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Does a Wealth Tax Discourage Individual Risk Taking?

Evidence from Norway

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Abstract

The interest in capital taxation has been revived by increasing inequality over the past decades. Norway is one of the few countries persisting with a wealth tax policy, making it an interesting research setting. The wealth tax is assumed to have some distortionary effects on individual behaviour, leading to efficiency losses. Our thesis seeks to further enhance the understanding of the behavioural effects associated with a personal wealth tax. Using administrative data on individual wealth holdings from 2009 to 2016, we therefore address the impact on individual risk taking. The method applied is a regression discontinuity design, exploiting the threshold for wealth taxation. We find no evidence of consistent significant results for individuals in proximity of the threshold, suggesting that the progressive nature of the wealth tax makes the reduction in initial wealth trivial.

Preface

This thesis is part of the Master of Science in Economics and Business Administration at the Norwegian School of Economics. The process of writing this thesis has been rewarding. We have learned a great deal about a topic that is both interesting and increasingly relevant to present times. We would like to thank our supervisor, Floris Zoutman, for his valuable insights and advice. The time he has dedicated towards guiding us along the way is greatly appreciated. As our time at the Norwegian School of Economics is coming to an end, we would like to express our gratitude for a challenging and exciting education. Lastly, we thank our families and close friends for the continued support in a challenging period.

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1. Introduction

The Norwegian wealth tax is a subject of controversy and widespread political debate. The right-wing is typically against taxation of wealth, or at least taxation on so-called “working capital”, whilst the left-wing are proponents. Working capital refers to funds being drained from both private and public firms through dividend payments in order to cover the wealth tax. Common claims are also that wealth taxation has distortionary effects on savings and investments, leading to efficiency losses.

Those in favour of wealth taxation argue that it is the only way to effectively tax personal wealth from the most affluent citizens. As wealth is distributed more unequally than income, proponents argue that a wealth tax effectively redistributes economic resources whilst simultaneously increasing tax revenue. Internationally, the interest in wealth taxation has been reignited along with increasing economic inequality for the last couple of decades (Keeley, 2015; Piketty et al., 2017). Bearing this in mind, it is interesting to note a decrease in the number of countries levying a wealth tax internationally, as Norway, Switzerland and Spain are the only remaining countries in the OECD that impose a broad annual tax on net wealth (Thoresen et al., 2021).

The international development has not yet affected the Norwegian policy; the new government increased the wealth tax rate (and the tax level generally) in 2022. Subsequently, several affluent individuals have relocated to countries with lower tax burdens, which has further amplified the debate. When assessing the appropriateness of the wealth tax as a compliment to taxes on income, the behavioural effects should be examined. The concept of neutrality, meaning that individuals and firms will not deviate from the decisions they would otherwise make for purely economic reasons, is one of the fundamental principles of the Norwegian tax system (Norwegian Ministry of Finance, 2022). It is accordingly important to understand how individuals adapt to the wealth tax. If investments in risky assets are distorted by the tax, the economic efficiency loss endured could outweigh the benefit of additional tax revenues.

Based on these concerns, this thesis provides an empirical analysis on whether the personal wealth tax in Norway discourages investments in risky assets on a personal level. The motivation for our thesis is based on an interest in the unexplored distortions caused by the wealth tax. If the reduction in the rate of return imposed on individuals subject to the wealth tax led to decreasing risk willingness, the wealth tax could be harmful to investments. Our findings could therefore prove valuable to the ongoing debate, and further shed light on the effects of wealth taxation. Deeping the understanding of the wealth tax can also prove important to policymakers considering adoption.

This forms the basis for our research question:

Does the Norwegian Wealth Tax Discourage Individual Risk Taking?

We frame the analysis in a regression discontinuity design, utilizing the threshold for taxable net wealth, which is the only criteria determining eligibility for wealth taxation. With panel data provided by NoCeT (Norwegian Centre of Taxation) from 2009 until 2016, we are able to determine whether there are significant differences in risk taking behaviour for individuals close to the threshold.

Our analysis rest on the assumption that the Norwegian tax system limits the individual ability to sort themselves on either side of the cut-off, effectively avoiding the wealth tax. Furthermore, crucial to our analysis is that individual risk aversion can be displayed through portfolio allocation choices. Our thesis contributes to existing wealth tax literature by investigating an aspect of behavioural responses which is not extensively covered empirically. Utilising asset ratios, we also provide insight on individual portfolio composition in relation to the policy.

1.1 Literature Review

As with all taxes, the wealth tax is expected to distort behaviour, causing changes in the allocation of resources that may lead to efficiency losses (Zimmer, 2012). It is therefore interesting to examine the literature on the behavioural effects of personal wealth taxes, which is limited despite the recent increase in academic interest. The literature has mainly focused on the wealth tax's effect on taxable wealth and savings, highlighting concerns with misreporting. In the following we will provide a brief summary of the relevant literature from developed countries.

Seim (2017) investigates behavioural effects of wealth taxation in Sweden by exploiting changes in the wealth tax threshold from 2000 to 2006. The tax system enabled strategic adaptation to wealth taxes through asymmetry in the valuation of assets and self-reported values for certain assets. The evidence suggests that individuals pursue avoidance rather than real responses to the wealth tax, as there is significant bunching below the threshold. This is supported by Duràn-Cabré et al. (2019), who use tax return data from the Catalan Tax Agency from 2011 to 2015 to analyse behavioural responses to the reintroduction of wealth taxes in Spain. They estimate that a 0.1 percentage point increase in the average wealth tax rate gave a reduction in taxable wealth of 3.24 percent over the four-year period. The findings suggest that avoidance is preferred, with no evidence of significant real responses, and a tendency that individuals changed their wealth composition towards tax-exempted assets.

Brülhart et al. (2022) exploit inter-cantonal variation in wealth tax rates in Switzerland, finding that taxable wealth is highly responsive to wealth taxation. They estimate that a 1 percentage drop in a canton's wealth tax rate increases taxable wealth by about 43 percent after 6 years. They find no substantial contribution from real responses to the effect, suggesting considerable evasion responses. It is worth noting that financial wealth in the Swiss administrative data is self-reported. Jakobsen et al. (2020) obtain similar results when investigating behavioural responses to wealth taxation from the 1989 tax reliefs in Denmark. They find positive effects on taxable wealth after eight years, respectively 19% for the moderately wealthy and 31% for the very wealthy. The mechanical effect of increasing after-tax rates of return amounts to one-tenth and one-fifth of the total effect for the moderately and very wealthy. Even though most assets were third-party reported, the remaining effects include avoidance and evasion responses. There is thus limited evidence for the estimated effects coming from changes in household saving behaviour, i.e., real responses.

Other studies have offered conflicting results for the effects on savings. In his paper using Norwegian data, Ring (2021) finds that wealth taxation has a positive effect on household savings, driven in large by increased labour earnings, suggesting that the income effect dominates the substitution effect. However, he finds no evidence of an impact on portfolio allocation (measured in the share of financial wealth placed in the stock market) from wealth taxation. This is supported by Bruer-Skarsbø (2015), who finds no evidence that the wealth tax discourages savings in Norway. Zoutman's (2018) findings point in the opposite direction. He uses a tax reform in Netherlands from 2001 as the basis for estimating the behavioural effect of changes in the after-tax rate of return on savings. He estimates that a 0.1 percentage increase in the wealth tax (which was at 1.2 percent) reduces household saving by 1.38 percent.

Berzins et al. (2022) examine the responses to the wealth tax by Norwegian households that own firms. They find that the negative shock in household liquidity due to the wealth tax has negative effects on the firm's liquidity. An increase in the wealth tax leads to higher payments to the owners, resulting in less cash holdings, investment, and performance in the companies. In contrast, Bjørneby et al. (2020) argue that the Norwegian wealth tax does not impair investments and employment in firms controlled by households. In fact, they find a positive causal relationship between the size of the wealth tax payments and succeeding employment growth in household firms. They suggest that it could be explained by households being able to reduce their taxable wealth by investing in unlisted companies.

With a theoretical approach, Bjerksund and Schjelderup (2019) investigate whether the wealth tax imposes a disadvantage on domestic investors when investing in shares. Assuming perfect capital markets, they challenge a claim stating that the wealth tax-exempt foreign investor would have a higher willingness to pay for a company's share. They prove that the domestic investor lowers his discount rate to the point where the two investors value the company's share at the same present value. This suggests that the wealth tax should not impair an investors appetite for risk, when juxtaposing the foreign investor with a Norwegian investor below the wealth tax threshold.

The review indicates that there is no consensus on the behavioural responses to a personal wealth tax, but avoidance or evasion measures seems to be preferred to real responses. As Seim (2017) points out, limiting the opportunities for evasion could give different results. Therefore, using Norwegian administrative data is beneficial, as assets are largely third-party reported. Additionally, examining households near the wealth tax threshold removes uncertainty regarding evasion, as this is primarily an issue for households in the top 1% of the wealth distribution (Alstadsæter et al., 2019). Our thesis aims to contribute to the existing literature by investigating whether the decrease in the rate of return on savings caused by the wealth tax affects risk taking behaviour. If wealth taxes discouraged risk taking, the potential effects on investments and the capital stock could be cause for concern.

2. The Norwegian Wealth Tax

This section presents an overview of the Norwegian wealth tax, including its design and the rationale for preserving it. It is important to understand the institutional context in order to evaluate how the wealth tax affects individual behaviour, which is the objective of our thesis. We consequently consider the changes in regulation for the period under study. Finally, we examine important characteristics of the wealth tax policy and discuss wealth taxation internationally.

2.1 Economic and Political Rationale

International trends suggest that the number of countries levying a wealth tax is decreasing, but Norway still advocates for the tax despite the controversy. Historically, wealth taxation was supported by an idea that income from personal wealth was a more taxable revenue stream compared to labour income, which could fluctuate substantially based on age, time, profession, and employability (Zimmer, 2012). Taxing personal wealth was thus regarded as the more reliable alternative. These arguments have since been dismissed with the introduction of modern labour laws and pension schemes (Zimmer, 2012). The current wealth tax is therefore based on other principles.

Fundamentally, taxes are a source of income both at the state- and regional level. Contemporary tax systems pursue objectives beyond providing funds for government expenditure, with redistribution being one of them (Stoilova, 2017). The Norwegian government emphasize this function when justifying wealth taxation, stating that the most well-endowed should carry a larger share of the burden (Norwegian Government, 2021). The wealth tax's progressive function is constructed by taxing only the net wealth above a threshold. Statistics show that individuals with higher personal wealth tend to earn more on average, supporting the redistributive objective (Zimmer, 2012).

The wealth tax also carries a channelling function, directing funds to assets that are deemed to provide the greatest return to society (Stortinget, 2021). This function is reflected in the valuation rules based on asset classes, which rational investors should consider when deciding where to allocate their wealth. Another argument is related to efficiency, as any tax assumedly involves an efficiency loss from the macroeconomic optimum allocation (Zimmer, 2012). The wealth tax can thus be a method of spreading the costs of taxation over multiple policies, potentially reducing the overall efficiency loss associated with taxation. By taxing wealth in addition to other sources of income, the rate for other sources of taxation can be lowered for a given level of tax revenue.

2.2 Definitions and Rules

The Norwegian Tax Act Chapter 4 regulates the wealth tax. According to § 4-1, the basis for taxable wealth is determined at 1. January of the assessment year, based on an individual's assets less his/her debt (Lovdata, u.d). The assessment year is the year succeeding the tax year, during which the tax is determined. All assets and debt of economic value is to be considered. The calculation of taxable wealth can be expressed by the following formula provided by Ring (2021).

$$wtax_{i,t} = \tau_t\left(TNW_{i,t} - Treshold_t\right)\mathbf{1}[TNW_{i,t} > Treshold_t]$$

In the formula, *wtax* indicates the wealth tax incurred for year t, which is due in the tax assessment year. τ_t denotes the tax rate for the given period, which is multiplied by the amount of taxable net wealth (*TNW)* above the threshold for wealth taxation. Any amount under the threshold is not subject to the wealth tax.

Valuation Rules

The wealth tax's channelling function is manifested through the valuation rules for the different asset classes. The Norwegian Tax Act states that assets should be valued according to their market value. However, it does not define methods for obtaining market values, causing various methods to be relevant for this matter (Zimmer, 2012). Most common is pricing an asset according to the trading price in an active market. Alternatively, the price of similar assets can be used as a proxy. For assets traded at a limited volume, evaluation based on future returns may be applied. Once the market value of an asset has been determined, it may be subject to a valuation discount. In the following, we will cover valuation rules for certain asset classes, as well as some important exceptions.

Property & Housing

Traditionally, there was no valuation discount applied to property. However, over time the inconsistency between actual market values and valuation practices became so significant that the Norwegian government addressed the need to alter the valuation practices (Zimmer, 2012). § 4-10 in the Norwegian Tax Act outlines the valuation practices.

A primary dwelling is defined as residential property on the Norwegian mainland where the tax subjects have their registered address (The Norwegian Tax Administration, n.d.-c). The presumed market value of primary housing is calculated by multiplying the total plot area of the residence by a specified rate. This rate is determined by the type of residence, the building year, size, and location. The Norwegian Tax Administration publish these rates on a yearly basis using calculations conducted by Statistics Norway (Lovdata, u.d). Secondary dwellings are covered by § 4-10 (3) in the Norwegian Tax Act. A secondary dwelling is defined as property that cannot be characterized as a primary dwelling or a holiday home. The market value of a secondary dwelling is established in the same manner as for primary residences.

Commercial property includes office premises, storage, production, parking, undeveloped land, and holiday homes that are rented out (The Norwegian Tax Administration, n.d.-c). There are exceptions not covered by the definition of commercial property, namely power generation facilities, agricultural property, forestry, and residential properties. Since 2009, commercial property has been valued according to the rental value, which is calculated based on the average revenue from rent for the previous three years (Zimmer, 2012). The aggregated value is then subtracted by the owner's cost for the property, which is typically 10% of the average rental revenue (Norwegian Ministry of Finance, 2009). Unrented commercial property is valued using the same principles that apply for housing.

Shares

Shares are classified as either publicly traded or unlisted. Publicly traded stocks are according to §4-12(1) currently valued according to the trading price at 1. January in the assessment year (Lovdata, u.d). The valuation of unlisted shares has been subject to debate because the valuation practice is considered complicated. Furthermore, the government have for some periods subsidized family-owned businesses, which are often unlisted (Zimmer, 2012). Unlisted shares are valued at 1. January in the year prior to the assessment year due to a lengthy valuation process. However, they are valued in the assessment year if the company has raised or withdrawn equity. Changes to the capital base will therefore accelerate the valuation process (Zimmer, 2012). The company's wealth is computed similarly to an individuals' wealth, utilizing the book value of assets minus debt. In practice, unlisted shares are often undervalued compared to listed shares, due to intangible assets like goodwill being excluded from the basis of calculation.

Shares listed abroad are valued according to the same principles used for shares listed in Norway. For unlisted shares abroad, the rules differ from domestic shares; they are valued at the sales price at 1. January during the assessment year (Lovdata, u.d). Finding the sales value is often complicated, and the Norwegian shareholder is obliged to provide the necessary information for the process (Zimmer, 2012). Foreign unlisted shares are frequently valued higher than Norwegian shares due to differing valuation practices. For instance, the taxable value will reflect a company's goodwill for foreign unlisted shares.

Debt

Debt is deducted from taxable assets at 1. January in the assessment year, forming the basis for net taxable wealth. The origin or whether the debt is interesting bearing is considered irrelevant (KPMG, 2017). Debt includes every legal commitment the individual has to another party, both monetary and of monetary value. All debt is deductible, except for debt associated with foreign assets that are exempt from taxation in Norway following an agreement with a foreign state. Between 2009 and 2016, all debt was deductible at face value.

2.3 The Wealth Tax From 2009-2016

In the period relevant to our analysis, the wealth tax in Norway featured a decreasing tax rate and a nearly tripling threshold, as shown in Table 1 (The Norwegian Tax Administration, 2022). These changes in regulation are vital to our investigation of the tax's behavioural effects, as they could dictate mechanisms in our data. In isolation, the lower tax rate reduces the negative impact on the rate of return on savings, and the higher threshold add to this by lowering the effective tax rate. This development in the regulation therefore reduces the relative burden of the tax for individuals in the segment that we are analysing.

	Threshold (in NOK)	Threshold for wedded couples (in NOK)	τ_t $(tax\ rate)$
2009	470 000	940 000	1.10 %
2010	700 000	1 400 000	1.10 %
2011	700 000	1 400 000	1.10 %
2012	750 000	1 500 000	1.10 %
2013	870 000	1 740 000	1.10 %
2014	1 000 000	2 000 000	1.00 %
2015	1 200 000	2 400 000	0.85 %
2016	1 400 000	2 800 000	0.85 %

Table 1. Wealth tax rates and thresholds, 2009-2016.

However, the taxable valuation of assets was also subject to changes in the period. Table 2 features the valuation for selected asset classes year-by-year, using information retrieved from Bjørneby et al. (2020). First, we will clarify the terminology. PY refers to an adjustment in value from the previous year, and MV refers to the percentage of the established market value (Bjørneby et al., 2020). If the PY is 10, the taxable value from the previous year is increased by 10 percent. For assets valued with the PY term, the initial value is based on historical costs.

For 2009, the valuation of property increased by the upward adjustment set by the government. Primary housing subsequently received a discount of 75% of the market value for the remaining period. The valuation of secondary housing was tightened from 2010; an increasing share of the market value was applied in continuation. For leisure housing, an initial value of maximum 30% of historical costs was applied, then adjusted according to the upward adjustment (The Norwegian Tax Administration, n.d.-b). Commercial property, owned directly by an individual as part of commercial activities, was initially valued in two ways. (Bjørneby et al., 2020). For property rented out, 40% of the market value was applied, and for unrented property the valuation was increased by 60% of the previous year. The asset class was later valued with an increasing share of market values. Listed and unlisted shares received no discounts in the period.

Year	Primary Home	Leisure Home	Secondary Home	Commercial Property	Shares
2009	PY: 10	PY: 10	PY: 10	PY: 60/ MV: 40	MV: 100
2010	MV: 25	PY: 10	MV: 40	MV: 40	MV: 100
2011	MV: 25	PY: 0	MV: 40	MV: 40	MV: 100
2012	MV: 25	PY: 10	MV: 40	MV: 40	MV: 100
2013	MV: 25	PY: 0	MV: 50	MV: 50	MV: 100
2014	MV: 25	PY: 10	MV: 60	MV: 60	MV: 100
2015	MV: 25	PY: 0	MV: 70	MV: 70	MV: 100
2016	MV: 25	PY: 0	MV: 80	MV: 80	MV: 100

Table 2. Valuation rules for selected asset classes, 2009-2016.

In the next section, we will examine how the regulation of the wealth tax materialized in the period. Specifically, in terms of the wealth tax burden on individuals in proximity of the wealth tax threshold. Tax rates and thresholds suggest lower wealth tax liabilities, but regulation in valuation led to increasing shares of market values being applied, leaving the combined effect unclear.

2.4 Characteristics of Wealth Taxation in Norway

In this section, we will discuss key characteristics of wealth taxation in Norway. These characteristics could prove influential to our analysis on individual risk taking behaviour. We will also examine how the regulation in the period 2009-2016 affected the volume of individuals subject to the wealth tax, the tax liability of these, and the share of total tax revenue.

Wealth Composition

Figure 1 illustrates the composition of wealth for 2009, giving an impression of the portfolio compositions for the households of interest. It displays the average proportions of real capital, financial capital, and debt by net wealth deciles. The figure reveals that households in the top decile tend to hold a much higher proportion of financial capital. In fact, financial wealth accounted for more than 70% of gross wealth for the top 1% households (Epland & Kirkeberg, 2012). Furthermore, about 92% of assets related to shares was held by the top decile as of 2018, demonstrating the skewed concentration of financial wealth (Thoresen et al., 2021). The households in the lower deciles mostly do not own share-related assets. The nation-wide financial to gross wealth ratio was 28% in 2009.

In line with the distribution of financial wealth, the proportion of financial wealth is substantially lower for households closer to the threshold. The proportion is increasing, but still constitutes a small component until the last decile. Real capital, such as housing, makes up the largest proportion of gross wealth, with about 65% of national gross wealth invested in primary housing. This share is larger for deciles around the wealth tax threshold. Changes in the portfolio allocation in relation to the wealth tax is thus expected to be small, as making larger changes in the basis for real capital would be timely and demand effort. The portfolio compositions could also reflect the tax-favoured nature of housing.

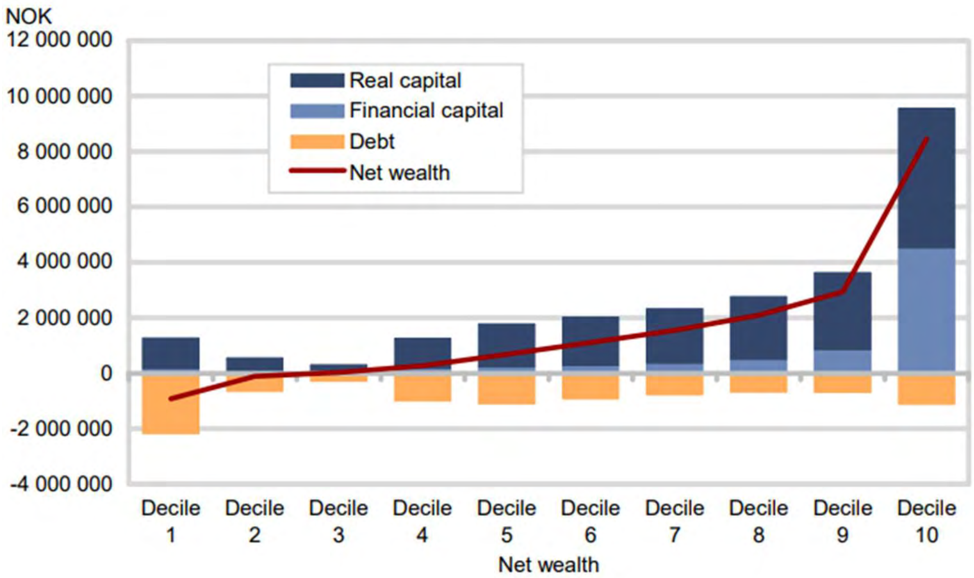

Figure 1. Average net wealth, real capital, financial capital, and debt for Norwegian households by net wealth deciles in 2009. From "Wealth Distribution in Norway: Evidence from a New Register-Based Data Source," by Epland & Kirkeberg, 2012. Copyright 2012 Statistics Norway.

Concerning debt, the average share of gross wealth for all households was 37 percent, with this figure decreasing as we approach the top decile. It is worth noting that the debt level for Norwegian households is one of the highest in Europe (Balestra & Tonkin, 2018). In recent years, the wealth distribution has not changed significantly, but the share of debt has dropped to 33 percent whilst the share of financial capital has increased to 32.7% percent as of 2020 (Statistics Norway, 2022).

Taxable Wealth Versus Market Wealth

As discussed in the section on valuation rules, several asset classes receive discounts in the taxable valuation, particularly primary dwellings. Figure 2 showcases the ratio of taxable wealth to market wealth reported to the Norwegian Tax Administration from 2009 until 2018. We observe a ratio in the interval of 15-30%, which is of consequence for the accuracy of our total wealth estimates. This is because our data set only contains information on taxable net wealth as opposed to real total wealth per individual.

There is a sharp increase in the ratio from 2009 to 2010, which could be attributed to changes in the valuation rules, making the wealth tax more reliant on market-based values. The total market wealth increased year-by-year, with a more fluctuating ratio of taxable wealth to market wealth. In the time-frame relevant to our thesis, the taxable wealth to market ratio went from about 17% in 2009 to almost 30% in 2016. Such an increase would suggest that individuals were subject to wealth taxation for an increasing part of their portfolio. This would theoretically increase their effective tax rate.

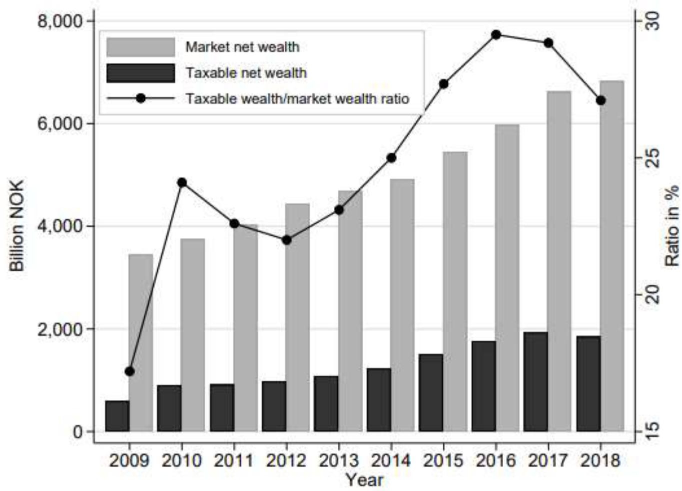

Figure 2. Taxable net wealth, market net wealth and the ratio between them, 2009-2018. From "A wealth tax at work," by Thoresen et al., 2021. Copyright 2021 Statistics Norway.

It is consequently interesting to examine whether the increase in the taxable wealth to market wealth ratio for wealth tax subjects have affected risk taking behaviour. As previously discussed, changes in the threshold and tax rate, had the opposite effect in the period. At the same time, holding shares may have become relatively more attractive in relation to the wealth tax as the increase in the ratio of taxable wealth to market wealth is caused by a tightening in the valuation of other asset classes.

The Income Generated by the Wealth Tax

Norway's tax-to-GDP ratio has for the recent decades been higher than the OECD average (OECD, 2022). Despite having a high level of taxation, the wealth tax comprises only a small share of the country's total tax revenue. The changes in regulation from 2009 until 2016 had no substantial effect on this share, which ranged in the interval of 1.09% to 1.19%. Figure 3 illustrates the ratio of income from wealth taxation to total tax revenue from 2000 to 2020.

The number of taxpayers is a key factor to the income generated from the wealth tax. In recent years, the number of individuals subject to the wealth tax has decreased, resulting in a smaller base of taxpayers (Thoresen et al., 2021). Despite this decrease, the share of total tax revenue from the wealth tax remains relatively stable. This implies that fewer people on average pay a larger amount of taxes. This aligns with the observed relationship between taxable and market wealth, suggesting that the wealth tax has become more progressive. This feature is interesting to consider when evaluating the behavioural responses to the wealth tax, as the tax burden on individuals that we are analysing above the threshold might have increased.

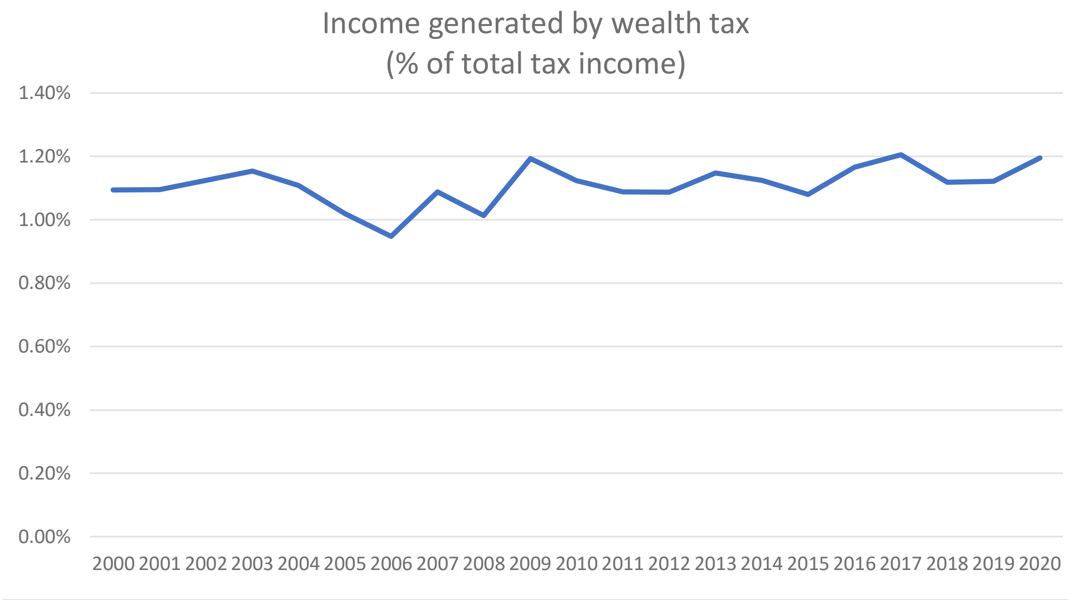

Figure 3. The share of total tax revenue generated by the wealth tax, 2000-2020.

