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Taxing Big Firms' Extra Profits: Evidence from the "Robin Hood" Tax

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Abstract

In extraordinary times, policy makers need to find new ways to finance public expenditures and restore public budgets. Taxing who benefit from the extraordinary time would be the easy way, but the threat of negative trickle-down responses often make policy makers reluctant to go along this road. This paper studies how big corporations respond to tax hikes in extraordinary times. We leverage variations from the "Robin Hood" tax: a large surcharge applying to Italian firms operating in the energy sector with revenues above a discrete threshold. After showing that firms did not game the law by manipulating their revenues, our regression discontinuity estimates provide compelling evidence that the tax did not hurt investments nor profits, and that the tax burden is not shifted to workers. Moreover, our results are confirmed by the additional analysis we run using a difference in difference approach.

Keywords: corporate taxation, big corporation, regression discontinuity design
JEL Classification: H22, H25, G38, L25

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1 Introduction

Governments of all political stripes are spending massive sums to overcome the COVID-19 pandemic. Eventually, though, the question of who will ultimately foot the bill needs to be answered. The idea of a tax hike targeting specific sectors, companies or people that are seen as having come out of this crisis relatively well-off is gaining political traction. For instance, the International Monetary Fund is evaluating the possibility of introducing a series of temporary taxes to help fund the pandemic recovery, in particular the Fund proposed a temporary tax for companies who gained unusually high profits due to the COVID-19 pandemic. During the Great Recession, several states in the U.S. (e.g., Connecticut, North Carolina and Oregon) introduced temporary corporate income tax surcharge. In Italy as well after the great recession it has been introduced a surtax - so called Robin Hood Tax (RHT) - on profits by taxing big firms operating in specific sectors that benefited from abrupt extra profits. [1]

A key challenge is that raising taxes during a recession can make things worse for two main reasons. Corporate tax hikes are claimed to substantially raise firms' cost of capital (see Harberger, 1962, 1966; Feldstein, 1970; Poterba, Rotemberg, and Summers, 1985) and to make firms less prone to invest (see Hall and Jorgenson, 1967; Cummins, Hassett, and Hubbard, 1994; Caballero, Engel, and Haltiwanger, 1995).

In fact, the depressing effect of corporate tax hikes on short-term output is often used as an argument against increasing taxes on corporations (Ryan, 2011, 2012; Hubbard et al. 2012). Nonetheless, larger and high-profit firms seem to be less sensitive to tax increase (see Lediga et al, 2019; Devereux et al, 2014, for recent empirical evidence). In broad terms, tax policies can either target investments directly - such as depreciation changes[2] - from those that affect the cost of capital gradually over time - such as corporate or dividend tax changes (Feldstein 1982; Auerbach and Hassett 1992; Yagan 2015).[3] However, in contrast with standard economic theory, Yagan (2015) has shown a null impact of increasing dividend's tax rate.The relevant outcome variables are investment, employee compensation and payout to shareholders. Yagan finds an immediate behaviour response on payout, but a null effect on investment and employee compensation.

Corporate tax hikes might as well affect wages and employment. In fact Bradford (1978) and Kotlikoff and Summers (1987) showed that if capital is perfectly mobile between countries but labour is not, the introduction of a tax on corporate income in a home country tends to reduce the world rate of return to capital and to shift capital away from the country to the rest of the world. This shift in capital reduces the return

[1] See Financial Post, "IMF Proposes Temporary Solidarity Tax on Pandemic Winners and the Wealthy", 7 April 2021.

[2] See Zwick and Mahon, 2017, who find that bonus depreciation has a substantial effect on investment.

[3] Furthermore, empirical research in economics and finance increasingly relies on cross-sectional studies using financial statement data (see Barnett and Sakellaris, 1998; Bond and Cummins, 2000; Erickson and Whited, 2000; Desai and Goolsbee, 2004; Cummins et al., 2006.

to labour in the home country, decreasing wages. Moreover, corporate taxes can also be passed on to workers through a bargaining mechanism between firms and workers. In this case both the wage and the number of workers is decided by the bargaining between unions of workers and firms, while firms choose capital by maximizing their profits (Arulampalam et al. 2012). In this model for given level of inputs (meaning that the number of workers and capital are fixed), an increase in corporate tax determines a decrease in wages and profits which is related, respectively, to the bargaining power of workers and firms. Given a hike in the corporate tax, higher bargaining power of workers will lead to a higher decrease in wage and a lower decrease in profits: in fact the higher the workers' bargaining power the bigger the quota of the quasi rent they get and the greater is the the reduction of their wage due to the increase in corporate tax. In particular, Arulampalam et al. (2012) find that an increase in corporate tax is 50% shifted onto wages. This estimation corresponds to the direct effect related to wages which is defined as the reduction of the quasi rent over which there is bargaining for given level of inputs. Consistently with these findings Fuest et al. (2018) find that the extent to which corporate tax is shifted onto labor depends on the profitability of firm because the higher the rents to be shared between firms and workers, the higher the pass-through on wages. Moreover, they find that the decrease in wage due to the corporate tax is stronger in the case of firm level bargaining than sectoral level collective.

