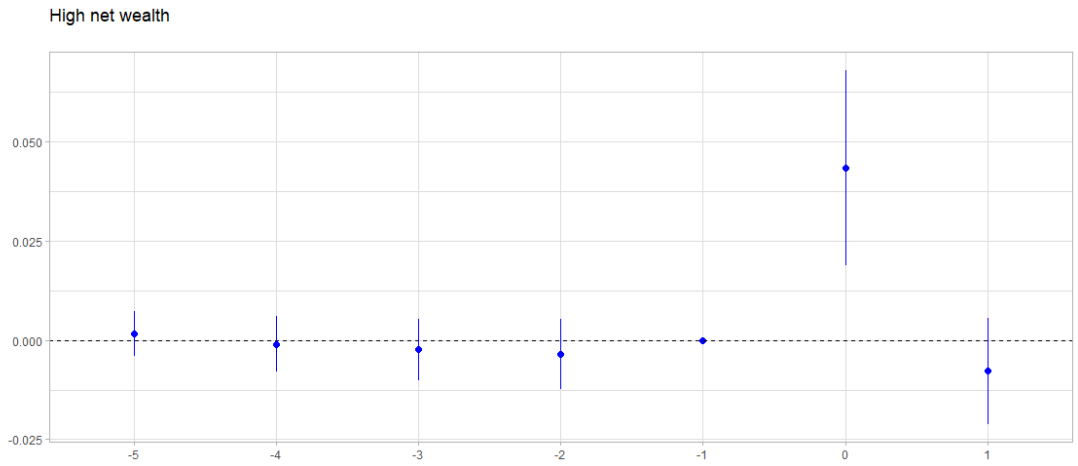
[14] Regional fixed effects control for different characteristics of regions of Norway from which individuals are moving from.

where $\mathbf{1}(y = t-2020)$ are indicators for each value of the time-to-treatment variable y. As is common practice in the literature, we omit $y = -1$ representing the year before treatment (2019). θ_y represents the years before the treatment ($2015 - 2018$), while β_y indicates the years after the treatment takes place. Figure 1 presents the results.

Figure 1: DiD event study: all movers



(a) Wealth taxpayers



(b) High net wealth

Note: This plot shows coefficients of the time-to-treatment variable y. In panel (a) wealth taxpayers, while panel (b) shows the case of individuals with high net wealth, above 10 million NOK. Pre-treatment years are $2015 - 2019$ (from lead -5 to lead -1), with the coefficient for the year before the treatment 2019 set to null. Post-treatment years are 2020 and 2021, re-labeled as lag 0 and lag 1.

Figure 1 shows that the coefficients of the treatment dummy before the onset of the treatment lie around the null for both the case of wealth taxpayers (panel a) and high net wealth (panel b), indicating that we cannot reject the hypothesis of parallel trends in either case.

Interestingly, the effect on the treated is approximately 0.3% in 2020 (lag 0 of panel a), but decays in 2021 (lag 1 of panel a). The same happens for individuals with high net wealth, where the effect on the treated is above 4% in 2020 (lag 0 of panel b), but decays in

2021 (lag 1 of panel b). This is another indication of the fact that the tax reform spurred a short-run mobility effect, that was not followed by an exodus of ultra-wealthy individuals to the municipality of Bø.

[Placebo treatment] Parallel trends confirmed in figure 1 only account for observed trends in the likelihood of moving, for individuals above or below the exemption threshold (panel a), and for individuals with more or less than 10 millions NOK in net wealth (panel b). However, there may still be unobserved confounders that could affect the mobility of different groups of the population. A placebo treatment test conducted by moving the treatment to a random pre-treatment year, helps us to understand whether the mobility response is likely due to the wealth tax reform itself, or some unobserved factors. Table 6 presents the results of the placebo treatment test, assigning the treatment year to 2018 and excluding the original treatment years $2020 - 2021$ from the panel.

Table 6: Location choice model: placebo treatment

Treatment group:	Wealth taxpayers $(1-4)$				- High net wealth $(5-8)$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
D_{i_t}	0.0001	0.00029	0.00028	**0.0003**	0.00002	0.00005	0.00004	**-0.00008**
Robust SEs	0.0001	0.0004	0.00041	0.00041	0.00002	0.00007	0.00007	0.00012
P-values	0.29271	0.46983	0.48696	0.46838	0.37381	0.46072	0.5752	0.51295
Individual FE	NO	YES	YES	YES	NO	YES	YES	YES
Time FE	NO	YES	YES	YES	NO	YES	YES	YES
Controls	NO	NO	YES	YES	NO	NO	YES	YES
Region FE	NO	NO	NO	YES	NO	NO	NO	YES
Obs.	1227486	1227486	1227486	1227486	1227486	1227486	1227486	1227486

Note: This table presents the results of the canonical TWFE DiD model that we run on all movers, however by moving the treatment year to 2018, and by excluding the original treatment years, to ensure that any significant effects observed in the placebo test are not influenced by the real treatment effects. In columns $(1-4)$, the treatment group is individuals who move to Bø and who pay a positive amount of wealth tax to the state and municipality. In columns $(5-8)$, the treatment group becomes individuals with net wealth higher than 10 million NOK. Robust standard errors. Significance * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

For both groups of wealth taxpayers and high net wealth owners, there is no significant difference in the likelihood of moving compared to individuals below the thresholds. Additional robustness checks, focusing on the enforcement of residence change and the presence of bunching, will be conducted in section 5.

4 Estimation of wealth elasticity

4.1 Aggregate analysis

We move to the aggregate analysis at the municipality level for the estimation of wealth elasticity. We estimate the effect of a single-period municipal reform reducing the marginal tax rate exclusively in the northern municipality of Bø from 0.85% to 0.35%, on aggregate wealth (average of net wealth within the municipality), and on the weighted number of wealth taxpayers. The panel in this aggregate analysis consists of all Norwegian munici-

palities in the period $2015 - 2021$.[15] We estimate the following model:

$$\ln(W_{m,t}) = \epsilon \cdot \ln(1 - \tau_{m,t}) + \mu_t + \omega_m + \delta(m \times t) + X_{m,t}\alpha + \nu_{m,t}, \tag{5}$$

where $\ln(W_{m,t})$ in (5) is the average taxable net wealth in municipality m and year t. Additionally, we run the same model with $\ln(n_{m,t})$ as the dependent variable, namely the number of wealth taxpayers in municipality m weighted by the municipality population share. μ, ω, and δ represent respectively time, unit, and unit interacted with time trend fixed effects. The vector $X_{m,t}$ includes controls at the municipality level such as per capita public spending,[16] municipal population count, age (in logs, controlling for the non-linear relationship between age and wealth). ν are standard errors clustered at the municipality level.