Wealth Taxes Paid by Income Categories

The wealth tax is a supplement to the personal income tax. It can be useful to classify wealth taxes paid by income tax thresholds, as fewer and wealthier people were subject to the wealth tax in our relevant time frame. This is exhibited in Figure 4, with income tax thresholds for the bracket tax on the horizontal axis. The bracket tax is applied to personal income from labour, sole proprietorships, and pensions. It is a gross tax, which means that it is generally not eligible for deductions (The Norwegian Tax Administration, n.d.-a).

Consistent with the redistributive intentions of the wealth tax, the highest earners pay the highest amount of wealth tax on average. However, it is interesting to note that individuals in two lowest income categories (those earning between NOK 0-99 999) are on average subject to larger wealth taxes than those in the middle income-brackets (those earning between NOK 100 000 and NOK 749 999). This could be explained by some of the richest individuals relying on dividends rather than labour income. Public tax records from 2013 show that more than 10 % of the 500 individuals with the highest net wealth had a taxable income of 0 (Sættem et al., 2014). The importance of the wealth tax is thus bolstered, as some of the wealthiest individuals are not subject to income taxation. Overall, the data appears to show a progressive trend in wealth taxes paid according to income, indicating that the wealth tax is achieving its intended purpose.

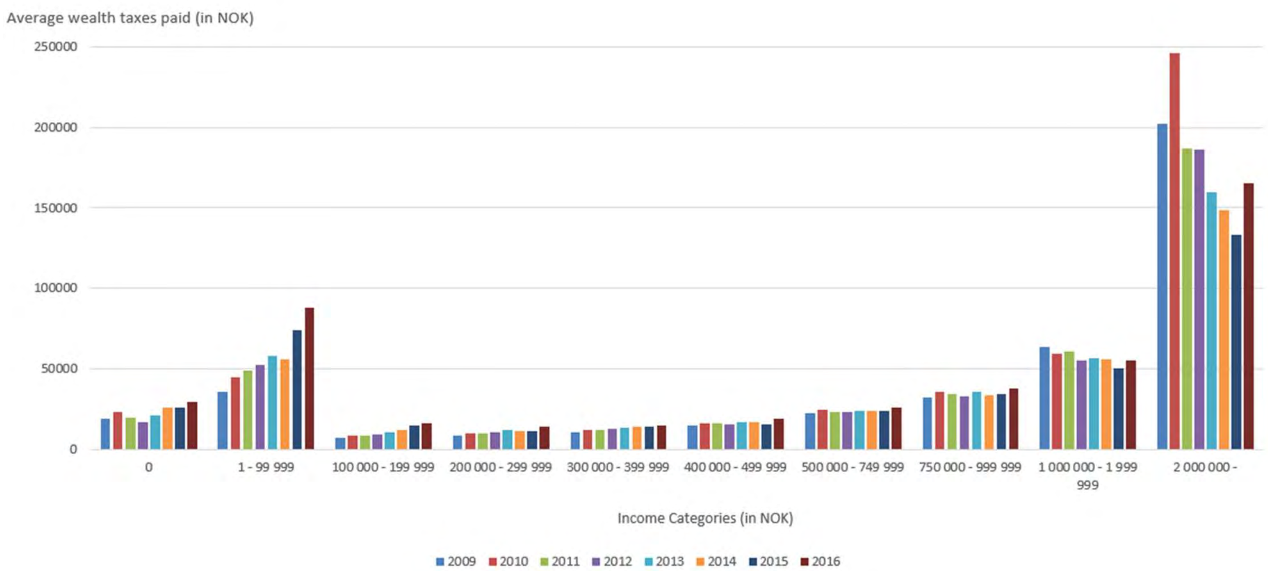

Figure 4. Average wealth taxes paid by income brackets, 2009-2016. From "Tax for personal tax payers", u.d. Copyright Statistics Norway.

2.5 The Wealth Tax Internationally

According to the OECD Wealth Distribution Database, more than half of total net wealth is held by the richest 10% in the OECD, representing a more uneven distribution of wealth than that of income (Balestra & Tonkin, 2018). The skewness in the wealth distribution has increased for the past decades, with evidence suggesting that high inequality weakens economic growth as well as social mobility (Keeley, 2015). In fact, the wealth-to-income ratio in developed countries has also increased, fuelling interest in capital taxation (Piketty & Zucman, 2014).

Despite this trend, we are seeing a shift away from wealth taxation. From a peak of twelve countries in 1990, only four still applied a wealth tax in 2017: France, Spain, Switzerland, and Norway (OECD, 2018). However, the French wealth tax was altered to concern only real property (Bunn, 2022). The main justifications for repealing the wealth tax have been economic effectivity, concerns with capital flight, and the wealth taxes not achieving their redistributive objectives (OECD, 2018).

The limited share of tax revenues raised by wealth taxes could also be deciding when policymakers opt to abolish the wealth tax. Figure 5 shows the share for OECD countries still levying a wealth as of 2016. Switzerland stands out by having a low threshold and a broad tax base, making more households exposed to the wealth tax. It is worth mentioning that a tax on net wealth is only one way to impose capital taxation. In fact, in terms of total tax revenue from property taxation (for instance financial transactions, immovable property, wealth, and inheritance), Norway is found below the median OECD country (OECD, 2018).

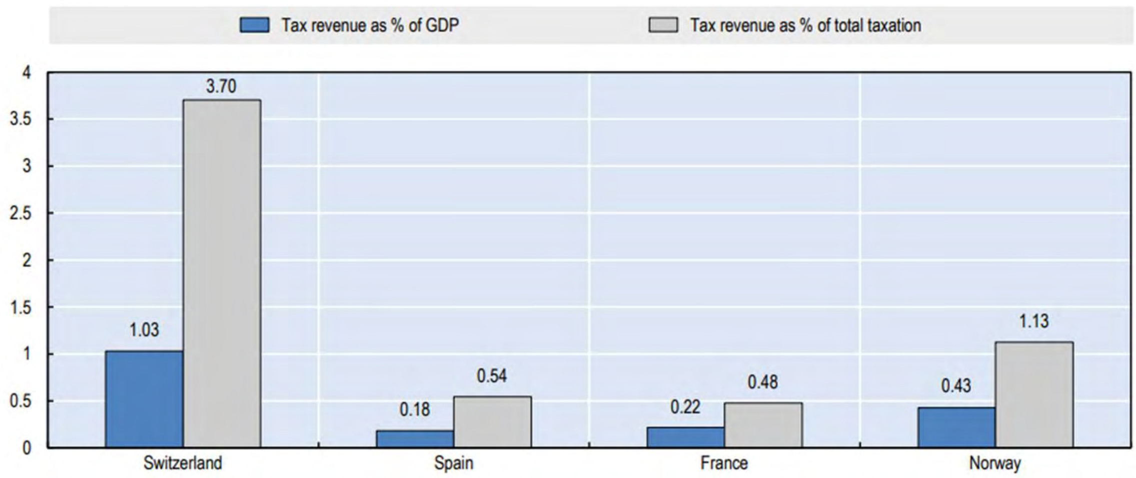

Figure 5. Wealth tax revenues in OECD countries, 2016. From "The Role and Design of Net Wealth Taxes in the OECD," by OECD, 2018. Copyright 2018 OECD Revenue Statistics Database.

Being one of few countries still opting for a wealth tax, Norway is an interesting case study. We have previously identified the redistributive effects of wealth taxation. Additionally, evidence suggests that capital flight is mainly an issue for the very wealthiest individuals (Alstadsæter et al., 2019). This leaves economic efficiency as the subject to be examined. Ring

(2021) suggests that the wealth tax does not distort savings. The stage is therefore set for further investigating the potential efficiency costs, such as whether the wealth tax discourages risk taking.

3. Theoretical Framework

This thesis aims to deepen the understanding of the behavioural effects of the Norwegian wealth tax by studying risk taking. It is therefore important to discuss the definition of risk, how individuals consider risk in decision-making, and which measures for risk taking we will be applying. In addition, we will consider the economic effect of a wealth tax on the rate of return and analyse the potential impact on individual risk taking. For this purpose, we will introduce Stiglitz's (1969, as cited in Sandmo, 1985) framework with one risky and one risk-free asset. Finally, we will include an explanation of the incentives created by the Norwegian tax system in terms of asymmetry in the valuation of asset classes.

3.1 Risk

The concept of risk is a central part of this thesis. It is therefore appropriate to introduce the underlying definition of risk that will be employing. We will rely on Rosa's (1998) definition of risk: a situation or event where something of human value is at stake, with an uncertain outcome. It is compatible with the standard definition from the technical literature that risk is the probability of an event multiplied by the consequence, where p is the probability and can be found in the range $0 < p < 1$ for each possible outcome.

Risk and Portfolio Composition

The literature has often considered risk taking in relation to the expected utility framework. Decisions under uncertainty had a breakthrough with Swiss mathematician Daniel Bernoulli (1738, as cited in Eeckhoudt et al., 2005). He highlighted that agents would value a lottery with a given expected value differently, such that the mathematical expression would not appropriately measure the experienced value. The relationship between the expected and experienced value is expressed in the utility function U; for each level of wealth, x, the function gives the level of utility $U(x)$. The utility function represents the subjective value to an agent, but is assumed to satisfy some rational conditions. Utility should increase in wealth, and Bernoulli (1738, as cited in Eeckhoudt et al., 2005) also argued for the concavity of the function. This means that the marginal utility $U'(x)$ is decreasing with x, giving a negative second derivative.

The assumption that marginal utility decreases with wealth introduces a central term to decision-making under risk: risk aversion. Risk aversion is a preference for the expected payoff of a lottery with certainty, rather than taking part in the lottery (Eeckhoudt et al., 2005). The risk averse agent does not value an increase in wealth as much as he disfavours an equal decrease. This attribute favours diversification, lessening the importance of extreme events, increasing utility for a given expected value. An agent's risk aversion is determined by the shape of the utility function, which is the basis for decision-making (Weber et al., 2002). This is formally expressed as $\frac{-U''(x)}{U'(x)}$, where U' and U'' are notations for the first and second derivatives of the utility function U (Pratt, 1964; Arrow, 1971).

However, the literature has shown that the expected utility approach could give inconsistent utility functions (Weber et al., 2002). In addition, individuals and groups appear to change their risk attitudes depending on the context of decision-making. We still consider the expected utility framework useful due to the assumption of risk aversion. A risk averse agent prefers the expected value to the actual investment but can still engage in risk taking if the expected value is sufficient (Eeckhoudt et al., 2005). The certainty equivalent (CE) of a decision under uncertainty, is the sure amount that yields the same utility as having to face the risk. The amount exceeding the CE is known as the risk premium, which can be interpreted as the cost of risk. In finance, the risk premium is the compensation required for bearing systematic risk (Gagliardini, Ossola, & Scaillet, 2016). Assuming individuals are to some extent rational, they will demand a higher return for investing in a risky asset than for a safe asset.

The Measures for Risk Taking

Derived from the definition of risk, individual risk taking behaviour must involve placing some part of investable wealth in assets with uncertain returns. Several methods are commonly applied to measure financial risk, e.g., the variance, standard deviation, and covariance with the market portfolio. However, the level of detail in our data set leaves us somewhat limited regarding measures for risk taking. It contains taxable values of asset classes, but not information on e.g., which shares or mutual funds an individual owns. Having said that, we are not interested in measuring the volatility of the individuals' portfolios, but rather the willingness to invest in risky assets.

We use three different ratios to identify the effect of wealth taxation on risk taking: shares/total assets, debt/total assets, and deposits/total assets. Before elaborating on these measures, an explanation for excluding property from our measures for risk taking is appropriate. Property is not a risk-free asset class by definition due to fluctuating market values. However, primary dwellings are acquired for the consumption value as much as for investment purposes and are therefore left out of our analysis. This view is supported by Cohn et al. (1975) and Morin & Suarez (1983). We make the same assumption about leisure housing, and since we do not have information on the taxable values of secondary housing, property is considered risk-free in our analysis.

First, we use the ratio of shares to total assets. This measure allows us to see the effect of the wealth tax on the share of the portfolio invested in the asset with the assumed highest risk. Please note that we exclude unlisted shares due to valuation issues, as these are valued at book value and at such undervalued compared to listed shares. Unlisted shares are also less commonly held, as only 2.5 % of the observations in the data set contain this asset class. Bonds could also be considered when looking at risk willingness, but only 4.4 % of the observations from the data set contain bonds compared to about 19 % for listed shares. There is also a significant difference in the risk premiums of shares and bonds, and it therefore makes less sense to directly collocate shares and bonds for risk willingness measures (Norges Bank Investment Management, 2016).

Secondly, we use the ratio of debt to total assets. When looking at debt as a fraction of total assets, we can find the share of total assets that is financed by debt. Naturally, a large fraction of debt is allocated to mortgages on primary dwellings, which can be thought of as a consumption choice. The risk associated with debt is that instalments and interest must be paid regardless of the individual's cash flow. In a period with increasing interest rates, the liquidity of the debtholder will be constrained, forcing him/her to reduce consumption or savings. In addition, the wealth tax reduces an individual's liquidity, such that the relative burden of interest payments could increase. We expect debt to be decreasing with wealth, as we assume that housing consumption does not increase proportionally in wealth.

Finally, we examine the share of deposits to total assets. Holding a high proportion of deposits can be interpreted as being reluctant towards risk-taking, as it represents the most risk-free asset an individual can possess. Of course, holding some deposits is necessary for unexpected expenses and living costs. However, it is rational to assume that financial commitments do not increase proportionally in wealth, and that the ratio would decrease, or at least stay constant, if individuals became less risk averse when wealth increases.

3.2 Taxation and Risk Taking

The intuitive assumption might be that capital taxation diminishes risk taking. However, Domar and Musgrave (1944) proved that this is not necessarily the case. For the instance of capital gains taxation, the government usually takes part in the loss as well as the gain; individuals can deduct losses from their total tax bill. This way, the government shares part of the risk that would be borne by the individual in its entirety in a world without taxes. As a result, the combined effect on risk taking may even be positive.

When it comes to wealth taxation, the setting differs in the way that the government does not take part in the risk as a reduction in wealth does not exempt individuals from taxation (Sandmo, 1985). The wealth tax is not applied to changes in final wealth, but as a fraction of year-end wealth. The literature on portfolio choices and other effects of wealth taxation is less extensive than for capital gains taxation, but we will provide a framework by Stiglitz (1969, as cited in Sandmo, 1985).

In this model, investors base their preferences on a strictly concave utility function, U(Y), which relies on the probability distribution of the investor's wealth, Y (Sandmo, 1985). Investors can place their assets at the risk-free rate of return, r, and in a risky asset (notation a) that yields an uncertain rate of return x. We have a tax rate of τ, and initial wealth A. This gives the following equation for final wealth:

$$Y = (A(1 + r) + a(x - r))(1 - \tau)$$

The equation shows that changing the rate of taxation has the same effect as changing the initial level of wealth (Stiglitz, 1969). The effect of the wealth tax on the share of wealth invested in the risky asset is therefore subject to the relative risk aversion of the investor. From the equation above we have the following first-order condition for expected utility maximization (Sandmo, 1985):

$$E[U'(Y)(x-r)(1-\tau)] = 0$$

Differentiating with respect to τ:

$$\frac{\partial a}{\partial \tau} = \frac{1}{1-\tau} \frac{E[U''(Y)Y(x-r)]}{E[U''(Y)(x-r)^2(1-\tau)]}$$

We assume risk aversion, which means that the expression's denominator is negative. A further assumption is that the utility function has constant relative risk aversion, such that:

$$-\frac{U''(Y)Y}{U'(Y)} = \alpha \rightarrow U''(Y)Y = -\alpha U'(Y)$$

In the following, we can insert $-\alpha U'(Y)$ into the function $\frac{\partial a}{\partial \tau}$:

$$\frac{\partial a}{\partial \tau} = \frac{1}{1-\tau} \frac{-\alpha E[U'(Y)(x-r)]}{E[U''(Y)(x-r)^2(1-\tau)]} = 0,$$

We see from the last equation in our model that wealth taxation does not affect portfolio composition, and hence risk taking. However, it is uncertain whether constant relative risk aversion is a reasonable assumption. This would mean that the elasticity of the marginal utility does not change with the level of wealth. The takeaway from the model is that the effect of an increase in the wealth tax on the share held in risky assets is subject to the properties of the relative risk aversion. The predicted effect is therefore unclear, as it is unclear empirically whether one should assume that relative risk aversion is increasing, constant or decreasing (Sandmo, 1985).

The ambiguity of the effect on the risky share of an individual's portfolio is illustrated in Figure 6, using Stiglitz's (1969) figurative framework. He proposes a scenario where there are only two states of the world, denoted as Φ_1 and Φ_2. The investor allocates his wealth between the risky asset and the risk-free asset, with the maximum allocation for either asset denoted with T and S. The budget line ST presents the possible combinations of the two assets for an individual, and each axis shows the level of wealth, $W(\Phi_i)$, achieved in either state for any combination. Applying the expected utility framework, the preferred combination is given where the indifference curve (the blue lines) intercepts the budget line.

Now consider a scenario where wealth decreases, shifting the budget line towards the centre of the graph, generating the new budget line $S'T'$. As previously mentioned, this equates to the implementation of a wealth tax. This forms the basis for an Engel curve, showing the allocation before and after the wealth decrease. If we assume that the relative risk aversion is constant, we get the scenario on the left, leaving the shares invested in each asset unaffected.

We get different results when assuming that risk aversion is not constant for any level of wealth. With an increasing relative risk aversion, a larger share will be invested in the risky asset when the initial wealth level decreases, giving an Engel curve bending towards the risk-free asset. This is shown in the scenario in the middle. The opposite is true for an individual with a decreasing relative risk aversion, illustrated on the right. However, this is a theoretical approach, and as Stiglitz (1969) states, it should be challenged empirically.

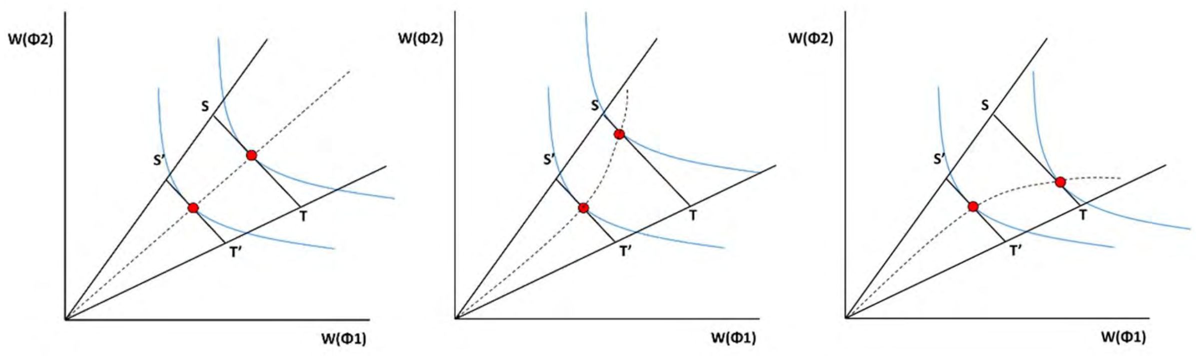

Figure 6. Changes in portfolio allocation for different relative risk aversions. From left to right: constant, increasing and decreasing relative risk aversion.

3.3 The Asymmetry in Valuation of Assets

It is important to note that the model we introduced above, based on the formula for final wealth Y, relies on an assumption that the assets face the same effective wealth tax-rate. It is necessary for the simplicity of the model but does not hold for the Norwegian wealth tax. Asset classes receive different tax treatments, being subject to separate valuation discounts for taxable wealth. The OECD (2012) provides a summary of the wealth tax treatment for the five asset classes most commonly held, which is shown in Table 3.

Asset class	Wealth taxation (exceeding the 2012 threshold of NOK 750 000)
Interest-bearing accounts	1.1 %
Shares	1.1 %
Owner-occupied housing (primary)	0.275 % (subject to a valuation discount of 75 %)
Rental housing (secondary)	0.44 % (subject to a valuation discount of 60 %)
Individual private (IPS) pensions	0%

Table 3. Effective wealth tax rates for selected asset classes, 2012. From "OECD Economic Surveys: Norway 2012", by OECD, 2012. Copyright 2012 OECD.

We see that housing, especially primary dwellings, is particularly favoured. IPS pensions are completely exempt from the wealth tax base, whilst shares and interest-bearing accounts are included at market value. Valuation rules provide another dimension for investors in their portfolio composition; interest-bearing accounts and shares are made less attractive relative to housing and pensions when considering their taxable values. Interesting to note is also the fact that individuals looking to invest in shares, would reduce their taxes by doing so through an IPS account for at least a part of the investment. An individual could thus invest in risky assets within the yearly limit of NOK 15 000 and reduce wealth tax payments in the process (The Norwegian Tax Administration., n.d.-d).

The differing effective tax rates illustrate how the wealth tax deviates from the concept of neutrality. Above, we assumed that the properties of relative risk aversion would decide the risky share of an individual's portfolio, but the asymmetry of the wealth tax system may also have some impact. Individual portfolio allocation could be affected such that we observe those in proximity of (but above) the wealth tax threshold increasing their share of a tax favoured asset. Initially, we expected individuals to invest more in risky assets as wealth increases, due to an increase in investable wealth, because we do not expect housing consumption to rise proportionally in wealth. However, the incentives provided by the wealth tax leave our expectations unclear towards the combined effect.

4. Data

The following chapter will describe the contents and alterations of the data set at our disposal. We will further elaborate on our choice of control variables and provide some descriptive statistics for the sample observations that we have applied in the analysis.

4.1 Contents of the Data Set

Our thesis uses individual tax return data from the Norwegian Tax Administration. The data set is provided by the Norwegian Centre of Taxation (NoCeT) at the Norwegian School of Economics. It is composed as panel data, with 26 variables containing information about each individual in the period 2009-2016. Each value is stated in 10 000 NOK and there are no decimals.

The design of the data allows us to measure behavioural effects as each individuals' unobserved characteristics can be assessed through year-to-year observations. The individuals are assigned individual ID-numbers to replace their names for the purpose of anonymity. As there are specific taxation rules for married couples, each couple is paired through spouse-specific ID-numbers. We are therefore able to analyse the behavioural effects for couples as well as singles.

A tax return contains information about income, deductions, wealth holdings and debt. It is pre-filled using primarily third-party information from banks, insurance companies, employers et cetera, and individuals are held accountable for information in the tax return (Altinn, u.d.). After an individual has accepted the pre-filled tax return, it is controlled by the Norwegian Tax Administration. The fact that individuals do not initially report wealth holdings themselves makes the data less exposed to misreporting.

The level of detail of the information in the data set is quite extensive. In addition to a variable on net wealth, we have information about the taxable wealth- values for primary housing, leisure housing, non-listed and listed shares, deposits etc. This allows us to investigate the effects of the wealth tax on portfolio allocation. The value reported for certain types of assets is subject to deduction from valuation discounts; the values in our data set are reported post-valuation discounting.

4.2 Sample Selection

The initial data set was altered prior to us getting access, due to anonymity considerations. Individuals with a reported net wealth above 5 million NOK and those with incomes exceeding 1.5 million NOK were removed. These account for respectively 1.5 and 0.5 percent of the initial sample. This left us with 31 804 386 observations on 26 variables for the eight-year period.

For simplicity purposes, we removed irrelevant variables and observations. We started by excluding missing values and individuals with a net wealth below 10 000 NOK, because we are primarily interested in the population close to the net wealth threshold. Moreover, as there are no decimals, this is effectively the lowest threshold for variables describing portfolio allocation. After considering all the variables present in the data set, we end up with the ones in table 4 below.

To narrow the scope of our analysis we remove observations for married couples. Our aim is to measure the relative fund allocation on either side of the threshold. We thus need variables capturing the individual share invested into each asset class. This estimation primarily faces two concerns. 1) The portfolios presented in the dataset have been distorted by valuation rules based on year and asset class. 2) There is no variable representing a natural denominator in our data. We solve these challenges by creating new variables reversing favourable asset valuation. Referring to the earlier section on valuation of assets, this process is complicated. We reverse all market value-based valuations by dividing the number stated by the corresponding discount. Unfortunately, we are unable to alter assets utilizing yearly adjustments, as we have no information describing the initial valuation. This is especially detrimental for the year 2009, for which this valuation practice dominates.

Furthermore, the variable for leisure housing cannot be sufficiently reversed, as this asset class has continued to be valued according to a yearly adjustment. We create a proxy for total assets based on combining the adjusted asset variables. Our relevant outcome variables are then constructed by dividing listed stocks, debt, and deposits by our proxy. As the numerator does not receive any beneficial valuation, these numbers are unadjusted. Summary statistics for the full initial sample is provided in Table 4. Summary statistics for each year is located in the appendix, which also provides descriptive features on the constructed variables. Additionally, we have attached a figure showing average net wealth by year, displaying an increase in net wealth levels. Lastly, a set of histograms showing the number of observations for different levels of net wealth in each year is included. These visual representations of the sample are also located in the appendix (Figure A1).

	N	Mean	St. Dev	Min	Ma
Age in 2015	31 804 386	50.258	19.03	20	14
Taxable value of primary housing	31 804 386	29.874	43.905	-124	4 68
Taxable value of leisure housing	31 804 386	1.653	7.323	-2	1 50
Taxable value of foreign housing	31 804 386	0.362	4.958	0	2 50
Taxable value of unlisted shares	31 804 386	1.847	17.588	-120	6 16
Cash holdings	31 804 386	0.006	0.524	-23	57
Taxable value of debt	31 804 386	235.779	235.779	-339	1 183 50
Taxable net wealth	31 804 386	235.709	235.709	-1 183 500	50
Taxable value of listed shares	31 804 386	12.178	12.178	-50	3 57
Taxable value of bond holdings	31 804 386	4.237	4.237	-4	2 38
Bank deposits	31 804 386	36.431	36.431	-746	6 29
Taxable value of pension	31 804 386	0.716	6.526	-813	2 00
Taxable value of moveables	31 804 386	3.03	8.966	-74	2 22
Taxable value of business assets	31 804 386	25.014	25.014	-813	10 06

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table 4. Summary statistics for the full sample.

5. Methodology

This section covers the econometric model developed for our thesis. We mainly utilize a regression discontinuity design, exploiting net wealth thresholds in our data. We will therefore first introduce the RD design, before covering the identifying assumptions in the context of the Norwegian wealth tax. Lastly, we present our model and discuss some of the choices made regarding the estimations.

5.1 The Regression Discontinuity Design

The regression discontinuity design (RDD) has risen into prominence over the past 20 years. Thistlethwaite and Campbell (1960) first introduced the method, highlighting the benefits of the approach in their article in the Journal of Educational Psychology (Cunningham, 2021). The recent increase is partly propelled by the method's ability to convincingly deal with selection bias by using arbitral thresholds. Furthermore, the underlying assumptions are perceived by many as more practical for evaluation and acceptance, culminating in a research design deemed as highly credible for observational data (Cunningham, 2021).

The regression discontinuity design is centred around the concept of a continuous running variable, called the assignment variable S_i (Van der Klaauw, 2014). As the name suggests, the assignment variable assigns units into a treatment group D_i, which is based on a cut-off or a threshold $\bar{S}$ (Cunningham, 2021). When the assignment variable crosses $\bar{S}$, the probability of an individual receiving treatment increases. Alternatively, any values of S_i under the given threshold decreases the likelihood of treatment. Sometimes the probability increases from zero to one, $D_i = 1\ (S_i \geq \bar{S})$, called a "sharp" RDD. For example, any driver caught driving over a certain speed will get a fine, whereas those driving below this fictional speed threshold will not.

Traditional econometric methods are often based on dividing the population into a test- and control group, estimating differences in expected outcomes for the two groups for a given value of S_i (Cunningham, 2021). For the RDD, such an estimation is impossible as there are no subjects in both the treatment group and the control group for the same level of S_i. The allocation of units into test/ control is dictated by the cut-off value of S_i (Cunningham, 2021).

However as $S_i \to \bar{\bar{S}}$ in the limit, the treatment and control overlap at the cut-off, identifying the average treatment effect for the sub population. The treatment effect can thus be measured at the threshold, constituting the marginal treatment effect (Van der Klaauw, 2014). This is written more formally as:

$$MTE(\bar{S}) = \lim_{s \downarrow \bar{S}} E[Y \,|\, S = s] - \lim_{s \uparrow \bar{S}} E[Y|S = s]$$

A visual presentation of the RDD might provide insight for further elaboration on the method. Machin et al. (2011) investigates the crime-reducing effects of education, utilizing an increase in the years of compulsory schooling in the UK. In Figure 7, the cut-off is indicated by year of birth, meaning that individuals born after 1958 receive an additional year of education compared to earlier generations. The Y axis displays the male conviction-rate per 1000 individuals. The curves illustrate the polynomial fit for both sides of the threshold; the shaded area show the 95 % confidence interval (Machin et al., 2011). It is interesting to note the negative "jump" at the cut off, suggesting a lower probability of crime after prolonging education by one year.