To the best of our knowledge, past empirical works have not fully explored the economic implications of imposing a temporary tax on big firms. To address this question empirically, we exploit the introduction of the RHT in Italy over the 2008-2015 period. This policy led to the imposition of a surtax on profits of firms reporting revenues above 25 million euros and operating in the energy sector.

We use financial data on Italian firms from the *Analisi Informatizzata delle Aziende Italiane* (AIDA) dataset, provided by the Bureau van Dijk. We retrieve firm-level information on annual revenue, input expenditures, value added, capital and labor costs, among the others, giving us the possibility to analyze multiple margins of responses to the surtax. We focus on firms reporting revenue between X and X million euros during the 2007-2013 period, during which the revenue threshold remained constant at 25 million euros.

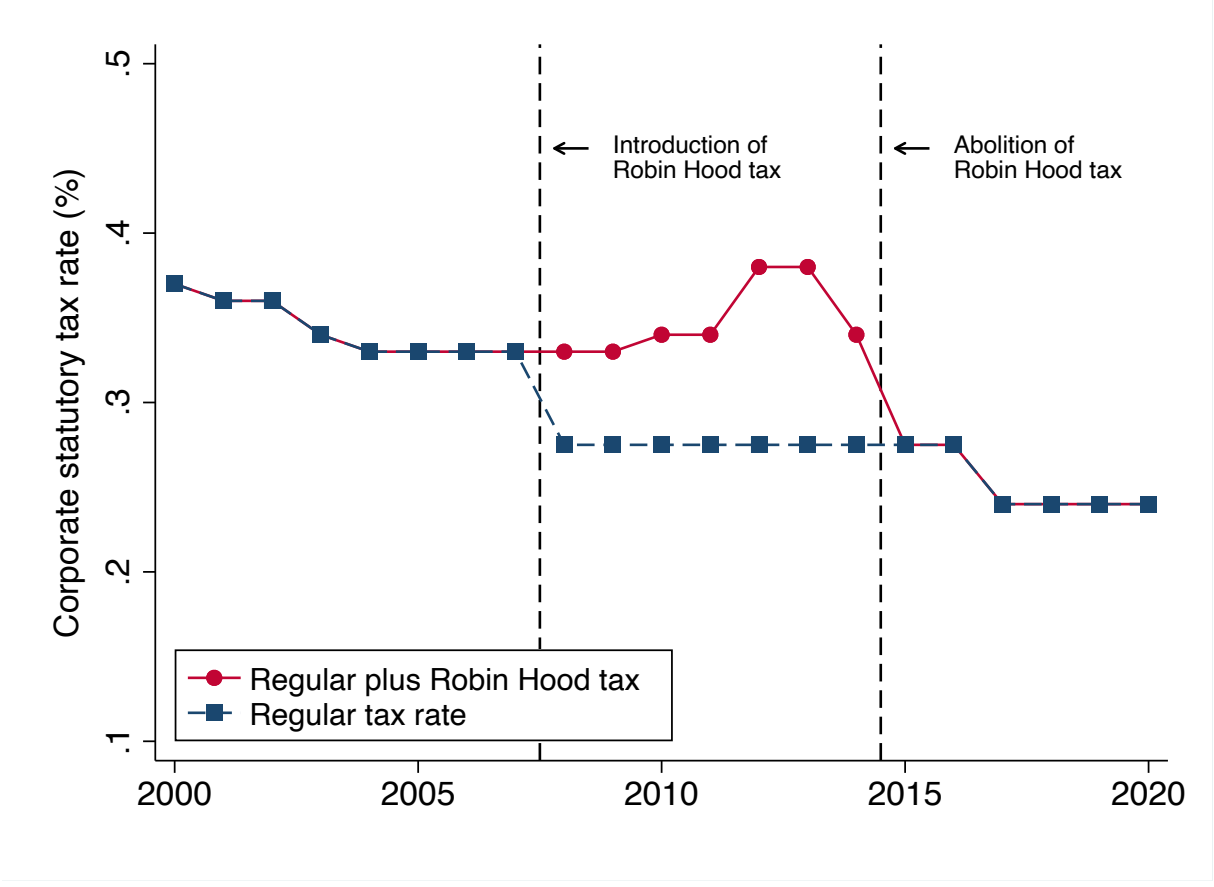
The key identifying assumption underlying our research design is that firms did not game the law by manipulating their revenues. We provide clear evidence that the revenue density is smoothly distributed around the 25 million threshold, as we would expect in a valid RD design. This is germane to the argument that it is harder to evade a broader base by concealing revenues (see, e.g., Best et al. 2015 JPE). We further show that key pre-determined firm-level outcomes look highly similar for firms below and above the threshold.