The coefficient ϵ of the above model corresponds to the net-of-tax-rate elasticity of taxable wealth, or to the semi-elasticity corresponding to a 1 p.p. (percentage point) change in the net-of-tax rate. In other words, $\epsilon \cdot 100$ can be interpreted as the percentage change in taxable wealth of a 1 p.p. change in the wealth tax rate. Table 7 presents the results of the aggregate analysis.

Table 7: Aggregate analysis: results

Dependent variable:	Taxable wealth $\ln(W_{m,t})$ $(1-4)$				- Wealth taxpayers $\ln(n_{m,t})$ $(5-8)$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\ln(1-\tau_{m,t})$	0.88651	0.70433	0.70433	**0.66551**	0.21944	0.1144	0.1144	**0.10269**
Clustered SEs	0.0075	0.01578	0.01578	0.01243	0.00206	0.00542	0.00542	0.00657
P-values	0.00^{***}	0.00^{***}	0.00^{***}	0.00^{***}	0.00^{***}	0.00^{***}	0.00^{***}	0.00^{***}
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	NO	YES	YES	YES	NO	YES	YES	YES
Municipal FE	NO	NO	YES	YES	NO	NO	YES	YES
Municipal FE X Time trend	NO	NO	NO	YES	NO	NO	NO	YES
Obs.	2827	2827	2827	2827	2833	2833	2833	2833

Note: This table presents the results from regressions of average municipal taxable net wealth (in columns $1-4$, with weighted number of wealth taxpayers in columns $5-8$) on the net-of-wealth-tax-rate, and control variables. We run four different specifications for each model by introducing stepwise controls (per capita public spending and demographic variables) and FEs for municipality, time, region, and municipality interacted with time trends. Standard errors clustered for municipalities. Significance * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Focusing on column 4 of table 7, we document a significant 66.6% (95% CI: $64.1 - 69\%$) increase in average taxable wealth in response to a 1 p.p. drop in the wealth tax rate. This elasticity therefore overcomes the 43% increase in self-reported taxable wealth (after 6 years from the 1 percentage point drop in a canton's wealth tax rate) documented by

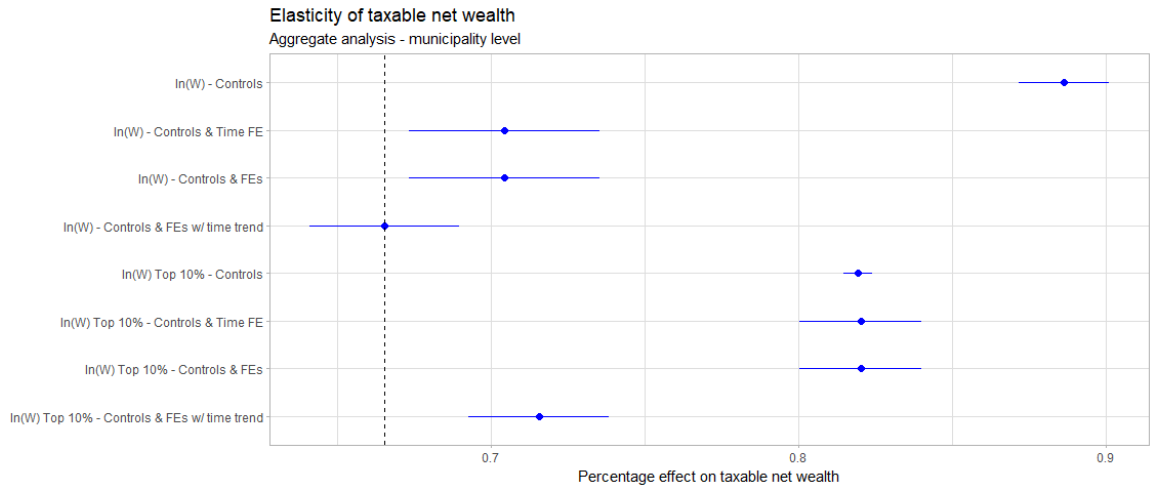
[15] In this period there were several changes in the composition of municipalities (majority of changes due to the reform in 2020). Many municipalities have been merged, and new entities were created. The overall number of municipalities was reduced from 428 in 2015 to 356 in 2021. It is important to mention that Bø (municipality number 1867) was not affected by these changes, which implies that the panel is balanced with respect to treatment. In other words, the only analytical consequence of the municipality reform is that we have an unbalanced panel in the control group.

[16] This variable equals total net operating expenditures, extracted from the following Statistics Norway table: 12137 - Financial key figures from the operational and balance sheet account per capita, by accounting concept (M) 2015 - 2022. This table is available here https://www.ssb.no/en/statbank/table/12137.

Brülhart et al. (2022) for Switzerland, which is currently the highest in the literature on behavioral responses. Focusing on column 8 of Table 7 instead, we document a significant but more modest 10.3% jump in the weighted mass of wealth taxpayers in response to a 1 p.p. reduction in the wealth tax rate.

[Wealth group heterogeneity] We expect the elasticity to be even higher when focusing on wealth taxpayers (approximately the top 10% of the wealth distribution): running the same model as in column 4 of table 7 with $\ln(W_{m,t})$ of wealth taxpayers as the dependent variable results in a 71.6% (SE= 0.01, p=0.00***, with 95% CI: $69.3 - 73.9\%$) taxable wealth increase in response to a 1 p.p. drop in the wealth tax rate. In other words, estimates of the elasticity for wealth taxpayers are significantly higher and do not overlap with the CI of the overall elasticity, allowing us to hypothesize that the very wealthy react more strongly to tax changes than the less wealthy individuals.

Figure 2: Elasticity - Aggregate analysis and wealth group heterogeneity



Note: This coefficient plot shows results from the 4 specifications of table 7, step-wise introducing time, municipal, and municipal interacted with time trend FEs. The lowest elasticity is the 66.6% increase in taxable net wealth, which increases to 71.6% when focusing on the elasticity of taxable wealth of wealth taxpayers. 95% CI are plotted around point estimates.

Figure 2 summarizes the whole subsection by plotting the results from the first 4 columns of table 7, together with the estimates for the wealth taxpayers.

Another robustness check to confirm the hypothesis of wealth group heterogeneity for the elasticity of the stock can be performed on the lines of the triple difference (DDD), by running the model in 5 (column 4) on a transformed outcome (Roth, Sant'Anna, Bilinski, & Poe, 2023). Namely, we focus on the elasticity of the difference in (log) of taxable net wealth between the non-overlapping groups of wealth taxpayers and non-taxpayers, with respect to the net-of-tax-rate. The results indicate a significant 88% (SE=0.01, p=0.00***) elasticity jump, confirming that the above results shown in figure 2 can indeed be interpreted as significantly different by wealth group.