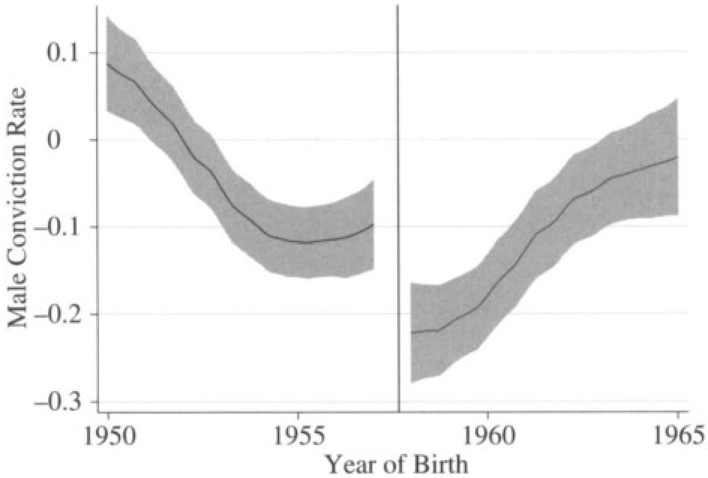

Figure 7. Example: Crime discontinuities for the year of birth of the UK male population. From "The Crime Reducing Effect of Education," by Machin et al., 2011. Copyright 2011 Royal Economic Society.

5.2 Identifying Assumptions

The identifying assumption of the regression discontinuity design dictates that the expected potential outcomes change smoothly as a function of the running variable through the cut-off (Cunningham, 2021). This assumption is often referred to as the “continuity” assumption and can be manifested visually. Referring to the example in the previous section, if the duration of schooling was not prolonged, the conviction rate would not have “jumped”. The conviction rate variable would instead run as a smooth function trough the threshold. The omitted variable bias is in extension removed from the cut-off, as any other variable affecting the dependent variable would cause a sharp increase or decrease, violating a smooth function.

In practice the continuity assumption can be violated by several mechanisms (Cunningham, 2021): *1)* If the assignment rule is known in advance, the population of interest might be able to sort themselves into either side of the threshold. The result depicted would consequently be biased. 2) Secondly, there might be advantages to be on either side of the cut-off, giving individuals an incentive to adjust. 3) Thirdly, there might be time to adjust. Individuals need time to place themselves according to the cut-off, given that the threshold is known. 4) The cut-off might also be affected by factors that independently cause potential outcomes to shift. This would render the cut-off endogenous. The concept of an endogenous cut-off might need further explanation. The results in the previous example would depict an unnatural effect if a government anti-crime project is starting simultaneously as the cut-off used. *5)* Lastly, there might be a non-random heaping on the running variable, manifested trough an unnatural number of observations at certain points for the running variable.

Discussing these assumptions in the context of our setting might prove valuable. The assignment rule for our thesis is the net wealth threshold. The selection basis is known in advance, as the yearly cut-off is announced ahead of the tax settlement. Furthermore, there are monetary incentives present as sorting allows individuals to prevent cost associated with the tax. These perspectives give the impression of the continuity assumption being violated, causing a potential biased result. However, it can be argued that several conditions must be fulfilled for individuals to efficiently sort themselves. Sorting can be regarded as time-consuming process, which need to be evaluated comparatively with the cost associated with the tax. We are foremost interested in units close to the threshold, which would involve a low proportion of wealth eligible for taxation and consequently a low tax burden. Individuals should thus have limited incentives for sorting, when factoring in the low cost and high time-consumption.

The counterargument to this assumption is that some individuals might have high incentives despite being close to the threshold. Individuals with a high gross wealth may utilize several techniques to increase their share of debt. The potential benefits of sorting would thus increase significantly. It might therefore be necessary to control for individuals with high gross wealth close to the threshold. On the other hand, we operate with a reduced dataset, not containing high wealth and high-income individuals. It could therefore be argued that the sorting possibility is of limited value. Furthermore, we have previously highlighted how the literature suggest that the Norwegian wealth tax is designed in such a manner that bunching is restricted. One should also note that the data we are employing (2009-2016) have yearly changes in the net wealth threshold. As sorting takes time, and the threshold is constantly changing, the average individual would have limited time to make the relevant adjustments. Such a perspective supports the notion of the continuity assumption being satisfied.

Some techniques can be applied to resolve the problems related to identification. The McCrary density test is commonly used to check whether individuals are sorting themselves in the data (Cunningham, 2021). We have provided the density test in the next section, substantiating the belief of no sorting.

The McCrary Density Test

We have conducted a McCrary density test for the running variable in all our 8 datasets. The full set of tests is listed in the appendix. Referring to the section covering historical wealth taxation rules, 2011 is the only year in our sample which have zero changes in the net wealth threshold. Individuals would thus have a lengthier window to sort themselves during this period. We have consequently chosen to highlight the test from 2011, as no sorting in this timeframe would indicate no sorting in the periods with yearly changes in the cut-off.

The figures below depict the running variable net wealth on the x-axis with density on the y-axis. We have conducted the test on two samples: 1) the full sample from 2011 with negative outliers removed and 2) a reduced sample with observations with a taxable net wealth between 500 000 NOK and 1 000 000 NOK. We are therefore able to validate our results across different sample sizes and simultaneously get a closer look at the cut-off. The McCrary density tests mimics the logic of the continuity assumption. A distinct increase or decrease in density at the cut-off would consequently imply that the identifying assumption is invalidated (Cunningham, 2021). Figure 8 displays both a red and a black line. The black line indicates those that are under the threshold, whereas the red line represents those above. Logically, the cut-off is located where the black line turns red. Visually inspecting the figures suggest no significant changes in density at the threshold. Both the figures display a smooth density function, suggesting that the continuity assumption holds. The test results provide evidence of individuals not being able place themselves on either side of the wealth threshold.

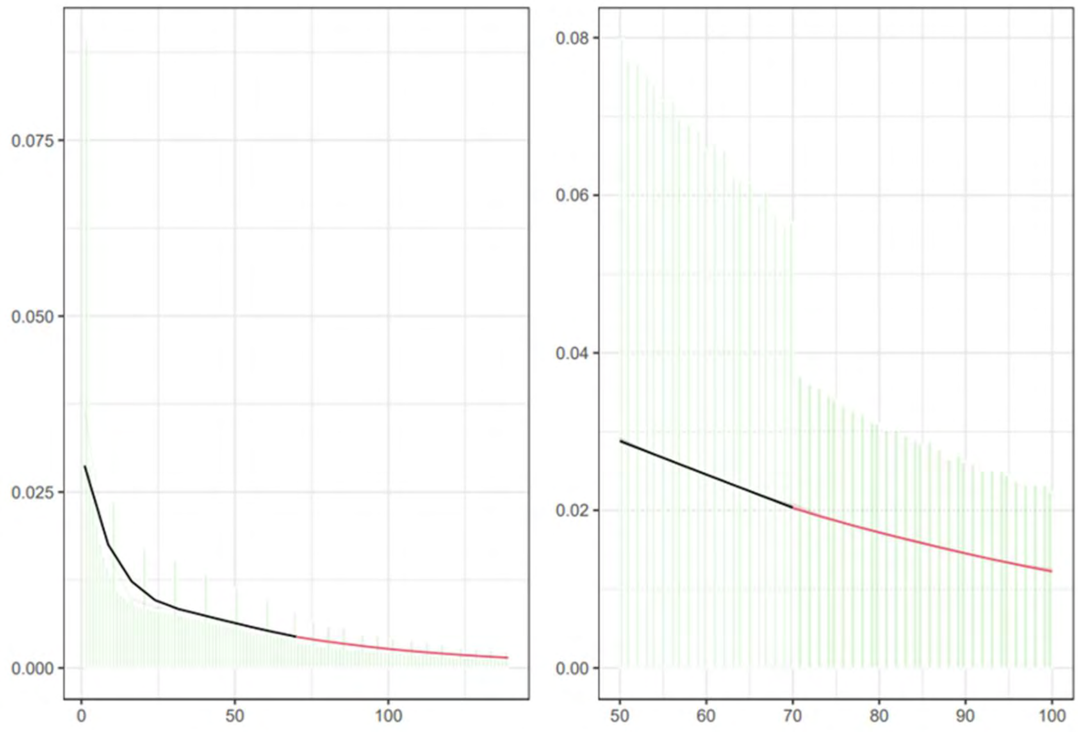

Figure 8: McCrary density test for the 2011-sample. On the right: full sample. On the left: observations between 0.5-1 million NOK. Cut-off at 0.70, from which the line changes colour.

5.3 The Econometric Model

With the continuity assumption satisfied, we can establish a basic outline of our model. As previously alluded to, we utilize taxable net wealth as the assignment variable X_i, with the yearly net wealth threshold being denoted by c_0. This forms the basis for the dummy variable $D_i \epsilon \{0,1\}$, where $D_i = 1$ indicates that $X_i \geq c_0$ and $D_i = 0$ when $X_i \leq c_0$. We are thus utilizing a sharp regression discontinuity design. Y_i constitutes the outcome variable. We choose to utilize different outcome variables, which combined can be employed to assess individual risk taking, adhering to the previous section covering risk. We use several asset ratios, namely $\frac{Debt}{Total\ assets}$, $\frac{Deposits}{Total\ assets}$ and $\frac{Listed\ stocks}{Total\ assets}$. We can therefore draw conclusions regarding individual portfolio composition. δ represents the local average treatment effect (LATE). Lastly, ε_i denotes the error term. This shapes the following simplistic linear model:

$$Y_i = \alpha + \beta X_i + D_i\delta + \varepsilon_\iota$$

It is common practice to recentre the running variable at the cut-off c_0. (Cunningham, 2021). We can thus rewrite the recentred equation using more intuitive variable names:

$$Y_i = a + \beta(TNW_i - cutoff_0) + Dummy_i\delta + \varepsilon_\iota$$

Estimation Choices

We will employ the linear parametric model for our first part of our analysis. Fitting a linear model in a RD-setting might prove hazardous, as the process might generate an artificial causal effect (Cunningham, 2021). In a scenario where the underlying relationship is non-linear, forcing a linear model on both sides of the threshold would create an unnatural discontinuity in the data. The results would consequently be invalid. Such a scenario is illustrated in Figure 9.

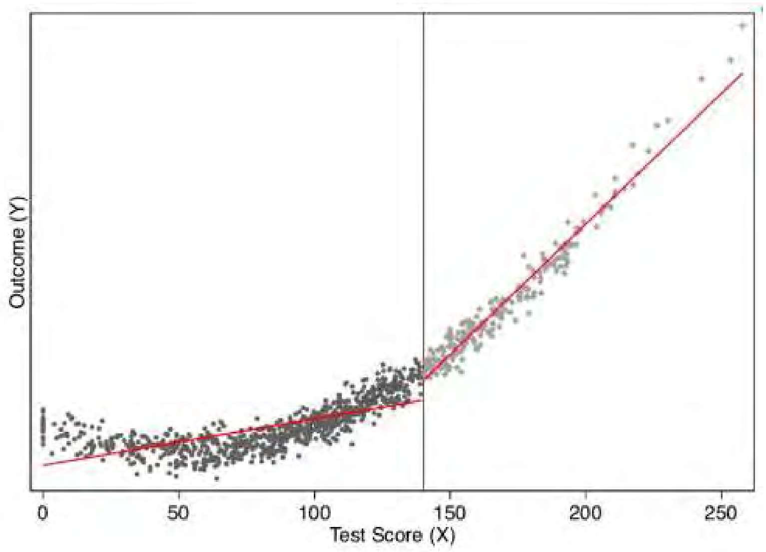

Figure 9: Discontinuity generated by using a linear model for a non-linear relationship. From "Causal Inference: The Mixtape," by Cunningham, 2021. Copyright 2021 Yale University Press.

A traditional approach would utilize a higher order polynomial as an alternative way of capturing the relationship between the outcome and running variable. However, Gelman & Imbens (2019) highlight how higher order polynomials raise several concerns when used for a RD design. We thus choose to run local linear non-parametric functions as suggested by Hahn et al. (2001). This would in simple terms represent a weighted regression limited to a given interval (Cunningham, 2021). The statistical software allows for three different Kernel methods to be used, picking the triangular option by default (Calonico et al., 2022). We choose to test the different options as we seek to uncover the causal effect. The Kernel alternatives are 1) Uniform, 2) Triangular and 3) Epanechnikov. The model can according to Cunningham (2021) be denoted to some version of the following expression:

$$(\hat{a},\hat{b}) = argmin_{a,b} \sum_{i=1}^{n} \left(y_i - a - b(x_i - c_0)\right)^2 K\left(\frac{x_i - c_0}{h}\right) 1(x_i > c_0)$$

The expression h in the formula above signifies the bandwidth, which dictates the relevant interval for the local regression. Determining the bandwidth is essential as it has the potential to greatly alter the results. Researchers operate with different bandwidths and different approaches of obtaining it, dependent on the context. Choosing the optimal bandwidth for our thesis could therefore prove challenging. Fortunately, the statistical software provides several algorithms for determining the bandwidth. Each algorithm typically uses one criterium for obtaining the suitable option (Calonico et al., 2022). We have included some of the output from running the command for the year 2011 and the $\frac{Listed\ stocks}{Total\ assets}$ outcome variable below.

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	12.279038	12.279038	19.04164	19.04164
msetwo	10.729174	48.629849	17.93326	90.41291
msesum	11.830477	11.830477	19.89264	19.89264
msecomb1	11.830477	11.830477	19.04164	19.04164
msecomb2	11.830477	12.279038	19.04164	19.89264
cerrd	5.943994	5.943994	19.04164	19.04164
certwo	5.193742	23.54057	17.93326	90.41291
cersum	5.726856	5.726856	19.89264	19.89264
cercomb1	5.726856	5.726856	19.04164	19.04164
cercomb2	5.726856	5.943994	19.04164	19.89264

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table 5. Bandwidth options for listed shares, 2011.

Table 5 depicts a total of 10 different algorithms, organized in four columns. The two columns to the right show the bandwidth on both the right and left side of the cut-off. The remaining columns show a bias corrected interval corresponding to each algorithm. The bias corrected interval is always greater than the uncorrected one. When running the RD-regressions both an uncorrected and corrected coefficient is provided. The bias corrected bandwidth is thus used for the corrected coefficient. Some alternatives also utilize different bandwidths on either side of the cut-off, composing a more complex bandwidth choice. Inspecting the table provide us with both a minimum and maximum bandwidth. To highlight how the causal effect might differ, we therefore choose to operate with 3 different bandwidths for each regression. We utilize the maximum (greatest bandwidth length), minimum (smallest bandwidth length) and default option ("mserd"), highlighting the full "optimal" range. An explanation for each algorithm used by the program is provided in the appendix (Table A9). We have also included the full list of tables for bandwidth options.

6. Analysis

Our analysis seeks to establish whether there is a causal relationship between wealth taxation and individual risk taking behaviour. The theoretical framework and literature presented are ambiguous towards the effect, and it may therefore be challenging to hypothesize an expected effect. However, we argue that a higher degree of risk taking could be manifested trough a higher share invested in stocks, higher levels of debt, and a lower share of deposits for units just above the threshold. The analysis is multi-dimensional as we adjust our estimations based on year, outcome variable, and bandwidth. We begin by utilizing the parametric linear model introduced in the previous section. Additionally, we employ the local non-parametric alternative. We finalize the section by summarizing and interpreting our findings.

6.1 Parametric Results

Stocks / Total Assets

We first employ the parametric model on the variable representing stocks divided by total assets. We must choose bandwidth manually, as there are no algorithms for picking the optimal option for this model. The dataset has an extensive number of observations close to the threshold, and we therefore operate with a relatively narrow bandwidth. We start by running regressions for a population ± 50 000 NOK from the yearly cut-off. The preceding estimates are based on doubling the bandwidth, meaning that we also use ± 100 000 NOK and ± 200 000 NOK samples. The last regression is using the full sample, including all positive values. We conduct a total of 96 regressions, of which 32 is dedicated to each variable. Consequently, we choose to showcase only some of the regression output, including all the regression tables in the appendix. Table 6 displays the results for 2010.

	Listed Stocks / Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.0001	0.0001*	0.0001***	0.0001***
	(0.0002)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	0.0002	-0.0001	-0.00004	-0.006***
	(0.001)	(0.001)	(0.001)	(0.0003)
Constant	0.024***	0.024***	0.024***	0.035***
	(0.001)	(0.0004)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	97 258	186 076	369 515	1 976 978
R2	0.00001	0.0001	0.0003	0.001
Adjusted R2	-0.00001	0.0001	0.0003	0.001
Residual Std.Error	0.079 (df = 97255)	0.080 (df = 186073)	0.080 (df = 369512)	0.116 (df = 1976975)
F Statistic	0.503 (df = 2; 97255)	5.910*** (df = 2; 186073)	54.735*** (df = 2; 369512)	546.021*** (df = 2; 1976975)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table 6. Parametric regression results for stocks/ total assets, 2010.

The table includes four columns corresponding to the different bandwidths, with the smallest bandwidth of ± 50 000 NOK on the right (column 1). The regression output features a coefficient for the recentred threshold and a constant. We are however, as mentioned in section 5.3, primarily interested in the coefficient for the dummy variable, as it signifies the local average treatment effect.

Further inspecting the table suggest a miniscule effect between wealth taxation and the share invested in stocks. The scale of the results is consistent when varying the bandwidth for 2010. We detect some minor variations with different bandwidths, most notably a significant negative effect when using the full sample. One should be cautious when interpreting this effect, as using the full sample constitutes an unprecise estimation choice (Cunningham, 2021). Most of the coefficients are negative, but insignificant. Such a notion is further substantiated by the local average treatment effect changing from negative to positive for the smallest bandwidth. Lastly, the r-squared for the model is low, indicating that a small portion of the sample variation is explained by the model.

We are also concerned with whether these results are coherent for different years. We have therefore chosen to condense the local average treatment effects for the whole period in Table 7. It shows the coefficient for the dummy variable for different bandwidths and years. As indicated previously, the greatest variation in terms of magnitude can be found when using the full sample. We remark that using smaller bandwidths produce more time-consistent results. The trends stated for the year 2010 are consistent for the whole period, with both positive and negative effects of minimal proportions. The results are mostly statistically insignificant, apart from a single coefficient 2012. It might however be hazardous to draw a conclusion based on this coefficient alone.

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Bandwidth: ± 50 000 NOK	-0.001	0.0002	0.001	0.001	0.001	-0.0003	0.001	0.001
Bandwidth: ± 100 000 NOK	-0.0003	-0.0001	0.001	0.0004	-0.0003	-0.001	-0.0004	0.0005
Bandwidth: ± 200 000 NOK	-0.00004	-0.00004	-0.00004	0.001*	-0.0002	0.0002	-0.0003	-0.0002
Bandwidth: Full sample	-0.005***	-0.006***	-0.004***	-0.004***	-0.003***	0.00003	0.004***	0.01***

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table 7. Estimated local average treatment effects for listed stocks, 2009-2016.

Figure 10 displays the discontinuity plot. The lines on both sides of the threshold seem similar, exhibiting an upward facing slope with no sudden change approaching the cut-off. The points in the plot are aggregated by displaying the mean of stocks divided by total assets (y) for each value of net wealth (x). The data contains abundant identical observations, and we have taken this stylistic choice to provide a plot which is easier to interpret. The shaded area demonstrates the confidence interval. The full list of plots is included in the appendix. The trend described earlier is mostly present in our remaining plots, showcasing an increasing line on either side of the threshold with no visible "jump" at the cut-off. There are a few exceptions, where the estimated slope on the left side of the threshold is stagnant, resulting in a distinct visible effect. Looking at the aggregated points, we cannot exclude that the scenario described in section 5.3 is present. We are therefore potentially faced with a problem where fitting a linear model creates an artificial effect. The plots for 2009, 2011, 2013 contains this trend.

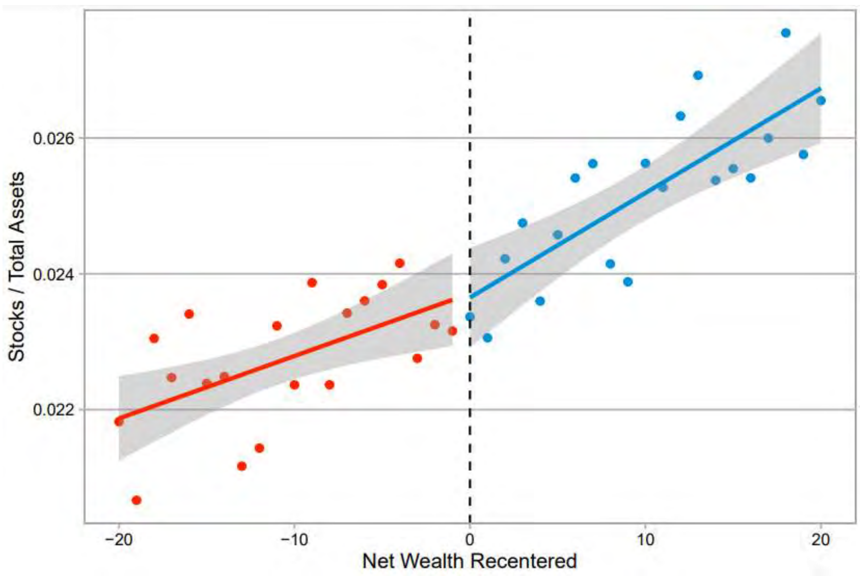

Figure 10. Regression discontinuity plot for stocks/ total assets, 2010.

Deposits / Total Assets

We repeat the process when analysing the share of deposits. A risk averse individual would favour a higher share invested in deposits, as deposits is regarded as the risk-free alternative. Table 8 depicts the regression result for 2010. There seems to be a higher share invested in deposits for individuals above the cut-off. The model also detects a significant effect, when using a bandwidth of ± 50 000 NOK and ± 200 000 NOK. The effect equates to an increase of 0.6 or 0.8 percentage points invested in deposits due to the wealth tax. However, the increase is susceptible to bandwidth choice, as a bandwidth choice of ± 100 000 NOK suggests that the effect is not significant.

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.001	0.0001	-0.00005	-0.001***
	(0.001)	(0.0002)	(0.0001)	(0.00001)
Threshold dummy	0.008**	0.004	0.006***	-0.030***
	(0.004)	(0.003)	(0.002)	(0.001)
Constant	0.225***	0.228***	0.228***	0.389***
	(0.002)	(0.002)	(0.001)	(0.0005)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	97 258	186 076	369 515	1 976 978
R2	0.0001	0.0001	0.0001	0.065
Adjusted R2	0.00003	0.0001	0.0001	0.065
Residual Std.Error	0.303 (df = 97255)	0.304 (df = 186073)	0.307 (df = 369512)	0.396 (df = 1976975)
F Statistic	2.589* (df = 2; 97255)	7.879*** (df = 2; 186073)	10.634*** (df = 2; 369512)	68 565.790*** (df = 2; 1976975)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table 8. Parametric regression results for deposits/ total assets, 2010.

If there were an effect present, we would expect this effect to be consistent with time. Table 9 shows the local average treatment effects for each year. We observe that the subsequent years display mostly insignificant coefficients, with both positive and negative effects of small magnitudes. An exception is the results for 2009, featuring significant negative local average treatment effects for all bandwidths. This could be attributed to the limited adjustments made to the total assets proxy due to the valuation of assets relying less on market-based values. Such an explanation fails to factor in the significant positive coefficients for 2010. We therefore theorize that the significant coefficients can be a consequence of the 2009 tax reform, complicating the interpretation for these years.

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Bandwidth: ± 50 000 NOK	-0.008**	0.008**	-0.005	-0.003	-0.004	0.001	0.002	-0.003
Bandwidth: ± 100 000 NOK	-0.005**	0.004	-0.003	-0.001	0.0004	-0.002	0.002	-0.001
Bandwidth: ± 200 000 NOK	0.005***	0.006***	-0.001	0.001	-0.001	0.001	-0.001	0.004
Bandwidth: Full sample	-0.086***	-0.03***	-0.053***	-0.038***	0.025***	0.102***	0.196***	0.248***

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table 9. Estimated local average treatment effect for deposits, 2009-2016.

Lasty, we provide a graphical interpretation for 2010. Figure 11 exhibits a decreasing trend on the left side of the cut-off, whereas the right side of the cut-off display the opposite. There is a visible “jump” as we approach the threshold, with an effect of roughly 0.05 percentage points. Determining a time-consistent trend for deposits proves challenging. Examining the plots for other years, some display a similar trend, whilst other conform to the slopes illustrated for stocks. Once again, we cannot exclude the possibility where fitting a linear model to a non-linear relationship creates an unnatural effect.

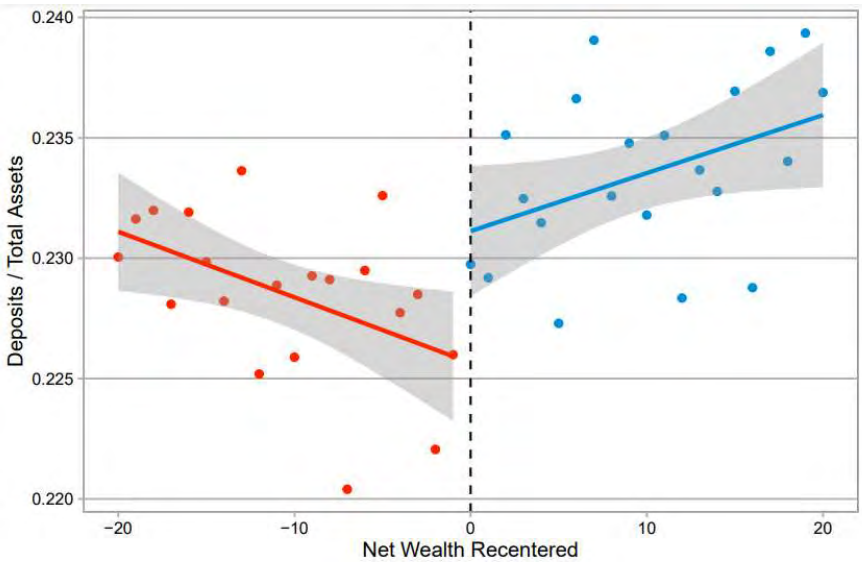

Figure 11. Regression discontinuity plot for deposits / total assets, 2010.

Debt / Total Assets

We utilize debt/ total asset as our last outcome variable. Table 10 presents the parametric results for 2010, completing the set of regressions performed for this year. The table shows no significant effect for the debt variable, except for the full bandwidth model. We obtain coefficients that are both positive and negative, indicating no clear effect.

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.001***	-0.0005***	-0.0003***	-0.0004***
	(0.0002)	(0.0001)	(0.00004)	(0.00000)
Threshold dummy	0.001	0.0003	-0.001	-0.021***
	(0.001)	(0.002)	(0.001)	(0.0005)
Constant	0.048***	0.049***	0.050***	0.083***
	(0.001)	(0.001)	(0.001)	(0.0002)
BW	±50 000NOK	±100 000 NOK	±200 000 NOK	Full
Observations	97 258	186 076	369 515	1 976 978
R2	0.0002	0.0002	0.001	0.027
Adjusted R2	0.0002	0.0002	0.001	0.027
Residual Std.Error	0.087 (df = 97255)	0.194 (df = 186073)	0.151 (df = 369512)	0.190 (df = 1976975)
F Statistic	8.988*** (df = 2; 97255)	19.091*** (df = 2; 186073)	156.436*** (df = 2; 369512)	27,236.880*** (df = 2; 1976975)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table 10. Parametric regression results for debt/ total assets, 2010.

We resort to examining the coefficients for the whole period, displayed in Table 11. The estimations conducted using smaller bandwidths remain positive generally, deviating only in the year 2009 and 2010. All coefficients for the limited bandwidths are at the unsignificant level. We can thus deduce no clear interpretation based on this result. The full bandwidth estimates are all significant with a greater effect, but we choose to neglect these results when analysed in isolation.

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Bandwidth: ± 50 000 NOK	0.001	0.001	0.001	0.0001	0.001	0.001	0.002	0.004
Bandwidth: ± 100 000 NOK	-0.0002	0.0003	0.0003	0.0002	0.0003	0.0001	0.002	0.001
Bandwidth: ± 200 000 NOK	-0.001	-0.001	0.0003	0.0004	-0.001	0.0002	0.0002	0.0004
Bandwidth: Full sample	-0.075***	-0.021***	-0.023***	-0.02	-0.012***	0.0002	0.018***	0.042***

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table 11. Estimated local average treatment effects for debt, 2009-2016.

We conclude the first part of our analysis by inspecting the plot for debt/ total assets in Figure 12. We observe no visible discontinuity at the threshold, which confirms the minimal effect reported in the regression output. As a contrast to the analysis conducted to deposits and stocks, the trend is decreasing on both sides of the threshold, suggesting that debt decreases with wealth. We also observe a smaller spread between the aggregated points, resulting in a clear trend with comparatively smaller confidence intervals. We find that the plots are consistent when evaluating year-by-year.

