

Supplemental Appendix The Big Short (Interest): Closing the Loopholes in the Dividend-Withholding Tax

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A Concurrent Tax Rule Changes in the Nordic Countries

In this section, we provide an overview of relevant tax rule changes during the sample period of our analysis from 2010 to 2019. We restrict the focus to changes that might affect the results in the Nordics. These are changes in corporate income tax (CIT) and DWT rates (as visible on Panel A of Table A.1) and changes to anti-tax avoidance regulations (as visible in Panel B of Table A.1).

Table A.1: Tax Rule Changes

Panel A
Rates Changes

	Denmark		Finland		Norway		Sweden	
	CIT	DWT	CIT	DWT	CIT	DWT	CIT	DWT
2010	25	28	26	28	28	25	26.3	30
2011	25	28	26	28	28	25	26.3	30
2012	25	27	24.5	28	28	25	26.3	30
2013	25	27	24.5	24.5	28	25	22	30
2014	24.5	27	20	24.5	27	25	22	30
2015	23.5	27	20	20	27	25	22	30
2016	22	27	20	20	25	25	22	30
2017	22	27	20	20	24	25	22	30
2018	22	27	20	20	23	25	22	30
2019	22	27	20	20	22	25	21.4	30

Panel B
Anti-Tax Avoidance Rules

	Denmark	Finland	Norway	Sweden
TC Rules	1998	2014	2009	2014
CFC Rules	1995	1995	1989	1992
TP Rules	1998	2007	1999	1928
CbC Reporting	2016	2016	2016	2016
GAAR	2015	1943	1981	1921

Notes: The Table shows the changes in tax rules between 2010 and 2019 for Denmark, Finland, Norway and Sweden. In panel A, we display changes CIT and DWT rate changes. In panel B, we display the introduction year of anti-avoidance regulations. TC rules stands for thin capitalization rules; CFC rules stands for controlled foreign company rules; TP rules stands for transfer pricing rules; CbC reporting stands for country-by-country reporting; GAAR stands for general anti-avoidance regulations. *Sources:* IBFD Tax Research Platform, PwC Worldwide Tax Summaries, ZEW & PwC Effective Tax Levels Using the Devereux/Griffith Methodology, Johansson et al. [2017], Lind et al. [2023]

First, all countries in the Nordics substantially reduced their corporate income tax, though they did so gradually. The decrease is smallest in Denmark (3 percentage points), and largest in Norway and Finland (6 percentage points). When considering DWT rates, the only country with major changes is Finland where the rate goes from 28% down to 20%.¹

Second, when focusing anti-tax avoidance regulations, we consider possible changes to thin capitalization rules, controlled foreign company rules, transfer pricing rules, country-by-country reporting, and general anti-tax avoidance regulations. Most anti-avoidance regulations in Nordic countries were introduced before the beginning of our sample period. The only exception are Country-by-Country reporting rules which all countries adopted simultaneously, Thin Capitalization rules, which Sweden introduced in 2014, and general anti-tax avoidance regulations which Denmark introduced in 2015.

We consider it unlikely that these changes contribute to explaining our findings in Section 4.2 and 5. In 4.2 we find that after the Danish DWT enforcement reform spikes in security-lending around the ex-dividend date in Denmark disappear, whereas these spikes remain in the other Nordic countries. The only reforms in Table A.1 that otherwise directly affects cum-cum and cum-ex trading is the reduction in the DWT rate by Finland, since reducing the DWT rate reduces the profitability of cum-cum and cum-ex trading. If this is indeed the case than, if anything, our analysis in Figure 6 overstates the reduction in security-lending among the control group relative to the counterfactual where Finland did not change its DWT rate. Hence, this reform does not contribute to our main result.

In Section 5 we find evidence that the Danish enforcement reform increases tax revenue without reducing stock market prices, investment and dividend yield by Danish companies. When considering the reforms in tax rates, it is clear that of all Nordic countries, Denmark reduced its rates the least. This potentially reduces investment into Denmark, which again does not contribute to our main finding. With respect to anti-avoidance regulations, Denmark introduced general anti-tax avoidance regulations in 2015, which also potentially reduces investment into Denmark. The only reform that can potentially contribute to our main finding is the introduction of thin capitalization rules in Sweden and Finland in 2015, as it potentially negatively affects the investment climate in the control group. However, given that Denmark and Norway already had thin capitalization rules we also consider this an unlikely contributor to our main result. Nevertheless, to be absolutely certain that our results are not driven by concurrent reforms in tax rates, our main analysis in Section 5 includes a measure of Treatment Intensity, which varies within country, and allows us to include country-time fixed effects in our analysis. We consider it likely that the country-time fixed effects absorbs most of the variation of the reforms that occurred concurrently with our enforcement reform.

¹Although in Denmark, the standard DWT rate for non-tax treaty investors remains 27%, as of July 1, 2016, corporate investors may apply for a reduced rate of 22%. For more details, see <https://taxsummaries.pwc.com/denmark/corporate/withholding-taxes> and <https://skat.dk/en-us/businesses/companies-and-foundations/companies-and-foundations/declaring-and-paying-dividends-and-dividend-tax>

B Additional Analysis

B.1 Cum-cum and Cum-ex Trading in Germany

In this Section, we study cum-cum and cum-ex trading in Germany in more detail. The main purpose is i.) to compare our findings to the earlier study by Buettner et al. [2020], ii.) to compare the results from Germany to our main case study on the Nordic countries, and iii.) to quantify the importance of cum-cum relative to cum-ex.

The first reform targeting tax-motivated trading strategies in Germany became effective on January 1, 2012. The reform made the custody bank of the final beneficiary (and not the company issuing the dividend) responsible for withholding the DWT (see Buettner et al., 2020 for more details). This change ensured that the same entity would be responsible for both remitting the dividend tax and issuing the tax certificate. The reform eliminated the possibility to issue two certificates for a single DWT payment and thereby prevented cum-ex transactions.

In August 2015, for the first time, the German federal tax court pronounced the final decision over a court case on a cum-cum transaction involving security lending. The judge ruled against the existence of an ownership transfer and thus the entitlement for a refund of the DWT. Shortly after, in December 2015, the Federal Ministry of Finance presented the draft of a law targeting such tax motivated trading strategies, the so-called Reform of Investment Taxation. According to the law proposal, a DWT refund is granted only if the investors hold the stock for a window of at least 45 days around the ex-dividend date as the legal and economic owner. Days for which the taxpayers carried less than 70% of market risk are excluded. Also, small investors (receiving annual dividends not exceeding EUR 20,000) are excluded.²

This law was approved in February 2016 and it was published in the official gazette in July 2016. Yet, it had a retroactive element as it started being effective as of January 1, 2016. Similar to Denmark, the German DWT legislation in 2016 was issued in an effort to close down tax code vulnerabilities associated with cum-cum and cum-ex trading. However, there are two major differences. First, in 2012 Germany already passed legislation targeted at closing the cum-ex loophole. Second, contrary to Denmark, the legislation passed in 2016 introduced the concept of a 45-day holding period. The German legislation is comparable to legislation in France and Belgium.

Figures B.1 and B.2 shows the effect of both reforms on excess shares on loan and excess transaction volume. Similar to Denmark, the excess number of shares on loan decreases to approximately zero after the 2016 reform takes effect, indicating the (close to) complete success of the 2016 reform at reducing cum-cum and cum-ex trading.

Results for the 2012 reform, targeted at cum-ex, are less clear. Intuitively, a cum-ex transaction typically takes the form of a short sale (see also Section 2). Therefore, a cum-ex

²For more details, see Junge and Kleutgens [2016]

transaction consists of a sale, which is registered in the transaction volume data, as well as a loan, registered in the security-lending data. Hence, the 2012 reform which intended to tackle cum-ex should result in a drop in both lending and transaction volume. However, we observe a drop in transaction volume, while the excess shares on loan remain constant.

The most likely explanation is that the drop in cum-ex transactions in 2012, as evidenced by the drop in the transaction volume, is countered by an increase in cum-cum transactions happening at the same time. Between 2010 and 2012 Germany was still affected by the financial crisis and the subsequent euro-zone crisis. Dividend payments were relatively low during this period. It is plausible that this also depressed the amount of cum-cum activity. After 2012 dividends, and as a consequence, cum-cum transactions picked up, which masks the effect of the 2012 reform in security-lending data. Note that this explanation is consistent with the general increase in stock lending observed throughout Northern-Europe in that period (see for instance Figure B.7). Also, note that excess stock lending is considerably higher than excess turnover. Before the reform excess turnover was, on average about 1.1 percent of the public float at the peak. In that same period, excess lending is around 9 percent of the public float.

We use these numbers to find an upper limit on the role of cum-ex relative to cum-cum. We make the following assumptions. First, we assume that the peak in turnover, at 1.1 percent, prior to 2012 was entirely due to cum-ex transactions. Second, we assume that the peak in excess lending in the same period, at 9.0 percent, contains both cum-cum and cum-ex transactions. In that case, cum-ex constitutes $1.1/9 = 12$ percent of the total amount of tax motivated trading strategies. Note that this number presents an upper limit for the role of cum-ex in the sense that i.) after 2012 in Germany the relative amount of excess transaction volume to excess stock lending is considerably smaller, ii.) Germany is an outlier in the sense that excess transaction volume in Germany is much larger than what we find in other European countries (see for instance Figures 9 and C.3 for the other Nordic countries), and iii.) we cannot be sure that the entire excess turnover before 2012 is the result of cum-ex. For instance, there is still a small spike remaining in the subsequent periods, which could either be the result of the 2012 reform not being completely successful, or the result of nontax motivated trading strategies. We therefore conclude that from a tax-revenue perspective, cum-cum is more relevant than cum-ex.