4.2 Elasticity decomposition

The elasticity of the stock estimated in subsection 4.1 provides an aggregate estimation of the behavioral response to the municipal wealth tax reform. By decomposing the change in taxable wealth we could estimate how much of the overall response is due to in-migration to the municipality of Bø, and how much is residually due to wealth accumulation (or assets appreciation) of immobile taxpayers. Because our study focuses exclusively on short-run treatment effects, we expect a limited role played by real responses such as changes in consumption and savings behavior, or changes in earnings through labor supply. Our third-party reported data limits as well the role of voluntary self-disclosures, in other words, wealth accumulation by non-movers that comes from suddenly declaring to tax authorities formerly undeclared assets, due to the lower tax rates (see Alstadsæter, Johannesen, Le Guern Herry, and Zucman (2022) on the effort that the Norwegian authorities have made to push wealthy individuals to disclose assets previously hidden abroad). The decomposition of the aggregate effect can be lined out as follows.

$$\Delta W_{m,t} = \Delta W^{\text{res}}_{m,t} + W^{\text{imm}}_{m,t} - W^{\text{out}}_{m,t-1}, \tag{6}$$

where $\Delta W^{\text{res}}_{it}$ is the wealth change from residents of Bø, also defined as the immobile taxpayers. The other two terms represent the wealth brought to Bø by immigrant taxpayers, and the wealth that movers take out from Bø. To estimate the share of taxable wealth brought to Bø by movers, we focus on pooled pre-reform years $2015 - 2019$, and compute the average percentage of all taxable wealth declared in Bø that is owned by in-movers in the period: 19.2%. This share rises to 79.2% in the post-treatment years, clearly documenting the substantial role of mobility in the aggregate wealth response to the municipal tax reform. Table 8 shows the percentage in each of the years under analysis.

Table 8: $\%$ of taxable net wealth owned by movers, Bø $2015 - 2021$

	2015	2016	2017	2018	2019	2020	2021
$\%$ of taxable net wealth owned by movers	26,63	16,55	17,63	18,4	19,26	**77,26**	**81,48**

Note: This table shows, for each of the years under analsyis, the $\%$ of total taxable net wealth in Bø that is owned by individuals that move their residence to Bø. Current prices Norwegian NOK. The post-treatment years 2020 and 2021 register a substantial increase from an average of 19.2% in the pre-reform years to 79.2% in the years after the reform.

All in all and not surprisingly, the mobility of wealthy taxpayers appears to have been the major force behind the behavioral response to the change in the net-of-tax-rate estimated in subsection 4.1. This is not unexpected in the short run, as an immediate response to the wealth tax competition between municipalities initiated by the municipalities of Bø. The share of wealth accumulation due to mobility might however decrease in future years, also due to a potentially stronger role played by wealth accumulation of new residents from the initial post-reform years.

5 Robustness checks

5.1 Addressing endogeneity concerns

The challenge of estimating correctly identified effects on income or wealth from a change in the net-of-tax-rate comes from the fact that the marginal tax rates (MTR) is influenced by the level of taxable income (wealth), introducing endogeneity problems (a survey of the literature on the estimation of the elasticity of taxable income is offered by Saez, Slemrod, and Giertz (2012)).

One standard way to overcome this is to utilize tax reforms, introducing exogenous variation in the net-of-tax-rate, plus carefully selecting the treatment group based only on pre-reform characteristics (Weber, 2014). We follow this approach in this paper as well, since we utilize a municipal tax reform and past outcomes from the net wealth distribution to select individuals into the treatment and control group, across the exemption threshold of the wealth tax schedule. K. M. Jakobsen and Søgaard (2022) highlight however that since variables such as income and wealth are affected by mean reversion, trend differentials will arise across the distribution. Trend differentials across the distribution imply serial correlation and a violation of the parallel trends assumption in the DiD setting.

In our setting, this violation would yield if the net wealth time trend for the top 10% of the net wealth distribution (the portion of individuals paying the wealth tax) is different from the trend for the bottom 90% of the distribution in the pre-treatment years. This would lead to serial correlation in outcomes and invalidate the assumption of common pre-trends tested in section 3.

We follow the roadmap described in K. M. Jakobsen and Søgaard (2022) by first investigating trend differentials. One way to analyze trend differentials in the growth of net wealth for the different portions of the distribution is to focus on wealth concentration and top shares. If top shares are stable, then we can disregard the hypothesis that different portions of the distribution grow unbalanced. We are interested in the period $2015 - 2019$ which corresponds to our pre-treatment years. The net wealth series from Statistics Norway[17] document that in the period from 2015 to 2019 the top 10% share lies in between $50,6\%$ and $53,5\%$. Overall, this shows that within such a short range of years, wealth concentration at the top is rather stable, confirming that the growth in net wealth between our treatment and comparison groups is not substantially different.

Second, to complement the above descriptive evidence, we again run the model specification as in equation 3, introducing individual-level time trends in (log) of net wealth in the set of controls. This gives a treatment coefficient of 0.00134 (SE=0.0005, p=0.022), negligibly different from the column 4 coefficient of table 5 of 0.00132. Results in table 10 and figure 3 documenting parallel trends in pre-treatment years in Appendix A.

[17] The shares for the net wealth distribution by Statistics Norway are available in the following table: https://www.ssb.no/statbank/table/10318/.

5.2 Enforcement

Norway has been practicing a residence-based tax system since 1882 (Gerdrup, 1998), meaning that it is not possible to relocate wealth and be subject to the preferential tax regime without changing fiscal (personal) residence. This simplifies our approach because by observing the mobility of people we infer the mobility of capital. This also leaves less scope for tax avoidance, and it provides within-country studies of behavioral responses to wealth and capital taxation with an advantage compared to cross-country approaches since residence-based tax systems are more difficult to enforce across nations (H. Kleven et al., 2020).

However, there is still a need to discuss the issue of enforcement as an important robustness check for the mobility effects. Do the local or central authorities have the capacity to monitor that wealth taxpayers have indeed moved to Bø, instead of simply renting or buying a property and moving the residence fictitiously to be taxed under the preferential regime?

We have first inquired about the details of this matter through correspondence with the Norwegian Tax Authority (*Skattetaten*). They declare that the official rule for people with more than one house at their disposal is that one is a fiscal resident in the municipality in which one spends most nights throughout the year.

How is this enforced in practice? Although the Norwegian tax authority declares that this is ultimately based on trust and that the taxpayers have the legal responsibility to obey this rule, they clearly state that if they have any reason to believe that a taxpayer is cheating on the municipality of residence, they would put in practice further investigation.