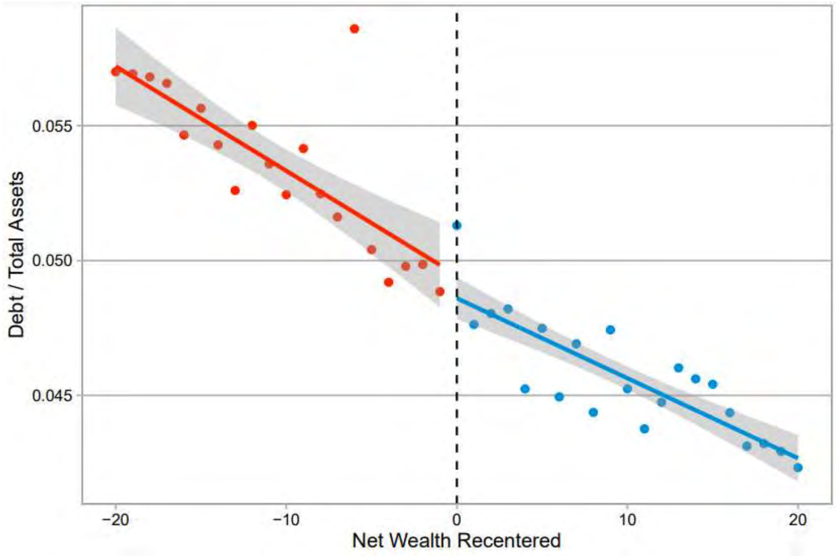

Figure 12. Regression discontinuity plot for debt/ total assets, 2010.

6.2 Non-Parametric Results

The parametric model ultimately yielded few clear results, with no indication of an effect around the threshold. We detected small effects for deposits in 2009 and 2010, but the results were not consistent with time. Apparent was also the potential problem of fitting a linear model to a polynomial relationship. We choose to address these concerns by utilizing a local non-parametric model. The second part of the analysis mimics the structure of the first part.

Stocks / Total Assets

We conduct the non-parametric analysis by following the procedure described in section 5.3 Table 12 shows the regression output for listed shares in 2010, grouped by the bandwidth algorithm used. The output feature 3 estimates named conventional, bias-corrected, and robust. Conventional utilized the bandwidth calculated by the algorithm, whilst the bias-corrected method employs a wider variant of the same option. The robust row indicates the estimate provided using robust standard errors. The remaining rows are dedicated to descriptive features of the regressions, displaying the Kernel used, bandwidth on either side of the threshold, observations included in the conventional calculations, and the size of the sample. After initial testing, we have chosen to persist with the triangular kernel as the different methods generated similar results. The full list of results is included in the appendix.

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.00007	0.0004	0.0007
	(0.922)	(0.738)	(0.336)
Bias-Corrected	-0.00005	0.0004	0.001
	(0.924)	(0.72)	(0.001)
Robust	-0.00005	0.0004	0.001
	(0.951)	(0.729)	(0.234)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	13.471 / 13.471	5.545 / 5.545	9.144 / 40.257
Observations (left / right)	130 833 / 109 382	46 730 / 50 528	87 099 / 257 009
Sample Size	1 976 978	1 976 978	1 976 978

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table 12. Non-Parametric regression results for stocks/ total assets, 2010.

Table 12 shows no significant effect for the different methods. The results are comparable to the parametric model, displaying both positive and negative results. The default bandwidth options suggest a small negative effect while the two others calculate a slight increase.

We discover similar trends when inspecting the full list of conventional results in Figure 13. The regressions predict both negative and positive LATEs, close to zero. However, the regressions conducted for 2009 display a significant positive effect for 2 out of 3 options, with a p value below 0.01. When discussing these specific results, one should keep in mind that the calculations for 2009 utilize a limited proxy for total assets. Nevertheless, it is important to note that this result did not stand out during our parametric regression. The significant results uncovered in the parametric analysis for 2012 is not present here.

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Bandwidth: Default	0.001	-0.00007	0.008	0.0005	-0.0004	-0.0003	-0.0002	-0.0001
Bandwidth: Min	0.004**	0.0004	0.001	0.001	0.0006	-0.0005	-0.0002	0.00004
Bandwidth: Max	0.002**	0.0007	0.0005	0.0002	-0.0001	-0.0002	0.0001	-0.0002

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001. Conventional estimates provided.

Table 13. Estimated local average treatment effects for listed stocks, 2009-2016.

Figure 13 shows the 3 plots for stocks in 2010, depicting the results retrieved with the “mserd” bandwidth option with different kernels. The x-axis ranges from 50 000 NOK to 100 000 NOK, as we do not recentre the running variable. We detect a minimal but visible discontinuity at the cut off with an effect roughly equal to the positive estimates described above. The non-parametric plots also feature aggregated observations like the parametric counterpart. One important distinction is however that the non-parametric model controls for multiple identical observations when calculating bandwidth. (Calonico et al., 2022). Looking closely at the lines in the plots may suggest some degree of overfitting. The plots feature a distinct drop when approaching the cut-off, creating a discontinuity of potentially greater magnitude. This should be considered when interpreting our findings and may suggest that the "true" effect might be smaller than the one estimated. On the other hand, the triangular kernel gives more weight to observations close to the cut-off such that the pattern displayed in the figure is to some extent expected (Cunningham, 2021). We notice a similar pattern when inspecting the plots for other years and outcome variables.

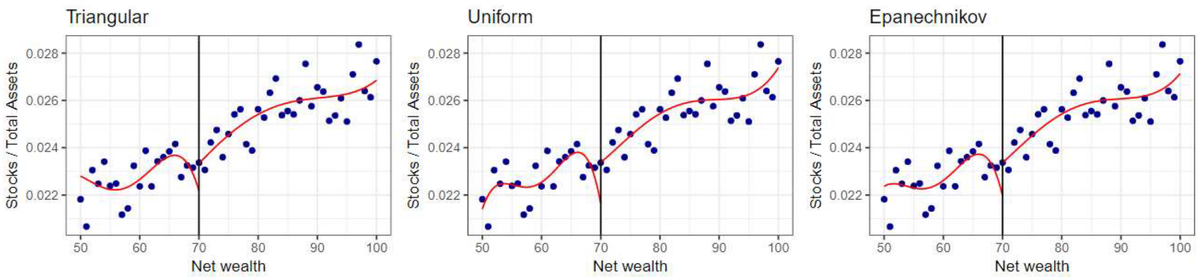

Figure 13. Regression discontinuity plots for stocks/ total assets, 2010. Non-parametric model.

Deposits / Total Assets

Our parametric analysis uncovered a significant effect for deposits in 2010. We are therefore interested in whether this effect is present in our non-parametric model. Table 14 indicates that the effect is still visible in our dataset, but only in 1 out of 3 bandwidth algorithms and at a smaller significance level. The estimation is also slightly smaller, ranging from 0.005 to 0.007. The effect is only significant using the greatest bandwidth, with NOK 96 880 below the threshold and NOK 435 450 above.

	Algorithm used		
	mserd	cersum	msetwo
Conventional	0.005	0.007	0.005+
	(0.102)	(0.113)	(0.048)
Bias-Corrected	0.005	0.007	0.006*
	(0.120)	(0.114)	(0.024)
Robust	0.005	0.007	0.006+
	(0.198)	(0.127)	(0.060)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	11.374 / 11.374	5.442 / 5.442	9.688 / 43.545
Observations (left / right)	108 529 / 95 363	46 730 / 50 528	87 099 / 269 466
Sample Size	1 976 978	1 976 978	1 976 978

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table 14. Non-Parametric regression results for deposits/ total assets, 2010.

Arranging the conventional estimates in Table 15 indicates a trend with an insignificant discontinuity close to zero. The significant increase, which was previously identified in 2009, is not present using our non-parametric model. There is however a small negative effect in 2012, which is significant with a p value less than 10 %. The effect is only present using the bias-corrected method with the largest bandwidth. Our remaining estimations display a familiar trend, with a small insignificant effect in either direction.

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Bandwidth: Default	0.01	0.005	-0.003	-0.001	-0.002	-0.0003	0.0003	0.0002
Bandwidth: Min	-0.003	0.007	-0.004	-0.005	-0.005	-0.001	0.001	-0.001
Bandwidth: Max	-0.0001	0.005*	-0.002	-0.004	-0.001	0.001	-0.002	-0.002

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001. Conventional estimates provided.

Table 15. Estimated local average treatment effects for deposits, 2009-2016.

The visual trend for deposits is shown in Figure 14. It exhibits a larger increase at the threshold compared to the other outcome variables. The "jump" is estimated to be roughly 0.0075, independent of the Kernel used. The observations have a sizeable spread, and we therefore cannot exclude that the model is susceptible to overfitting.

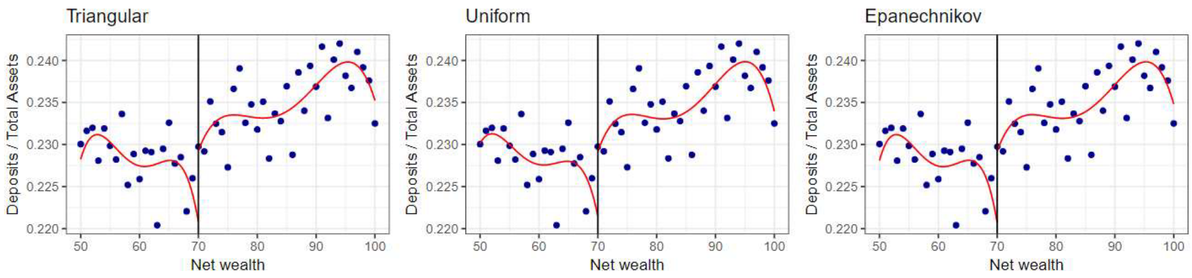

Figure 14. Regression discontinuity plots for deposits/ total assets, 2010. Non-parametric model.

Debt / Total Assets

We dedicate the last part of our analysis to debt/ total assets. The parametric analysis consistently revealed a small insignificant increase in debt levels for those above the threshold. The local non-parametric regression suggests a similar result. Table 16 displays the results for the year 2010. We observe a significant effect using the default bandwidth algorithm with the bias corrected method. The effect is estimated to 0.003, which could be interpreted as the increase in debt levels when being subject to the wealth tax.

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.002	0.002	0.009
	(0.113)	(0.173)	(0.541)
Bias-Corrected	0.003*	0.002	0.001
	(0.043)	(0.140)	(0.331)
Robust	0.003	0.002	0.001
	(0.122)	(0.151)	(0.482)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	7.407 / 7.407	3.588/ 3.588	7.202 /30.642
Observations (left / right)	66 448 / 66 088	27 698 / 34 258	66 448 / 210 256
Sample Size	1 976 978	1 976 978	1 976 978

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table 16. Non-Parametric regression results for deposits/ total assets, 2010.

The regressions for the other years mostly indicate a positive insignificant effect. 2014 is an exception, showing only negative effects, but the remaining estimations does not deviate from the trend described. We detect an additional significant positive effect in 2015 when using the smallest bandwidth. In this instance, the effect is present for both the conventional and bias corrected estimates. Having an effect reappear in our data could support the notion of higher debt levels for those just above the cut-off. However, most of the results are insignificant, suggesting that the wealth tax does not affect an individual's share of debt/ total assets. The conventional estimates are provided in Table 17.

	Year							
	2009	2010	2011	2012	2013	2014	2015	2016
Bandwidth: Default	0.002	0.002	0.0008	-0.00005	0.0002	-0.0001	0.0009	0.0008
Bandwidth: Min	0.0009	0.002	0.001	-0.0005	0.001	-0.0005	0.002*	0.002
Bandwidth: Max	0.001	0.0009	0.0008	-0.0005	-0.0007	-0.0007	0.003	-0.0005

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001. Conventional estimates provided.

Table 17. Estimated local average treatment effects for debt, 2009-2016.

Figure 15 shows the visual representation of the regressions for 2010. The trend displayed seem approximately negative linear with the aggregated observations following a clear pattern. The trend is persistent for the majority of our datasets for each year. However, the two last years show a greater spread between the aggregated observations.

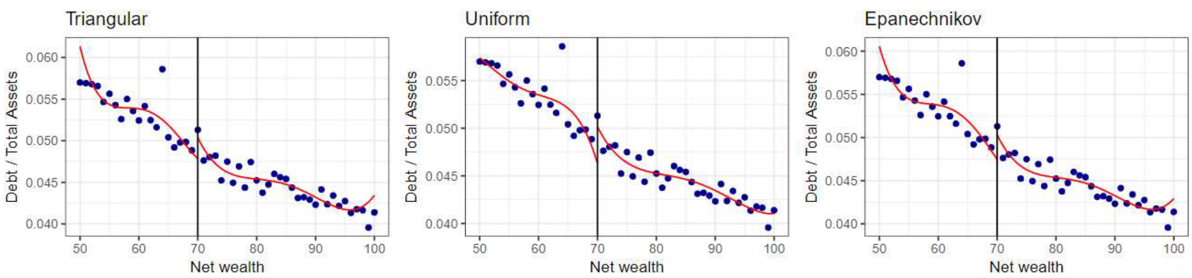

Figure 15. Regression discontinuity plots for debt/ total assets, 2010. Non-parametric model.

6.3 Intepreting the Results

We complete this section by summarizing and interpreting our findings. Our thesis has sought to establish whether there is a causal relationship between the wealth tax and individual risk taking behaviour. We have conducted the analysis by applying three asset ratios as our outcome variables, namely 1) listed stocks / total assets, 2) deposits / total assets and 3) debt / total assets:

1) Our analysis covering listed stocks highlights how there is no significance effect on stock-allocation when being eligible for the wealth tax. The results are consistent when varying both bandwidth, model, and year. We uncover a single positive local average treatment

effect for 2009, but we can possibly attribute this isolated coefficient to differing valuation rules in this year. The effects presented are of limited magnitude in both directions.

2) We find significant effects for deposits in 2009 and 2010. Changing from a parametric to a non-parametric model limits the significance of the LATE estimated for 2010. This leads us to believe that our deposits analysis for 2009 is susceptible to the same valuation mechanisms described for stocks. The trend revealed is also similar to the one presented for stocks. We observe both negative and positive effects of miniscule magnitude.
3) The final part of our analysis is dedicated to debt. We note that the debt levels decrease with wealth. This pattern is the opposite to the one presented for stocks and deposits. The estimated coefficients for debt/ total assets are mainly insignificant and of a small magnitude. We uncover one significant coefficient in the non-parametric model for 2015. However, the lack of consistent results gives no reason to deduce a causal relationship.

Applying Stiglitz's (1969, as cited in Sandmo, 1985) framework to interpret these results, the findings suggest that taxpayers subject to wealth taxation show signs of constant relative risk aversion. We find no evidence for the wealth tax affecting the risky share of the portfolio. However, the model assumes that the basis for the tax is the entire net wealth, which is a wrongful assumption for our context. The basis for taxation of wealth in the Norwegian tax system is the established net wealth deducted by the threshold. This reduces the effective tax rate, which can be illustrated by an example assuming the 2009 tax rate of 1.1% and threshold of NOK 470 000: We can calculate the tax payment for an individual with a net wealth of NOK 800 000. The wealth tax would equate to $(800\,000 - 470\,000) * 0.011 = 3\,630$. This constitutes an effective tax rate on net wealth of $\frac{1\,430}{800\,000} = 0.45\%$.

This presents several implications to the interpretation of our results. The first is that the effective wealth tax rate is so small that the reduction of initial wealth may be trivial even to a fully rational agent. Secondly, if individuals in fact adjusts their share in risky assets because of the wealth tax, the effect could be so small that it would be difficult to estimate. It also seems that the asymmetry of the wealth tax' valuation rules does not impact individuals in proximity of the threshold, as the effective tax rate is miniscule regardless of the portfolio composition. With such a moderate rate, it is therefore difficult to draw any conclusion about the relative risk aversion of those subject to the wealth tax.

7. Conclusion

With increasing interest in capital taxation, as we experience a global increase in inequality, the Norwegian wealth tax is an interesting case study. The literature on the behavioural effects of a wealth tax have highlighted concerns with misreporting due to avoidance and evasion, making it difficult to estimate real responses. There are, however, reasons to believe that these issues are limited in their presence for our Norwegian administrative data (Bruer-Skarsbø, 2015; Alstadsæter et al., 2019, Ring, 2021). With the results reviewed, it is useful to refer to our research question, asking whether the Norwegian wealth tax discourages individual risk taking.

Neither economic theory nor the literature on behavioural effects of a wealth tax yield a clear answer to whether it is expected to impact risk taking behaviour. However, this is a common claim amongst opponents of the tax. The wealth tax is assumed to be distortionary to some extent, as all other taxes, but we find no evidence to suggest that risk taking is significantly affected. Our results are fairly consistent for different outcome variables and bandwidths in both econometric models. According to Stiglitz's (1969) framework, this would imply that Norwegian tax payers exhibit properties of constant relative risk aversion, as a reduction of initial wealth leaves the risky share of the portfolio unaffected. However, we argue that the progressive character of the tax causes the effective tax rate to be trivial to those in proximity of the wealth tax threshold.

The wealth tax does not seem to distort risk taking behaviour, suggesting that the moderate rate and threshold succeed to fulfil the wealth tax's redistributive purpose, at least for the moderately wealthy. The regression discontinuity design operates with a local effect, making it difficult to extrapolate. In other words, it may prove challenging to determine what occurs further away from the threshold (Cattaneo et al., 2020). We therefore cannot determine any potential effects for what is arguably the key demographic of the wealth tax policy: those with high taxable net wealth's.

The results from our analysis are in line with the existing literature on the behavioural effects of the Norwegian wealth tax. There is limited evidence for behavioural distortions from wealth taxation when excluding avoidance and evasion responses. Ring (2021) provides one of the few contributions to the wealth tax' impact on portfolio allocation, finding no significant effect. We hope to compliment the literature by supplying additional evidence for the limited distortionary effects in an environment that relies on third-party reporting of wealth holdings. This could be useful to policymakers considering the adoption of a wealth tax.

7.1 Limitations

Our research is limited by several factors, of which some have already been highlighted to an extent. Firstly, our thesis is restricted by the boundaries set by our dataset. Our data does not include high-wealth individuals, which arguably operate under different conditions compared to our sample. These individuals pay a larger fraction of the total wealth tax, and we may therefore suspect more distinctive behavioural responses. High net wealth individuals constitute the main contributor and focusing on this group is important when determining the total effect of wealth taxation on investments in risky assets.

Another restricting aspect of our data is the possibility to adjust variables in 2009, which has been a prominent discussion point in our analysis. We theorize that a correct adjustment of the total assets proxy in 2009 would yield similar results to those described in preceding years, but we can never be entirely certain. Overall, the data left a natural denominator for the outcome variable to be desired. Perhaps optimally, we could use the total amount of investable wealth, but this would be difficult to establish given the limitations in our data set. In addition, not all values associated with risk taking appear in the individual tax returns. For instance, IPS accounts are exempt, meaning that there could be differences in the pension savings that we were not able to reveal.

Some of the choices that were made for our thesis have also been constraining. We have previously highlighted how the dataset facilitates an analysis of couples, by providing an ID for the associated spouse. Still, we have chosen to exclude such an analysis, which is limiting. Spouses operate with a double threshold and possibly share other traits; we could therefore theoretically detect a different effect. Similarly, we have deviated from sub-analysis based on gender and age. This would imply differing risk aversion based on these characteristics, which is compatible with a notion of risk willingness shifting based on individual characteristics. The literature supports this claim (Meissner et al., 2022). We have instead favoured a more limited scope for our thesis.

We have also made the decision to utilize asset ratios as a measure of individual risk taking, which have some potential drawbacks. Our thesis highlights how there is a considerable disparity between taxable asset and real asset valuation, providing us with a potentially unprecise outcome variable. With an unprecise estimator our results will be of little interpretive value. We have aimed to prevent this by using a proxy for total assets, but not all asset-classes are adjustable with the level of information provided. Our results are thus limited. Alternatively, we could have calculated the variance of returns from different assets. This would however re-shape the approach undertaken in our thesis. We would in theory resort to tracking individual returns over time, which also could cause potential biases from adjustments and calculations. Furthermore, the econometric model relevant for this approach would potentially need additional information to control for different variables making the outcome variable endogenous.

We also choose to highlight a limitation of the model utilized in our analysis. Using the RD-design in the setting of the Norwegian wealth tax have constructed a trade-off. We have used a parametric model, potentially affected by a linear fit used for a non-linear relationship, whilst the non-parametric model might be biased by overfitting the data. There are thus limitations of both models. We have chosen to utilize both models, creating a broader understanding of the potential causal effect. The corresponding limitations should nevertheless not be understated.

7.2 Further Research

Restrictive aspects of our thesis can constitute research opportunities for others. We have already emphasized how high-wealth individuals are central to the wealth tax debate. An empirical study focusing on these citizens would therefore be valuable. Such a study might prove challenging however, demanding individual tracking over several years, incorporating evasion and unique data. Similarly, we have discussed the option of further studies of the sub-population. Certain characteristics might be associated with risk taking; investigating these might be complementary to our thesis.

Our conclusion is also only applicable to our context, specifically the Norwegian tax system. A study covering risk taking behaviour in another nation levying a wealth tax might therefore represent an interesting research proposition. We have previously emphasized that other tax systems might be more prone to individual evasion, which would increase the complexity of the research. Replicating our study in another setting, might also be difficult considering the diminishing number of countries that still levy a wealth tax. Researchers could circumvent this issue by using historical data, as the topic still bears relevance.

A topic which has received substantial attention both in the media and literature is how the wealth tax impacts businesses. The effects that have primarily been explored is business owners withdrawing capital to manage wealth tax costs, potentially impacting liquidity and growth. As this thesis is more concerned with risk taking, future research may to a larger degree incorporate behavioural effects when studying the effect of wealth taxation for business owners, for instance as in Berzins et al. (2022) and Bjørneby et al. (2020).

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Appendix

Summary statistics

Table A1
Summary statistics 2009

	N	Mean	St. Dev	Min	Max
Age in 2015	1 899 560	60.993	19.866	20	140
Taxable value of leisure housing	1 899 560	1.949	6.839	-2	797
Taxable value of unlisted shares	1 899 560	1.924	17.284	-9	2 325
Cash holdings	1 899 560	0.012	0.87	-2	300
Taxable value of pension	1 899 560	1.156	7.741	0	1 002
Taxable value of moveables	1 899 560	3.302	9.234	0	700
Taxable value of debt	1 899 560	12.078	32.504	-271	2 799
Taxable net wealth	1 899 560	48.308	58.503	1	500
Taxable value of listed shares	1 899 560	3.351	14.326	0	1 139
Taxable value of bond holdings	1 899 560	0.817	6.664	0	2 086
Bank deposits	1 899 560	24.395	38.937	-138	1 640
Taxable value of primary housing	1 899 560	17.791	23.123	0	466
Adjusted value of business assets	1 899 560	12.935	61.337	-335	6177.5
Taxable value of foreign housing	1 899 560	0.258	3.585	0	914
Total assets (proxy)	1 899 560	67.891	91.157	-280	6277.5
Debt / Total Assets	1 899 560	0.152	0.346	-57	126
Stocks / Total Assets	1 899 560	0.043	0.127	-0.073	1.072
Deposits / Total Assets	1 899 560	0.489	0.388	-97	6

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table A2
Summary statistics 2010

	N	Mean	St. Dev	Min	Max
Age in 2015	1 976 978	59.566	20.021	20	140
Taxable value of leisure housing	1 976 978	1.926	7.114	-2	457
Taxable value of unlisted shares	1 976 978	1.921	17.115	-13	2 325
Cash holdings	1 976 978	0.01	0.798	-1	340
Taxable value of pension	1 976 978	1.062	7.452	0	970
Taxable value of moveables	1 976 978	3.359	9.55	-74	1 150
Taxable value of debt	1 976 978	14.164	35.628	-174	3 546
Taxable net wealth	1 976 978	54.715	63.552	1	500
Taxable value of listed shares	1 976 978	3.727	15.484	0	1 188
Taxable value of bond holdings	1 976 978	0.734	6.413	0	2 110
Bank deposits	1 976 978	25.055	39.851	-67	1 464
Adjusted value of primary housing	1 976 978	104.358	133.331	-24	3 120
Adjusted value of business assets	1 976 978	11.767	60.546	-137.5	7 415
Adjusted value of foreign housing	1 976 978	0.929	12.483	0	3 960
Total assets (proxy)	1 976 978	154.846	167.398	-64.6	10 753
Debt / Total Assets	1 976 978	0.083	0.192	-128.5	74
Stocks / Total Assets	1 976 978	0.033	0.116	0	2
Deposits / Total Assets	1 976 978	0.403	0.409	-0.946	5.333

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table A3
Summary statistics 2011

	N	Mean	St. Dev	Min	Max
Age in 2015	2 003 175	58.388	20.18	20	130
Taxable value of leisure housing	2 003 175	1.904	7.104	0	442
Taxable value of unlisted shares	2 003 175	1.931	17.313	0	3 004
Cash holdings	2 003 175	0.01	0.775	0	350
Taxable value of pension	2 003 175	0.973	7.333	-2	1 976
Taxable value of moveables	2 003 175	3.364	9.639	0	1 271
Taxable value of debt	2 003 175	14.69	36.483	-339	3 243
Taxable net wealth	2 003 175	56.748	65.223	1	500
Taxable value of listed shares	2 003 175	2.918	12.131	0	1 087
Taxable value of bond holdings	2 003 175	0.626	5.845	0	2 075
Bank deposits	2 003 175	26.621	41.954	-115	1 021
Adjusted value of primary housing	2 003 175	112.452	144.376	-24	4 672
Adjusted value of business assets	2 003 175	11.693	60.39	-400	6 550
Adjusted value of foreign housing	2 003 175	1.029	13.295	0	4 000
Total assets (proxy)	2 003 175	163.521	176.94	-12.500	6 850
Debt / Total Assets	2 003 175	0.084	0.167	-36.800	38.5
Stocks / Total Assets	2 003 175	0.412	0.413	0	1
Deposits / Total Assets	2 003 175	0.026	0.102	-2.640	4.667

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table A4
Summary statistics 2012

	N	Mean	St. Dev	Min	Max
Age in 2015	2 064 113	57.078	20.246	20	130
Taxable value of leisure housing	2 064 113	2.079	7.871	0	1500
Taxable value of unlisted shares	2 064 113	1.989	17.623	-4	1 750
Cash holdings	2 064 113	0.008	0.545	-1	220
Taxable value of pension	2 064 113	0.992	7.442	-126	465
Taxable value of moveables	2 064 113	3.308	9.62	0	1 150
Taxable value of debt	2 064 113	15.662	38.394	-227	2 211
Taxable net wealth	2 064 113	59.721	68.356	1	500
Taxable value of listed shares	2 064 113	3.052	12.785	-7	1 069
Taxable value of bond holdings	2 064 113	0.512	5.534	0	2 038
Bank deposits	2 064 113	28.151	44.041	-23	1 705
Adjusted value of primary housing	2 064 113	121.626	155.061	-140	5 088
Adjusted value of business assets	2 064 113	11.41	59.852	-575	4 467.5
Adjusted value of foreign housing	2 064 113	1.225	14.98	0	4 430
Total assets (proxy)	2 064 113	174.352	187.908	-9	5 720
Debt / Total Assets	2 064 113	0.084	0.162	-9	27.667
Stocks / Total Assets	2 064 113	0.025	0.1	-1.222	5.5
Deposits / Total Assets	2 064 113	0.415	0.415	-30.222	16

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values

Table A5
Summary statistics 2013

	N	Mean	St. Dev	Min	Max
Age in 2015	2 101 440	55.924	20.253	20	130
Taxable value of leisure housing	2 101 440	2.113	7.955	0	486
Taxable value of unlisted shares	2 101 440	2.181	18.861	0	2 319
Cash holdings	2 101 440	0.007	0.532	0	180
Taxable value of pension	2 101 440	1.027	8.058	0	498
Taxable value of moveables	2 101 440	3.245	9.555	0	1 080
Taxable value of debt	2 101 440	16.903	41.632	-242	2 172
Taxable net wealth	2 101 440	63.371	72.795	1	500
Taxable value of listed shares	2 101 440	3.699	15.957	0	1 884
Taxable value of bond holdings	2 101 440	0.49	5.493	0	725
Bank deposits	2 101 440	29.501	45.9	-15	1 649
Adjusted value of primary housing	2 101 440	132.191	175.022	0	4508
Adjusted value of business assets	2 101 440	1.334	49.531	-312	3 528
Adjusted value of foreign housing	2 101 440	185.022	15.496	0	1 703.333
Total assets (proxy)	2 101 440	0.085	204.106	-3	4 735
Debt / Total Assets	2 101 440	0.027	0.171	-12	63
Stocks / Total Assets	2 101 440	0.027	0.105	0	1
Deposits / Total Assets	2 101 440	0.42	0.417	-11	8.095