2 Institutional Background

2.1 Corporate Taxation in Italy

Italian companies are subject to a corporate income tax, known as *Imposta sul Reddito delle Società* (IRES). Similarly to most advanced economies, the corporate tax is charged on net profits (i.e., gross income minus allowable tax reliefs) of a company. The tax base is determined according to the worldwide taxation principle.[4] According to OECD Tax Database, corporate taxation in Italy accounts for around 2 percent of the GDP (or about 4.5 percent of taxation) in 2019. The IRES rate has registered a gradual reduction in the last twenty years: since 2016, it is set at 24%, while it decreased from 33% to 27.5% in 2008 (Figure 1).

Figure 1: Corporate Taxation in Italy



2.2 The "Robin Hood" Tax

The introduction of the RHT had a redistributive objective by taxing, in a period of crisis, the windfall profits of the energy sector, namely those extra-profits resulting from an increase in speculation on commodity prices, such as crude oil and gas. At the same time, RHT hit companies operating in sectors with high negative impact on

[4]Non-resident companies are taxed only on Italian-source income.

the environment, the tax revenue thus obtained can be considered as compensation for these negative environmental externalities.

When firstly introduced, the RHT corresponded to a surtax equal to 5.5%, that, in addition to the IRES standard rate of 27.5%, effectively restored the 33% tax rate in force up to 2008 (Figure 1). The RHT was applied to certain companies operating on specific energy sectors[5], that exceeded revenues greater than 25 million euros in the previous fiscal year. The 25 million threshold includes all the revenues resulting from the balance sheet, regardless of the source, thus incorporating also the revenues generated from activities that are not related to the energy sector as long as the firm is eligible for the RHT. Producers of electricity from renewable sources (biomass, photo-voltaic and wind) were excluded from the RHT until 2010.

The RHT, since its first introduction, has been modified several times in terms of both tax rates and thresholds (Table 1). After the first two years, in 2010, the surtax was increased by one percentage point. In 2012, it increased by four additional percentage points, thus reaching 10.5%. Finally, in 2014, the surtax decreased to 6.5%. As for the thresholds, the fiscal years from 2008 to 2011, included companies whose revenues exceeded 25 million euros. Then, from 2012 to 2013, there were two simultaneous thresholds: 10 million euros of revenues, and 1 million euros of IRES tax base. Finally, in 2014 these thresholds further decreased: the revenues to 3 million euros and the IRES tax base to 300 thousand euros.

The RHT was applied until the fiscal year 2014, since in 2015 it was considered illegitimate by the Constitutional Court[6].

Table 1: Surtax and thresholds of the RHT.

Law	Fiscal year	Threshold revenue (mil. euros)	Threshold IRES taxable income (mil. euros)	Surtax rate
Law n.81/2008	2008-2009	25	-	5.5%
Law n.99/2009	2010-2011	25	-	6.5%
Law n.138/2011	2012-2013	10	1	10.5%
Law n.69/2013	2014	3	0.3	6.5%

The RHT foresaw two rules that prevented tax avoidance. First of all, firms that were part of a corporate group had to pay the RHT based on their separate tax base

[5]More specifically, companies subject to the RHT are those whose main activity is the research and the production of liquid and gaseous hydrocarbons, the refining of oil, the production or the marketing of oil, lubricating oils and residues, liquefied gas and natural gas and the transport or distribution of natural gas, the production of electricity, its transmission and dispatching, its distribution or its marketing.

[6]The main aspects of unconstitutionality highlighted by the Constitutional Court with the judgment n.10/2015 were the violation of the principle of the ability to contribute and the lack of necessity and urgency.

and eligibility threshold. Secondly, in case of mergers (or divisions), RHT eligibility was based on the revenues of the year before the consolidation (or split). The RHT included a "user-friendly" rule, namely companies subject to the surtax were prohibited from shifting the additional tax burden on consumer prices[7]. The task of monitoring compliance with this rule was entrusted to an independent agency: the Italian Regulatory Authority for Energy, Networks and Environment (ARERA). To convey an idea of the magnitude of this measure, we show the data of the tax bases and the revenues of the RHT during the period of its application (Table 2). In the first year of the RHT application, the surtax revenue amounted to 117 million of euros, while in the following two years, revenues reached about 500 million. With the increase in the surtax rate and the reduction of the thresholds, in 2012 and 2013, the tax base reached 29 billion and the revenue of the RHT increased to 2.7 billion. Finally, with the last reduction of the surtax rate, in 2014 the RHT revenue decreased to 700 million.

Table 2: Taxable income and revenues of the RHT (in thousand euros).

Fiscal year	Surtax taxable income	Surtax revenues
2008	2,137,905	117,585
2009	9,231,158	509,033
2010	8,171,764	531,452
2011	14,275,994	1,498,926
2012	13,213,471	1,387,414
2013	29,401,927	2,734,505
2014	10,717,848	697,952

3 Data

3.1 AIDA

The "user-friendly" rule did not allow firms to shift the burden on consumer prices, therefore we assume that firms might shift the tax burden on either capital or labor. We estimate the impact on capital by looking at total assets and one of its specific components, namely fixed tangible assets (capital). Then, we estimate the impact on labor by looking at labor cost and its quota on value added, labor share.