One indication that can lead to further investigation is when they see that individuals have an attachment of some kind (e.g., *de-facto* couples or marriage) to some other individuals or to a household but declare that they reside in a different location than the latter. This is mostly the case for students, who happen to change their actual domicile or residence often during the years of higher education.

As a robustness check on our estimates of mobility effects for movers, we use a variable from Statistics Norway called *Municipality Residence - Actual address*.[18] In this variable the Norwegian Tax Authority in cooperation with Statistics Norway has further investigated and settled cases in which the residence of individuals was disputed.

We investigate the number of individuals for whom the municipality of residence in the main residence variable utilized in Section 3 does not coincide with the revised residence (actual address). This applies only to a total of 50 individuals throughout the 7 years under analysis, implying that only 0.003% of the full sample is affected. Most importantly, no wealth taxpayer is affected, confirming that this issue mostly yields for students. This confirms that the enforcement issue does not affect the main results.

[18] More information on the Statistics Norway variable "Municipality Residence - Actual address" is available here.

5.3 Bunching

Can individuals influence the assessment of their wealth tax base in order to avoid taxation? The extent of bunching evidence at the unique kink point of the wealth tax schedule (as originally done for the elasticity of taxable income in Saez (2010)) is a further check for the validity of our estimates on taxable wealth elasticity to the wealth tax rate.[19] Ring (2020) shows evidence of limited (if any) bunching at the unique threshold of the wealth tax schedule in Norway. However, he focuses on pooled data for $2010 - 2015$, which only minimally overlap with our period of analysis $2015 - 2021$. We, therefore, complement his analysis with the evidence below.

One channel through which individuals govern their pre-tax net wealth accumulation is through labor supply and savings behavior (Ring, 2020). The other channel is through strategic reporting and tax optimization. The assessment of taxable wealth in Norway is made for financial wealth by the Norwegian tax authorities based on market value information on asset ownership and debt, reported by third parties such as banks and employers (Thoresen et al., 2022). Notice that third-party reporting does not apply to cryptocurrency holdings within online crypto wallets, hence in this case wealth registers at our disposal face self-reporting limitations as is the case for surveys on wealth in other countries. Notice as well that pension wealth is not subject to wealth taxation. For real wealth such as real estate, the market value of properties is estimated via hedonic price modeling developed by Statistics Norway (Fagereng, Holm, & Torstensen, 2020). This reduces by a large extent the risk of strategic reporting and tax minimization behavior.

We focus on the full population of adult residents in the years $2019 - 2021$ and exclude married and cohabiting couples for which the wealth tax base is computed at the household level rather than at the individual level, by doubling the threshold. Descriptive statistics on taxable net wealth and bunching evidence for each year under analysis are produced in Appendix B.

A visual inspection of the mass of taxpayers within the interval around the kink point for the wealth tax (1.5 million NOK in all years, roughly the 9th decile of the net wealth distribution) in figure 5, leads to rejecting the hypothesis of substantial bunching. Exclusively in year 2020 there is a higher frequency of individuals below the kink point, within 20 thousand NOK from the tax threshold.

Although a more rigorous analysis of bunching evidence would require the construction of a counterfactual distribution, as is standard in the literature[20], we believe that the results of the bunching exercise in Ring (2020) for $2010 - 2015$, jointly with the evidence of the subsequent years $2015 - 2021$ lead to safely disregard the hypothesis of meaningful bunching. According to Ring (2020), this could be because, given the institutional details

[19] Tax evasion is not the primary focus of our analysis, as that has been shown by Alstadsæter, Johannesen, and Zucman (2019) to be a relevant issue in Norway only for the ultra-wealthy households. In this robustness exercise, we focus on whether individuals bunch at the exemption threshold of the wealth tax, which lies constantly around the 9th decile of the net wealth distribution in the period under analysis.

[20] Notice that, due to the technical limitations of the data access at our disposal (through the interface microdata.no), we are not able to construct a counterfactual distribution around the kink using the .ado file provided by Chetty, Friedman, Olsen, and Pistaferri (2011).

regarding wealth tax base assessment, most households do not possess the technology or resources to bunch. Limited evidence of bunching can therefore be interpreted as a signal of limited avoidance possibilities, at least for wealth owners who do not possess businesses. For these individuals, moving to another jurisdiction represents in principle a more feasible option to avoid taxation.

5.4 Local government revenues and expenditures

To what extent can we exclude the hypothesis that individuals changing their residence choose Bø due to its characteristics (e.g. per capita expenditure on local public services), rather than paying less taxes on wealth? Recall that in the individual analysis (location choice model) of section 3.3, we control for region fixed effects, to cancel away all time-invariant differences in the region of origin of movers. In the aggregate analysis of section 4.1, we control for per capita net operating expenditures by the municipality, representing expenditures on local public services that might attract movers.

We add some institutional details and descriptive evidence in this subsection. In principle, in the post-treatment years $2020-2021$, the increased tax revenues due to the immigration of wealthy individuals might potentially lead to a jump in per capita expenditure (e.g., by subsidizing the per child cost of kindergarten or similar measures to attract movers), and therefore lead to an increase in in-migration rates. We believe that this concern is limited, due to a revenue equalization scheme that redistributes revenues from municipalities with excess tax revenues to other municipalities (Borge, Krehic, Nyhus, Rattsø, & Sørensen, 2022). Due to this revenue equalization scheme imposed by the central government, for each 1 NOK of increased tax revenue in per capita terms, each municipality is forced to pay back 0.6 NOK to the other municipalities experiencing a deficit in tax revenues Ring (2020). This scheme implies that the increased revenues from the wealth tax in Bø in the post-treatment years are neutralized so that the effect on local public services is limited.

To complement this hypothesis, we provide some descriptive evidence on the revenues and expenditures of the municipality of Bø. In Table 12 in Appendix C we present the key variables from the municipality budget for Bø in the years $2015-2021$ (per capita). Table 12 shows that aggregate expenditure at the municipality level (the first three rows) did not increase in the post-treatment years. The tax revenues on income and wealth (including natural resource taxes) increased by 51.68% in 2021 from the 2020 level, most likely driven by the jump in wealth tax revenues due to the inmigration of wealthy individuals that started in 2020. If this proceeds in the following years, it can be reasonable to expect that aggregate expenditures will be uplifted in response. However, recall that an approximate 60% portion of the excess tax revenues will have to be paid back to the state due to the revenue equalization scheme, effectively neutralizing part of the potential effect of increased revenues on future expenditures. Figure 6 in Appendix C decomposes the aggregate expenditure time series in the municipality of Bø (total net operating expenses from table 12) into per capita expenditures in different subareas, confirming that no significant jump is detectable for the post-treatment years $2020-2021$.