As we did for the Nordic analysis, we also assess the broader economic consequence of the German reform. We primarily focus on the 2016 reform, since the effect of this reform on the spikes in shares-on-loan is comparable to what we find for Denmark. Differently from our main analysis, we do not have the tax-revenue data for Germany which prevents any assessment of the reform with respect to tax revenue. However, we can investigate potential effects on the overall investment climate. We consider both possible stock market reactions around the announcement of the reform and firm reactions in terms of changes to investment and dividend policy. We keep the same control group as in the main paper. This choice is mostly motivated by practical reasons. First, it is a priori unclear what would be a good control group to Germany, because Germany is i.) by far the largest economy in Europe, and

ii.) centrally located with many neighboring countries, potentially resulting in a large control pool from which it is difficult to make a selection. Second, from a practical perspective we found roughly parallel trends when using the same control pool as for Denmark, suggesting that our outcome variables follow a roughly parallel trend in the Nordics and Germany.

With respect to stock-market reactions, B.3 finds no evidence for a stock market reaction to announcement of the reform in December, nor to the vote in parliament in 2016. Both our DiD and DDD results exhibit no pre-trends. In addition, estimates are significantly more precise than for the Danish case study (Figure 11). This is likely the result of the larger number of companies in Germany compared to Denmark.

Figure B.4 studies the effect of the German reform on Investment (Panel A) and Dividend Yield (Panel B). For both outcome variables, there is slight evidence of a pre-trend with the DDD specification, but not with the DiD specification. With the DiD specification we do not find that the reform negatively affects investment or dividend yield. The DDD specification also does not find evidence of a reform effect on Investment, but it does find a negative effect on dividend yield that is statistically significant for 2018 (but not for any of the other years). However, also note that coefficients are negative for all years except the base year in 2014. Hence, the significantly negative coefficient in 2018 could be driven by something that occurred in the base year.

Hence overall we conclude that results confirm the pattern observed for Denmark with no substantial impact of stricter enforcement on stock-market prices, investment or dividend yield.

B.2 Dividend Reinvestment Plans

Ang et al. [2019] identify a type of non-tax motivated trading strategy that involves share lending around the ex-dividend date. Specifically, some companies offer Dividend Reinvestment Plans (DRIP) that allow shareholders to exchange their cash dividends for newly issued shares. The new shares are typically sold at a discount relative to the market price. This makes it attractive for investors to participate in a DRIP.³ There is an incentive for an investor to borrow shares with a DRIP before the dividend period, as it allows the borrower to participate in the DRIP. Ang et al. [2019] show that in Australia, only DRIP-dividends see a spike in share lending, whereas this spike is absent for non-DRIP dividends.

In our analysis, we rule out that this important confounder can explain the effect of the Danish reform because such a reform does not affect DRIP-related trading strategies. Therefore, if the spike in lending in Denmark is the result of DRIP-related trading rather than cum-cum and cum-ex trading, it should remain in place after the reform. However, additionally in this section, we run a robustness check by focusing the analysis exclusively on events

³Sometimes the term DRIP is also used to describe an agreement between an investor and a broker to invest cash dividends into new shares. The key difference is that such an agreement with the broker does not result in newly issued shares, since the broker simply buys the shares from the market. As a result, there is also no discount relative to the market price, and no arbitrage opportunity for these DRIPs.

for which the public float of the company remains constant during the event window. Since a DRIP involves the issuing of new shares, we can be certain that for these dividend events, no DRIP took place. The results are presented in Figure B.6. As can be seen, the results in Figure B.6 are virtually identical to our main result in Figure 6 which includes DRIP events.

B.3 The UK Case with No DWT

The UK does not levy a DWT. Therefore, it is at first sight puzzling that European Securities and Markets Authority [2020] reports significant spikes in shares on loan around the ex-dividend date. In this appendix, we explain the findings by European Securities and Markets Authority [2020] as follows. We first estimate the excess share lending on the ex-dividend date using our standard empirical approach (i.e. estimating regression equation (1)). Second, we estimate the same equation but drop all dividend payments involving a DRIP.⁴

Figure B.5 plots the result for both specifications. We replicate the finding of European Securities and Markets Authority [2020] by showing that there is indeed a significant increase in shares on loan around the ex-dividend date in the UK. However, Panel B reveals that the lending spikes in the UK are predominately driven by DRIP-related trading strategies since when we exclude DRIP-events, the spike in share lending around the ex-dividend date decreases by around 70%.

B.4 Cum-cum and Cum-ex Trading across Europe

In this section, we explore cum-cum and cum-ex trading and countermeasures in the remainder of Europe.⁵ We first discuss the various reforms before turning to the results.

Reforms in European countries can be broadly categorized into two groups. The first set introduces additional documentation, which directly targets the loopholes exploited by cum-ex transactions. The second set introduces a minimum holding period for DWT relief, effectively reducing the profitability of all short-term transactions around the ex-dividend date including cum-cum and cum-ex transactions.⁶

With respect to the set of reforms around minimum ownership periods, Germany introduced new legislation on January 1, 2016 according to which a refund for the DWT is granted only if the beneficiary has been the legal and economic owner of the underlying shares for

⁴See Appendix B.2 above for an explanation of DRIP.

⁵We exclusively focus on those reforms that have been enacted with the explicit goal of ensuring stricter enforcement of the DWT. With a different aim, Finland in 2021 and Norway in 2019 introduced a reform designed to develop a more efficient system for DWT refunds. Although the two systems have certain differences, the overall objective is to standardize the DWT system by increasing the due diligence requirements for the dividend-paying firm or authorized intermediary.

⁶The reform in Denmark we have discussed thus far falls somewhere in the middle between these two extremes. On the one hand, the Danish reform requires additional documentation, which closes the cum-ex loophole. On the other hand, it introduces the concept of a beneficial owner which safeguards against cum-cum.

at least 45 days around the dividend record date.⁷ Belgium and France introduced similar legislation in 2019. However, these reforms are likely too late to be picked up in our analysis given that our sample period ends in 2019.

With respect to the second group of reforms, in Germany since January 1, 2012, the obligation to withhold the DWT is no longer on the dividend-distributing German company but rather on the custody bank of the final beneficiary. In addition, a tax voucher is required for claiming the refund of a DWT and such tax vouchers can be only obtained upon submission of extensive documentation from the beneficiary to central tax offices, safeguarding against the possibility that one DWT payment is refunded twice.⁸ Austria introduced a requirement for the submission of an electronic pre-application for obtaining the refund from a DWT.⁹ Specifically, until December 31, 2018, foreign investors could request a refund from the DWT in the same year when the DWT is deducted. From January 1, 2019 on, the pre-application and thus also the actual refund request can only be filed after the end of the year when the DWT is deducted. In this way, the beneficiaries incur a liquidity cost that was absent before the requirement to fill in a pre-application form. Finally, beginning on January 22, 2019, Belgium introduced the requirement to prove full ownership of the share as a pre-condition to obtain a refund for the DWT.¹⁰

Figure B.7 shows the size of the effect on the ex-dividend day for the excess shares on loan for 15 European countries for 4 years.¹¹ The most noticeable change occurs in Germany, which prior to its 2016 reform experienced the largest volume of cum-cum and cum-ex trading of all countries in our sample. After, the 2016-reform the spike in shares on loan disappear (see the online appendix section B.1 for a more detailed German case study). Similarly, Figure B.7 provides clear evidence of both the Danish (2016) and the Austrian reform (2018).

However, it should also be noted that generally, the volume of cum-cum and cum-ex trading appears to be reducing across Europe even in countries that did not introduce a reform. We see two possible reasons for this general reduction. First, given the large size of the German financial market, there may have been spillover effects of the new German legislation. Alternatively, around 2015 targeted tax audits and tax court rulings in Germany appear to indicate that both cum-cum and cum-ex trading may have been illegal even prior to changes in legislation, which could result in penalties and sanctions. As a result, investors may have become more reluctant to participate in cum-cum and cum-ex trading.

⁷See Official Gazette of 26 July 2016 (BGBl. I 36/2016 at 1730) and Income Tax Act, section 36a.

⁸See Act on the Implementation of Directive 2009/65/EC on the coordination of laws, regulations, and administrative provisions relating to undertakings for collective investments in transferable securities.

⁹See Sec. 240a of the Federal Fiscal Procedures Act.