We use firm's level data from the AIDA dataset containing information on the balance sheets. Our dataset covers 15.627 firms operating in the energy sector over the 2007-2015 period. Our main estimation is based on the years from 2008 to 2011. This is due to two reasons. First, from 2012 on, the threshold is determined by both revenues

[7]The legislation also regulated that in the case of a merger the reference revenues must be those of the companies incorporated or merged in the period before the merger, in the case of a division the reference revenues refer to the company split before the division.

and taxable income, which makes difficult to apply the regression discontinuity design. Second, data on taxable income is not available. From the raw data, we keep firm-year observations satisfying the following criteria: i) firms observed over the whole 2007-2011 period; ii) firms that are active for the whole period, implying that we exclude companies that are dissolved, into liquidation or went bankrupt; iii) extreme values of dependent variables at the top and bottom 1 percent level are excluded from the dataset. Based on the local nature of the regression discontinuity (RD), we also restrict our sample to firms whose revenues are between 5 and 45 million euros, 20 million above and below the threshold of 25 million. This leaves us with a sample of 262 firms for a total of 1.047 observations from 2008 to 2011. Among them, 856 are below the thresholds and 191 are above. Our sample contains approximately 10% of the firms subject to the RHT. We use the revenues in year *t-1* to determine whether a firm in year t is subject to the RHT. Our dataset also contains time-invariant information on the firm's economic activity classified with ATECO codes.

4 Identification

4.1 Regression Discontinuity (RD) Design

To estimate the response of firms to corporate taxes, we use a discontinuity in the corporate tax rate at the 25 million euros revenues threshold of firms operating in the energy sector, as described in Section 2.2. Following the recommendations of Imbens (2008) and Gelman (2019), our main specification uses local linear regressions within a given bandwidth of the treatment threshold, and controls for the running variable (lagged revenues) on either side of the threshold. Formally, we estimate the following model:

$$\begin{aligned} y_{i,t} = \alpha + \beta \cdot 1(T_{i,t-1} \geq C) + \gamma \cdot (T_{i,t-1} - C) \\ + \delta \cdot (T_{i,t-1} - C) \cdot 1(T_{i,t-1} \geq C) + u_{i,t}, \end{aligned} \tag{1}$$

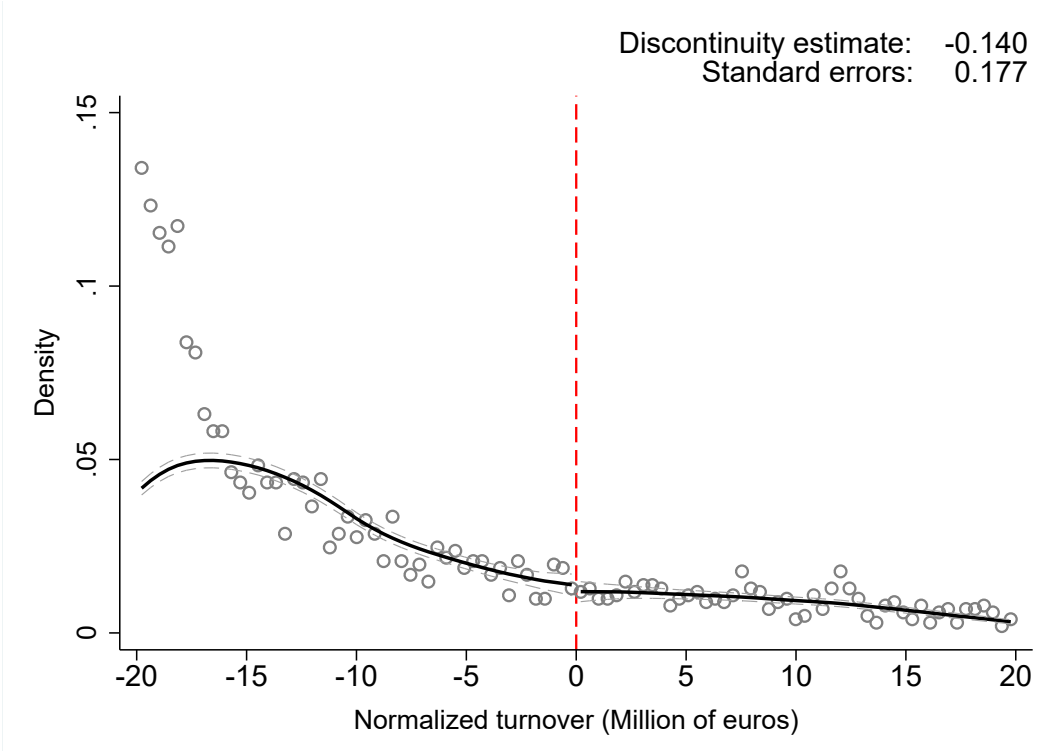
where the outcome variable, $y_{i,t}$, is measured at year t for each firm i. $T_{i,t-1}$ is firm lagged revenues and C is the cutoff defining eligibility for the RHT, so that the dummy variable $1(T_{i,t-1} \geq C)$ defines treatment and control firms. The RD estimator, β, calculates the local average treatment effect (LATE) of eligibility for the RHT on firm-level outcomes. In some specifications, we will add industry and year fixed effects. These controls are not necessary for identification, but they might improve the efficiency of the estimation by reducing the sampling variability. $u_{i,t}$ is the error term. Standard errors are clustered at firm-level.