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table A6
Summary statistics 2014

	N	Mean	St. Dev	Min	Max
Age in 2015	2 147 892	54.716	20.274	20	130
Taxable value of leisure housing	2 147 892	2.328	8.859	0	535
Taxable value of unlisted shares	2 147 892	2.469	21.058	0	4 374
Cash holdings	2 147 892	0.006	0.619	0	577
Taxable value of pension	2 147 892	1.084	8.834	0	987
Taxable value of moveables	2 147 892	3.168	9.493	0	1 127
Taxable value of debt	2 147 892	17.901	45.306	-279	7 897
Taxable net wealth	2 147 892	66.073	76.341	-1	500
Taxable value of listed shares	2 147 892	3.874	16.534	-50	2 222
Taxable value of bond holdings	2 147 892	0.479	5.542	-4	684
Bank deposits	2 147 892	31.052	47.873	-181	3 164
Adjusted value of primary housing	2 147 892	138.598	191.775	0	8 948
Adjusted value of business assets	2 147 892	7.422	41.151	-285	4 681.667
Adjusted value of foreign housing	2 147 892	1.582	17.87	0	2 433.333
Total assets (proxy)	2 147 892	192.063	219.517	-94.000	9 832
Debt / Total Assets	2 147 892	0.087	0.168	-22.909	13.111
Stocks / Total Assets	2 147 892	0.027	0.105	-0.139	1
Deposits / Total Assets	2 147 892	0.43	0.418	-0.765	4.05

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table A7
Summary statistics 2015

	N	Mean	St. Dev	Min	Max
Age in 2015	2 181 782	53.782	20.163	20	130
Taxable value of leisure housing	2 181 782	2.397	9.085	0	535
Taxable value of unlisted shares	2 181 782	2.881	23.74	-27	1 549
Cash holdings	2 181 782	0.005	0.427	-9	220
Taxable value of pension	2 181 782	1.179	9.676	0	646
Taxable value of moveables	2 181 782	3.193	9.603	0	1 224
Taxable value of debt	2 181 782	19.654	50.124	-225	2 892
Taxable net wealth	2 181 782	71.294	82.095	1	500
Taxable value of listed shares	2 181 782	4.462	18.614	-15	1 130
Taxable value of bond holdings	2 181 782	0.433	5.195	0	1 166
Bank deposits	2 181 782	32.29	49.61	-83	1 997
Adjusted value of primary housing	2 181 782	156.575	226.309	0	7 924
Adjusted value of business assets	2 181 782	6.432	36.359	-210	4 071.429
Adjusted value of foreign housing	2 181 782	1.745	19.542	0	3 536.667
Total assets (proxy)	2 181 782	211.591	251.86	-97.714	8 443.714
Debt / Total Assets	2 181 782	0.088	0.186	-13.263	86
Stocks / Total Assets	2 181 782	0.029	0.109	-0.154	1
Deposits / Total Assets	2 181 782	0.423	0.418	-2.333	2.609

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Table A8
Summary statistics 2016

	N	Mean	St. Dev	Min	Max
Age in 2015	8 443 714	53.854	19.609	20	120
Taxable value of leisure housing	8 443 714	2.544	9.473	0	561
Taxable value of unlisted shares	8 443 714	3.639	29.106	0	2 689
Cash holdings	8 443 714	0.005	0.472	0	212
Taxable value of pension	8 443 714	1.331	10.741	0	801
Taxable value of moveables	8 443 714	3.309	9.892	0	1 204
Taxable value of debt	8 443 714	22.771	58.425	-315	3 675
Taxable net wealth	8 443 714	79.658	89.988	1	500
Taxable value of listed shares	8 443 714	1.757	12.931	-1	1 715
Taxable value of bond holdings	8 443 714	0.031	1.953	0	571
Bank deposits	8 443 714	34.653	52.365	-191	1 941
Adjusted value of primary housing	8 443 714	184.279	273.396	0	14 676
Adjusted value of business assets	8 443 714	5.982	33.943	-131.25	3 698.75
Adjusted value of foreign housing	8 443 714	1.958	21.767	0	6 370
Total assets (proxy)	8 443 714	239.488	295.463	-78.250	15 180
Debt / Total Assets	8 443 714	0.099	0.282	-10.333	147
Stocks / Total Assets	8 443 714	0.008	0.053	-0.004	1
Deposits / Total Assets	8 443 714	0.417	0.421	-4	2.667

Note: Each entry is stated in 10 000 NOK. The table only display variables of interest. The dataset provides no values with decimals.

Histograms for distribution of wealth over time

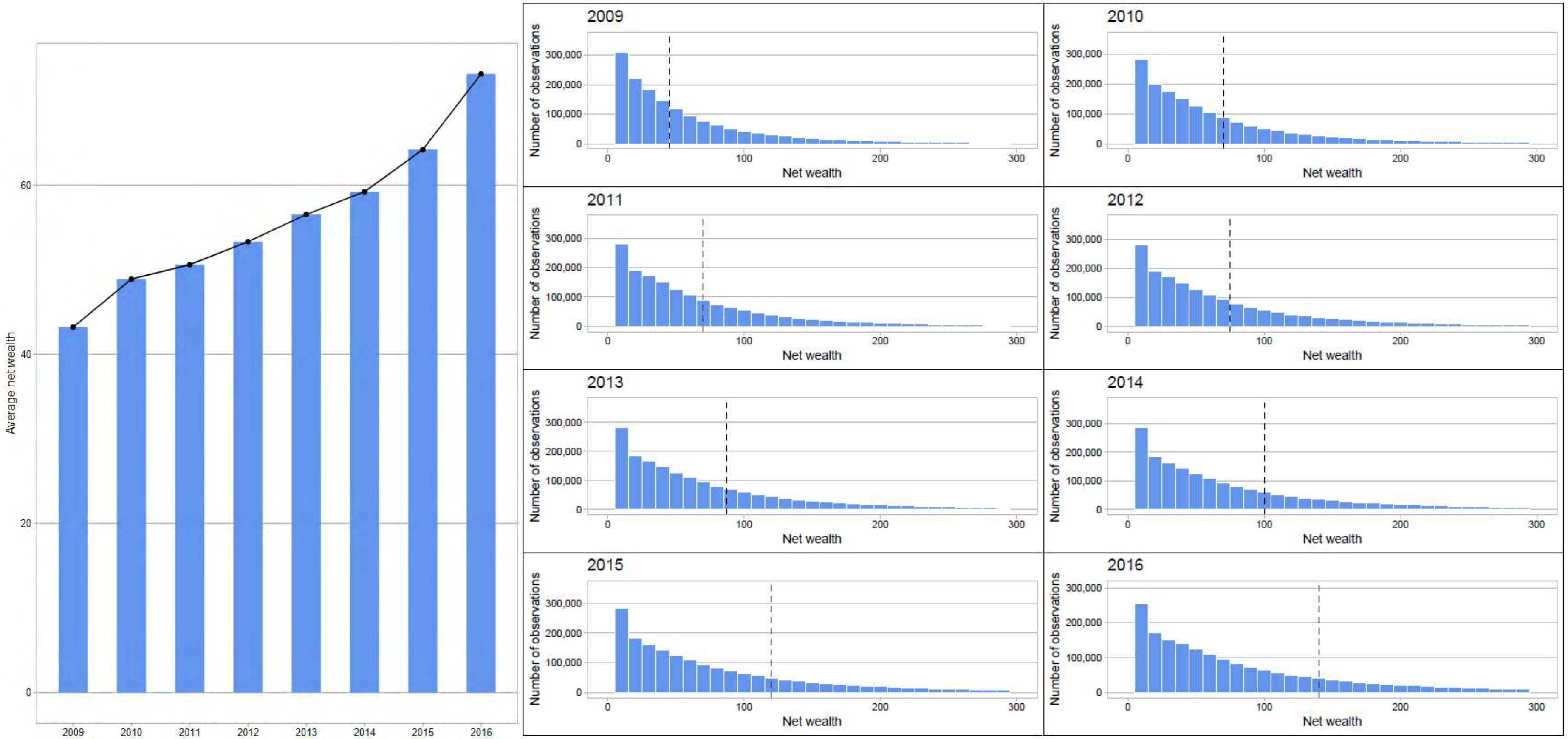


Figure A1: Histograms for wealth over time. On the left: Average net wealth in each of our datasets. On the right: Number of individuals for each level of net wealth by year. Estimated using filtered sample with net wealth >= 10 000 NOK.

McCrary Density Tests 2009-2016

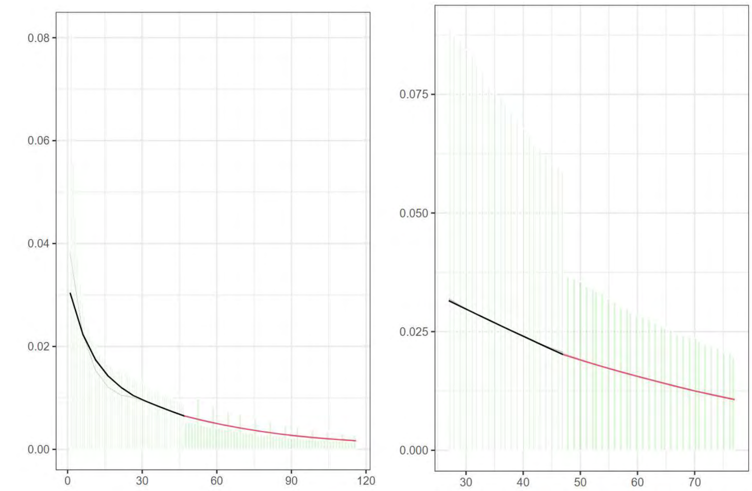


Figure A2: McCrary Density Test for 2009. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

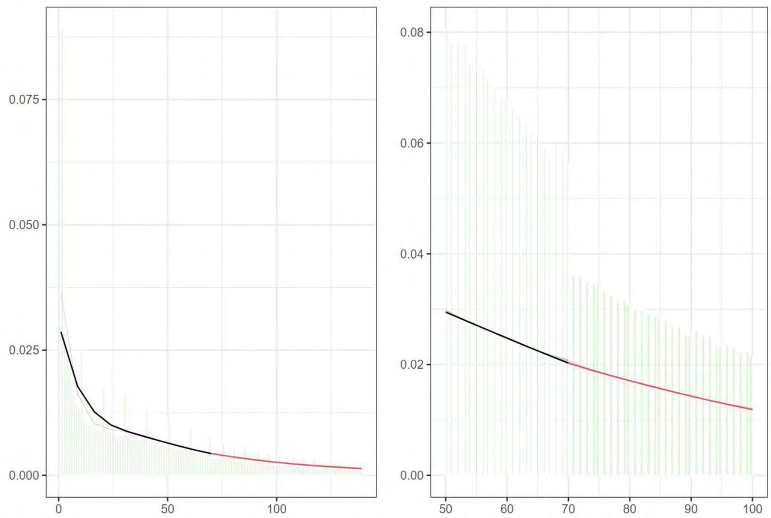


Figure A3: McCrary Density Test for 2010. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

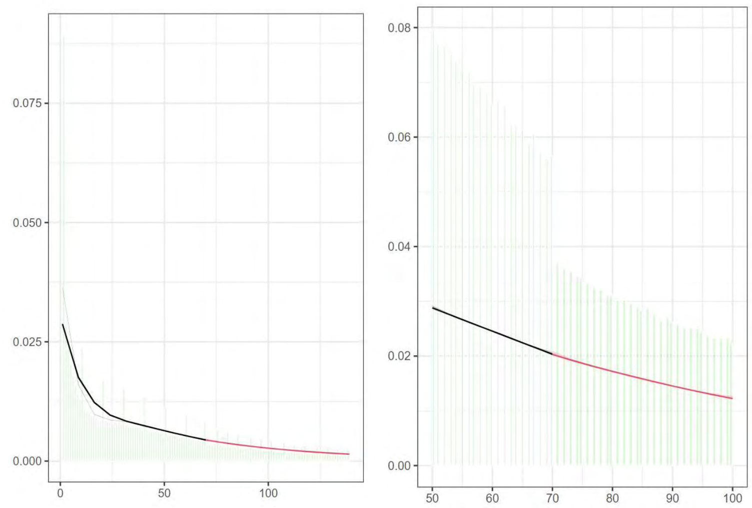


Figure A1: McCrary Density Test for 2012. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

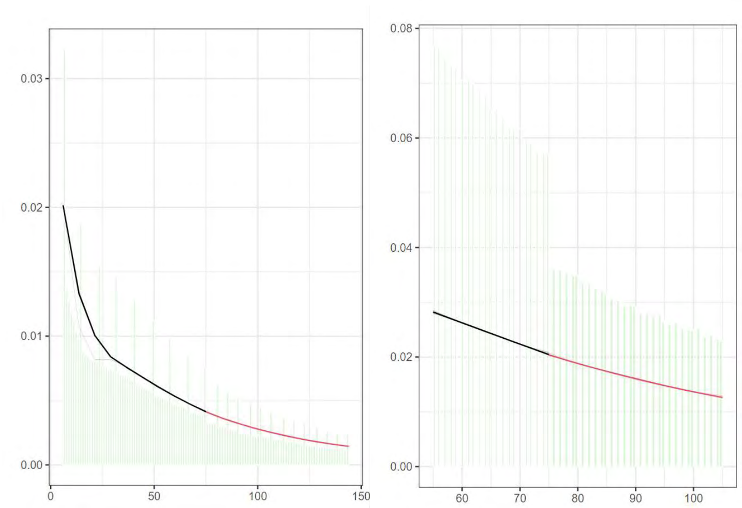


Figure A2: McCrary Density Test for 2013. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

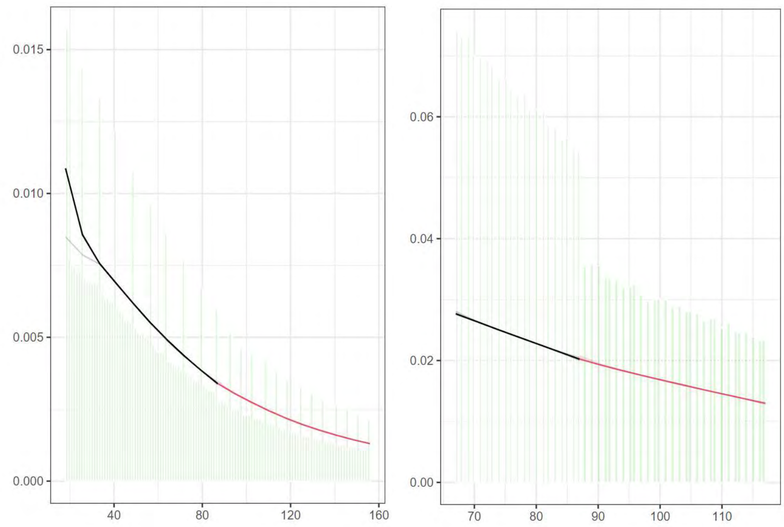


Figure A3: McCrary Density Test for 2014. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

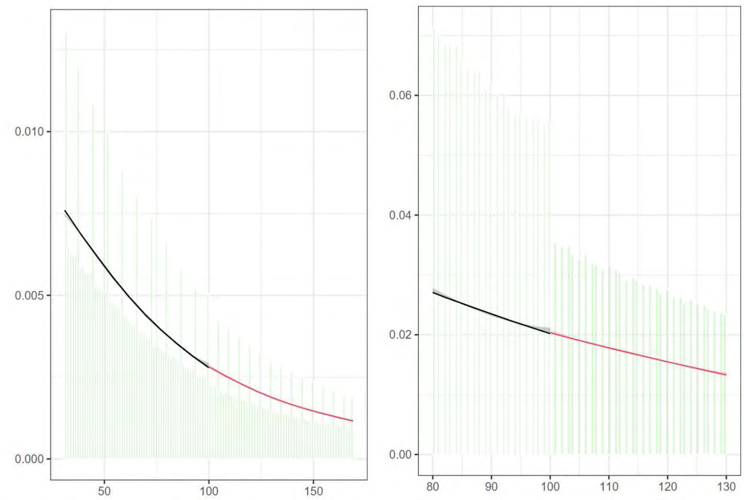


Figure A4: McCrary Density Test for 2015. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

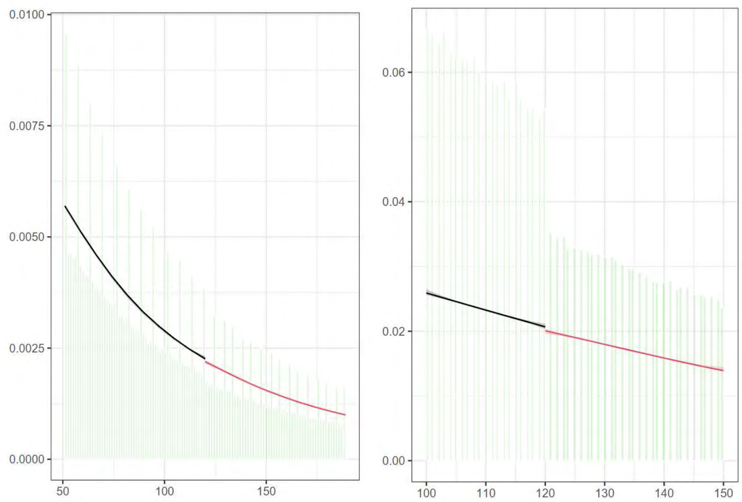


Figure A5: McCrary Density Test for 2016. On the left: full sample. On the right: reduced sample (-20' and +30' from the threshold).

Bandwidth algorithm explanation

Table A9
Bandwidth algorithm explanation

mserd	Mean Square Error
msetwo	Two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator.
msesum	One common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof).
msecomb1	For min(mserd,msesum)
msecomb2	For median(msetwo,mserd,msesum), for each side of the cutoff separately.
cerrd	Coverage Error Rate
certwo	Two different CER-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator
cersum	One common CER-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof).
cercomb1	For min(cerrd,cersum)
cercomb2	For median (certwo,cerrd,cersum), for each side of the cutoff separately

Bandwidth options: 2009-2016

Table A10
Bandwidth options for listed stocks 2009

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	10.384824	10.384824	16.21756	16.21756
msetwo	8.004003	40.737318	13.806	71.18897
msesum	9.055613	9.055613	15.0848	15.0848
msecomb1	9.055613	9.055613	15.0848	15.0848
msecomb2	9.055613	10.384824	15.0848	16.21756
cerrd	5.040417	5.040417	16.21756	16.21756
certwo	3.884853	19.772418	13.806	71.18897
cersum	4.395267	4.395267	15.0848	15.0848
cercomb1	4.395267	4.395267	15.0848	15.0848
cercomb2	4.395267	5.040417	15.0848	16.21756

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A11
Bandwidth options for debt 2009

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	9.113889	9.113889	13.22762	13.22762
msetwo	6.883307	22.933652	11.362	56.77778
msesum	9.424808	9.424808	13.35656	13.35656
msecomb1	9.113889	9.113889	13.22762	13.22762
msecomb2	9.113889	9.424808	13.22762	13.35656
cerrd	4.423551	4.423551	13.22762	13.22762
certwo	3.340908	11.131164	11.362	56.77778
cersum	4.57446	4.57446	13.35656	13.35656
cercomb1	4.423551	4.423551	13.22762	13.22762
cercomb2	4.423551	4.57446	13.22762	13.35656

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A12
Bandwidth options for deposits 2009

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	8.59632	8.59632	15.64234	15.64234
msetwo	7.11973	39.213467	13.59524	102.48817
msesum	8.317646	8.317646	15.22965	15.22965
msecomb1	8.317646	8.317646	15.22965	15.22965
msecomb2	8.317646	8.59632	15.22965	15.64234
cerrd	4.172342	4.172342	15.64234	15.64234
certwo	3.455659	19.032796	13.59524	102.48817
cersum	4.037084	4.037084	15.22965	15.22965
cercomb1	4.037084	4.037084	15.22965	15.22965
cercomb2	4.037084	4.172342	15.22965	15.64234

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A13

Bandwidth options for listed stocks 2010

	BW conventional		BW biascorrected	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	102.48817	13.47073	20.46316	20.46316
msetwo	9.144413	40.25732	16.66062	75.04973
msesum	11.44687	11.44687	18.43675	18.43675
msecomb1	11.44687	11.44687	18.43675	18.43675
msecomb2	11.44687	13.47073	18.43675	20.46316
cerrd	6.52516	6.52516	20.46316	20.46316
certwo	4.429511	19.50046	16.66062	75.04973
cersum	5.54481	5.54481	18.43675	18.43675
cercomb1	5.54481	5.54481	18.43675	18.43675
cercomb2	5.54481	6.52516	18.43675	20.46316

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A14

Bandwidth options for debt 2010

	BW conventional		BW biascorrected	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	7.407227	7.407227	14.46193	14.46193
msetwo	7.201968	30.641714	13.46023	67.99333
msesum	9.908075	9.908075	16.96463	16.96463
msecomb1	7.407227	7.407227	14.46193	14.46193
msecomb2	7.407227	9.908075	14.46193	16.96463
cerrd	3.588026	3.588026	14.46193	14.46193
certwo	3.488599	14.842702	13.46023	67.99333
cersum	4.799425	4.799425	16.96463	16.96463
cercomb1	3.588026	3.588026	14.46193	14.46193
cercomb2	3.588026	4.799425	14.46193	16.96463

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A15

Bandwidth options for deposits 2010

	BW conventional		BW biascorrected	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	11.374137	11.374137	17.48477	17.48477
msetwo	9.687786	43.544953	16.28524	84.76835
msesum	11.234035	11.234035	17.92635	17.92635
msecomb1	11.234035	11.234035	17.48477	17.48477
msecomb2	11.234035	11.374137	17.48477	17.92635
cerrd	5.509578	5.509578	17.48477	17.48477
certwo	4.692718	21.09297	16.28524	84.76835
cersum	5.441713	5.441713	17.92635	17.92635
cercomb1	5.441713	5.441713	17.48477	17.48477
cercomb2	5.441713	5.509578	17.48477	17.92635

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A16
Bandwidth options for listed stocks 2011

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	12.279038	12.279038	19.04164	19.04164
msetwo	10.729174	48.629849	17.93326	90.41291
msesum	11.830477	11.830477	19.89264	19.89264
msecomb1	11.830477	11.830477	19.04164	19.04164
msecomb2	11.830477	12.279038	19.04164	19.89264
cerrd	5.943994	5.943994	19.04164	19.04164
certwo	5.193742	23.54057	17.93326	90.41291
cersum	5.726856	5.726856	19.89264	19.89264
cercomb1	5.726856	5.726856	19.04164	19.04164
cercomb2	5.726856	5.943994	19.04164	19.89264

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A17
Bandwidth options for debt 2011

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	10.365749	10.365749	17.34983	17.34983
msetwo	8.271127	24.913149	14.50589	59.92625
msesum	10.858078	10.858078	17.81929	17.81929
msecomb1	10.365749	10.365749	17.34983	17.34983
msecomb2	10.365749	10.858078	17.34983	17.81929
cerrd	5.017816	5.017816	17.34983	17.34983
certwo	4.003859	12.059872	14.50589	59.92625
cersum	5.256141	5.256141	17.81929	17.81929
cercomb1	5.017816	5.017816	17.34983	17.34983
cercomb2	5.017816	5.256141	17.34983	17.81929

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A18
Bandwidth options for deposits 2011

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	13.852902	13.852902	22.67029	22.67029
msetwo	9.784587	52.586597	17.91987	89.36391
msesum	11.697634	11.697634	18.56774	18.56774
msecomb1	11.697634	11.697634	18.56774	18.56774
msecomb2	11.697634	13.852902	18.56774	22.67029
cerrd	6.705865	6.705865	22.67029	22.67029
certwo	4.736489	25.455939	17.91987	89.36391
cersum	5.66255	5.66255	18.56774	18.56774
cercomb1	5.66255	5.66255	18.56774	18.56774
cercomb2	5.66255	6.705865	18.56774	22.67029

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A19
Bandwidth options for listed stocks 2012

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	14.231801	14.231801	21.92972	21.92972
msetwo	11.279669	53.133465	19.16849	99.86526
msesum	13.772831	13.772831	21.94147	21.94147
msecomb1	13.772831	13.772831	21.92972	21.92972
msecomb2	13.772831	14.231801	21.92972	21.94147
cerrd	6.878966	6.878966	21.92972	21.92972
certwo	5.452048	25.682155	19.16849	99.86526
cersum	6.657122	6.657122	21.94147	21.94147
cercomb1	6.657122	6.657122	21.92972	21.92972
cercomb2	6.657122	6.878966	21.92972	21.94147

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A20
Bandwidth options for debt 2012

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	12.213726	12.213726	18.7469	18.7469
msetwo	9.279018	29.428014	16.76581	63.67236
msesum	10.533712	10.533712	18.24788	18.24788
msecomb1	10.533712	10.533712	18.24788	18.24788
msecomb2	10.533712	12.213726	18.24788	18.7469
cerrd	5.903526	5.903526	18.7469	18.7469
certwo	4.48503	14.224083	16.76581	63.67236
cersum	5.091488	5.091488	18.24788	18.24788
cercomb1	5.091488	5.091488	18.24788	18.24788
cercomb2	5.091488	5.903526	18.24788	18.7469

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A21
Bandwidth options for deposits 2012

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	11.844549	11.844549	20.04698	20.04698
msetwo	10.432237	57.678437	19.50345	94.36325
msesum	12.077937	12.077937	21.58855	21.58855
msecomb1	11.844549	11.844549	20.04698	20.04698
msecomb2	11.844549	12.077937	20.04698	21.58855
cerrd	5.725084	5.725084	20.04698	20.04698
certwo	5.04244	19.50345	19.50345	94.36325
cersum	5.837892	5.837892	21.58855	21.58855
cercomb1	5.725084	5.725084	20.04698	20.04698
cercomb2	5.725084	5.837892	20.04698	21.58855

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A22
Bandwidth options for listed stocks 2013

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	16.243036	16.243036	25.7499	25.7499
msetwo	13.801879	63.829013	22.60661	118.10931
msesum	16.754312	16.754312	25.53105	25.53105
msecomb1	16.243036	16.243036	25.53105	25.53105
msecomb2	16.243036	16.754312	25.53105	25.7499
cerrd	7.844068	7.844068	25.7499	25.7499
certwo	6.665187	30.824233	22.60661	118.10931
cersum	8.090973	8.090973	25.53105	25.53105
cercomb1	7.844068	7.844068	25.53105	25.53105
cercomb2	7.844068	8.090973	25.53105	25.7499

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A23
Bandwidth options for debt 2013

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	12.391648	12.391648	20.63266	20.63266
msetwo	11.286448	35.755675	18.97252	76.22493
msesum	14.1996	14.1996	23.0259	23.0259
msecomb1	12.391648	12.391648	20.63266	20.63266
msecomb2	12.391648	14.1996	20.63266	23.0259
cerrd	5.98416	5.98416	20.63266	20.63266
certwo	5.450439	17.267089	18.97252	76.22493
cersum	6.857255	6.857255	23.0259	23.0259
cercomb1	5.98416	5.98416	20.63266	20.63266
cercomb2	5.98416	6.857255	20.63266	23.0259

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A24
Bandwidth options for deposits 2013

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	16.74308	16.74308	28.62737	28.62737
msetwo	14.036341	81.301293	27.71035	135.6784
msesum	15.510979	15.510979	28.27966	28.27966
msecomb1	15.510979	15.510979	28.27966	28.27966
msecomb2	15.510979	16.74308	28.27966	28.62737
cerrd	8.085549	8.085549	28.62737	28.62737
certwo	6.778413	9.261926	27.71035	135.6784
cersum	7.490544	7.490544	28.27966	28.27966
cercomb1	7.490544	7.490544	28.27966	28.27966
cercomb2	7.490544	8.085549	28.27966	28.62737

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A25
Bandwidth options for listed stocks 2014

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	18.137682	18.137682	30.32436	30.32436
msetwo	14.054238	71.908487	25.77474	114.79266
msesum	18.29545	18.29545	29.93191	29.93191
msecomb1	18.137682	18.137682	29.93191	29.93191
msecomb2	18.137682	18.29545	29.93191	30.32436
cerrd	8.749458	8.749458	30.32436	30.32436
certwo	6.779641	34.688021	25.77474	114.79266
cersum	8.825564	8.825564	29.93191	29.93191
cercomb1	8.749458	8.749458	29.93191	29.93191
cercomb2	8.749458	8.825564	29.93191	30.32436

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A26
Bandwidth options for debt 2014