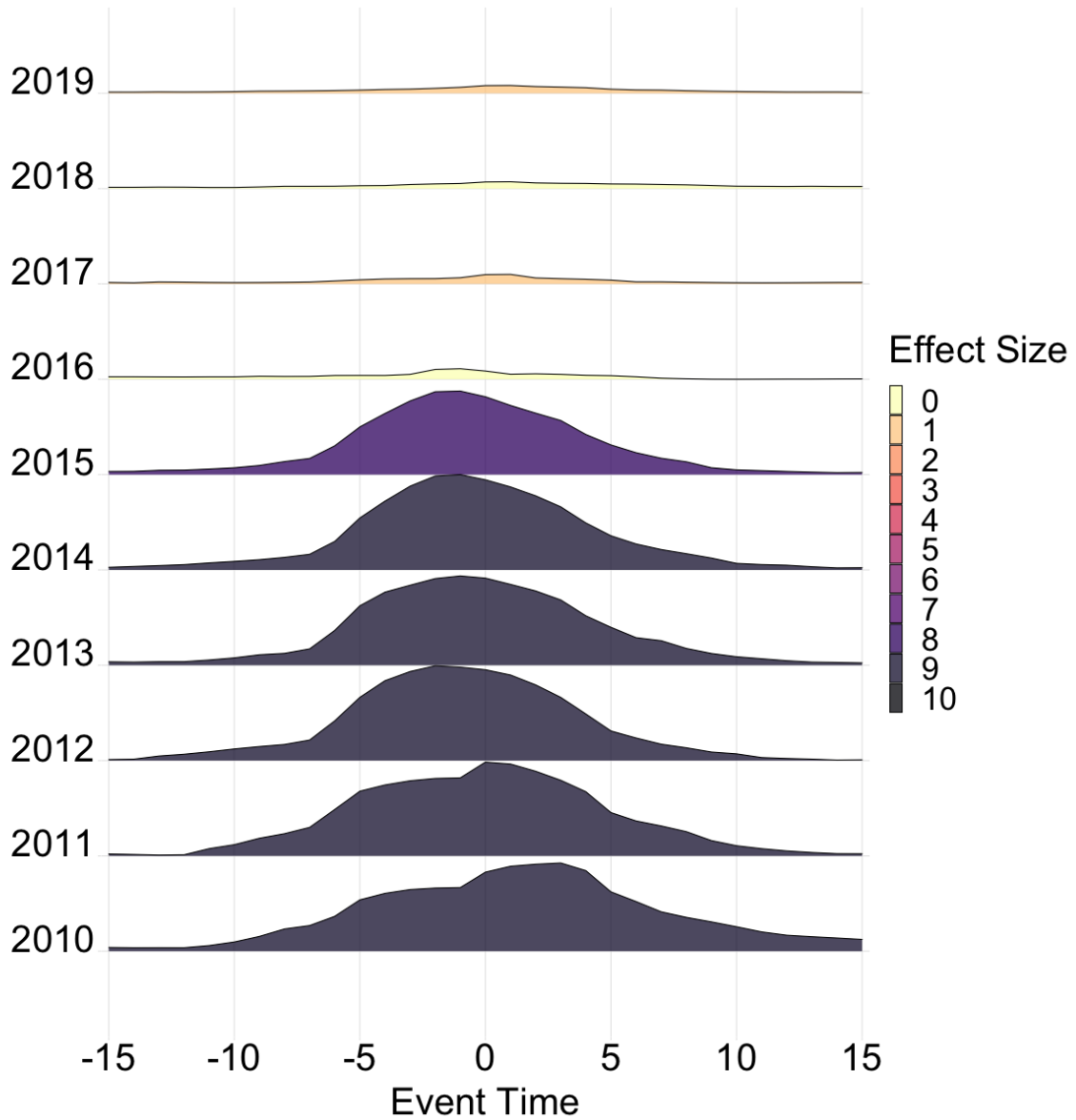
¹⁰See articles 266(4) and 281/1 of Belgian Income Tax Code.

¹¹To create these maps we estimate Equation (1) on the number of shares on loan as a percentage of the public float for each country. We then color-code each country according to the maximum number of excess shares on loan in the $[-3, 3]$ event window.

B.5 Additional Analysis - Figures and Tables

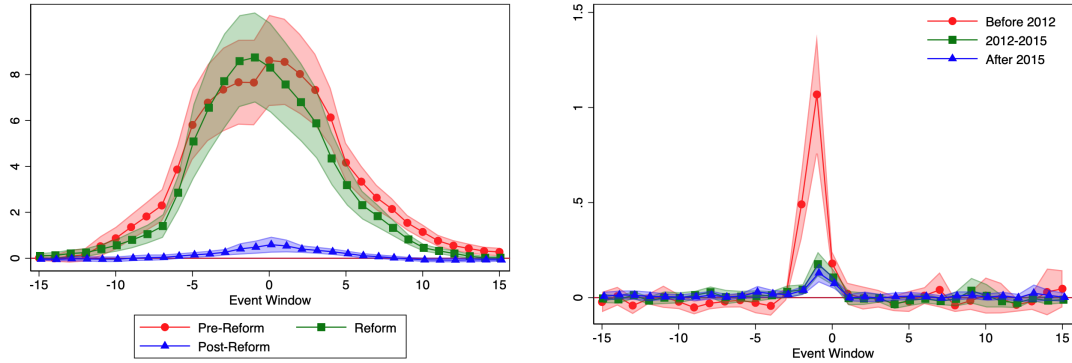
We replicate the ridge plot analysis for Germany in the figure below. The results are similar to Denmark, following the reforms in 2016.

Figure B.1: German Excess Shares on Loan around the Ex-Dividend Day



Notes: The Figure plots the excess shares on loan as a percentage of the public float by 1) event time on the x-axis, where event date $k = 0$ represents the ex-dividend date, 2) by year on the y-axis. Here, we present results for Germany, where each yearly profile represent the excess shares on loan as estimated values of coefficient β_k in regression equation (1), where we estimate using the imputation estimator of Borusyak et al. [2024]. The companies annual market capitalization is used as regression weights. The area underneath the profile line is colored by the maximum effect size in the event window, representing the maximum of the observed peak in excess shares on loan. The effect size is given in the legend. Insignificant effects were additionally assigned the color for zero. For example, the maximum effect size for Germany in 2013 is around 8 percent, while in 2019 the effect sizes for Denmark are small and insignificant.

Figure B.2: Event Study for Germany on Excess Shares on Loan and Turnover

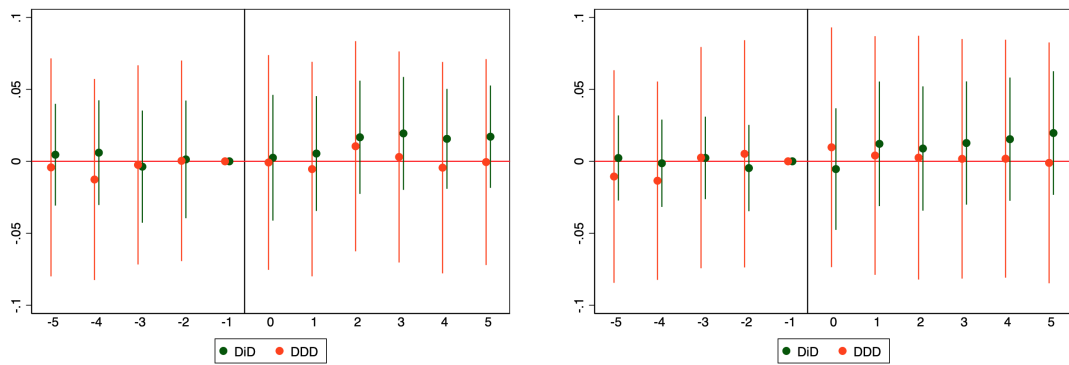


a. Excess shares on loan

b. Turnover

Notes: The Figure plots the excess shares on loan, and stock market turnover as a percentage of the public float by event time, where event date $k = 0$ represents the ex-dividend date. Excess shares on loan are estimated values of coefficient β_k in regression equation (1), where we estimate using the imputation estimator of Borusyak et al. [2024]. The model is estimated on German data, and is separated into three periods consistent with the 2013 and 2016 reform in Germany. The companies annual market capitalization are used as regression weights. The shaded regions represent 95-percent confidence intervals. Standard errors are clustered at the issuing firm level.

Figure B.3: Effect of the Reform on German Stock Prices

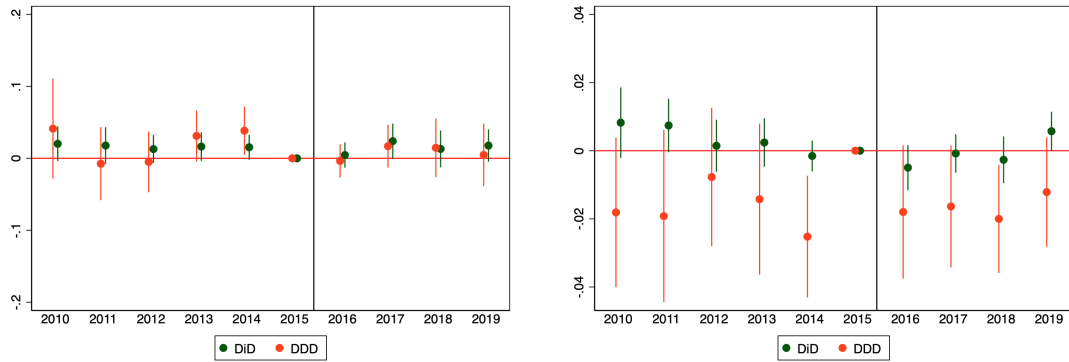


A. 15 December 2015

B. 19 July 2016

Notes: The Figure replicates 11 for the German reform. In our specification we use the same control group (Finland, Norway and Sweden), but use German firms, instead of Danish firms as the treatment group. In addition, we select the relevant reform dates for Germany (December 15, 2015 is the announcement date; July 19, 2016 is when parliament voted in favor of the reform). Error-bars represent 95 % confidence intervals. Standard errors are two-way clustered by both the issuing firm level, and time.

