



Munich Personal RePEc Archive

What happens when the income tax increases?

Cerqua, Augusto

University of Westminster

5 November 2018

Online at <https://mpra.ub.uni-muenchen.de/89857/>
MPRA Paper No. 89857, posted 07 Nov 2018 02:28 UTC

What happens when the income tax increases?

Augusto Cerqua

Department of Economics and Quantitative Methods, University of Westminster

Abstract: This paper exploits a sudden income tax rate increase in a large Italian region to examine whether this induced taxpayers to change their tax-related behavior. By using a spatial regression discontinuity design and a detailed dataset at the municipality level, we find a sizable and persistent decrease in declared income only for the self-employed and entrepreneurs.

Keywords: Income tax; tax evasion; spatial regression discontinuity design

JEL codes: C21; H26; J21

1. Introduction

When national and local governments raise income tax rates, they expect to achieve higher revenues which may in turn allow them to balance their public deficits. However, an income tax rate increase might push some categories of taxpayers to declare less income. Indeed, while pensioners and employees can hardly change their tax-related behavior, the self-employed and entrepreneurs could reduce their tax liabilities by deciding to work less hours or by evading (more) taxes. There is a strong evidence that self-employed income goes vastly unreported (see, among others, Pissarides and Weber 1999 and Artavanis et al. 2016 who find a tax evasion rate of over 40% for Britain and Greece, respectively) and an increase in tax liabilities could further incentivize such an illicit behavior (see Heim, 2010). We contribute to the existing literature by investigating how the self-employed and entrepreneurs react to an income tax rate increase. To do so, we exploit a sudden increase in the income tax rate in one of the largest Italian regions by adopting a spatial regression discontinuity design (spatial RDD) and a rich dataset at the municipality level.

2. Policy

The Italian central government imposes a progressive income tax, IRPEF (Imposta sul reddito delle persone fisiche), which applies to the majority of incomes. It is a “personal” tax, as its amount depends on some specific features of the taxpayer, such as his/her occupation and household composition (Marino and Zizza, 2012). In 2015, the personal income tax rates were as reported in Table 1. In that

year, in Italy almost 41 million taxpayers earned incomes subject to IRPEF for an overall declared amount of 833 billion euros.

Table 1 – The Italian personal income tax rates in 2015

Threshold	Rate (%)
Up to €15,000	23
Up to €28,000	27
Up to €55,000	38
Up to €75,000	41
Above €75,000	43

Source: Italian Ministry of Economy and Finance

On top of the personal income tax, there are also a municipal¹ and a regional surcharge. The income tax surcharge for regional administrations was introduced in 1998, consisting of a mandatory flat rate of 0.9% and an additional discretionary rate of up to 0.5%. Since 2010, the phasing in of fiscal federalism has been accompanied by repeated increases in the discretionary element of the regional income tax surcharge. In addition, an unusual feature of Italy's territorial financing arrangements is the central government's ability to require regions to raise the surcharge rates to meet deficits in health expenditure (Poole, 2017). In 2015 this led Lazio, one of the richest and most populated Italian regions, to raise by one percentage point the regional surcharge on the income tax rate for incomes above €35,000² (from 2.33% to 3.33%). For instance, this meant that a taxpayer with €100,000 of taxable income was liable to pay 650€ more than the previous year. At the same time, the six regions neighboring with Lazio did not experience relevant changes in the regional surcharge (see Table A1 in the Appendix).³ This allows us to exploit such geographic discontinuity to estimate the impact on taxpayers' behavior of a sudden increase in the personal income tax rate.

3. Method and data

Our estimation strategy is based on the spatial RDD first proposed by Holmes (1998). This identification strategy is appealing because it controls for confounding unobservables that evolve smoothly over space. Locations separated by a regional border share the same geography, access to

¹ The municipal income tax rate ranges from 0% to 0.9%.

² In December 2014 Lazio regional government approved a lower threshold (€15,000) to the 1 percentage point increase; however, in July 2015 the threshold was raised to €35,000. Therefore, the surcharge between €15,000 and 35,000 stayed at 2.33%.

³ The neighboring regions are Tuscany, Umbria, Marche, Abruzzo, Molise and Campania. In 2015, only Abruzzo slightly raised the regional surcharge for incomes below €28,000 (from 1.54% to 1.73%).

transportation, and access to specialized labor and supplies; the key feature that sets these locations apart is indeed the difference in regional income tax surcharge on the two sides of the border. This analysis retrieves the local average treatment effect (LATE) β of a percentage point increase in personal income tax on different types of taxpayers. To do so, we run the following equation:

$$\Delta y_{irb} = \alpha + f(\text{geographic location}_{ir}) + \beta D_r + X'_{irb} \gamma + \phi_b + \varepsilon_{irb}$$

where Δy_{irb} is the log change in the outcome variable between 2014 and 2015 of the i^{th} municipality in region r along segment b of the treatment boundary, D_r is the binary indicator variable for treatment which is unity in case of Lazio and zero else, X'_{irb} are pre-treatment covariates, ϕ_b is a set of boundary segment fixed effects,⁴ ε_{irb} is the error term and $f(\text{geographic location}_{ir})$ is the RDD polynomial. In the specification of $f(\cdot)$ we use the two-dimensional RDD in latitude-longitude space proposed by Dell (2010). We employ a 2nd order polynomial in latitude and longitude which allows comparing observations which are very close to each other and absorbs all smooth variation in the outcome.