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	16.690275	16.690275	27.88609	27.88609
msetwo	12.604142	34.541676	23.733	73.4431
msesum	13.190488	13.190488	24.71812	24.71812
msecomb1	13.190488	13.190488	24.71812	24.71812
msecomb2	13.190488	16.690275	24.71812	27.88609
cerrd	8.051242	8.051242	27.88609	27.88609
certwo	6.080127	16.662601	23.733	73.4431
cersum	6.362976	6.362976	24.71812	24.71812
cercomb1	6.362976	6.362976	24.71812	24.71812
cercomb2	6.362976	8.051242	24.71812	27.88609

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A27
Bandwidth options for deposits 2014

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	16.116087	16.116087	28.56848	28.56848
msetwo	14.280461	61.750738	26.20978	93.33123
msesum	17.635667	17.635667	27.33205	27.33205
msecomb1	16.116087	16.116087	27.33205	27.33205
msecomb2	16.116087	17.635667	27.33205	28.56848
cerrd	7.774259	7.774259	28.56848	28.56848
certwo	6.888769	29.788013	26.20978	93.33123
cersum	8.507291	8.507291	27.33205	27.33205
cercomb1	7.774259	7.774259	27.33205	27.33205
cercomb2	7.774259	8.507291	27.33205	28.56848

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A28
Bandwidth options for listed stocks 2015

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	22.70555	22.70555	38.10826	38.10826
msetwo	20.226385	61.9963	33.85326	108.74522
msesum	26.1089	26.1089	40.07029	40.07029
msecomb1	22.70555	22.70555	38.10826	38.10826
msecomb2	22.70555	26.1089	38.10826	40.07029
cerrd	10.944388	10.94439	38.10826	38.10826
certwo	9.749396	29.88307	33.85326	108.74522
cersum	12.584849	12.58485	40.07029	40.07029
cercomb1	10.944388	10.94439	38.10826	38.10826
cercomb2	10.944388	12.58485	38.10826	40.07029

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A29
Bandwidth options for debt 2015

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	24.67186	24.67186	37.13842	37.13842
msetwo	20.720867	54.01257	33.65338	116.13984
msesum	24.757584	24.75758	38.67349	38.67349
msecomb1	24.67186	24.67186	37.13842	37.13842
msecomb2	24.67186	24.75758	37.13842	38.67349
cerrd	11.892176	11.89218	37.13842	37.13842
certwo	9.987743	26.0348	33.65338	116.13984
cersum	11.933496	11.9335	38.67349	38.67349
cercomb1	11.892176	11.89218	37.13842	37.13842
cercomb2	11.892176	11.9335	37.13842	38.67349

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A30
Bandwidth options for deposits 2015

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	17.425847	17.425847	28.61944	28.61944
msetwo	15.836701	57.898178	26.22045	88.7008
msesum	19.246325	19.246325	29.43783	29.43783
msecomb1	17.425847	17.425847	28.61944	28.61944
msecomb2	17.425847	19.246325	28.61944	29.43783
cerrd	8.399498	8.399498	28.61944	28.61944
certwo	7.633508	27.907718	26.22045	88.7008
cersum	9.276993	9.276993	29.43783	29.43783
cercomb1	8.399498	8.399498	28.61944	28.61944
cercomb2	8.399498	9.276993	28.61944	29.43783

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A31

Bandwidth options for listed stocks 2016

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	41.71223	41.71223	62.26353	62.26353
msetwo	37.2367	68.778	58.90446	113.06685
msesum	39.54881	39.54881	62.65171	62.65171
msecomb1	39.54881	39.54881	62.26353	62.26353
msecomb2	39.54881	41.71223	62.26353	62.65171
cerrd	20.12639	20.12639	62.26353	62.26353
certwo	17.96692	33.18578	58.90446	113.06685
cersum	19.08253	19.08253	62.65171	62.65171
cercomb1	19.08253	19.08253	62.26353	62.26353
cercomb2	19.08253	20.12639	62.26353	62.65171

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A32

Bandwidth options for debt 2016

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	29.23666	29.23666	42.50537	42.50537
msetwo	21.21144	73.43118	37.95049	158.7067
msesum	26.63495	26.63495	42.30578	42.30578
msecomb1	26.63495	26.63495	42.30578	42.30578
msecomb2	26.63495	29.23666	42.30578	42.50537
cerrd	14.10686	14.10686	42.50537	42.50537
certwo	10.23464	35.43097	37.95049	158.7067
cersum	12.85152	12.85152	42.30578	42.30578
cercomb1	12.85152	12.85152	42.30578	42.30578
cercomb2	12.85152	14.10686	42.30578	42.50537

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Table A33

Bandwidth options for deposits 2016

	BW conventional		*BW biascorrected*	
	Left of cut-off	Right of cut-off	Left of cut-off	Right of cut-off
mserd	18.896692	18.896692	31.75945	31.75945
msetwo	13.906261	79.509793	26.05651	162.09433
msesum	18.910119	18.910119	31.26143	31.26143
msecomb1	18.896692	18.896692	31.26143	31.26143
msecomb2	18.896692	18.910119	31.26143	31.75945
cerrd	9.117763	9.117763	31.75945	31.75945
certwo	6.709851	38.363935	26.05651	162.09433
cersum	9.124242	9.124242	31.26143	31.26143
cercomb1	9.117763	9.117763	31.26143	31.26143
cercomb2	9.117763	9.124242	31.26143	31.75945

Note: Each number is stated in 10 000 NOK. Triangular kernel used

Parametric regression results

Table A34
Parametric regression results 2009

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.0004**	0.0002***	0.0001***	0.0002***
	(0.0002)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	-0.001	-0.0003	-0.00004	-0.005***
	(0.001)	(0.001)	(0.001)	(0.0003)
Constant	0.036***	0.036***	0.024***	0.044***
	(0.001)	(0.0004)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	139 423	268 535	369 515	1 899 560
R2	0.0001	0.0001	0.0003	0.004
Adjusted R2	0.0001	0.0001	0.0003	0.004
Residual Std.Error	0.099 (df = 139420)	0.099 (df = 268532)	0.080 (df = 369512)	(df = 1899557)
F Statistic	5.503*** (df = 2; 139420)	14.281*** (df = 2; 268532)	54.735*** (df = 2; 369512)	4 015.183*** (df = 2; 1899557)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A35
Parametric regression results 2009

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.002***	0.001***	0.0004***	-0.0003***
	(0.001)	(0.0002)	(0.0001)	(0.00001)
Threshold dummy	-0.008**	-0.005**	0.005***	-0.086***
	(0.003)	(0.003)	(0.002)	(0.001)
Constant	0.362***	0.361***	0.360***	0.520***
	(0.002)	(0.001)	(0.001)	(0.0004)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	139 423	268 535	369 515	1 899 560
R2	0.0001	0.0003	0.0004	0.022
Adjusted R2	0.0001	0.0003	0.0004	0.022
Residual Std.Error	0.324 (df = 139420)	0.326 (df = 268532)	0.357 (df = 537502)	0.384 (df = 1899557)
F Statistic	7.818*** (df = 2; 139420)	45.655*** (df = 2; 268532)	115.774*** (df = 2; 537502)	20 972.720*** (df = 2; 1899557)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A36
Parametric regression results 2009

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.002***	-0.002***	-0.0003***	-0.0004***
	(0.0004)	(0.0002)	(0.00004)	(0.00001)
Threshold dummy	0.001	-0.0002	-0.001	-0.075***
	(0.003)	(0.003)	(0.001)	(0.001)
Constant	0.119***	0.121***	0.050***	0.179***
		(0.001)	(0.001)	(0.0004)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	139 423	268 535	369 515	1 899 560
R2	0.0005	0.001	0.001	0.026
Adjusted R2	0.0005	0.001	0.001	0.026
Residual Std.Error	0.235 (df = 139420)	0.332 (df = 268532)	0.151 (df = 369512)	0.342 (df = 1899557)
F Statistic	32.435*** (df = 2; 139420)	15.586*** (df = 2; 268532)	156.436*** (df = 2; 369512)	25 225.490*** (df = 2; 1899557)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A37
Parametric regression results 2011

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0001	0.00003	0.0001***	0.00002***
	(0.0001)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	0.001	0.001	-0.00004	-0.004***
	(0.001)	(0.001)	(0.001)	(0.0003)
Constant	0.017***	0.018***	0.024***	0.028***
	(0.001)	(0.0004)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	99 732	190 761	369 515	2 003 175
R2	0.00003	0.00004	0.0003	0.0001
Adjusted R2	0.00001	0.00003	0.0003	0.0001
Residual Std.Error	0.066 (df = 99729)	0.066 (df = 190758)	0.080 (df = 369512)	0.102 (df = 2003172)
F Statistic	1.689 (df = 2; 99729)	4.223** (df = 2; 190758)	54.735*** (df = 2; 369512)	123.164*** (df = 2; 2003172)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A38
Parametric regression results 2011

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.001	0.0003	0.0001	-0.001***
	(0.001)	(0.0002)	(0.0001)	(0.00001)
Threshold dummy	-0.005		-0.001	-0.053***
	(0.004)	(0.003)	(0.002)	-0.001
Constant	0.233***	0.233***	0.233***	0.409***
	(0.002)	(0.002)	(0.001)	(0.0005)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	99 732	190 761	369 515	2 003 175
R2	0.00001	0.00001	0.00001	0.071
Adjusted R2	-0.00001	0.00000	0.00001	0.071
Residual Std.Error	0.310 (df = 99729)	0.311 (df = 190758)	0.314 (df = 378061)	0.398 (df = 2003172)
F Statistic	0.660 (df = 2; 99729)	1.013 (df = 2; 190758)	2.371* (df = 2; 378061)	76 479.630*** (df = 2; 2003172)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A39
Parametric regression results 2011

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0005***	-0.0004***	-0.0004***	-0.0004***
	(0.0002)	(0.0001)	(0.00003)	(0.00000)
Threshold dummy	0.001	0.0003	0.0003	-0.023***
	(0.001)	(0.001)	(0.001)	(0.0004)
Constant	0.049***	0.050***	0.050***	0.085***
	(0.001)	(0.001)	(0.0004)	(0.0002)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	99 732	190 761	369 515	2 003 175
R2	0.0002	0.0003	0.002	0.039
Adjusted R2	0.0002	0.0003	0.002	0.039
Residual Std.Error	0.086 (df = 99729)	0.123 (df = 190758)	0.108 (df = 378061)	0.164 (df = 2003172)
F Statistic	9.324*** (df = 2; 99729)	32.330*** (df = 2; 190758)	330.721*** (df = 2; 378061)	40 829.660*** (df = 2; 2003172)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A40

Parametric regression results 2012

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0001	0.0001	0.00003	0.00002***
	(0.0001)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	0.001	0.0004	0.001*	-0.004***
	(0.001)	(0.001)	(0.0004)	(0.0003)
Constant	0.017***	0.018***	0.018***	0.027***
	(0.001)	(0.0004)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	95 427	182 273	360 044	2 064 113
R2	0.00003	0.0001	0.0001	0.0001
Adjusted R2	0.00001	0.0001	0.0001	0.0001
Residual Std.Error	0.066 (df = 95424)	0.065 (df = 182270)	0.066 (df = 360041)	0.100 (df = 2064110)
F Statistic	1.245 (df = 2; 95424)	6.894*** (df = 2; 182270)	19.431*** (df = 2; 360041)	105.589*** (df = 2; 2064110)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A41

Parametric regression results 2012

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.001	0.0003	0.0001	-0.001***
	(0.001)	(0.0002)	(0.0001)	(0.00001)
Threshold dummy	-0.003	-0.001	0.001	-0.038***
	(0.004)	(0.003)	(0.002)	(0.001)
Constant	0.232***	0.231***	0.230***	0.404***
	(0.002)	(0.002)	(0.001)	(0.0005)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	95 427	182 273	360 044	2 064 113
R2	0.00002	0.00003	0.00002	0.075
Adjusted R2	0.00000	0.00002	0.00001	0.075
Residual Std.Error	0.309 (df = 95424)	0.310 (df = 182270)	0.312 (df = 360041)	0.399 (df = 2064110)
F Statistic	1.089 (df = 2; 95424)	2.579* (df = 2; 182270)	3.287** (df = 2; 360041)	84 157.710*** (df = 2; 2064110)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A42

Parametric regression results 2012

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0004**	-0.0004***	-0.0004***	-0.0004***
	(0.0002)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	0.0001	0.0002	0.0004	-0.020***
	(0.001)	(0.001)	(0.001)	(0.0004)
Constant	0.050***	0.049***	0.050***	0.084***
	(0.001)	(0.0005)	(0.0003)	(0.0002)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	95 427	182 273	360 044	2 064 113
R2	0.0002	0.001	0.002	0.042
Adjusted R2	0.0001	0.001	0.002	0.042
Residual Std.Error	0.085 (df = 95424)	0.085 (df = 182270)	0.087 (df = 360041)	0.159 (df = 2064110)
F Statistic	7.346*** (df = 2; 95424)	57.110*** (df = 2; 182270)	403.170*** (df = 2; 360041)	45 463.980*** (df = 2; 2064110)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A43
Parametric regression results 2013

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0003*	0.0001	0.0001***	0.00005***
	(0.0002)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	0.001	-0.0003	-0.0002	-0.003***
	(0.001)	(0.001)	(0.001)	(0.0003)
Constant	0.020***	0.021***	0.021***	0.029***
	(0.001)	(0.0004)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	79 686	152 935	302 529	2 101 440
R2	0.00004	0.00004	0.0002	0.001
Adjusted R2	0.00001	0.00003	0.0002	0.001
Residual Std.Error	0.072 (df = 79683)	0.072 (df = 152932)	0.072 (df = 302526)	0.104 (df = 2101437)
F Statistic	1.580 (df = 2; 79683)	3.414** (df = 2; 152932)	37.382*** (df = 2; 302526)	563.636*** (df = 2; 2101437)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A44
Parametric regression results 2013

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.001	0.0001	0.0003***	-0.002***
	(0.001)	(0.0003)	(0.0001)	(0.00001)
Threshold dummy	-0.004	0.0004	-0.001	0.025***
	(0.004)	(0.003)	(0.002)	(0.001)
Constant	0.235***	0.233***	0.234***	0.372***
	(0.003)	(0.002)	(0.001)	(0.0005)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	79 686	152 935	302 529	2 101 440
R2	0.00002	0.00001	0.0001	0.082
Adjusted R2	0.00000	-0.00001	0.0001	0.082
Residual Std.Error	0.303 (df = 79683)	0.303 (df = 152932)	0.305 (df = 302526)	0.399 (df = 2101437)
F Statistic	0.990 (df = 2; 79683)	0.591 (df = 2; 152932)	14.792*** (df = 2; 302526)	93 819.850*** (df = 2; 2101437)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A45
Parametric regression results 2013

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.001***	-0.0004***	-0.0003***	-0.0004***
	(0.0002)	(0.0001)	(0.00003)	(0.00000)
Threshold dummy	0.001	0.0003	-0.001	-0.012***
	(0.001)	(0.001)	(0.001)	(0.0004)
Constant	0.048***	0.049***	0.049***	0.079***
	(0.001)	(0.001)	(0.0004)	(0.0002)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	79 686	152 935	302 529	2 101 440
R2	0.0003	0.001	0.002	0.037
Adjusted R2	0.0003	0.001	0.002	0.037
Residual Std.Error	0.089 (df = 79683)	0.090 (df = 152932)	0.089 (df = 302526)	0.167 (df = 2101437)
F Statistic	13.241*** (df = 2; 79683)	52.606*** (df = 2; 152932)	260.330*** (df = 2; 302526)	40,769.580*** (df = 2; 2101437)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A46
Parametric regression results 2014

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.0002	0.0002**	0.0001***	0.00004***
	(0.0002)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	-0.0003	-0.001	0.0002	0.00003
	(0.001)	(0.001)	(0.001)	(0.0003)
Constant	0.022***	0.022***	0.022***	
	(0.001)	(0.0005)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	67 606	128 954	254 577	2 147 892
R2	0.00003	0.0001	0.0003	0.001
Adjusted R2	0.00000	0.0001	0.0002	0.001
Residual Std.Error	0.073 (df = 67603)	0.073 (df = 128951)	0.073 (df = 254574)	0.105 (df = 2147889)
F Statistic	0.940 (df = 2; 67603)	7.169*** (df = 2; 128951)	32.742*** (df = 2; 254574)	729.621*** (df = 2; 2147889)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A47
Parametric regression results 2014

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.00002	0.001**	0.0004***	-0.002***
	(0.001)	(0.0003)	(0.0001)	(0.00001)
Threshold dummy	0.001	-0.002	0.001	0.102***
	(0.005)	(0.003)	(0.002)	(0.001)
Constant	0.243***	0.244***	0.244***	0.336***
	(0.003)	(0.002)	(0.001)	(0.001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	67 606	128 954	254 577	2 147 892
R2	0.00000	0.0001	0.0003	0.091
Adjusted R2	-0.00003	0.0001	0.0002	0.091
Residual Std.Error	0.300 (df = 67603)	0.300 (df = 128951)	0.302 (df = 254574)	0.398 (df = 2147889)
F Statistic	0.048 (df = 2; 67603)	9.016*** (df = 2; 128951)	32.193*** (df = 2; 254574)	107 125.400*** (df = 2; 2147889)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A48
Parametric regression results 2014

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.001**	-0.0002***	-0.0002***	-0.0004***
	(0.0002)	(0.0001)	(0.00003)	(0.00000)
Threshold dummy	0.001	0.0001	0.0002	0.0002
	(0.001)	(0.001)	(0.001)	(0.0005)
Constant	0.048***	0.048***	0.048***	0.072***
	(0.001)	(0.001)		(0.0002)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	67 606	128 954	254 577	2 147 892
R2	0.0002	0.0003	0.001	0.038
Adjusted R2	0.0001	0.0003	0.001	0.038
Residual Std.Error	0.087 (df = 67603)	0.087 (df = 128951)	0.098 (df = 254574)	0.165 (df = 2147889)
F Statistic	5.848*** (df = 2; 67603)	17.840*** (df = 2; 128951)	104.280*** (df = 2; 254574)	42 866.550*** (df = 2; 2147889)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A49
Parametric regression results 2015

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0002	0.0002**	0.0002***	0.00002***
	(0.0002)	(0.0001)	(0.00003)	(0.00000)
Threshold dummy	0.001	-0.0004	-0.0003	0.004***
	(0.001)	(0.001)	(0.001)	(0.0003)
Constant	0.024***	0.025***	0.025***	0.029***
	(0.001)	(0.001)	(0.0004)	(0.0002)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	54 189	103 325	202 989	2 181 782
R2	0.00001	0.0001	0.0004	0.001
Adjusted R2	-0.00002	0.0001	0.0004	0.001
Residual Std.Error	0.079 (df = 54186)	0.079 (df = 103322)	0.080 (df = 202986)	0.109 (df = 2181779)
F Statistic	0.333 (df = 2; 54186)	6.663*** (df = 2; 103322)	43.651*** (df = 2; 202986)	984.045*** (df = 2; 2181779)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A50
Parametric regression results 2015

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.00002	-0.0002	0.0002*	-0.002***
	(0.001)	(0.0003)	(0.0001)	(0.00001)
Threshold dummy	0.002	0.002	-0.001	0.196***
	(0.005)	(0.004)	(0.003)	(0.001)
Constant	0.244***	0.243***	0.244***	0.270***
	(0.003)	(0.002)	(0.001)	(0.001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	54 189	103 325	202 989	2 181 782
R2	0.00001	0.00000	0.00005	0.104
Adjusted R2	-0.00003	-0.00002	0.00004	0.104
Residual Std.Error	0.293 (df = 54186)	0.293 (df = 103322)	0.293 (df = 202986)	0.395 (df = 2181779)
F Statistic	0.273 (df = 2; 54186)	0.186 (df = 2; 103322)	4.598** (df = 2; 202986)	126 501.500*** (df = 2; 2181779)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A51
Parametric regression results 2015

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0004*	-0.0003***	-0.0002***	-0.0005***
	(0.0002)	(0.0001)	(0.00003)	(0.00000)
Threshold dummy	0.002	0.002*	0.0002	0.018***
	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.044***	0.044***	0.045***	0.061***
	(0.001)	(0.001)	(0.0004)	(0.0003)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	54 189	103 325	202 989	2 181 782
R2	0.0001	0.0002	0.0005	0.033
Adjusted R2	0.00003	0.0002	0.0005	0.033
Residual Std.Error	0.084 (df = 54186)	0.084 (df = 103322)	0.086 (df = 202986)	0.183 (df = 2181779)
F Statistic	1.800 (df = 2; 54186)	11.705*** (df = 2; 103322)	50.475*** (df = 2; 202986)	37 098.460*** (df = 2; 2181779)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A52

Parametric regression results 2016

	Listed Stocks/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.0002	-0.00003	0.0001***	0.00004***
	(0.0001)	(0.0001)	(0.00002)	(0.00000)
Threshold dummy	0.001	0.0005	-0.0002	0.001***
	(0.001)	(0.001)	(0.0005)	(0.0002)
Constant	0.008***	0.009***	0.009***	0.010***
	(0.001)	(0.0004)	(0.0003)	(0.0001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	44 674	85 289	166 905	2 137 714
R2	0.0001	0.00001	0.0001	0.005
Adjusted R2	0.00001	-0.00002	0.0001	0.005
Residual Std.Error	0.050 (df = 44671)	0.050 (df = 85286)	0.050 (df = 166902)	0.053 (df = 2137711)
F Statistic	1.276 (df = 2; 44671)	0.251 (df = 2; 85286)	2.082*** (df = 2; 166902)	5 648.295*** (df = 2; 2137711)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A53

Parametric regression results 2016

	Deposits/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	0.001	0.0004	0.00002	-0.002***
	(0.001)	(0.0003)	(0.0001)	(0.00001)
Threshold dummy	-0.003	-0.001	0.004	0.248***
	(0.006)	(0.004)	(0.003)	(0.001)
Constant	0.251***	0.248***	0.245***	0.232***
	(0.003)	(0.002)	(0.002)	(0.001)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	44 674	85 289	166 905	2 137 714
R2	0.00002	0.0001	0.00005	0.107
Adjusted R2	-0.00002	0.00003	0.00004	0.107
Residual Std.Error	0.293 (df = 44671)	0.292 (df = 85286)	0.293 (df = 166902)	0.397 (df = 2137711)
F Statistic	0.511 (df = 2; 44671)	2.162 (df = 2; 85286)	3.938** (df = 2; 166902)	128 332.600*** (df = 2; 2137711)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Table A54

Parametric regression results 2016

	Debt/ Total Assets			
	(1)	(2)	(3)	(4)
Net wealth recentred	-0.001**	-0.0002**	-0.0001***	-0.001***
	(0.0003)	(0.0001)	(0.00005)	(0.00000)
Threshold dummy	0.004**	0.001	0.0004	0.042***
	(0.002)	(0.001)	(0.001)	(0.001)
Constant	0.044***	0.045***	0.045***	0.055***
	(0.001)	(0.001)	(0.001)	(0.0004)
BW	± 50 000NOK	± 100 000 NOK	± 200 000 NOK	Full
Observations	44 674	85 289	166 905	2 137 714
R2	0.0001	0.0001	0.0001	0.022
Adjusted R2	0.0001	0.0001	0.0001	0.022
Residual Std.Error	0.096 (df = 44671)	0.103 (df = 85286)	0.111 (df = 166902)	0.279 (df = 2137711)
F Statistic	3.291** (df = 2; 44671)	3.523** (df = 2; 85286)	11.217*** (df = 2; 166902)	23,785.780*** (df = 2; 2137711)