All in all, revenue analysis in the years to come will most likely increasingly reflect the mobility of wealthy individuals into Bø, with potential effects on the decision of non-wealthy movers as well. For now, we can disregard that these aspects crucially influence the results for the period under analysis in this work.

5.5 The role of political parties

In this subsection, we discuss the potential interaction between wealth tax reform at the municipality level and the role of the incumbent party of the national government. First, notice that under the period of analysis $2015 - 2021$, the same party is in power at both the national and municipal level, namely *Høyre*, the main center-right liberal party in Norway. This continuity in the party in power allows us to disregard that the design and implementation of the wealth tax reform is subject to interference by competing parties.

As soon as the municipality announced the reduction in the wealth tax rate in 2019, potentially leading to a sudden deficit in the budget of the municipality from 2021, the government coalition publicly promised that they would compensate the municipality for this potential loss (mitigated only partially by the revenue equalization scheme between municipalities). In 2021, right after the Labour party - *Arbeiderpartiet*, the main center-left party in Norway - won the elections, they announced that from 2022 onwards they would no longer compensate Bø for the potential loss in tax revenues.

Several considerations arise from this interplay between parties at the national vs. local level. First, the treatment years 2020 and 2021 of this study are not affected by the shift of incumbent party at the national level since the new regime (no financial support from the state) applies only from 2022. It has to pointed out as well that due to the substantial increase in tax revenues documented in table 12 from 2021, there would have been no need to compensate the municipality from any loss in revenues in the subsequent years. In contrast, it is the municipality of Bø that returned a fraction of their excess tax revenues to the state, partially compensating other municipalities for their revenue losses.

Second, a hypothetical wealth taxpayer that has to decide whether to move to Bø in 2020 will not see the potential loss in tax revenues (and consequently in local public service provision) as a real risk, due to the potential government compensation that would neutralize the losses. Hence, we cannot understand the "no exodus" result of this study with this hypothesis.

6 Discussion

Let us provide some additional context to make better sense of the results of this study. Although the design of the single-period municipal wealth tax reform in Bø is ideal in terms of identification, it should be pointed out that we focus on a very limited portion of Norwegian wealth taxpayers. The external validity of the results therefore requires caution. In 2021, only 280 of all 572000 Norwegian wealth taxpayers reside in Bø, hence 0.004%. However, they constitute a substantial number with respect to the municipality popula-

tion: 280 wealth taxpayers out of 2751 residents in 2021, meaning that wealth taxpayers are approximately 10% of the local resident population.

The magnitude of the migration to Bø documented in sections 3.2 and 3.3 also appears to be limited: there is no real exodus from other municipalities to Bø, conditional on being a wealth taxpayer, and controlling for individual-level confounders and region fixed effects. Although the fact that Bø is a remote location in the north of the country helps us to exclude that other observable covariates could attract wealth taxpayers, the limited magnitude of mobility is a remarkable result in itself, since it highlights that preferential (wealth) tax regimes in remote locations do not necessarily boost in-migration.

One potential explanation for the no-exodus result could be that, conditional on being a wealthy individual with potentially substantial gains from preferential tax regimes, moving out of Norway to a more favorable location taxation wise might be more appealing than moving to a rural location in the north of the country with sinking population and limited amenities. Table 9 shows, however, the limited magnitude of the outmigration phenomenon, with a fraction between 1.83 and 2.78% of all movers being wealth taxpayers, for each year of the period under analysis (recall that the fraction of wealth taxpayers in the adult population is approximately 10%).

Table 9: Out migration of wealth taxpayers, $2015 - 2021$

	2015	2016	2017	2018	2019	2020	2021
Moving out of Norway	34742	38463	34869	32701	25437	25722	33225
Moving out of Norway - wealth taxpayer	792	707	694	912	686	694	860
Moving out of Norway - % of wealth taxpayer	2.2%	1.83%	1.99%	2.78%	2.69%	2.69%	2.58%
Moving out of Norway - TNW above 10 mill. NOK	50	51	48	51	41	39	65

Note: This table shows the magnitude of out-migration between 2015 and 2021. First line shows out-migration in the whole adult population. Second line shows the amount of wealth taxpayers migrating out of Norway. Third line shows the % of out-movers that are wealth taxpayers. Last line shows movers with taxable net wealth above 10 million NOK.

In other words, table 9 shows that wealth taxpayers are under-represented in the population of out-movers, with respect to their share in the main population of adults. The result of no exodus to Bø can therefore only to a limited extent be explained by outmigration rates.

What can be the consequences of tax competition for wealth inequality at the national level? The tax competition initiated in 2021 by the municipality of Bø to attract wealthy citizens unfolds novel policy options for other municipalities, in case they wish to respond by, in turn, lowering their tax rates. Agrawal (2023b) reviews a set of strategies for promoting jurisdictional cooperation in tax policy, to limit the degree of tax competition. He shows that partial harmonization dominates other strategies, such as minimum tax rates or complete harmonization. In the context of our study, it might then be desirable to develop increased coordination between central and local authorities regarding wealth taxation, to minimize the scope for unhealthy competition by municipalities, resulting in tax optimization strategies by wealthy individuals.

The lack of cooperation can result in a potentially distortive race to the bottom in the municipal wealth tax rates. In the hypothetical case in which all municipalities adjust their wealth tax rates downward, the resulting new equilibria will imply a lower overall wealth tax rate (keeping the state tax rate fixed at 0.15% and tax rates on capital incomes untouched). This race to the bottom could subsequently lead to (i) reduced tax revenues for all municipalities, *ceteris paribus*, with respect to the equilibrium revenues prior to the municipal reform in Bø; (ii) increased concentration of wealth at the top of the distribution, as documented for the case of Switzerland by Marti, Martínez, and Scheuer (2023).

7 Concluding remarks

Behavioral responses to wealth taxation are crucial to inform policymakers about the distortions that the introduction of such a tax can bring about. Until now, the existing empirical evidence from countries that have or have had forms of wealth taxation has documented significant negative impacts on reported taxable wealth (or positive impacts from lowering tax rates and/or rising exemption thresholds). It has to be said that much of this evidence reflects either mobility effects or avoidance behavior, rather than real behavioral changes to saving and consumption patterns. Only for the case of Norway, does Ring (2020) focus on geographical discontinuities created by valuation procedures and documents a positive overall effect of the tax on savings.