4.2 Validity of RD design

4.2.1 Strategic Manipulation of Revenues: McCrary test

The key assumption to identify β is that firms did not game the law by reporting revenues just below the threshold determining eligibility for the Robin Hood tax. In practice, firms have limited control over revenues that depends on market conditions which we assume not to be manipulated by firms subject to taxation. Moreover, the eligibility for the RHT is based on the revenues of the previous fiscal year (lagged revenues). We scrutiny the validity of this assumption in Figure 2, which depicts the density of firms around the revenues cutoff for RHT eligibility. As we would expect in a valid RD design (Lee 2008; McCrary 2008), the figure depicts a smooth distribution around the cutoff. Such result of no response over the revenues margin constitutes prima facie evidence that firms did not respond to the introduction of the Robin Hood tax. This evidence is supported by the fact that in case of division of big firms the revenue determining the RHT eligibility is based on the revenue of the year before the splitting. Therefore there is no incentive to split to manipulate the revenue in order to avoid the surtax.

Figure 2: Frequency of Firms and McCrary Test



Note:

4.2.2 Pre-Determined Characteristics: Balance Test

To check the validity of our RD design, we examine the patterns of a range of predetermined characteristics around the threshold. In Table 3, we check for manipu-

lative sorting by performing balance tests on the available invariant firms characteristics. If there were nonrandom sorting, we should expect some of these characteristics to differ systematically between treated and untreated firms around 25 million revenues threshold. The available pretreatment characteristics are the geographical location (North-East, North-West, Center, South and Islands), the firm's age, and the legal form (limited company, public limited company and others). We run the balance test using one year, namely 2008, since the pre-determined characteristics are invariant over the years. No pre-treatment characteristics show a significant discontinuity at the threshold. In particular, the geographical location, which in Italy might be correlated with larger firms, is perfectly balanced.

Table 3: Balance Test

	Age	North-East	North-West	Center
Discontinuity	6.126	-0.006	0.018	-0.005
	(4.661)	(0.105)	(0.123)	(0.070)
Obs.	448	456	456	456
	South	Islands	LTD	PLC
Discontinuity	-0.049	0.043	0.066	0.040
	(0.081)	(0.051)	0.123	0.123
Obs.	456	456	456	456

Note: Values refer to 2008. Optimal bandwidth is fixed at 20 million euros of revenues.