Note: *p< 0.1; **p< 0.05; ***p< 0.01

Figure A9: Parametric regression discontinuity plot 2009

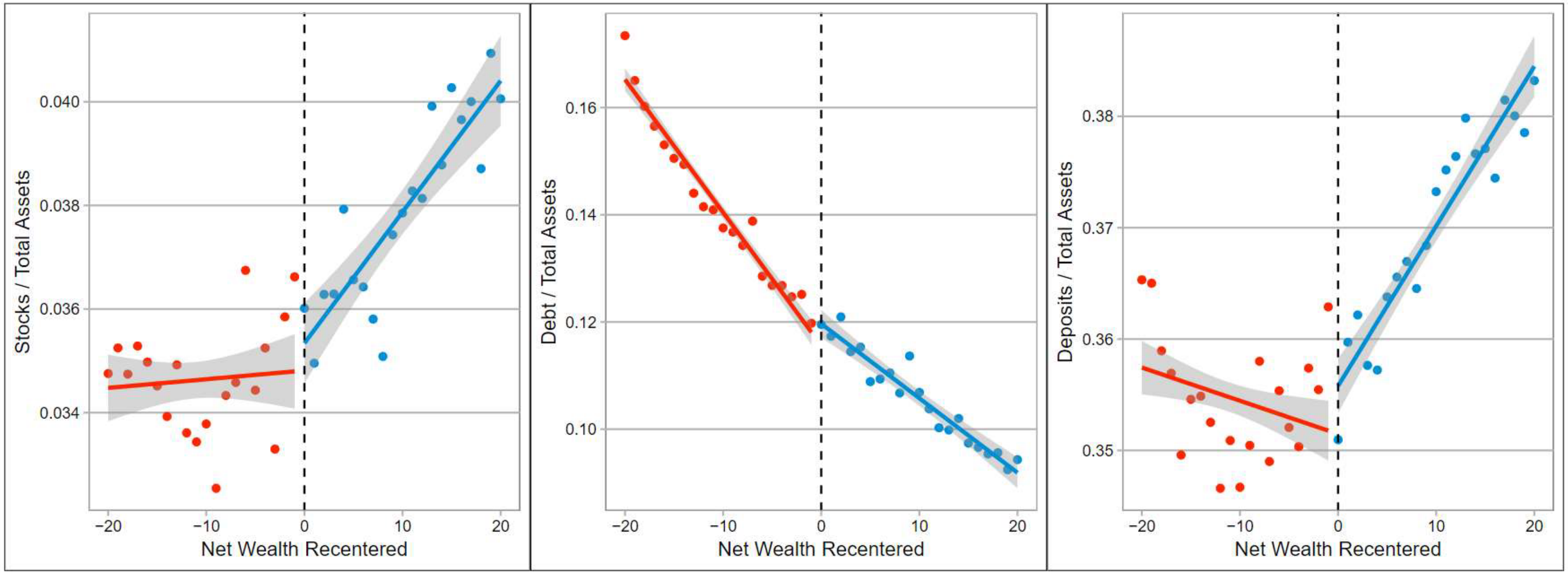


Figure A10: Parametric regression discontinuity plot 2010

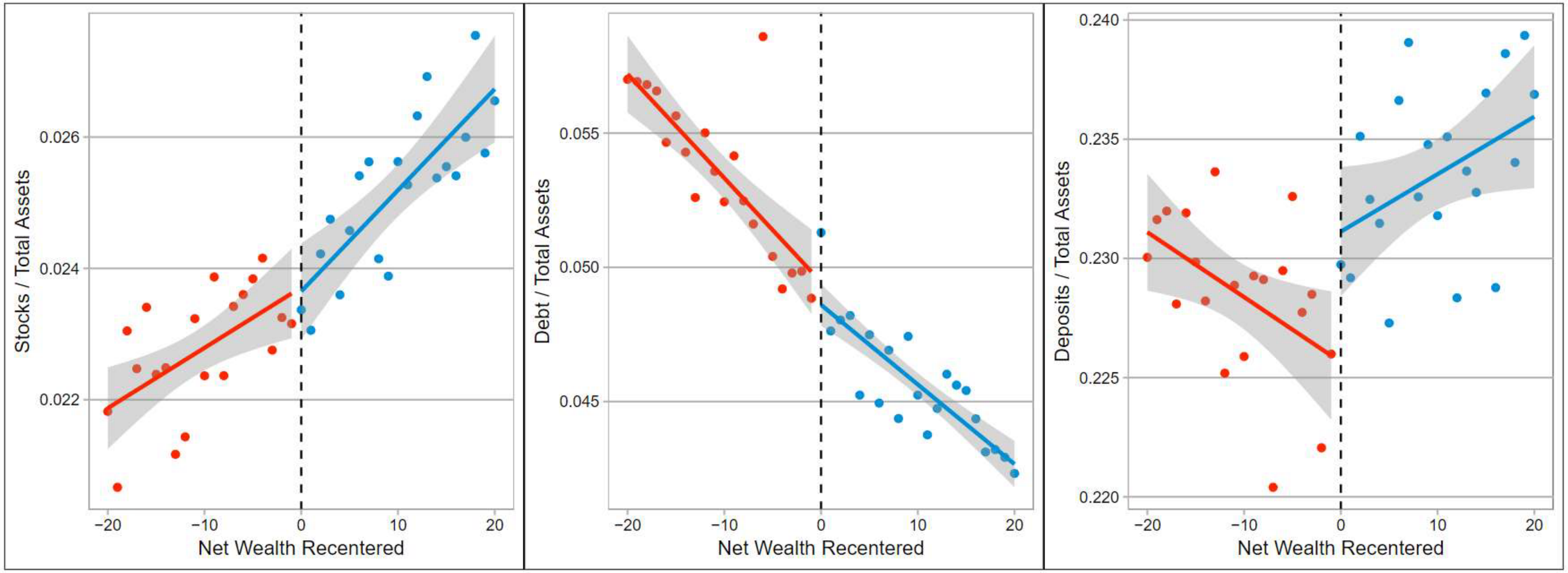


Figure A11: Parametric regression discontinuity plot 2011

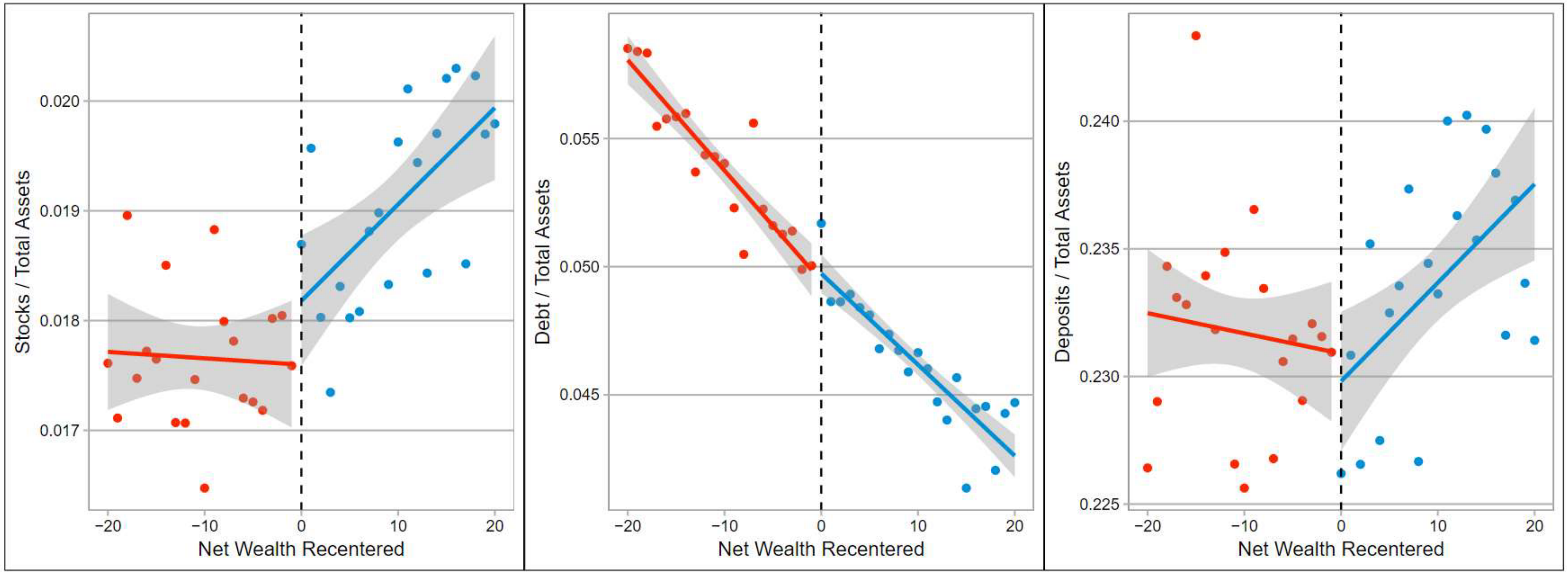


Figure A12: Parametric regression discontinuity plot 2012

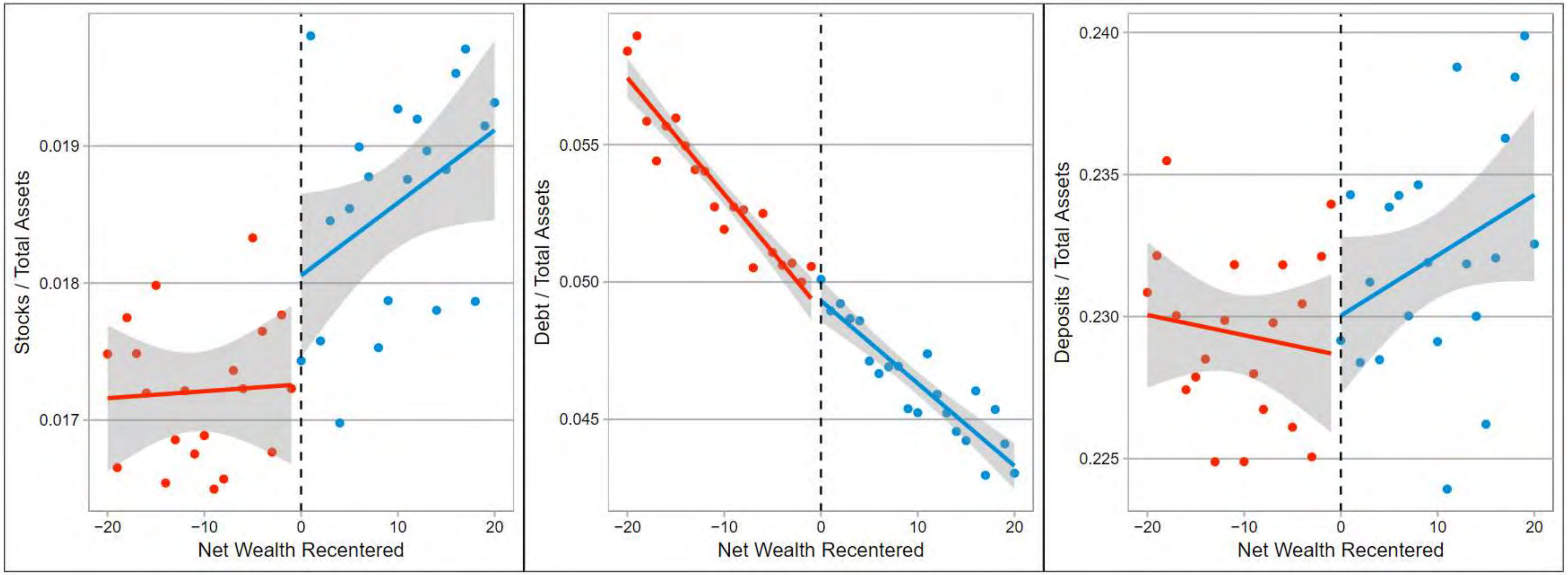


Figure A13: Parametric regression discontinuity plot 2013

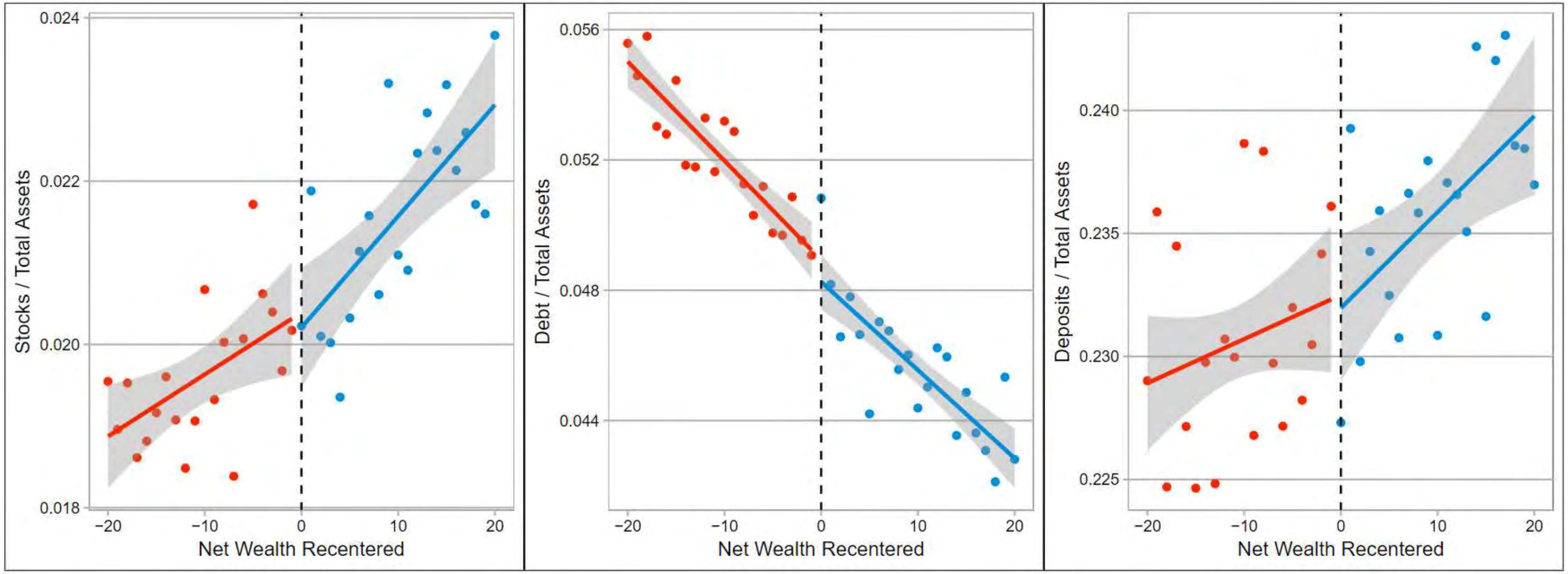


Figure A13: Parametric regression discontinuity plot 2014

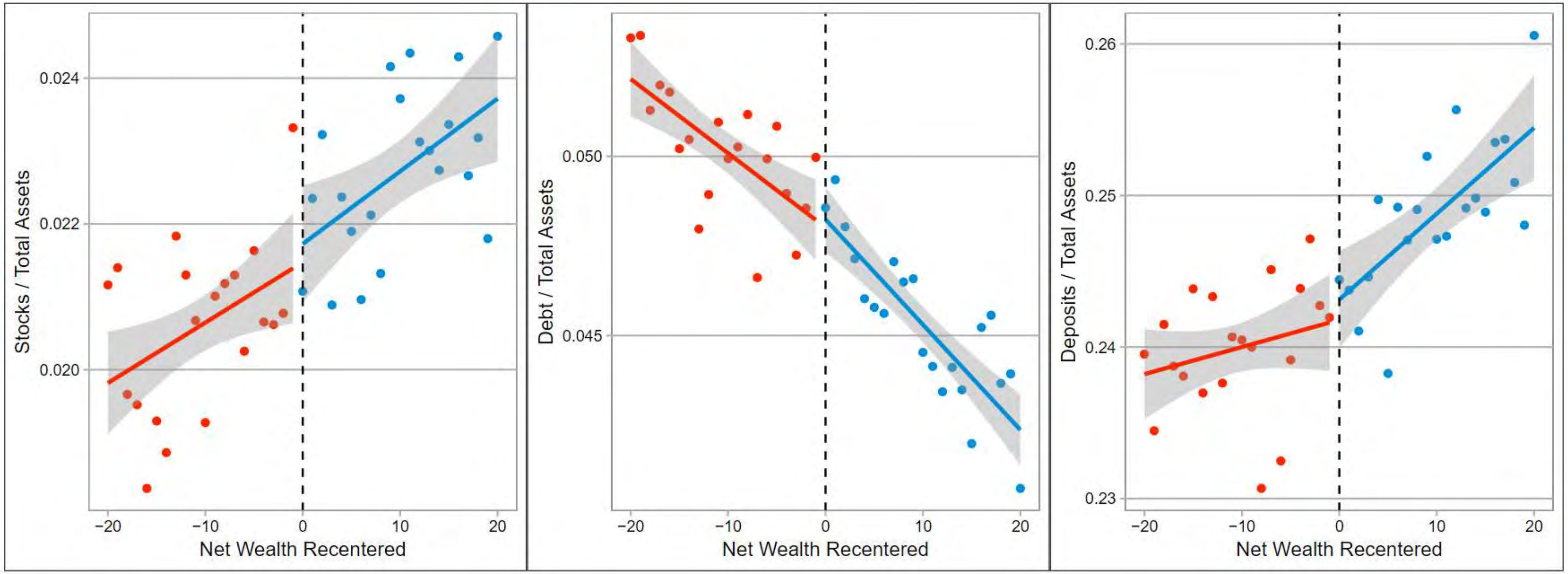


Figure A14: Parametric regression discontinuity plot 2015

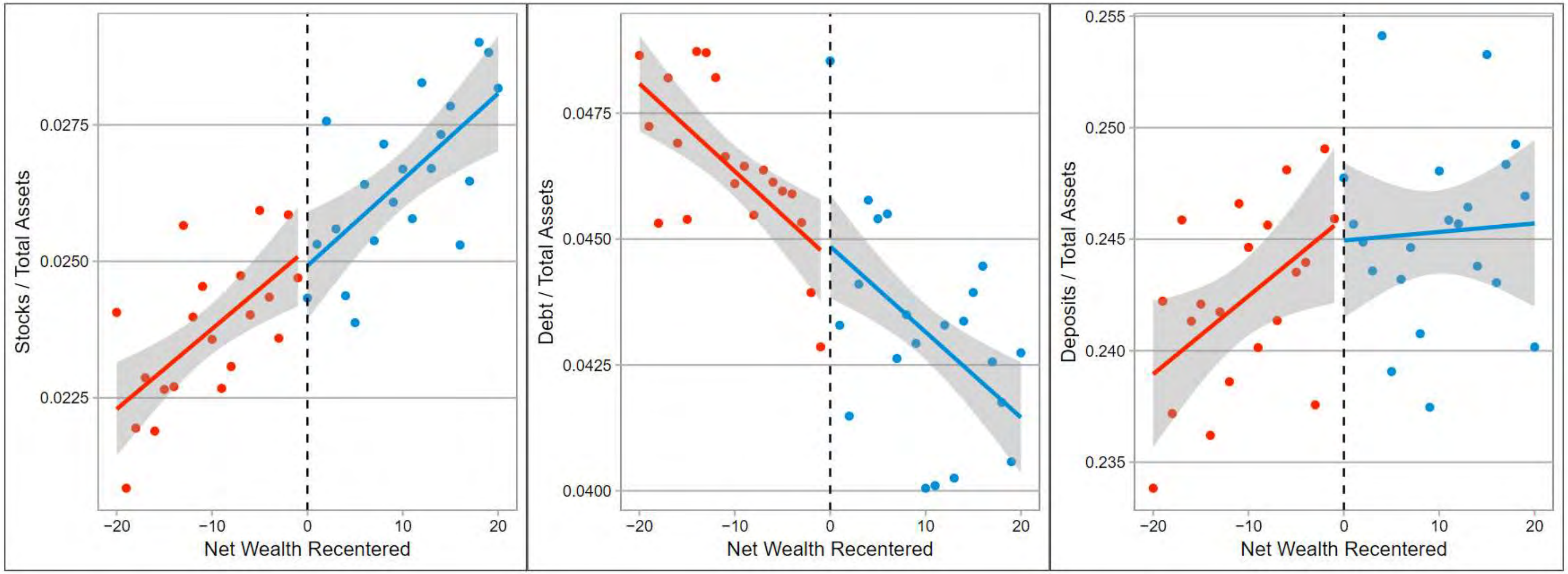
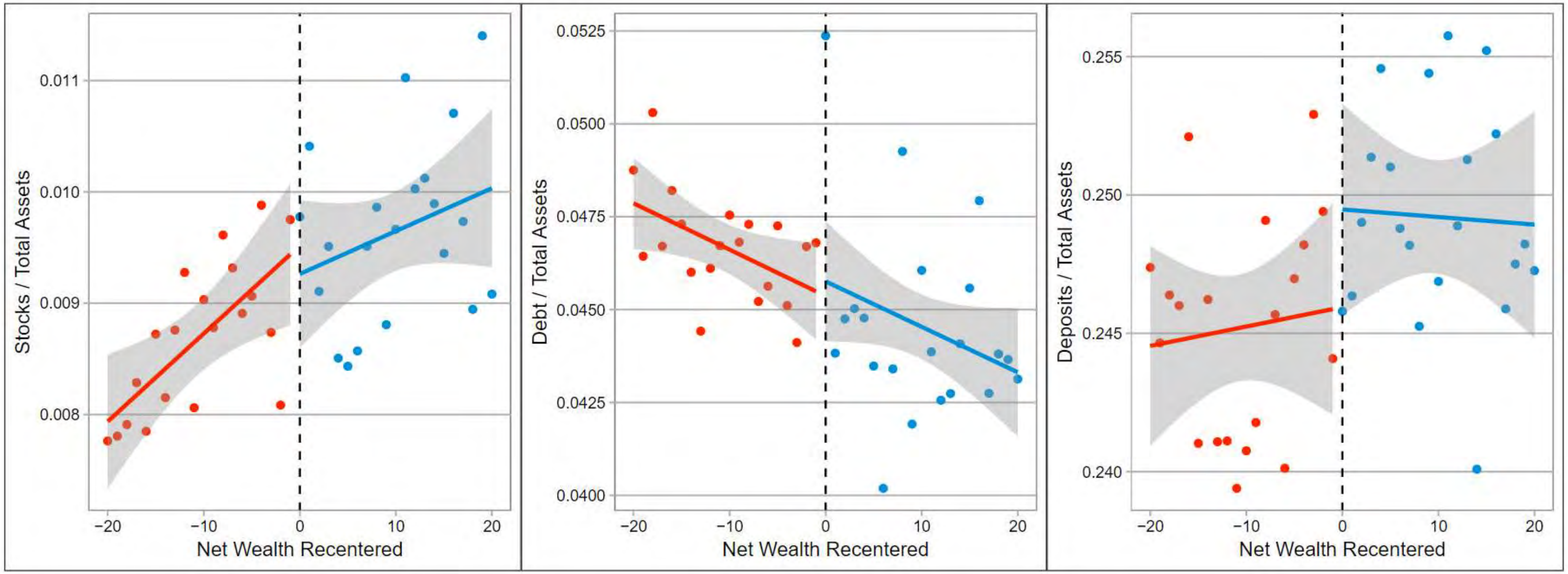


Figure A15: Parametric regression discontinuity plot 2016



Non-Parametric regression results

Table A55
Non-Parametric regression results 2009: Listed stocks

	Algorithm used		
	mserd	cersum	msetwo
Conventional	0.001	0.004**	0.002**
	(0.124)	(0.006)	(0.040)
Bias-Corrected	0.002+	0.004**	0.002*
	(0.087)	(0.006)	(0.012)
Robust	0.002	0.004*	0.002*
	(0.156)	(0.008)	(0.033)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	9.138 / 9.138	4.696 / 4.696	6.734 / 34. 495
Observations (left / right)	133 565 / 120 156	55 898 / 63 269	85 982 / 328 195
Sample Size	1 899 560	1 899 560	1 899 560

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A56
Non-Parametric regression results 2009: Deposits

	Algorithm used		
	mserd	cersum	msetwo
Conventional	0.001	-0.003	-0.0001
	(0.623)	(0.603)	(0.965)
Bias-Corrected	0.001	-0.003	-0.001
	(0.709)	(0.570)	(0.706)
Robust	0.001	-0.003	-0.001
	(0.759)	(0.576)	(0.754)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	8.923 / 8.923	4.012 / 4.012	7.431 / 40.651
Observations (left / right)	117353 / 109 095	55 895 / 63 269	101 497 / 364 364
Sample Size	1 899 560	1 899 560	1 899 560

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A57
Non-Parametric regression results 2009: Debt

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.002	0.0009	0.001
	(0.440)	(0.791)	(0.582)
Bias-Corrected	0.002	0.001	0.002
	(0.297)	(0.750)	(0.346)
Robust	0.002	0.001	0.002
	(0.395)	(0.760)	(0.441)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	7.292 / 7.292	3.539 / 3.539	6.124 / 21. 193
Observations (left / right)	101 497 / 97 948	41 475 / 51 219	85 982 / 233 442
Sample Size	1 899 560	1 899 560	1 899 560

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A58

Non-Parametric regression results 2011: Listed stocks

	Algorithm used		
	mserd	cersum	msetwo
Conventional	0.0008	0.001	0.0005
	(0.224)	(0.243)	(0.385)
Bias-Corrected	0.0008	0.001	0.0005
	(0.186)	(0.244)	(0.340)
Robust	0.0008	0.001	0.0005
	(0.273)	(0.257)	(0.429)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	12.279 / 12.279	5.272 / 5.272	10.720 / 48.63
Observations (left / right)	121 939 / 105 673	47 616 / 52 116	99 741 / 301 862
Sample Size	2 003 175	2 003 175	2 003 175

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A59

Non-Parametric regression results 2011: Deposits

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.003	-0.004	-0.002
	(0.227)	(0.347)	(0.437)
Bias-Corrected	-0.004	-0.005	-0.003
	(0.140)	(0.311)	(0.343)
Robust	-0.004	-0.005	-0.003
	(0.211)	(0.327)	(0.420)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	13.853 / 13.853	5.663 / 5.663	9.785 / 52.587
Observations (left / right)	133 193 / 112 840	47 616 / 52 116	89 070 / 317 421
Sample Size	2 003 175	2 003 175	2 003 175

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A60

Non-Parametric regression results 2011: Debt

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.0008	0.001	0.0008
	(0.401)	(0.277)	(0.466)
Bias-Corrected	0.001	0.002	0.001
	(0.309)	(0.265)	(0.262)
Robust	0.001	0.002	0.001
	(0.402)	(0.279)	(0.379)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	10.366 / 10.366	5.018 / 5.018	8.271 / 24.913
Observations (left / right)	99 741 / 91 020	47 616 / 52 116	78 326 / 184 251
Sample Size	2 003 175	2 003 175	2 003 175

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A61

Non-Parametric regression results 2012: Listed stocks

	Algorithm used		
	mserd	cersum	msetwo
Conventional	0.005	0.001	0.0002
	(0.402)	(0.232)	(0.643)
Bias-Corrected	0.004	0.001	0.0002
	(0.503)	(0.246)	(0.662)
Robust	0.004	0.001	0.0002
	(0.576)	(0.261)	(0.713)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	14.232 / 14.232	6.657 / 6.657	11.280 / 53.133
Observations (left / right)	137 488 / 115 278	55 104 / 57586	105 146 / 313 203
Sample Size	2 064 113	2 064 113	2 064 113

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A62

Non-Parametric regression results 2012: Deposits

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	-0.001	-0.005	-0.004
	(0.642)	(0.270)	(0.132)
Bias-Corrected	-0.002	-0.005	-0.005+
	(0.421)	(0.242)	(0.084)
Robust	-0.002	-0.005	-0.005
	(0.492)	(0.255)	(0.139)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	11.842 / 11.842	5.725 / 5.725	10.432 / 10.432
Observations (left / right)	105 146 / 94 665	45 567 / 49 860	94 701 / 327 792
Sample Size	2 064 113	2 064 113	2 064 113

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A63

Non-Parametric regression results 2012: Debt

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.00005	-0.0005	-0.0005
	(0.952)	(0.728)	(0.537)
Bias-Corrected	-0.0001	-0.0005	-0.0005
	(0.872)	(0.705)	(0.509)
Robust	-0.0001	-0.0005	-0.0005
	(0.894)	(0.712)	(0.573)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	12.214 / 12.214	5.091 / 5.091	9.297 / 29.428
Observations (left / right)	115 776 / 101 673	45 567 / 49 860	84 628 / 205 787
Sample Size	2 064 113	2 064 113	2 064 113

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A64
Non-Parametric regression results 2013: Listed stocks

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.0004	0.0006	-0.0001
	(0.580)	(0.520)	(0.865)
Bias-Corrected	-0.0005	0.0006	-0.00004
	(0.439)	(0.544)	(0.952)
Robust	-0.0005	0.0006	-0.00004
	(0.516)	(0.556)	(0.960)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	16.243 / 16-243	7.844 / 7.844	13.820 / 63.829
Observations (left / right)	132 647 / 109 326	54 011 / 54904	105 094 / 303 343
Sample Size	2 101 440	2 101 440	2 101 440

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A65
Non-Parametric regression results 2013: Deposits

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.002	-0.005	-0.001
	(0.564)	(0.196)	(0.561)
Bias-Corrected	-0.002	-0.006	-0.002
	(0.356)	(0.176)	(0.319)
Robust	-0.002	-0.006	-0.002
	(0.426)	(0.186)	(0.381)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	16.743 / 16.743	7.491 / 7.491	14.036 / 81.301
Observations (left / right)	132 647 / 109326	54 011 / 54904	114 170 / 350 630
Sample Size	2 101 440	2 101 440	2 101 440

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A66
Non-Parametric regression results 2013: Debt

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.0002	0.001	-0.0007
	(0.842)	(0.441)	(0.385)
Bias-Corrected	0.0005	0.001	-0.0004
	(0.617)	(0.419)	(0.586)
Robust	0.0005	0.001	-0.0004
	(0.671)	(0.431)	(0.648)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	12.392 / 12.392	5.984 / 5.984	11.286 / 35.756
Observations (left / right)	96 337 / 85 836	37 786 / 41 900	87 559 / 203 471
Sample Size	2 101 440	2 101 440	2 101 440

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A67

Non-Parametric regression results 2014: Listed stocks

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.0003	-0.0005	-0.0002
	(0.630)	(0.616)	(0.787)
Bias-Corrected	-0.0005	-0.0006	-0.0003
	(0.427)	(0.578)	(0.595
Robust	-0.0005	-0.0006	-0.0003
	(0.496)	(0.588)	(0.648)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	18.138 / 18.138	8.749 / 8.749	14.054 / 71.908
Observations (left / right)	125 885 / 103 158	51 914 / 52 398	94 789 / 283 978
Sample Size	2 147 892	2 147 892	2 147 892

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A68

Non-Parametric regression results 2014: Deposits

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.0003	-0.001	0.001
	(0.912)	(0.796)	(0.656)
Bias-Corrected	-0.001	-0.001	0.0004
	(0.633)	(0.750)	(0.879)
Robust	-0.001	-0.001	0.0004
	(0.677)	(0.755)	(0.896)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	16.116 / 16.116	7.774 / 7.774	14.280 / 61.751
Observations (left / right)	110 158 / 93 537	45 013 / 46 956	94 789 / 258 126
Sample Size	2 147 892	2 147 892	2 147 892

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A69

Non-Parametric regression results 2014: Debt

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	-0.0001	-0.0005	-0.0007
	(0.876)	(0.974)	(0.416)
Bias-Corrected	-0.0004	-0.0001	-0.0008
	(0.655)	(0.938)	(0.366)
Robust	-0.0004	-0.0001	-0.0008
	(0.706)	(0.939)	(0.429)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	16.690 / 16.690	6.363 / 6.363	12.604 / 34.542
Observations (left / right)	110 158 / 93 537	38 387 / 41 462	80 161 / 170 840
Sample Size	2 147 892	2 147 892	2 147 892

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A70

Non-Parametric regression results 2015: Listed stocks

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	-0.0002	-0.0002	0.0001
	(0.833)	(0.878)	(0.839)
Bias-Corrected	-0.0004	-0.0002	0.0001
	(0.595)	(0.837)	(0.844)
Robust	-0.0004	-0.0002	0.0001
	(0.647)	(0.841)	(0.867)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	22.706 / 22.706	10.944 / 10.944	20.226 / 61.996
Observations (left / right)	125 111 / 98 193	52 863 / 50 462	112 267 / 213 890
Sample Size	2 181 782	2 181 782	2 181 782

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A71

Non-Parametric regression results 2015: Deposits

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.0003	0.001	-0.002
	(0.928)	(0.807)	(0.408)
Bias-Corrected	0.001	0.001	-0.002
	(0.710)	(0.773)	(0.525)
Robust	0.001	0.001	-0.002
	(0.751)	(0.780)	(0.596)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	17.426 / 17.426	8.399 / 8.399	15.837 / 15.837
Observations (left / right)	93 834 / 79 332	41 914 / 41 734	81 721 / 204 294
Sample Size	2 181 782	2 181 782	2 181 782

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A72

Non-Parametric regression results 2015: Debt

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.0009	0.002*	0.0003
	(0.239)	(0.039)	(0.692)
Bias-Corrected	0.001	0.002*	0.0005
	(0.151)	(0.036)	(0.529)
Robust	0.001	0.002*	0.0005
	(0.233)	(0.042)	(0.601)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	24.672 / 24.672	11.892 / 11.892	20.721 / 54.013
Observations (left / right)	138 358 / 105 572	58 479 / 54 801	112 267 / 196 754
Sample Size	2 181 782	2 181 782	2 181 782