This work adds to this growing literature by offering evidence of short-run behavioral responses to a recent municipal wealth tax reform in the northern municipality of Bø, in Norway. On the one hand, we provide causal evidence that wealthy individuals do respond to preferential tax regimes by moving their residence, resulting in a higher concentration of wealth in the treated municipality. On the other hand, the magnitude of the mobility responses is limited, indicating that preferential tax regimes in remote locations are not necessarily successful policies. In any case, future research on the impact of this (and similar) reform is needed, as in the next years it will become more clear whether the experiment of unilaterally lowering the wealth tax in Bø has generated more investments, and jobs; or whether it has had detrimental consequences for other municipalities (through lower tax revenues). Focusing on business owners, Bjørneby et al. (2023) have shown that the Norwegian wealth tax stimulates employment growth in companies closely held by taxpayers. Their analysis at the national level could also be tailored to a within-country reform such as the one analyzed in this research, to add more evidence to the heated debate on whether the wealth tax kills jobs.

We conclude with a caveat: although this work has identified strong and significant mobility effects in response to the municipal wealth tax reform in Bø, we have not analyzed the full set of repercussions on the local (and national) tax system that such reform has had, and might have in the years to come. In addition, potentially important effects in terms of portfolio composition might emerge, with a high degree of heterogeneity in responses when comparing more traditional households with business-owning individuals.

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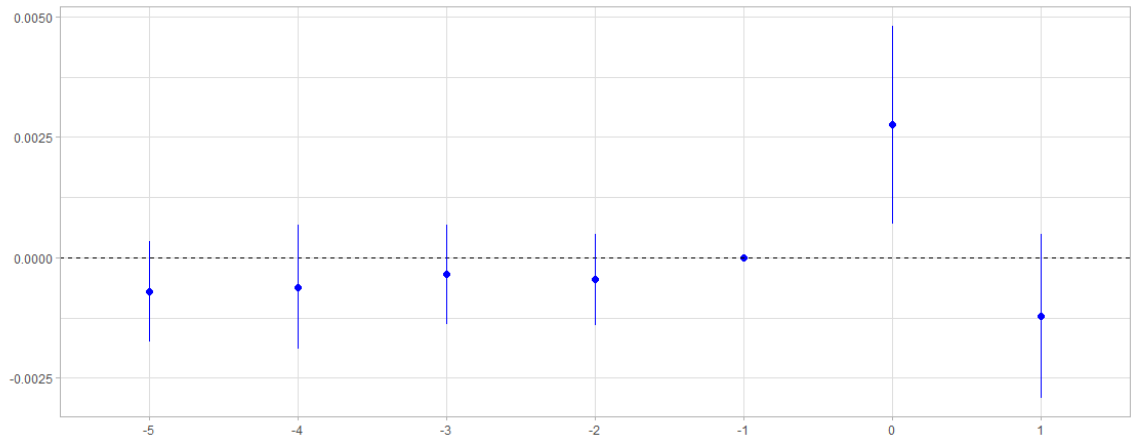
A Appendix: time trends

Table 10: Location choice model with time trends

	(1)	(2)	(3)	(4)	(5)
D_{i_t}	0.00116	0.0013	0.00129	**0.00132**	**0.00134**
Robust SEs	0.00021	0.00054	0.00054	0.00054	0.00059
P-values	0.00***	0.0171**	0.0177**	0.0144**	0.02255**
Individual FE	NO	YES	YES	YES	YES
Time FE	NO	YES	YES	YES	YES
Controls	NO	NO	YES	YES	YES
Region FE	NO	NO	NO	YES	YES
Time trends	NO	NO	NO	NO	YES
Obs.	1631480	1631480	1631480	1631480	1631480

Note: This table presents the results of the canonical TWFE DiD model that we run on all movers. We run five different specifications by introducing stepwise FEs for individual, time, region, controls, and individual-level time trends in (log) of net wealth. Significance * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

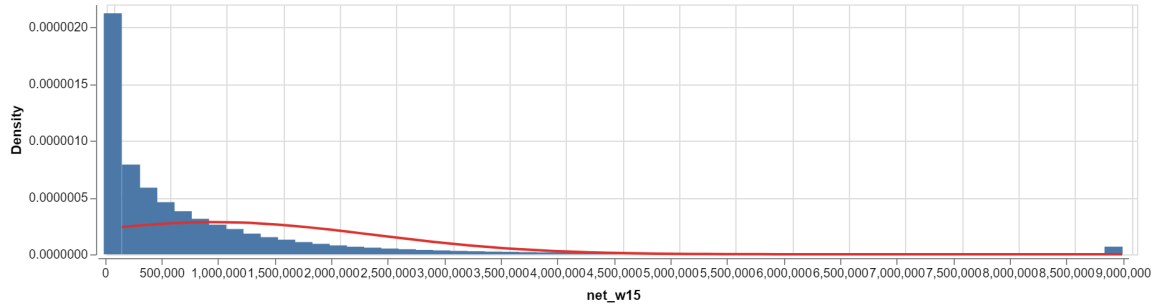
Figure 3: DiD event study: all movers with time trends (column 5)



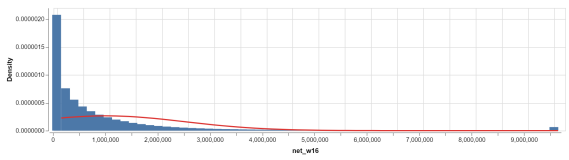
Note: This plot shows coefficients of the time-to-treatment variable y. Pre-treatment years are $2015-2019$ (from lead -5 to lead -1), with the coefficient for the year before the treatment 2019 set to null. Post-treatment years are 2020 and 2021, re-labeled as lag 0 and lag 1.