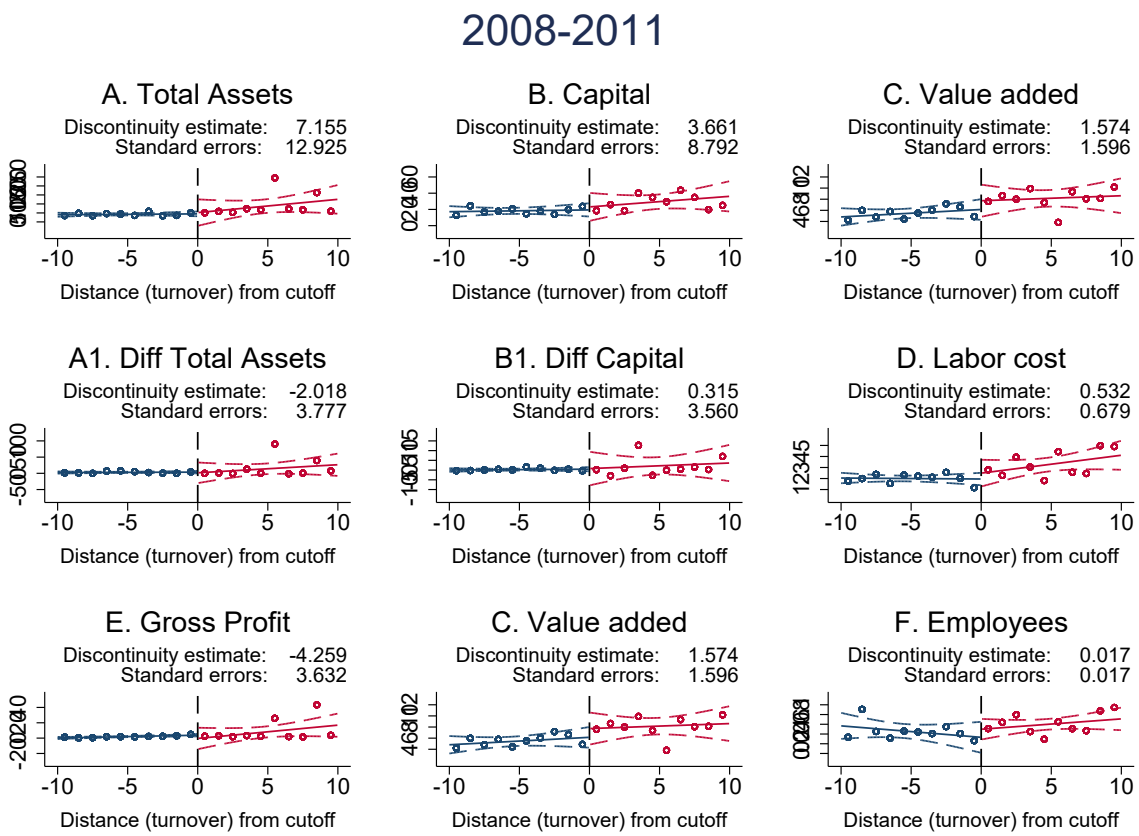
4.3 Graphical evidence

We investigate the impact of the increase in corporate tax by looking at capital and labor. Namely, we use total assets and labor cost as the main indicators. We expect that total assets, and one of its components, capital, can decrease if the tax is beard by capital. On the other side, if the tax burden is shifted onto labor, we expect a decrease in labor cost. Moreover, we look at value added which is the sum of profits and labor cost. In case profits or/and labor cost decreases because of the tax, then the value added will drop as well. Finally, we investigate the labor share, measured as the ratio between labor cost and value added. First graphical evidence shows that there is no discontinuity in total assets, suggesting that a tax hike does not affect the decisions regarding investments.This result also holds for capital. Moreover, we also do not observe any discontinuity in profits, labor cost, value added and laborshare.

4.4 Baseline Results

Table 4 presents the RD estimates of the impact of the Robin Hood tax on our main outcome variables. For each variable, we present results using a bandwidth equal to 20 million euros (column 1). We show the estimated β coefficient obtained from equation (1) and robust standard errors clustered at firm level. In column 2 we add industry

Figure 3: The impact of the Robin Hood tax on firm-level outcomes



Note: Total assets, capital, value added, labor cost, profit and labor share are expressed in million euros. Bandwidth is estimated with inference procedures developed in Calonico, Cattaneo and Farrell (2020) using labor cost as dependent variable. Bandwidth is fixed at 20 million euros and expressed in million euros. Capital refers to fixed tangible assets. Labor share is the ratio between labor cost and value added. Profit is the the net profit.

fixed effects and in column 3 we add both industry and year fixed effects.

4.4.1 "Real" Tax Responses: Investments

If we look at the total asset margin there is no effect of the increase in tax given that the coefficient of the dummy variable equal to one when the revenue is greater than 25 millions is not significant. Namely we get a coefficient of 11.7 (which is 23% of the mean value) with a standard error of 12.6. We also get a positive but not significant result if we look at part of the total asset like capital (fixed tangible assets). In the case of capital we get a coefficient of 1.1 (which is 7% of the mean) with a standard error of 7.1.

4.4.2 Corporate Tax Incidence: Do Workers Bear the Tax?

When we look at labor cost margin we di not find any significant drop at the threshold, namely we get a coefficient of -0.4 (which is 19% of the mean) and a standard error equal to 0.612. Moreover if we examine the behavior of profits we do not find any

evidence of distortion at threshold, in fact the coefficient is -0.1 (17% of the mean) and its standard error of 1.2. When we look at the value added there is a negative coefficient (0.2) which represents 5% of the mean and is not statistically significant (standard error equal to 1.193).

4.5 Robustness checks

4.5.1 Difference in difference analysis

We included a difference in difference analysis as a robustness check. Given the tax eligibility criteria, we can only perform a difference in difference analysis for the first year, 2008. Since after 2008, there are some previously untreated firms that become treated (revenues in the previous year above 25 million euros), and vice-versa. Therefore we verify our results by running a difference in difference analysis over 2007 and 2008, our sample is given by 403 firms for a total of 806 observations. We use the firms in the 20 million revenues bandwidth from the threshold of 25 million euros. This additional analysis captures the short term effect of the introduction of the RHT. We do not find any statistically significant result for the investments (total assets and capital). However, unexpectedly, we find an increase in labor cost for firms subject to the surtax. The coefficient is equal to 348.2 thousand euros with a standard error of 139.3, which corresponds to an increase in labor cost of 19%. Our interpretation is that in order to decrease the tax base, the firms immediately reacted by increasing their costs. In fact, if we use the total costs as a dependent variable, we find that a statistically significant increase in costs equal to 4000.2 thousand euros with a standard error of 1992.5 (19% of total costs).