Figure B.4: Effect of the Reform on German Investment Rate and Dividend Policy

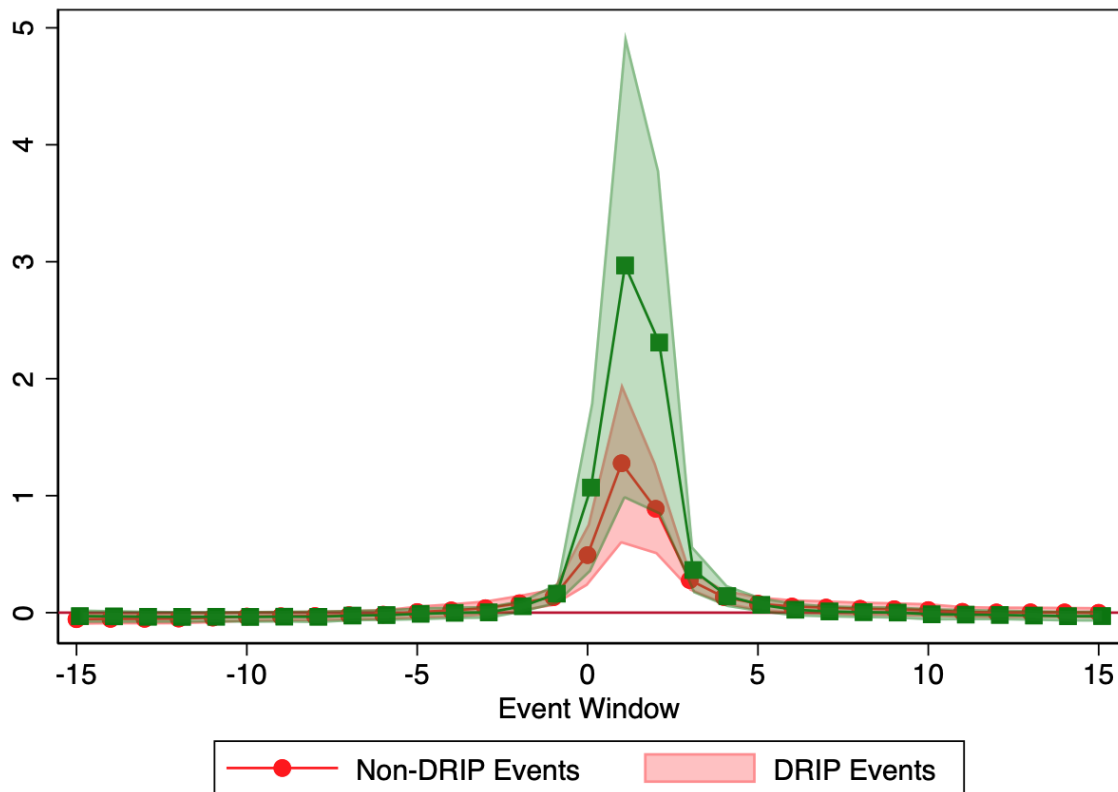


A. Investment Rate

B. Dividend Yield

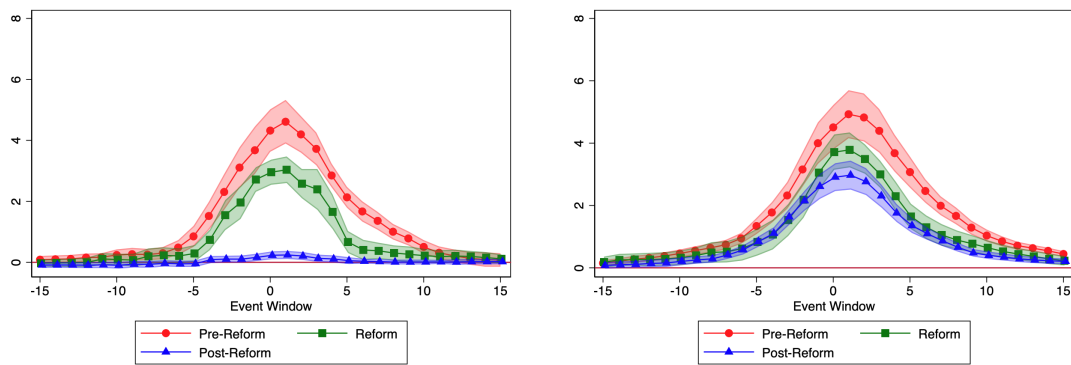
Notes: The Figure replicates 11 for the German reform. In our specification we use the same control group (Finland, Norway and Sweden), but use German firms, instead of Danish firms as the treatment group. Error bars represent 95-percent confidence intervals. Standard errors are clustered at the issuing firm level.

Figure B.5: Event Study for UK on Excess Shares on Loan and Turnover



Notes: The Figure plots the excess shares on loan as a percentage of the public float by event time where $k = 0$ is the ex-dividend date for all dividend distributions and excluding DRIP-dividend distributions. The excess shares on loan are estimated via event study regression equation (1), using the imputation estimator of Borusyak et al. [2024]. Estimates are weighted by annual market capitalization. The label "With Drip" contains all dividend events. The label "Drip Removed" removes DRIP dividend events. Shaded regions represent 95-percent confidence intervals. Standard errors are clustered at the issuing company level.

Figure B.6: Event Study Excluding Dividend Distributions with DRIP

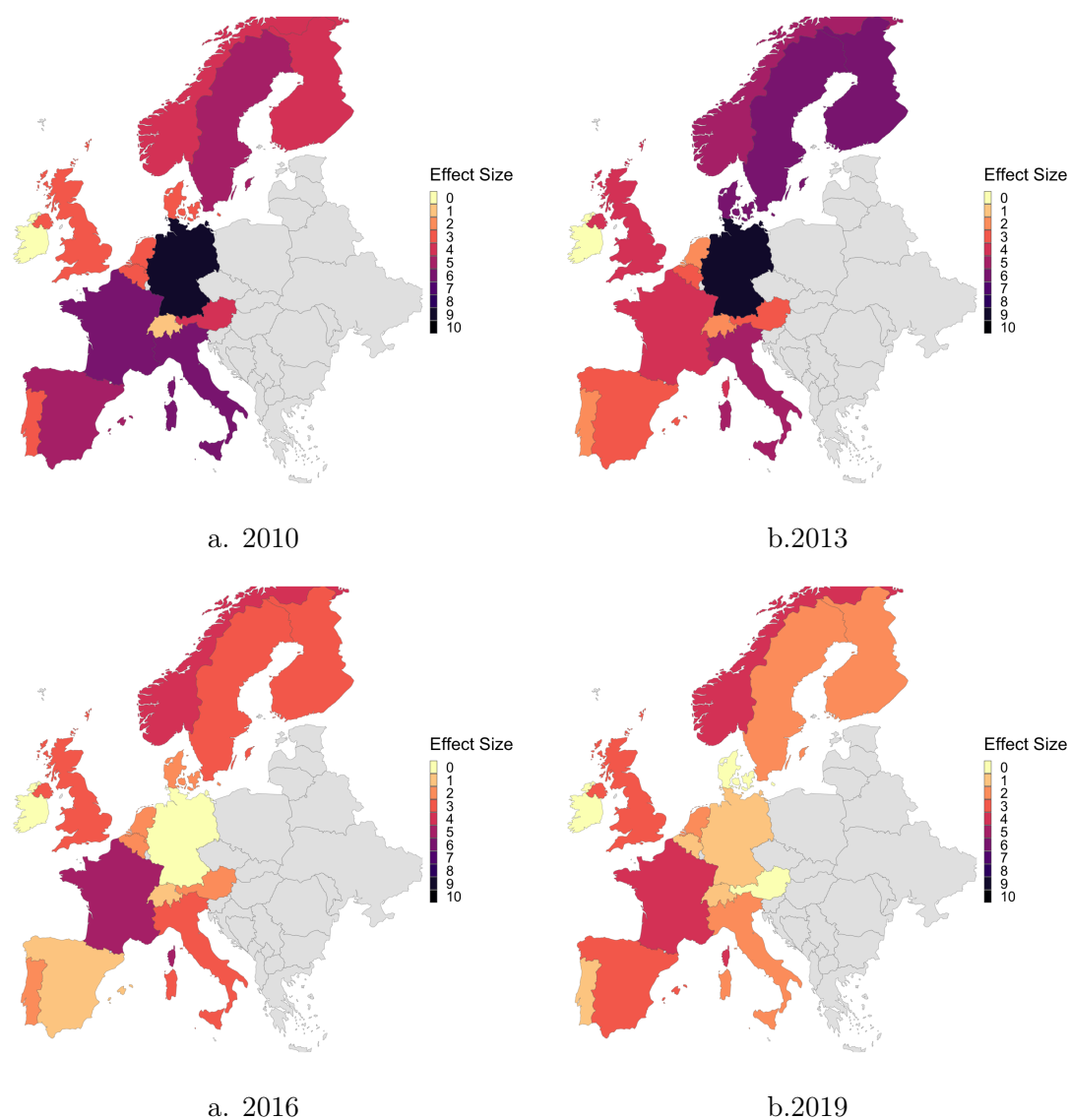


A. Denmark

B. Control Group

Notes: The Figure replicates Figures 6 on a sample that excludes DRIP-dividend distributions. Shaded regions represent 95-percent confidence intervals. Standard errors are clustered at the issuing company level.