B Appendix: Descriptive statistics - Taxable Net Wealth

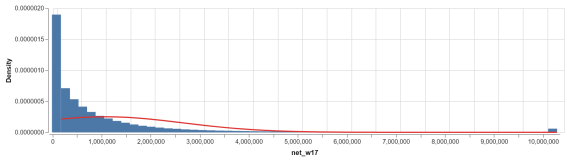
Figure 4: Taxable net wealth 2015-2021



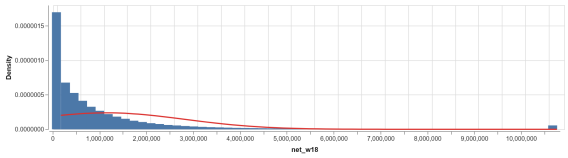
(a) Net wealth 2015



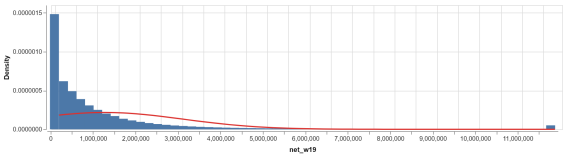
(b) Net wealth 2016



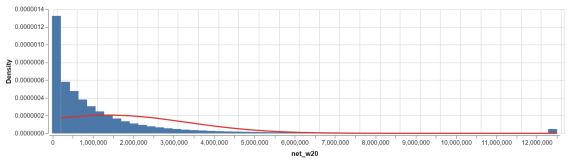
(c) Net wealth 2017



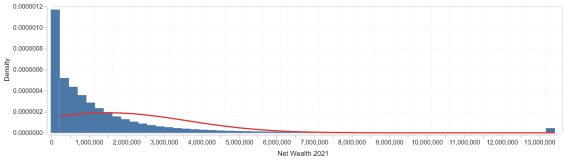
(d) Net wealth 2018



(e) Net wealth 2019



(f) Net wealth 2020



(g) Net wealth 2021

Note: The density distribution of net wealth in the period $2015 - 2021$. Notice that negative values of the distribution have been truncated. The red line represents the normal distribution. The highest mass at the very top of the distribution is due to 2% winsorization. Notice that the data is anonymized and subject to 2% bottom and top winsorization only when we retrieve graphical outputs. In all regressions instead, there is no winsorization in the underlying data.

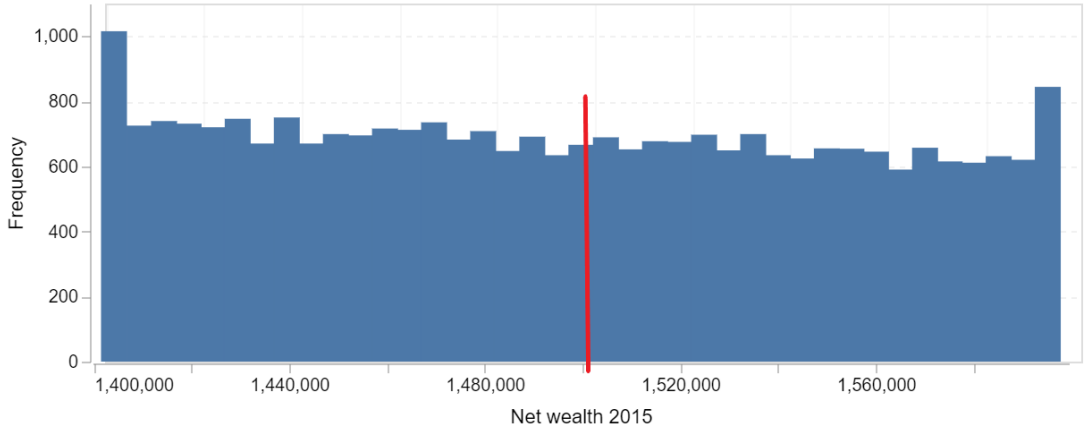
Table 11: Taxable Net Wealth

Variable	Avg	Std.dev.	Individuals	1%	25%	50%	75%	99%
Net Wealth 2015	887497,4636	1406460,087	934773	93	89300	395000	1070000	8990000
Net Wealth 2016	924936,1171	1502480,9949	1000387	85	87600	395000	1100000	9650000
Net Wealth 2017	981647,4648	1591572,072	991943	85	96100	429000	1170000	10300000
Net Wealth 2018	1053838,0371	1666141,5814	900793	75	116000	487000	1260000	10800000
Net Wealth 2019	1168126,2194	1835551,7813	852242	67	138000	554000	1390000	11900000
Net Wealth 2020	1264502,7597	1939078,0498	809909	71	167000	625000	1510000	12500000
Net Wealth 2021	1394753,0154	2091925,1135	779027	68	196000	714000	1670000	13400000

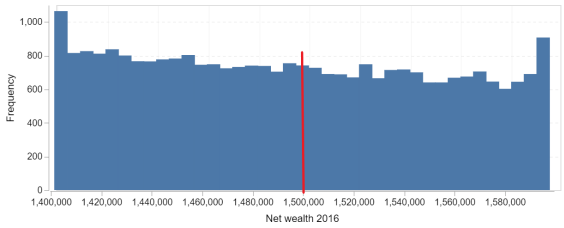
Note: Net taxable wealth in the period 2015-2021. Average, standard deviation, number of individuals, and percentile thresholds. Notice that we drop individuals with negative net wealth, and wealth amounts are in current prices Norwegian kroner NOK. The Statistics Norway variable used is Taxable Net Wealth - Skattepliktig nettoformue.

B.1 Bunching evidence

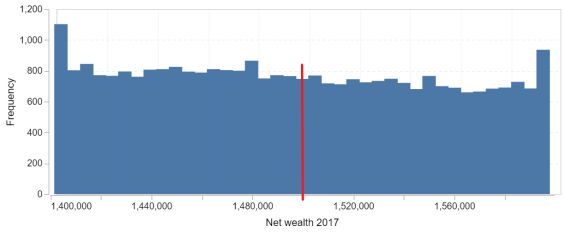
Figure 5: Bunching 2015-2021



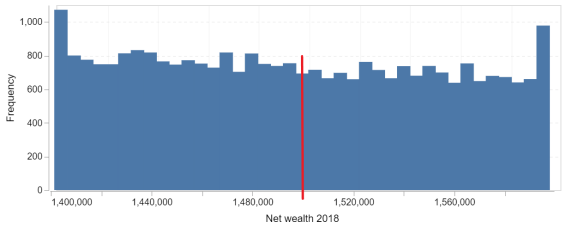
(a) Bunching 2015



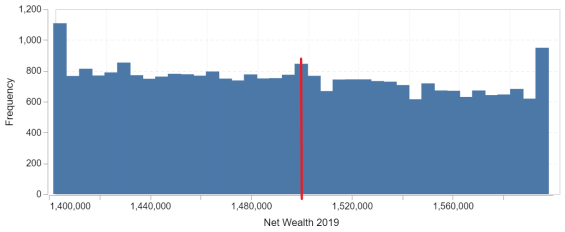
(b) Bunching 2016



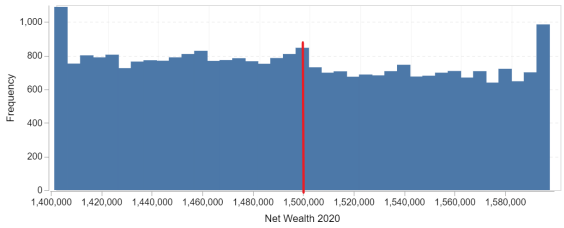
(c) Bunching 2017



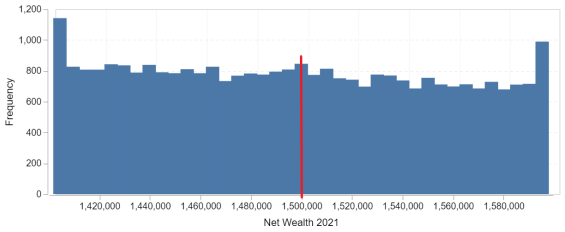
(d) Bunching 2018



(e) Bunching 2019



(f) Bunching 2020



(g) Bunching 2021

Note: Frequency (number of individuals on the y-axis, and net wealth (in between 1.4 and 1.6 million NOK, current prices) for $2015 - 2021$ on the x-axis. The width of each bin is set to 5 thousands NOK. Notice that the higher mass of individuals at both left and right tails is due to 2% data winsorization. Notice that the data is anonymized and subject to 2% bottom and top winsorization only when we retrieve graphical outputs. In all regressions instead, there is no winsorization in the underlying data.