Our main source of data comes from the Italian Ministry of Economy and Finances (MEF) archive which makes available yearly data on the declared income by residents' taxpayers at the municipality level. As the treatment is at the taxpayer level, it would have been ideal to gain access to individual level data; however, MEF limits disclosure of data collected for tax purposes and it releases only data aggregated at the municipality level. Although municipality level data are a second-best alternative, municipalities represent the lowest administrative units in Italy, with 378 treated municipalities in Lazio and 1,598 control municipalities in its six neighboring regions. Our dataset reports the overall declared income and the number of taxpayers split by six categories of income: i) employment, ii) retirement, iii) lands and buildings; iv) equity, v) self-employment, and vi) entrepreneurship. The availability of such disaggregated data allows us to isolate the self-employment and entrepreneurial incomes and test how taxpayers react to a personal income tax increase. In addition, we have collected data from the Italian National Statistical Institute on population, area, workplace employment and pre-treatment growth rate in workplace employment. These variables, together with the per capita income and proportion of self-employment and entrepreneurial incomes derived from the MEF archive, are used as pre-treatment variables.

⁴ Each boundary segment dummy denotes which segment of the Lazio boundary is the closest to the municipalities' centroids.

4. Results

Table 2 reports the spatial RDD estimated impact of the income tax rate increase on the overall declared income (Panel A), the self-employment and entrepreneurial declared incomes (Panel B), and the retirement, employment, lands and buildings and equity declared incomes (Panel C) for the specifications without (1) and with (2) pre-treatment covariates X'_{irb} .

Table 2 – Spatial RDD estimates

Dependent variable		(1)	(2)
Panel A - Growth rate in overall declared income	Coefficient	0.02	0.00
	Standard Error	(0.33)	(0.34)
	Control variables	No	Yes
	Observations	1,976	1,976
Panel B - Growth rate in self-employment and entrepreneurial declared incomes	Coefficient	-4.44***	-4.67***
	Standard Error	(1.40)	(1.50)
	Control variables	No	Yes
	Observations	1,952	1,952
Panel C - Growth rate in retirement, employment, lands and buildings and equity declared incomes	Coefficient	0.28	0.30
	Standard Error	(0.35)	(0.35)
	Control variables	No	Yes
	Observations	1,976	1,976

Notes: All specifications include border-segment fixed effects. Conley (1999) standard errors that correct for spatial dependence of unknown form in parentheses. ***p<0.01, **p<0.05, *p<0.1.

The estimates in Panel A show that, overall, there is no decrease in declared income after the surge in income tax rate. However, column (1) of Panel B shows that, when we isolate self-employment and entrepreneurial incomes, there is a sizable and highly statistically significant decrease in declared income of -4.44%. When we add the pre-treatment covariates X'_{irb} (column (2)) the negative impact gets even larger, i.e. -4.67%. We check the robustness of this finding in a number of ways and summarize the results of interest in Table 3. The first robustness test shows that the finding is robust to a falsification test, i.e. when we re-estimate our model assigning fake treatment dates to one year before actual treatment, we obtain statistically insignificant effects (Panel A). Our main finding also holds when we add the municipal IRPEF surcharge among control variables (Panels B) and when we drop the municipalities which increased or decreased the municipal surcharge between 2014 and 2015 (Panel C). Lastly, to the use of different polynomials of the Spatial RDD does not substantially affect the extent of the estimates (Panels D and E).

Table 3 – Robustness checks

Robustness check		(1)	(2)
Panel A – Using as dependent variable the growth rate in the self-employment and entrepreneurial declared incomes in the year before the policy change	Coefficient	-1.16	-1.40
	Standard Error	(1.32)	(1.25)
	Control variables	No	Yes
	Observations	1,953	1,953
Panel B – Addition of the pre-treatment municipal surcharge as control variable	Coefficient	-4.51***	-4.77***
	Standard Error	(1.42)	(1.52)
	Control variables	No	Yes
	Observations	1,952	1,952
Panel C – Removal of municipalities which increased or decreased the municipal surcharge between 2014 and 2015	Coefficient	-3.27**	-3.46**
	Standard Error	(1.28)	(1.35)
	Control variables	No	Yes
	Observations	1,706	1,706
Panel D – Use of 1 st order RDD polynomial	Coefficient	-4.13***	-4.45***
	Standard Error	(1.33)	(1.44)
	Control variables	No	Yes
	Observations	1,952	1,952
Panel E – Use of 3 rd order RDD polynomial	Coefficient	-5.41***	-5.19***
	Standard Error	(1.76)	(1.85)
	Control variables	No	Yes
	Observations	1,952	1,952

Notes: See notes of Table 2.