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A73

Non-Parametric regression results 2016: Listed stocks

	Algorithm used		
	mserd	cersum	msetwo
Conventional	-0.0001	0.00004	-0.0002
	(0.711)	(0.943)	(0.553)
Bias-Corrected	-0.0002	0.00004	-0.0002
	(0.677)	(0.949)	(0.549)
Robust	-0.0002	0.00004	-0.0002
	(0.729)	(0.950)	(0.612)
Kernel	Triangular	Triangular	Triangular
BW (left / right)	41.712 / 41.712	19.083 / 19.083	37.237 / 68.778
Observations (left / right)	212 192 / 136 130	85 839 / 72 747	187 070 / 196 197
Sample Size	2 137 714	2 137 714	2 137 714

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A74

Non-Parametric regression results 2016: Deposits

	Algorithm used		
	mserd	cerrd	msetwo
Conventional	0.0002	-0.001	-0.002
	(0.949)	(0.815)	(0.480)
Bias-Corrected	-0.0008	-0.001	-0.002
	(0.796)	(0.769)	(0.243)
Robust	-0.0008	-0.001	-0.004
	(0.824)	(0.775)	(0.308
Kernel	Triangular	Triangular	Triangular
BW (left / right)	18.897 / 18.987	9.118 / 9.118	13.906 / 79.510
Observations (left / right)	80 994 / 69 522	38 521 / 38 678	56 969 / 216 561
Sample Size	2 137 714	2 137 714	2 137 714

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Table A75

Non-Parametric regression results 2016: Debt

	Algorithm used		
	mserd	cersum	msetwo
Conventional	0.0002	-0.001	-0.002
	(0.949)	(0.815)	(0.480)
Bias-Corrected	-0.0008	-0.001	-0.004
	(0.796)	(0.769)	(0.243)
Robust	-0.0008	-0.001	-0.004
	(0.824)	(0.775)	(0.308
Kernel	Triangular	Triangular	Triangular
BW (left / right)	18.897 / 18.897	9.118 / 9.118	13.906 / 79.510
Observations (left / right)	80 994 / 69 522	38 521 / 38 678	59 696 / 216 561
Sample Size	2 137 714	2 137 714	2 137 714

Note: + p< 0.1, *p< 0.05, **p< 0.01, ***p< 0.001

Figure A16: Non-Parametric regression discontinuity plot 2009

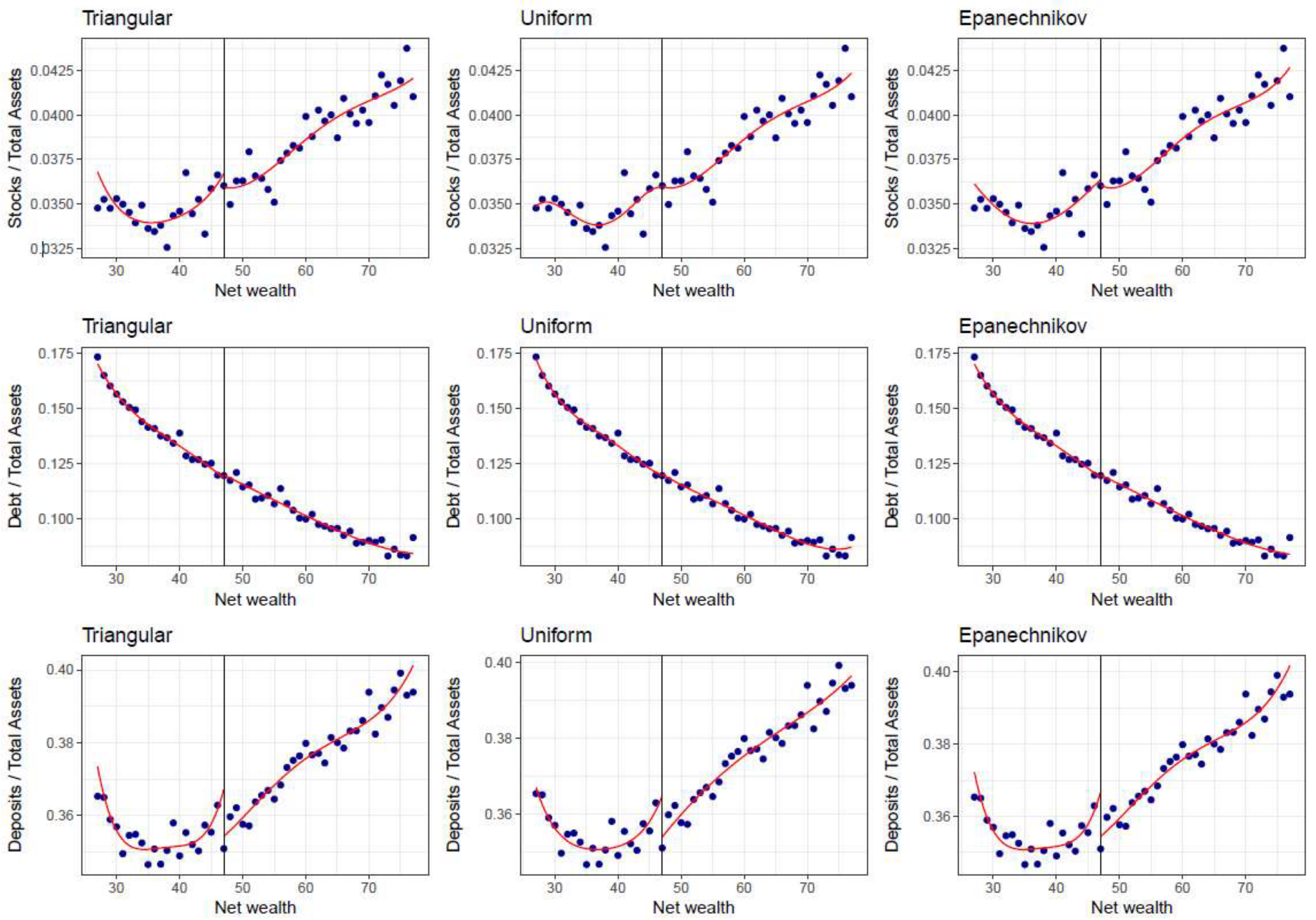


Figure A17: Non-Parametric regression discontinuity plot 2010

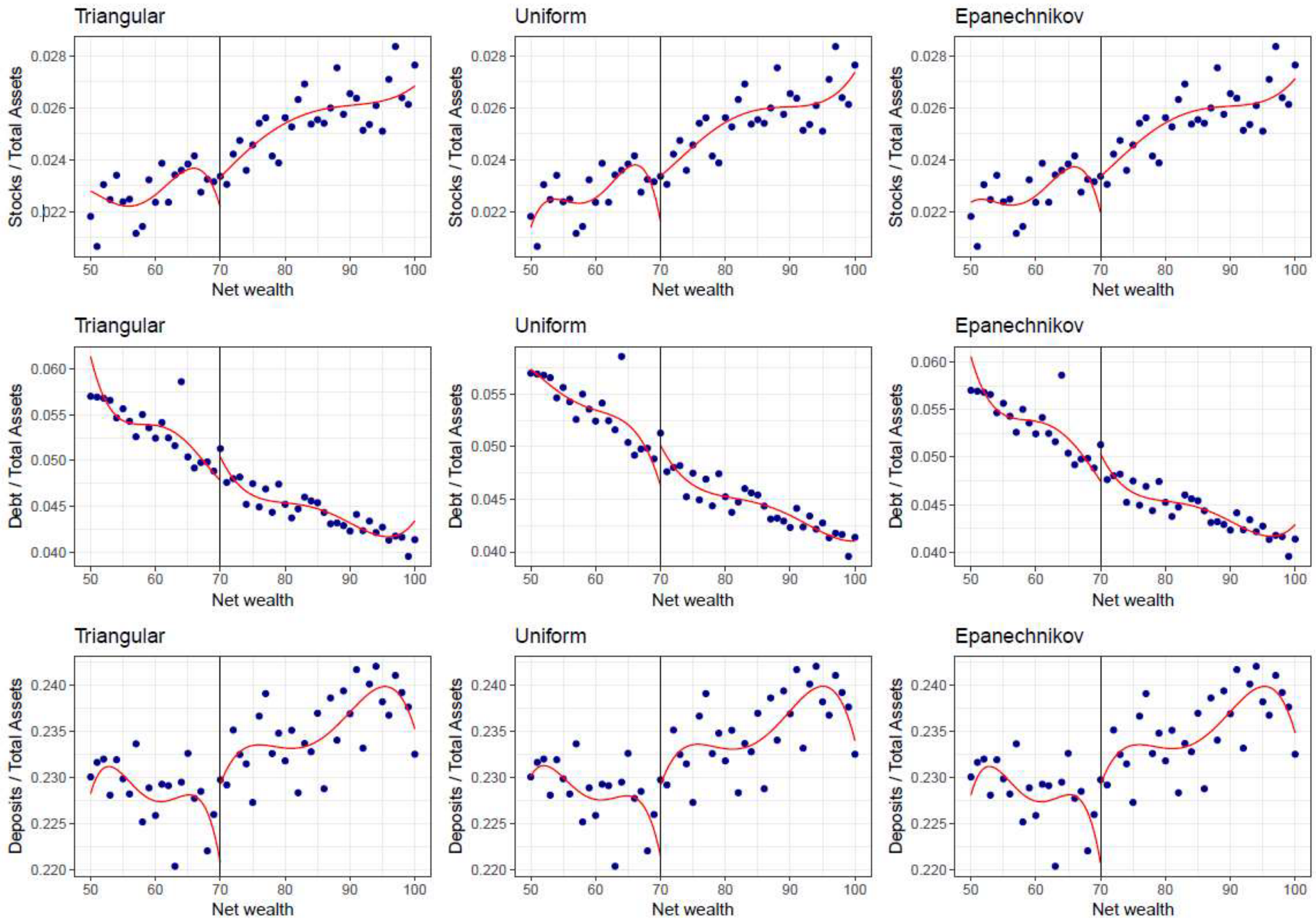


Figure A18: Non-Parametric regression discontinuity plot 2011

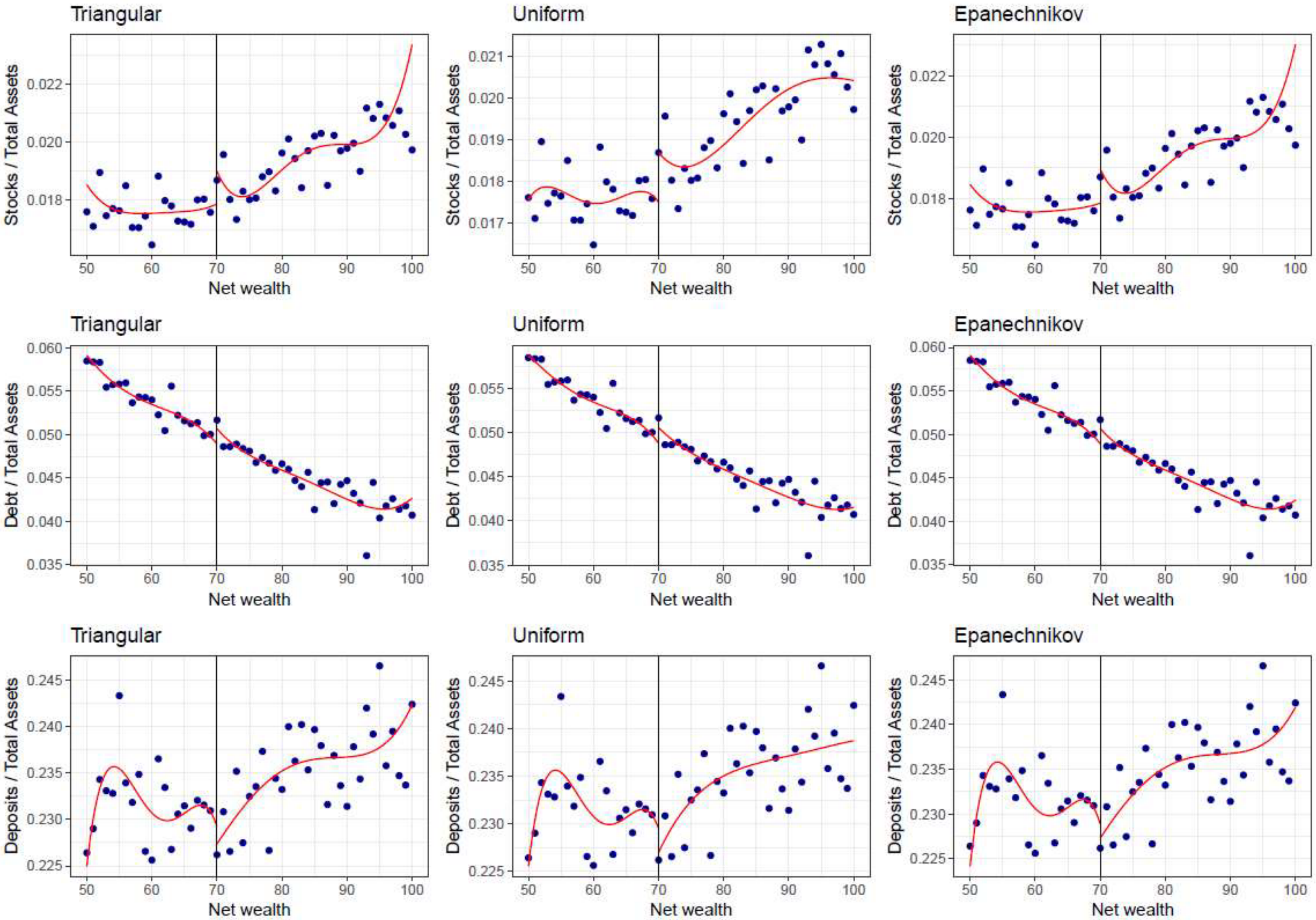


Figure A19: Non-Parametric regression discontinuity plot 2012

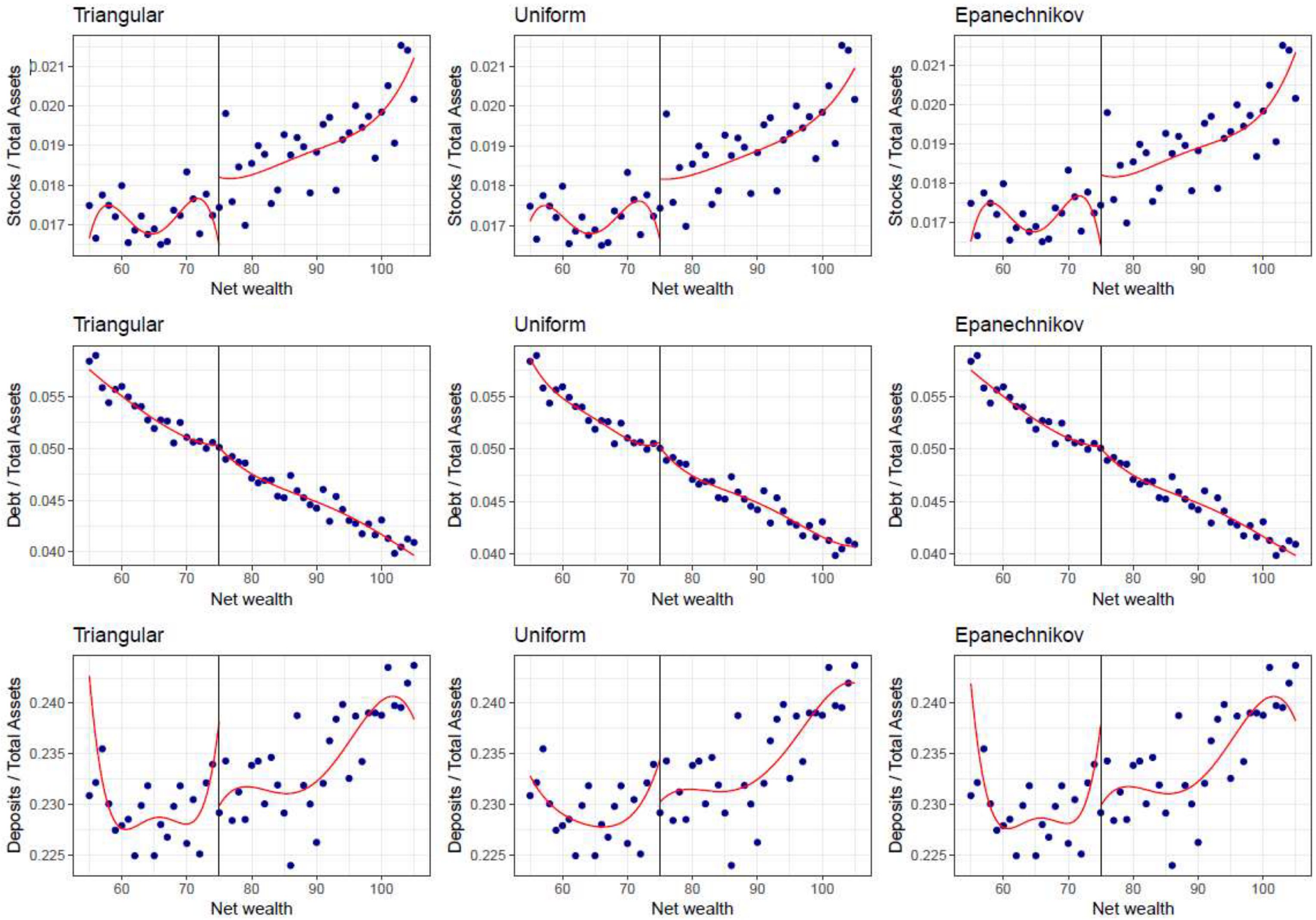


Figure A20: Non-Parametric regression discontinuity plot 2013

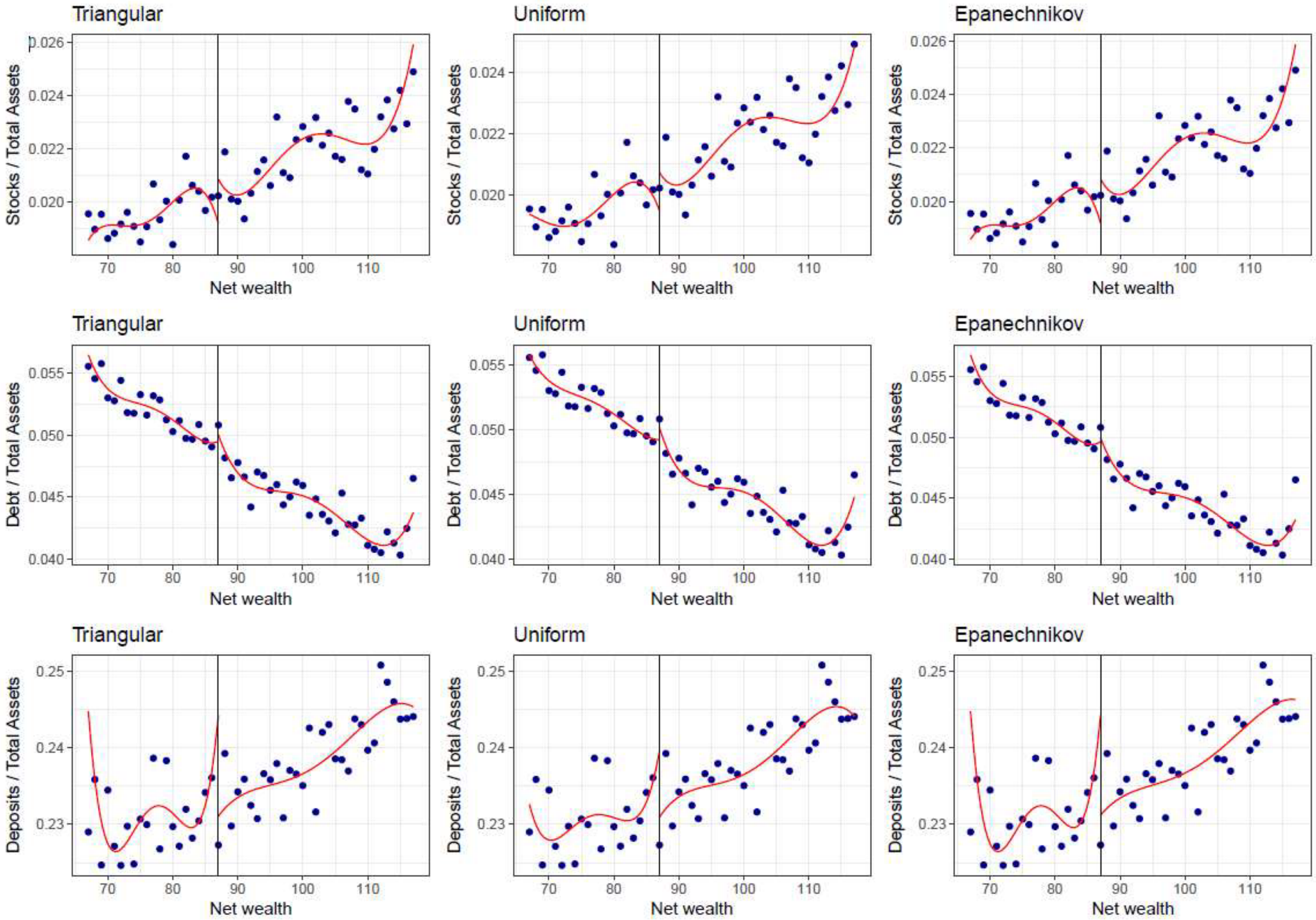


Figure A21: Non-Parametric regression discontinuity plot 2014

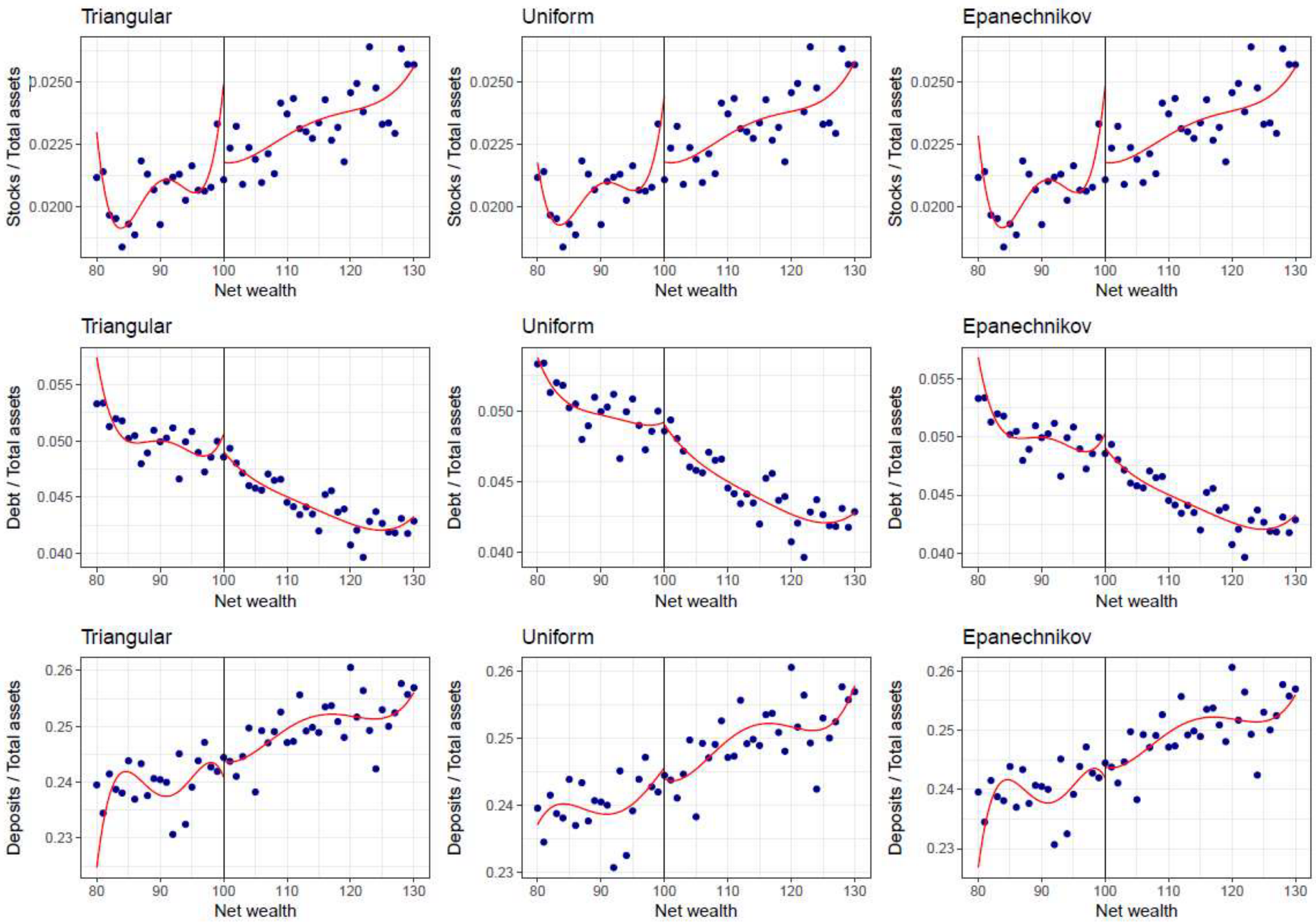


Figure A22: Non-Parametric regression discontinuity plot 2015

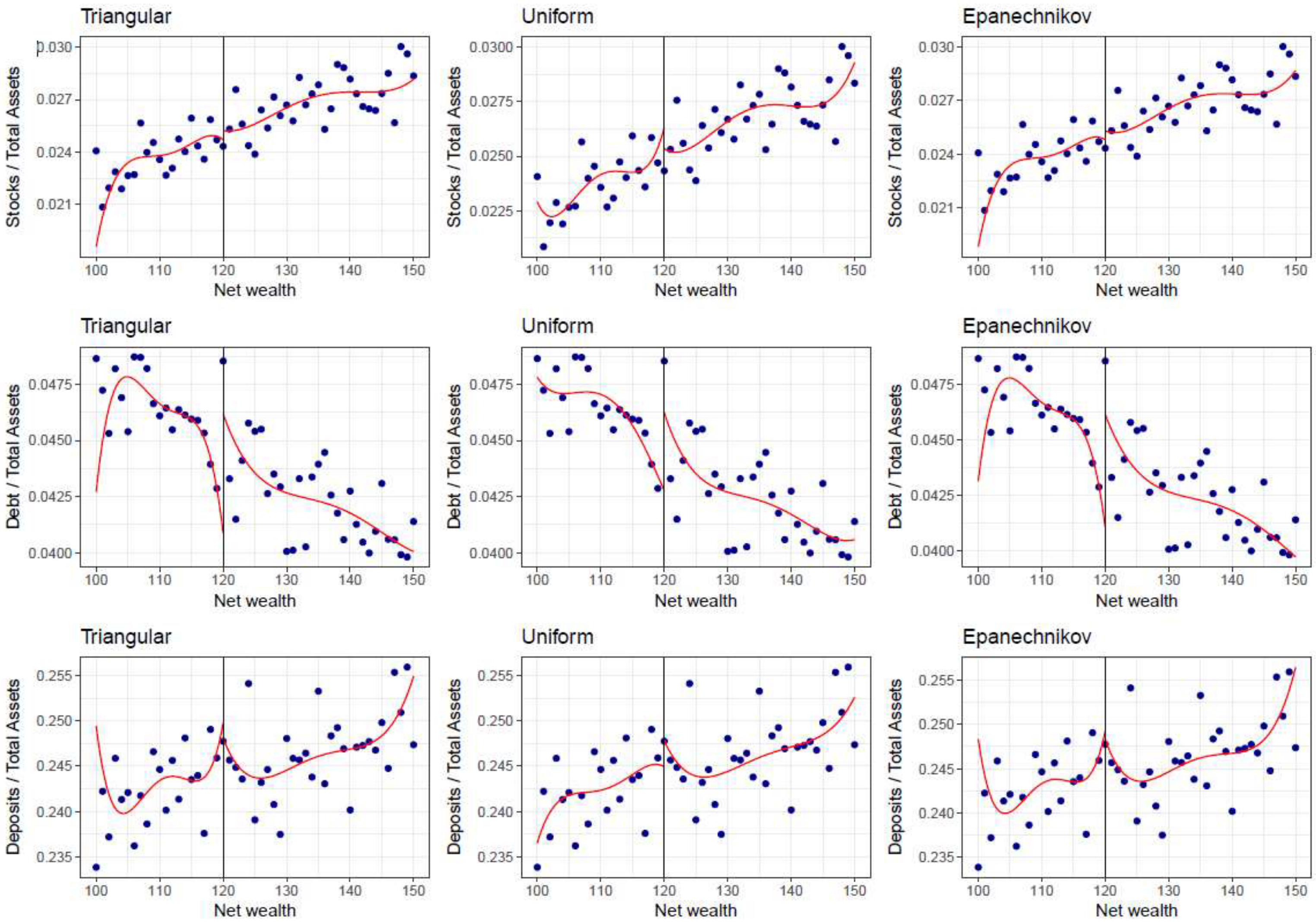


Figure A23: Non-Parametric regression discontinuity plot 2016