Figure B.7: Excess Shares on Loan in 15 European Countries

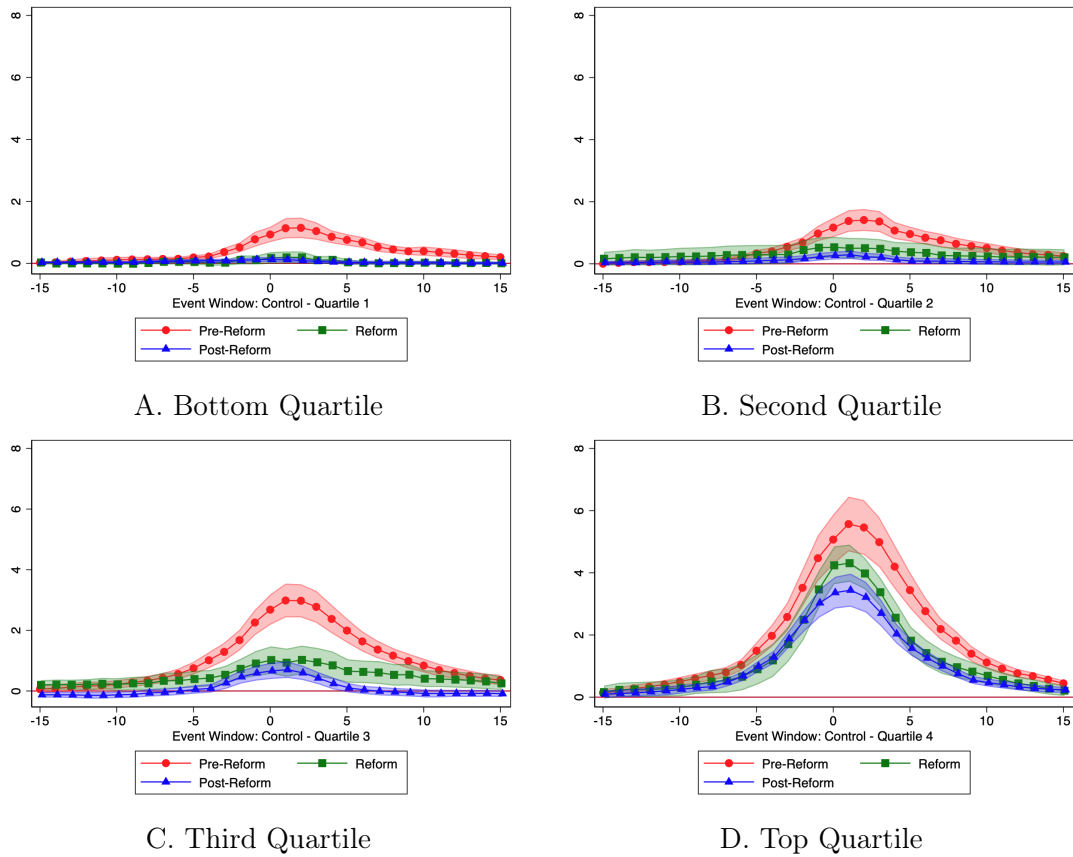


Notes: The maps plot the excess shares on loan as a percentage of the public float. The map is color-coded according to the the maximum coefficient β_k from regression equation (1) subject to $k \in [-3, 3]$ (i.e. within 3 days of the ex-dividend date) by country and year. Estimates are weighted by annual market capitalization. Standard errors are clustered at the issuing firm level. Non-significant estimates are color-coded as 0 (yellow). Data for countries coded in gray is not available.

C Robustness Checks

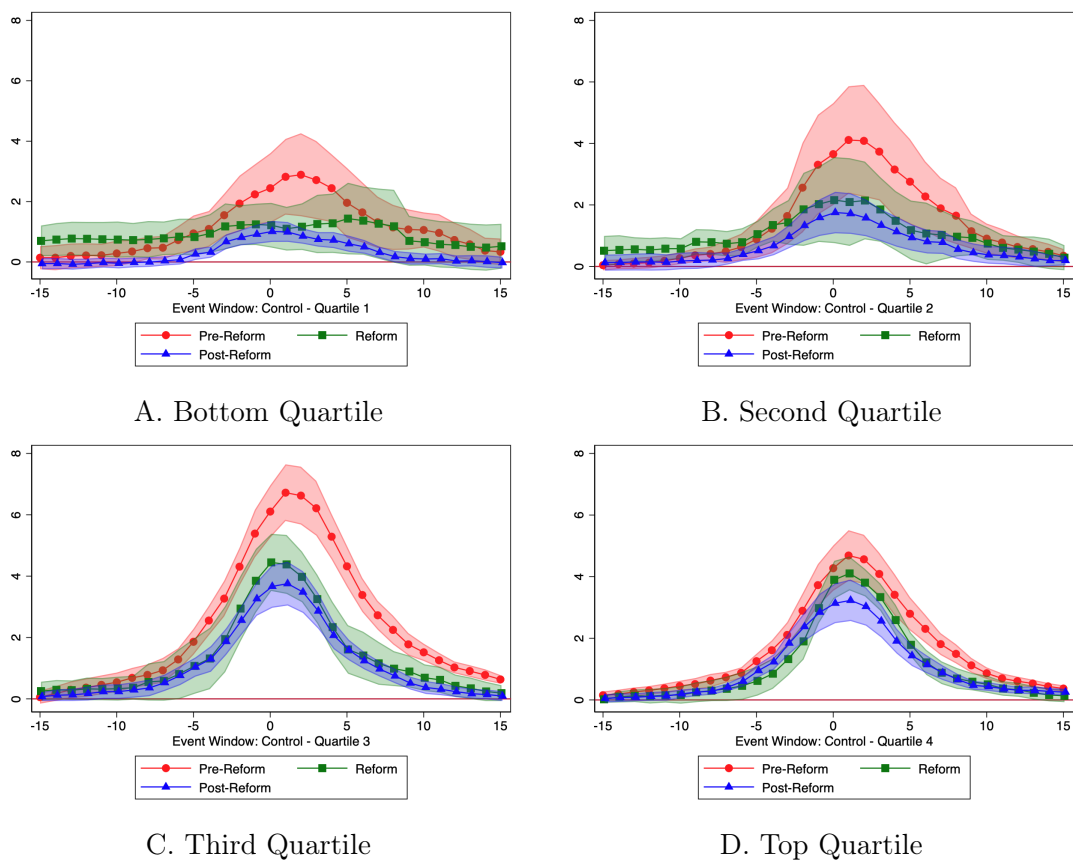
C.1 Additional Results for the Control Group (Finland, Norway, Sweden)

Figure C.1: Heterogeneity in Unweighted Excess Shares on Loan with respect to Market Capitalization for the Control Group



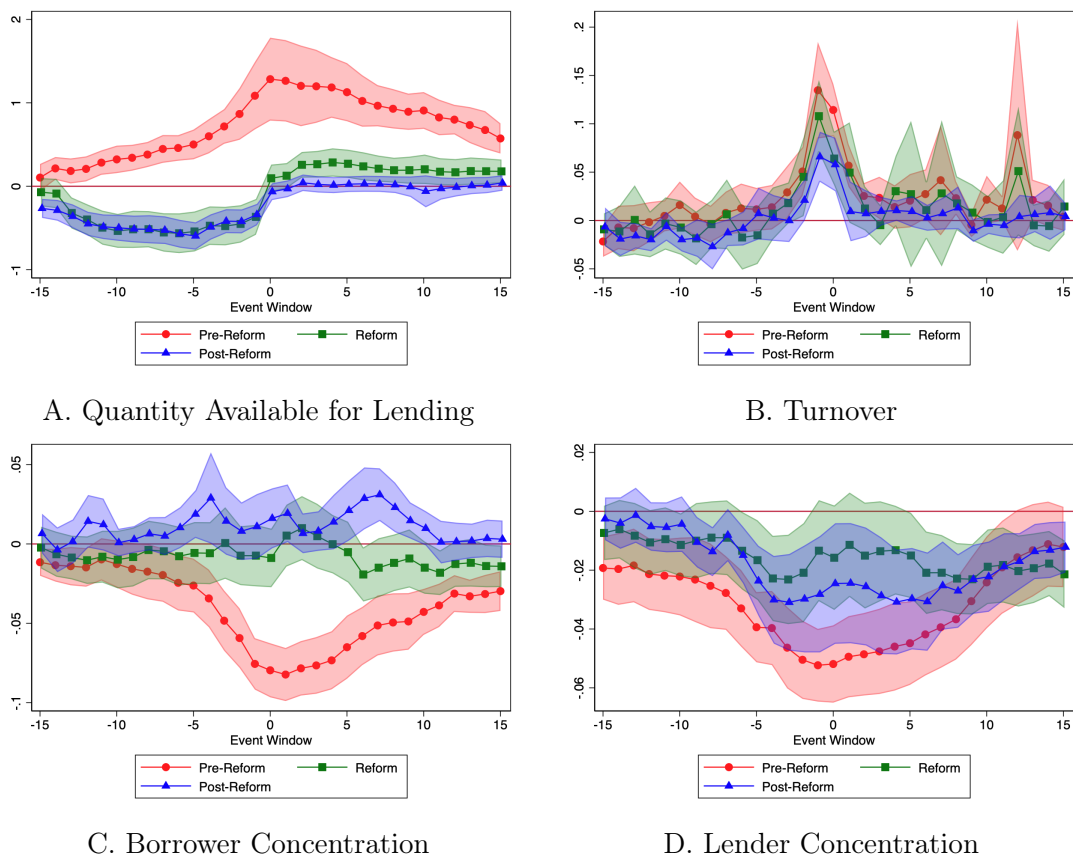
Notes: The Figure replicates 7 for firms in the control group (Finland, Norway and Sweden). Standard errors are clustered at the issuing firm level.

Figure C.2: Heterogeneity in Excess Shares on Loan with respect to Dividend Yield for the Control Group



Notes: The Figure replicates 8 for firms in the control group (Finland, Norway and Sweden). Standard errors are clustered at the issuing firm level.

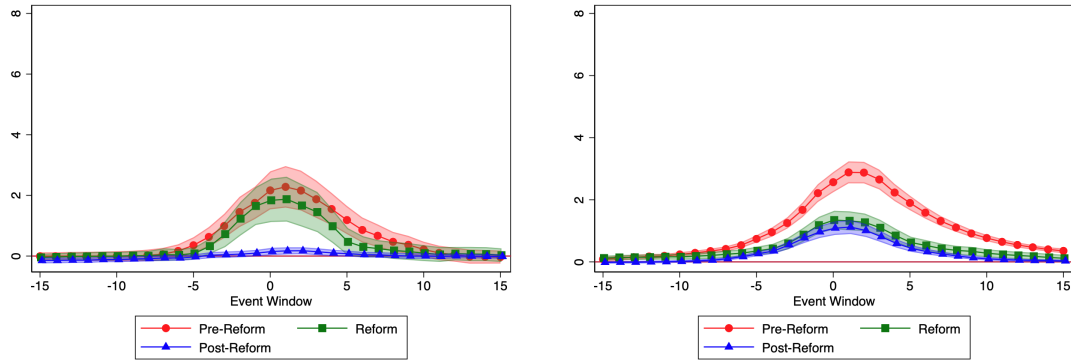
Figure C.3: Event Study for Additional Outcome Variables for the Control Group



Notes: The Figure replicates 9 for firms in the control group (Finland, Norway and Sweden). Standard errors are clustered at the issuing firm level.