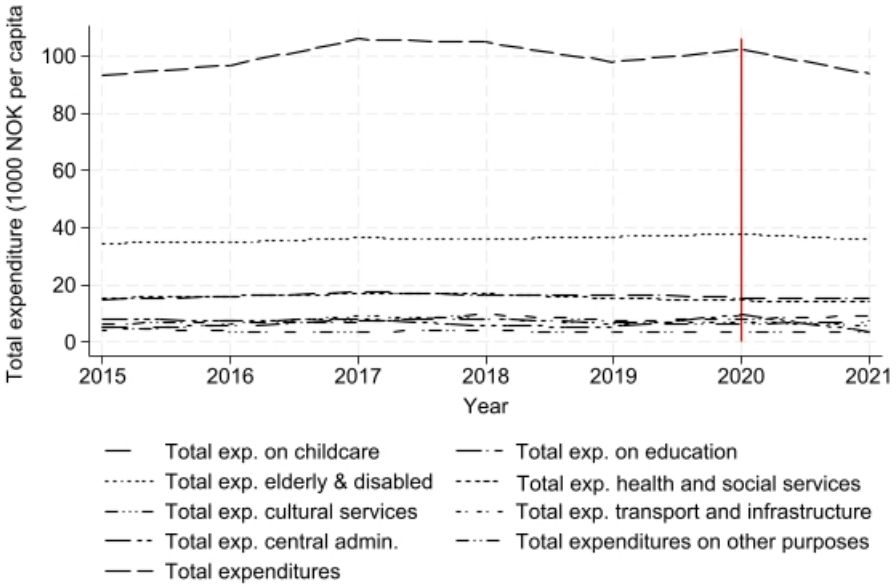
C Appendix: Municipal revenues and expenditures

Table 12: Revenues and expenditures, Bø 2015 – 2021

	2015	2016	2017	2018	2019	2020	2021
Total gross operating expenses	265490	278271	299017	302602	304937	300161	302234
Total corrected gross operating expenses	229414	239179	256562	260119	263110	257208	258395
Total net operating expenses	192247	206244	221659	223540	226229	222376	218827
Total gross operating income	261837	277659	290838	300894	292028	292185	301256
Net operating result	2426	5143	-1335	5542	-4467	17383	69859
Tax on income & wealth incl. natural resource tax	45774	52119	54762	61567	64569	63494	**96312**
(% change in tax on income & wealth)	n.a.	13,86	5,07	12,43	4,88	-1,66	**51,68**
Total property tax	458	7266	7315	7340	7394	5900	5829
Unrestricted revenues	170362	176933	180049	182475	188170	191162	204304
Total gross investment expenses	13722	17369	31695	32944	17276	35381	16738
Net debt	222920	224862	237410	253760	261591	280621	280779
Long-term debt excluding pension obligations	284473	256723	265045	300047	308548	325220	342956
Pension liability	446813	470273	484316	496727	517083	509274	495852

Note: This table showing per capita revenues and expenditures in Norwegian kroner (NOK) for the municipality of Bø in the years 2015 – 2021, is extracted from the following Statistics Norway table: 12137 - Financial key figures from the operational and balance sheet account per capita, by accounting concept (M) 2015 - 2022. This table is available here https://www.ssb.no/en/statbank/table/12137.

Figure 6: Total municipality expenditures, Bø 2015-2021



Note: Total municipality expenditures for Bø (municipality number 1867). Data are extracted from the Local Government Dataset by Fiva et al. (2023). All variables are measured in constant NOK 1000 per capita (the variable CPI2011 is used as a deflator).

D Appendix: Reproducibility and Open Science

D.1 Reproducibility

We believe in the importance of reproducibility of scientific research, on the lines of this manifesto for open science practices Munafò et al. (2017). Our data access (the interface microdata.no) has the advantage of ensuring immediate and full reproducibility of results. With the more traditional data access to Norwegian registers and microdata, it is not straightforward to reproduce the authors' results since data access is costly and entails long delivery waiting time.

In our case, subject to affiliation with a Norwegian higher education or research institution (Get microdata.no access), data access through the microdata.no interface is immediate and free of charge. Microdata.no is currently working with access solutions for researchers at international universities and research institutions. The set of codes to fully replicate the results of this work (upon granted access to Microdata.no) will be made available to reviewers to ensure a transparent code review process, and upon publication, they will be made publicly available on Open Science Framework here: osf.io/a5ysc/.

D.2 Readme and instructions to replicators

The following codes replicate the content of this work. The microdata.no codes are all self-contained, independent from each other, and do not need to be run in a specific order.

- 'Code1_descriptives' can be used to replicate all content in subsection 3.2: descriptive statistics in table 3, and table 4.
- 'Code1_allmovers' can be used to replicate all content in subsection 3.3: regression output in table 5, and table 6. Regression output in figure 1 is plotted by using library 'coefplot' in R, codes and figures in .png available here osf.io/a5ysc/.
- 'Code2' can be used to replicate all content in subsection 4.1: regression output in table 7. Regression output in figure 2 is plotted by using library 'coefplot' in R, codes and figures in .png available here osf.io/a5ysc/.
- 'Code2_decomposition' can be used to replicate table 8 in subsection 4.2.
- 'Robustness_time_trend' replicating content in subsection 5.1: regression output in table 10 in Appendix A. Regression output in figure 3 in Appendix A is plotted by using library 'coefplot' in R, codes and figures in .png available here osf.io/a5ysc/.
- 'Robustness_enforcement' replicating content in subsection 5.2;
- 'Robustness_bunching' replicating content in subsection 5.3, shown in in Appendix B: figure 4, table 11, and figure 5. Figures are plotted by using the Vega editor on the microdata.no interface (Vega editor).
- 'Out_migration' code replicating table 9 in section 6.