4.5.2 Sensitivity to Bandwidth Selection

We test whether our results are sensitive to bandwidth choice. Appendix Figure A1 reports coefficient estimates and 95 percent confidence intervals obtained by estimating equation 1 on different bandwidths around the threshold. The figure shows that our coefficient estimate is qualitative similar when using a reasonable range of bandwidths. In particular all the coefficients are never statistically significant for bandwidth going from 3000 to 20000 and the other margins are never significant.

Table 4: Baseline results

	(1)	(2)	(3)
	A. Total assets		
$1(T_{i,t-1} \geq C)$	11.708	-0.407	-0.826
	(12.551)	(27.262)	(27.309)
Net-of-tax elasticity	0.634	1.690	1.870
	(2.124)	(1.902)	(1.919)
	B. Capital		
$1(T_{i,t-1} \geq C)$	1.063	1.148	1.175
	(7.088)	(6.381)	(6.393)
Net-of-tax elasticity	0.391	1.941	2.292
	(7.298)	(5.178)	(5.254)
	C. Value added		
$1(T_{i,t-1} \geq C)$	-0.215	-0.254	-0.263
	(1.193)	(1.106)	(1.108)
Net-of-tax elasticity	0.682	1.162	1.681
	(2.911)	(2.562)	(2.606)
	D. Labor cost		
$1(T_{i,t-1} \geq C)$	-0.375	-0.564	-0.565
	(0.612)	(0.507)	(0.506)
Net-of-tax elasticity	3.857	4.982	5.318
	(3.178)	(2.571)	(2.581)
	E. Profit		
$1(T_{i,t-1} \geq C)$	0.115	0.022	0.013
	(1.159)	(1.170)	(1.164)
Net-of-tax elasticity	-1.298	-0.940	-0.245
	(4.482)	(4.252)	(4.306)
	F. Labor share		
$1(T_{i,t-1} \geq C)$	-0.013	-0.006	-0.004
	(0.082)	(0.075)	(0.076)
Net-of-tax elasticity	1.770	1.565	1.540
	(2.098)	(1.695)	(1.727)
Observations	1,047	1,047	1,047
Industry FE	No	Yes	Yes
Year FE	No	No	Yes

Note: Coefficients from linear regression discontinuity estimates. Optimal bandwidth is fixed at 20 million euros of revenues. Values are expressed in million euros. Capital refers to fixed tangible assets. Labor share is the ratio between labor cost and value added. Profit is the the net profit. Industry fixed effects refers to ATECO codes. Errors clustered at firm level. Standard errors in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Difference in difference results

	Total assets	Capital	Value Added
$1(T_{i,t-1} \geq C)$ *x Post*	674.504	343.4406	679.359
	(1891.753)	(1054.785)	(467.632)
	Labor cost	Profit	Labor share
$1(T_{i,t-1} \geq C)$ *x Post*	348.242**	-53.926	2718.516
	(139.345)	(315.436)	(2389.349)
Observations	806	806	806

Note: Coefficients from difference in difference estimates from years 2007 and 2008. Values are expressed in thousand euros. Capital refers to fixed tangible assets. Labor share is the ratio between labor cost and value added. Profit is the the net profit. Industry fixed effects refers to ATECO codes. Errors clustered at firm level. Standard errors in brackets. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

5 Conclusion

This paper studies the impact of an increase in corporate tax on big firms behavior. We focus on the Italian Robin Hood Tax: a surtax on firms of the energy sector with more than 25 million revenue. Combining a regression discontinuity design with firm-level balance sheets, our contribution finds a null effect on the labor cost. This results is opposed to Arulampalam et al. (2012) and Fuest et al. (2018). Notice that our results is relative to big firms and for temporary increase in tax. Fuest et al. (2018) find similar results for medium- small firms. They do not find any decrease in wage for big firms as we do. Moreover the increase in tax either in Arulampalam et al. (2012) and Fuest et al. (2018) is not relative to specific event but it exploits changes in tax rates over a given period of time. On the contrary the RHT is an unexpected shock introduced to face a period of economic crisis. Our results are applicable to tax extra-profits in period of crises like that of COVID-19 pandemic and some normative attention should be paid in avoiding the negative impact on the labor cost.