C.2 Specification Tests

Figure C.4: Unweighted Estimates of Excess Shares on Loan Aggregated by the Treatment and Control Group, and Treatment and Control Period

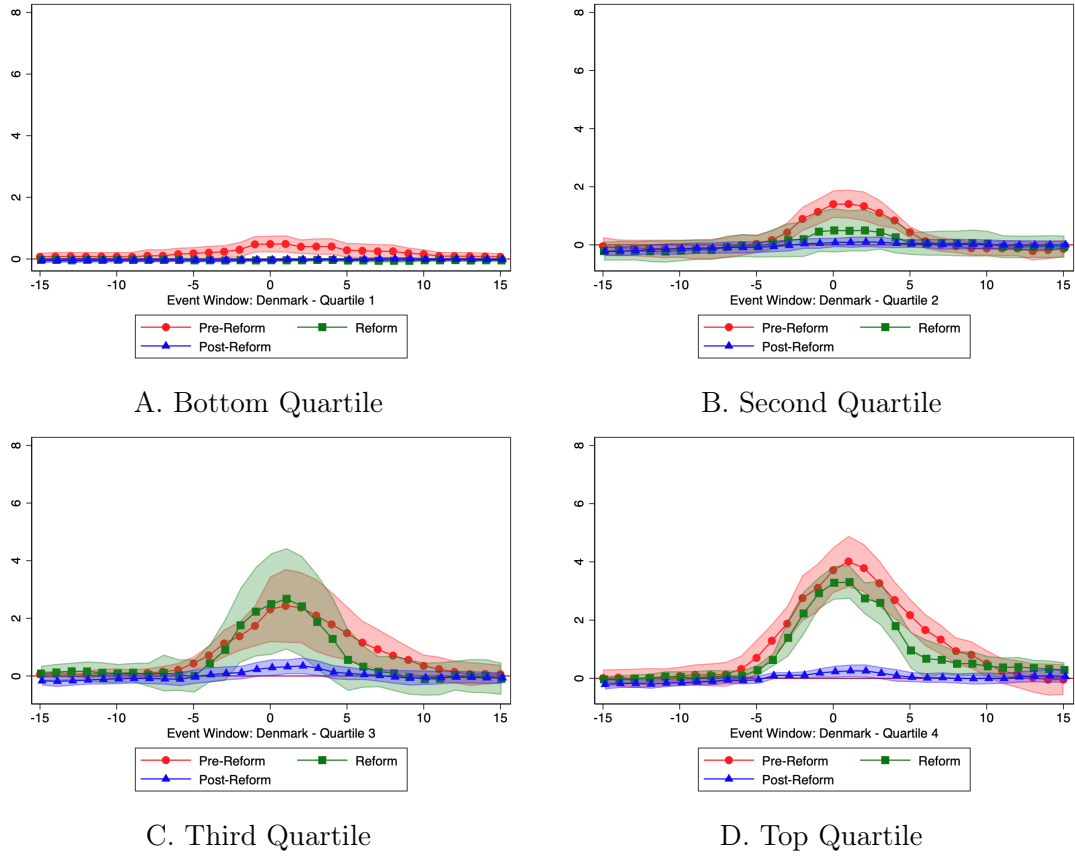


A. Denmark

B. Control Group

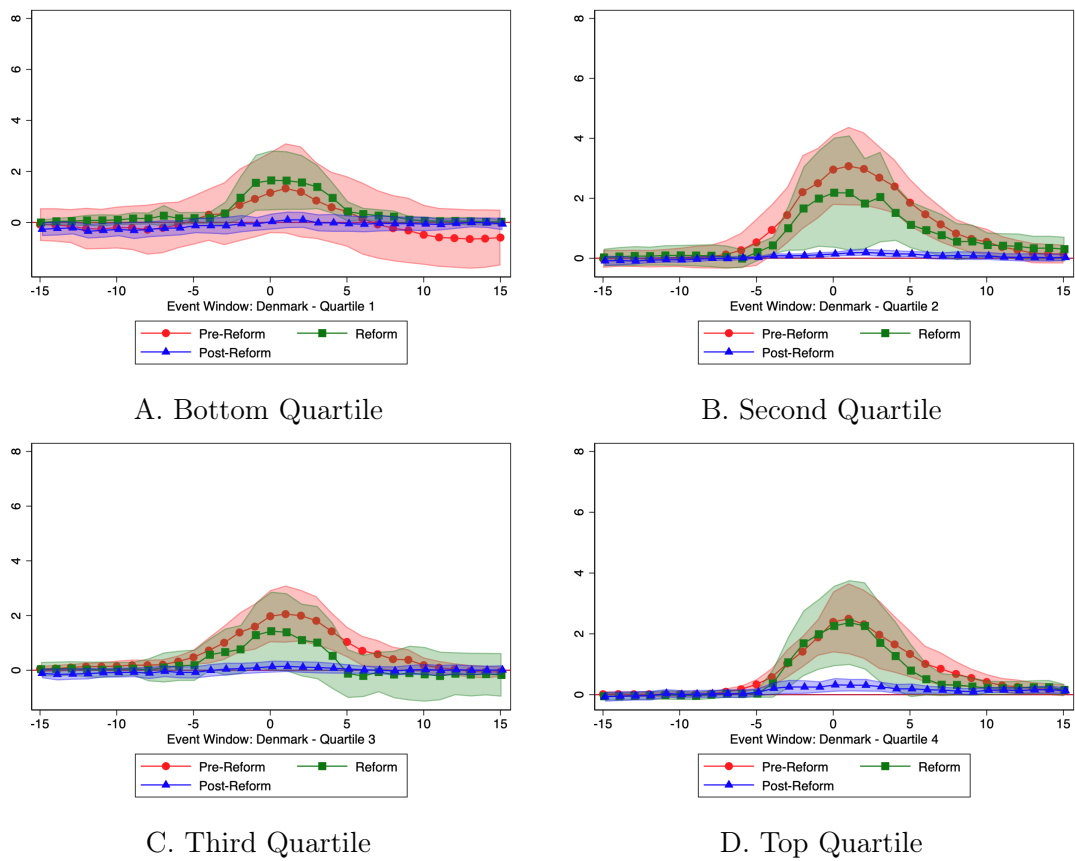
Notes: The Figure replicates Figure 6 without regression weights.

Figure C.5: Unweighted Estimates of Heterogeneity in Excess Shares on Loan with respect to Market Capitalization for Denmark



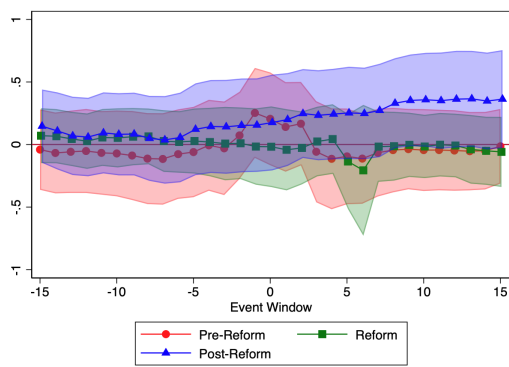
Notes: The Figure replicates Figure 7 without regression weights.

Figure C.6: Unweighted Estimates of Heterogeneity in Excess Shares on Loan with respect to Dividend Yield for Denmark

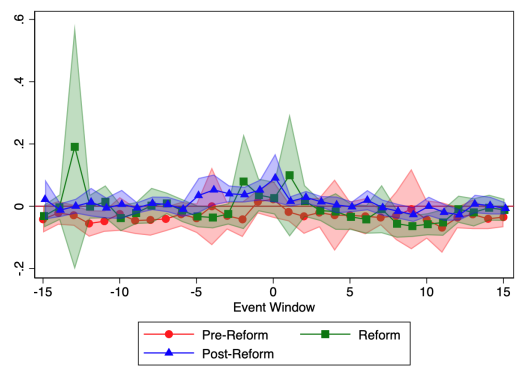


Notes: The Figure replicates 8 without regression weights.

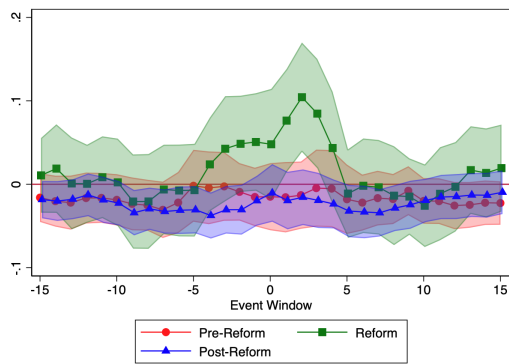
Figure C.7: Unweighted Estimates on Additional Outcome Variables for Denmark



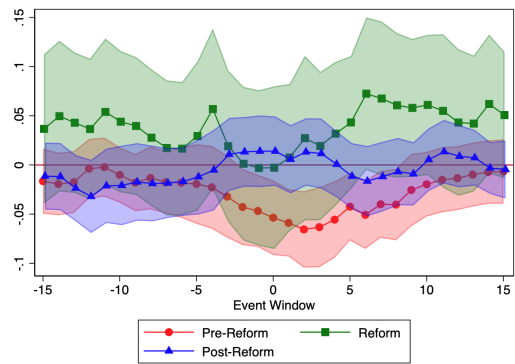
A. Quantity Available for Lending



B. Turnover



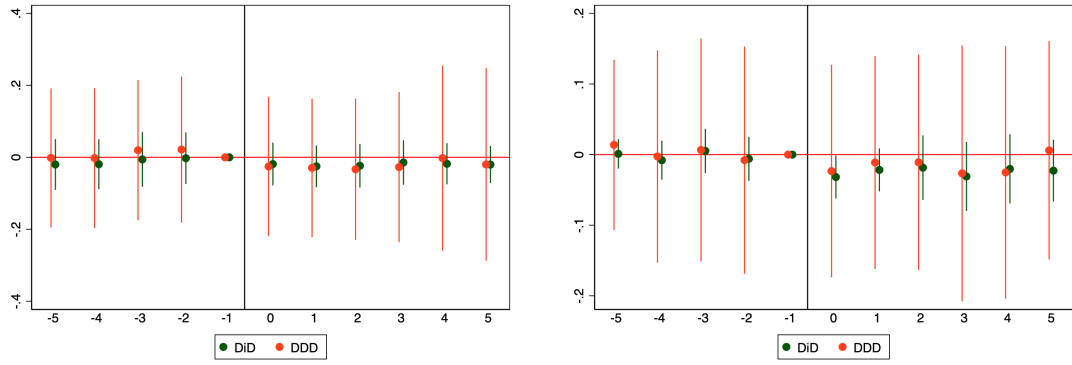
C. Borrower Concentration



D. Lender Concentration

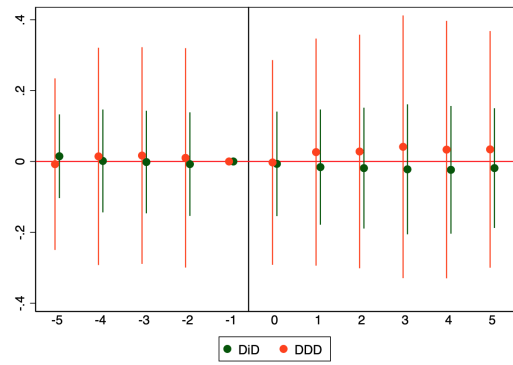
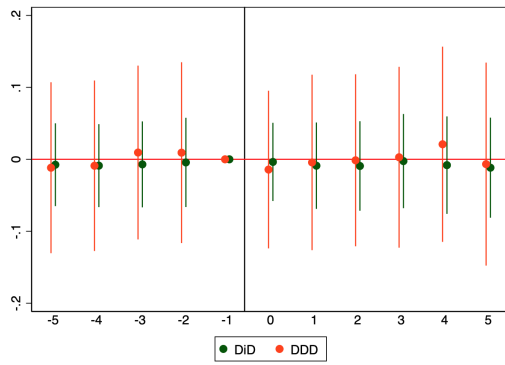
Notes: The Figure replicates 9 without regression weights.

Figure C.8: Effect of the Reform on Danish Stock Prices Without Control Variables, Without Regression Weights, and Using a Placebo Exercise For Confidence Intervals



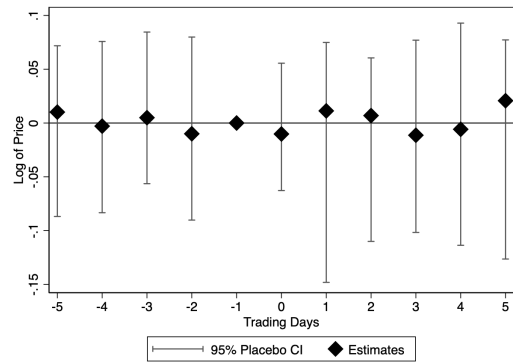
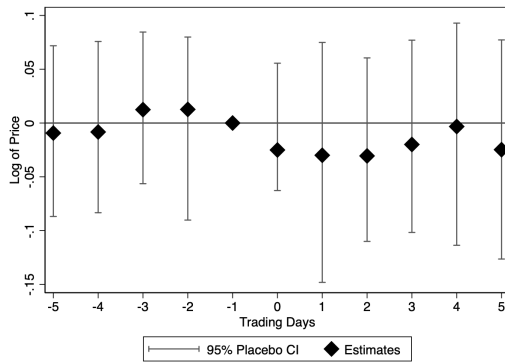
A. 6 August 2015, No Controls

B. 17 March 2016, No Controls



C. 6 August 2015, Unweighted

D. 17 March 2016, Unweighted

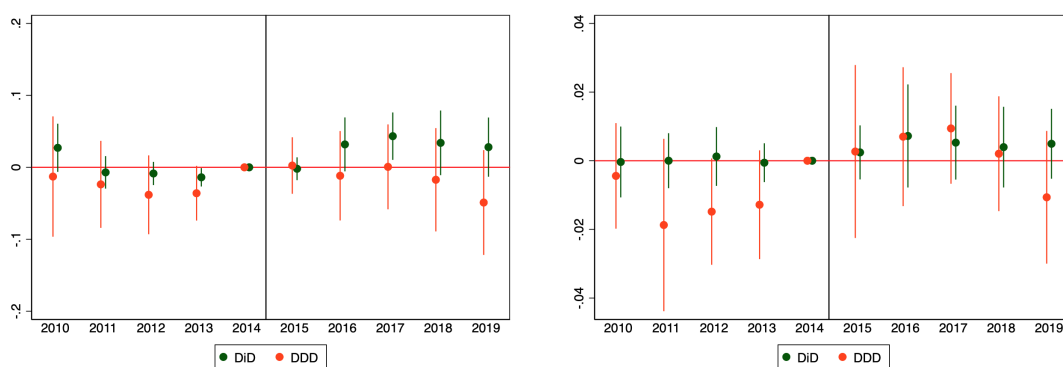


E. 6 August 2015, Placebo

F. 17 March 2016, Placebo

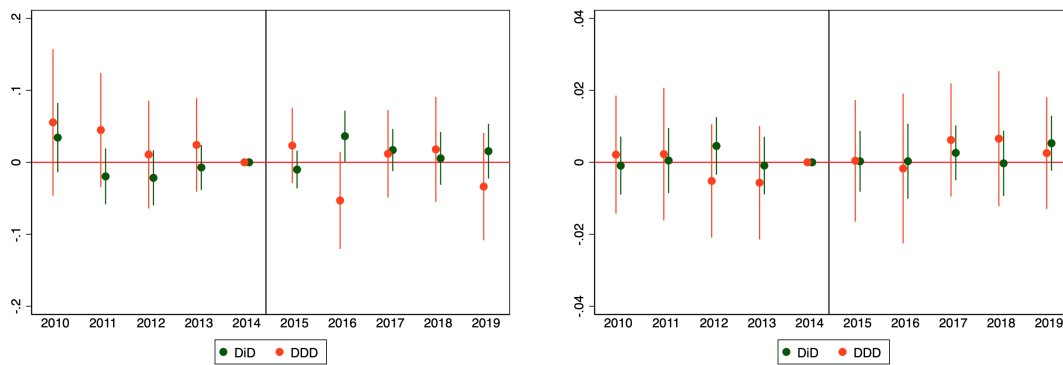
Notes: A replication of Figure 11 without the inclusion of controls for i.) company size, and sectoral composition (Panel A, B), and using OLS instead of weighting by market capitalization (Panel C,D). Panel E and D are identical to 11 but use confidence intervals are constructed on the basis of a Placebo exercise in which treatment is randomly assigned to other dates (more detail in Section 4.2). Error-bars represent a 95 % confidence interval. Standard errors are clustered at the company level, except in Panel E,D where we use the placebo exercise rather than standard errors to construct confidence intervals.

Figure C.9: Effect of the Reform on Danish Investment Rate and Dividend Policy without Control Variables and without Regression Weights



A. Investment Rate

B. Dividend Yield



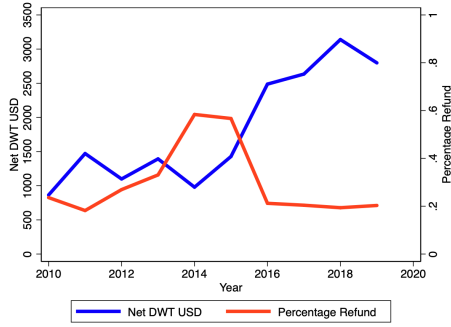
C. Investment Rate

D. Dividend Yield

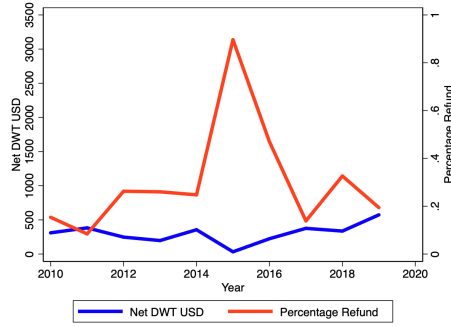
Notes: A replication of Figure 12 without the inclusion of controls for i.) company size, and sectoral composition (Panel A,B), and using OLS instead of weighting by market capitalization (Panel C,D). Error-bars represent a 95 % confidence interval. Standard errors are clustered at the company level.