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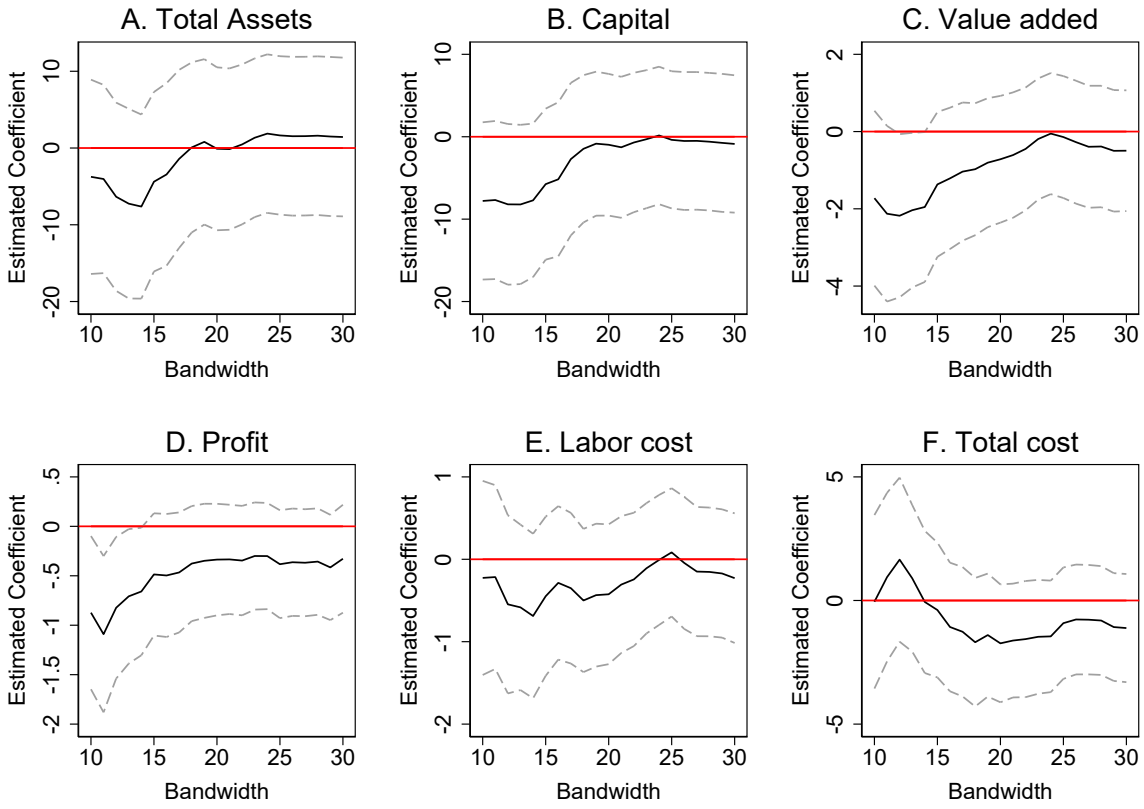
Appendices

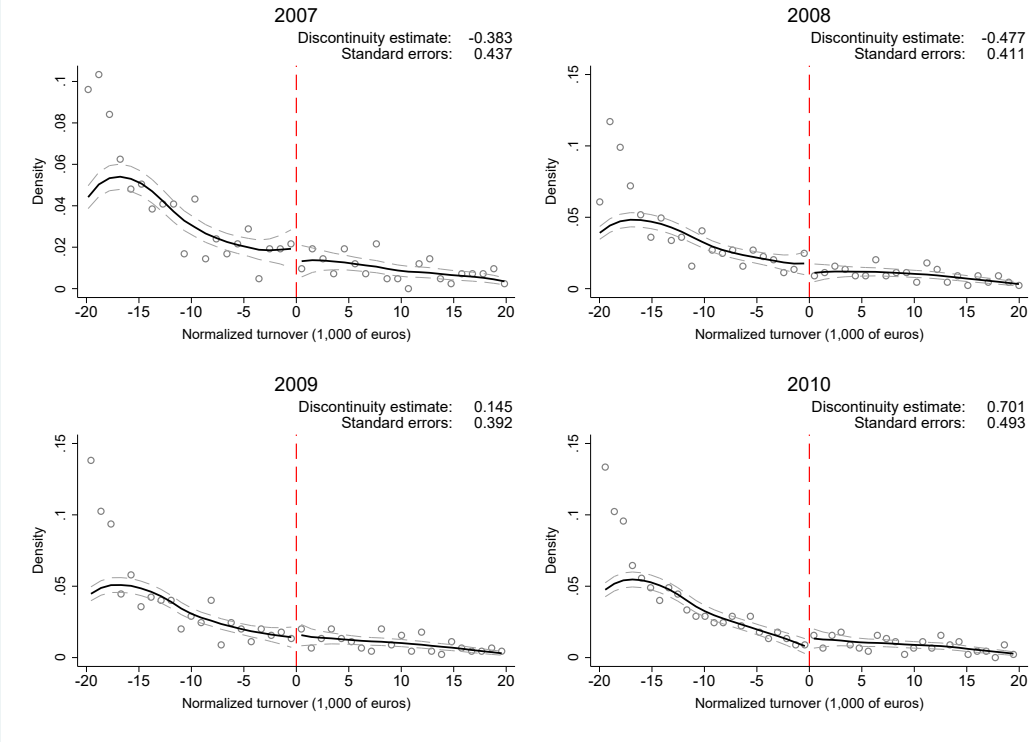
A Additional Results

Figure A1: Sensitivity of estimates to varying bandwidth



Note: This figure reports RD estimate and 90 percent confidence intervals obtained from estimating 1 on a various range of bandwidths.

Figure A2: Frequency of Firms and McCrary Test: Year by Year analysis



Note: year by year McCrary test from 2007 to 2010.