C.3 Additional Figures and Tables

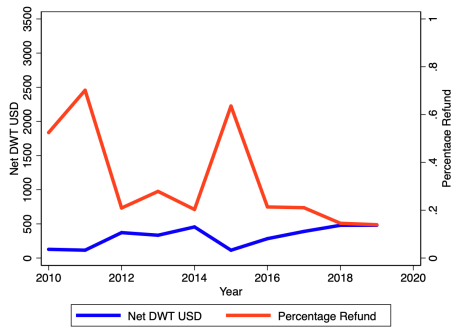
Figure C.10: Net DWT Revenue and Refunds



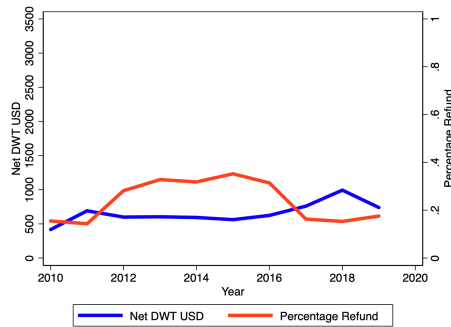
A. Denmark



B. Finland



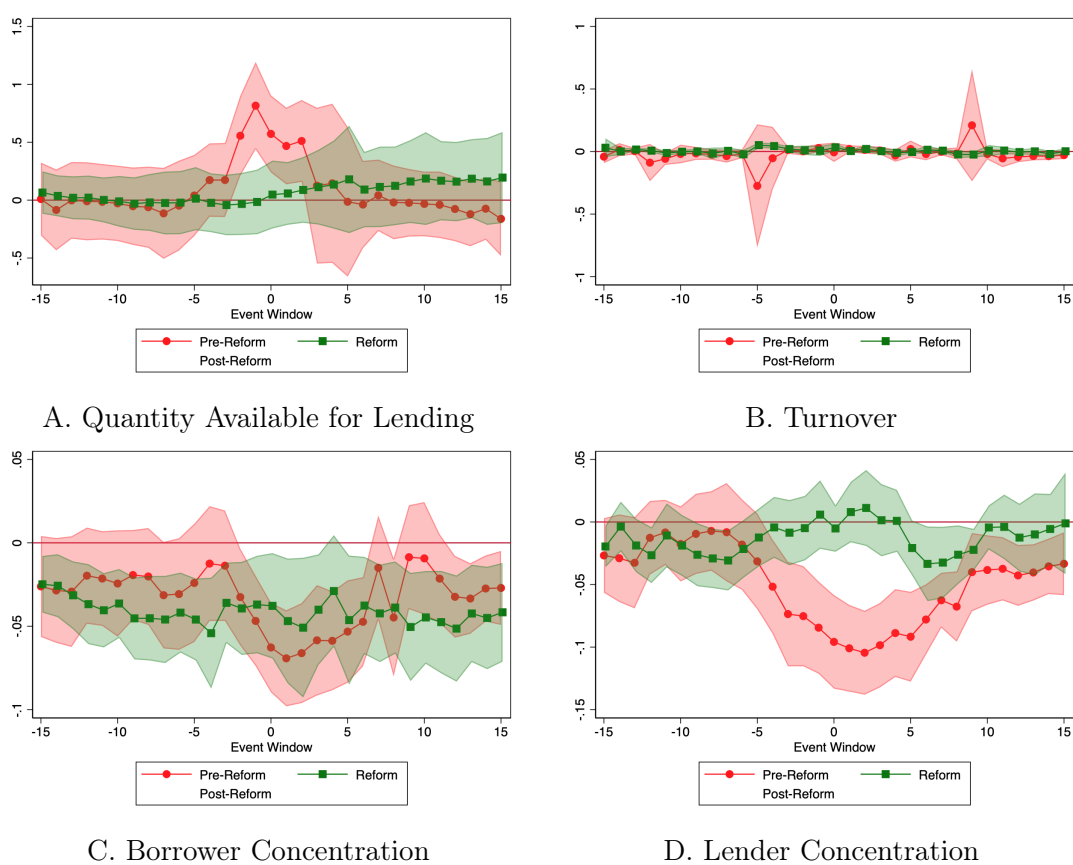
C. Norway



D. Sweden

Notes: Plot of the amount of net DWT revenue in million of USD (left axis), and refunds as a percentage of gross tax revenue (right axis) by country and year.

Figure C.11: Event-study for Additional Outcome Variables for Denmark



Notes: This Figure replicates 9 showing only the the Pre-Reform and Post-Reform Coefficients.

Table C.1: Summary Statistics Annual Data Separated by Treatment Intensity

	Denmark		Finland		Norway		Sweden	
	Before	After	Before	After	Before	After	Before	After
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Statistics for Firms with High Treatment Intensity</i>								
Investment Rate	0.138 (0.0489)	0.164 (0.0567)	0.136 (0.0779)	0.133 (0.0783)	0.164 (0.0611)	0.157 (0.0605)	0.138 (0.0717)	0.131 (0.0681)
Dividend Yield	0.0178 (0.0143)	0.0204 (0.00980)	0.0384 (0.0175)	0.0360 (0.0116)	0.0399 (0.0173)	0.0327 (0.0190)	0.0338 (0.0149)	0.0324 (0.0173)
<i>Statistics for Firms with Low Treatment Intensity</i>								
Investment Rate	0.103 (0.0523)	0.102 (0.0550)	0.135 (0.118)	0.139 (0.112)	0.172 (0.116)	0.138 (0.103)	0.177 (0.138)	0.162 (0.107)
Dividend Yield	0.0220 (0.0173)	0.0171 (0.0151)	0.0321 (0.0194)	0.0254 (0.0150)	0.0242 (0.0273)	0.0283 (0.0258)	0.0157 (0.0170)	0.0200 (0.0167)

Notes: The Table presents summary statistics for the variables used in the analysis. The columns Before refer to the period from 2010 to 2014. The columns After refers to the period from 2015-2019, consistent with the timeline in Figure 4. The statistics for Dividend Yield and Investment Rate are weighted by market capitalization. The statistics are presented for firms by treatment intensity status (see subsection 5.2.1 for the definition of treatment intensity). The number of observations for firms with high treatment intensity is 1119. The number of observations for firms with low treatment intensity is 1143. Standard deviations are in parenthesis.

Table C.2: Full Summary Statistics

	Denmark			Finland			Norway			Sweden			Outside
	Before	Reform	After	Before	Reform	After	Before	Reform	After	Before	Reform	After	Event Window
<i>Panel A. Daily Data</i>													
Stocks on Loan	4.496 (2.054)	3.730 (2.101)	1.424 (1.481)	5.044 (3.228)	6.660 (3.090)	3.479 (2.303)	4.414 (2.469)	4.871 (3.031)	3.730 (2.435)	6.492 (3.473)	5.201 (3.408)	4.043 (2.454)	1.297 (1.909)
Stocks Available for Lending	16.33 (5.280)	17.33 (6.209)	17.23 (5.401)	12.85 (7.040)	16.59 (4.349)	14.43 (7.826)	9.407 (4.415)	12.23 (4.605)	10.66 (5.528)	18.06 (7.303)	17.30 (6.279)	16.15 (5.738)	14.89 (6.646)
Turnover	0.251 (0.191)	0.240 (0.393)	0.203 (0.141)	0.316 (0.329)	0.189 (0.113)	0.213 (0.170)	0.260 (0.295)	0.233 (0.414)	0.172 (0.150)	0.406 (0.341)	0.332 (0.475)	0.315 (0.254)	0.254 (0.386)
Lender Concentration	0.152 (0.122)	0.175 (0.187)	0.246 (0.169)	0.222 (0.182)	0.144 (0.143)	0.224 (0.185)	0.166 (0.157)	0.164 (0.132)	0.186 (0.157)	0.175 (0.129)	0.216 (0.225)	0.211 (0.157)	0.245 (0.178)
Borrower Concentration	0.206 (0.132)	0.290 (0.180)	0.246 (0.137)	0.180 (0.157)	0.153 (0.109)	0.215 (0.171)	0.156 (0.155)	0.178 (0.132)	0.243 (0.133)	0.174 (0.134)	0.240 (0.225)	0.223 (0.146)	0.252 (0.161)
<i>N</i>	1113	104	1127	1965	64	1448	1710	67	1829	4324	148	4887	678408
<i>N</i>	4950	449	4982	8703	397	6295	7546	314	8083	19145	703	21596	678408
Number of Events	159	15	161	281	9	207	246	10	263	624	21	699	0

Notes: Column 1-8 columns show the mean of the variable for event time $[-3,3]$. The last column shows the summary statistics outside the $[-15,15]$ event window. The columns Before refer to the period from 2010 to August 26, 2015. The columns Reform capture the interval from August 26, 2015-June 30, 2016. The columns After refers to the period from July 1, 2016-2019, consistent with the timeline in Figure 4. The variables shares on loan, Quantity available for lending and Turnover are represented as a percentage of public float. Lender and Borrower Concentration are a Herfindahl index of concentration. All statistics are weighted by market capitalization. Standard deviations are in parenthesis.

Table C.3: DWT Tax Revenue Data from the Nordic Countries

Year	Denmark		Finland		Norway		Sweden	
	Gross	Refund	Gross	Refund	Gross	Refund	Gross	Refund
2010	6 365	1 502	277	43	1 623	852	3 560	551
2011	9 654	1 756	300	25	2 163	1 518	5 241	752
2012	8 714	2 349	262	69	2 738	573	5 655	1 593
2013	11 695	3 870	201	52	2 719	758	5 858	1 922
2014	13 201	7 706	356	88	3 603	732	5 979	1 904
2015	22 182	12 575	284	255	2 545	1 618	7 320	2 579
2016	21 256	4 510	382	179	3 034	648	7 795	2 449
2017	21 862	4 465	387	54	4 081	859	7 761	1 264
2018	24 591	4 764	422	138	4 563	663	10 200	1 562
2019	23 425	4 760	636	124	4 913	685	8 485	1 490

Notes: The Table provides the raw data from the Nordic tax authorities on the gross and the refund value for the DWT. Numbers are reported in millions and in the original currency (Danish krone, EURO, Norwegian krone, Swedish krona respectively).

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