We then investigate whether such a decrease is due to a reduction in the number of individuals declaring incomes from self-employment and entrepreneurial activities or it is due to individuals declaring lower amounts per capita. As shown in Panels A and B of Table 4, both phenomena are at work. Besides, as there were no changes in the regional surcharge in the seven regions under analysis between 2015 and 2016, we further investigate whether the decrease in self-employment and entrepreneurial incomes was short-lived or not. Panel C of Table 4 reports a drop of -7.59% in declared income in 2016 with respect to 2014, which shows that the self-employed and entrepreneurs declared even less income two years after the surge in income tax rate.

Table 4 – Additional spatial RDD estimates

Dependent variable		(1)	(2)
Panel A - Growth rate in the number of taxpayers declaring income from self-employment and entrepreneurial activities	Coefficient	-2.18**	-2.14**
	Standard Error	(0.97)	(1.01)
	Control variables	No	Yes
	Observations	1,952	1,952
Panel B - Growth rate in self-employment and entrepreneurial average declared incomes	Coefficient	-2.26**	-2.53**
	Standard Error	(1.05)	(1.08)
	Control variables	No	Yes
	Observations	1,952	1,952
Panel C - Growth rate in self-employment and entrepreneurial declared incomes between 2014 and 2016	Coefficient	-7.45***	-7.59***
	Standard Error	(2.37)	(2.49)
	Control variables	No	Yes
	Observations	1,924	1,924

Notes: See notes of Table 2.

It is theoretically possible that the sudden increase in the income tax rate might have led self-employed and entrepreneurs to work less hours. Although there are no disaggregated data available to investigate such alternative channel, the use of survey data suggests that this did not happen. Indeed, Table 4 reports a descriptive analysis of survey data at the regional level showing no evidence that in Lazio there was a change in the working behavior of entrepreneurs and self-employed with respect to the number of hours worked between 2014 and 2015. In addition, we find a similar result in Table 6 by analyzing the number of registered merchants and artisans reported by the Italian Social Security Institute (INPS) observatory of independent workers. This means that it is unlikely that the increase in the regional surcharge pushed the self-employed and entrepreneurs to work less; therefore, the most likely explanation of the decrease in declared income by entrepreneurs and self-employed is an exacerbation of their tax evasion behavior.

Table 5 – Average number of hours worked per week for the self-employed and entrepreneurs

Region	Self-employed		Entrepreneurs	
	2014	2015	2014	2015
Tuscany	44.04	43.54	46.53	46.65
Umbria	43.16	43.36	50.95	46.27
Marche	42.28	42.73	47.45	46.49
Lazio	42.13	42.26	48.47	50.10
Abruzzo	42.88	42.15	46.75	54.67
Molise	43.35	45.04	48.07	52.09
Campania	41.86	41.26	51.35	48.98

Notes: Data are derived from the Italian Labor Force Survey

Table 6 – Number of registered independent workers

Region	Merchants		Artisans	
	2014	2015	2014	2015
Tuscany	170,351	169,163	153,156	150,160
Umbria	35,898	35,772	31,205	30,625
Marche	63,861	62,971	69,598	68,010
Lazio	209,347	211,017	120,569	118,509
Abruzzo	50,827	50,786	40,853	39,694
Molise	10,939	10,843	8,809	8,566
Campania	215,379	218,249	82,174	80,520

Notes: Data are derived from the INPS observatory of independent workers

5. Concluding remarks

We analyze the effect of a one percentage point increase in income tax rate on the behavior of different categories of taxpayers. Using a spatial RDD, we find that a one percentage point increase in the income tax rate engendered a sizable and persistent decrease in self-employment and entrepreneurial incomes, likely due to an increase in their tax evasion rate. From the regional government point of view, raising the income tax surcharge led to the “expected” increase in tax revenues mainly because in 2015 self-employment and entrepreneurial incomes made up only 8.2% of the overall declared income. On the other hand, from the taxpayers’ point of view, such an increase meant that the additional tax burden fell almost entirely on the employees and the pensioners’ shoulders, who were already the taxpayers’ categories liable to most taxes.

References

- Artavanis, N., Morse, A., Tsoutsoura, M., 2016. “Measuring income tax evasion using bank credit: Evidence from Greece”. *The Quarterly Journal of Economics*, 131(2), 739–798.
- Conley, T.G., 1999. “GMM estimation with cross sectional dependence”. *Journal of Econometrics*, 92, 1–45.
- Dell, M., 2010. “The persistent effects of Peru’s mining mita”. *Econometrica*, 78, 1863–1903.
- Heim, B.T., 2010. “The responsiveness of self-employment income tax rate changes”. *Labour Economics*, 17, 940–950.
- Holmes, T.J., 1998. “The effect of state policies on the location of manufacturing: evidence from state borders”. *Journal of Political Economy*, 106(4), 667–705.

- Marino, M., Zizza, R., 2012. "Personal income tax evasion in Italy: An estimate by taxpayer type," in *Tax Evasion and the Shadow Economy*, edited by Pickhardt, M., Prinz, A. (Cheltenham, UK: Edward Elgar).
- Pissarides, C.A., Weber, G., 1989. "An expenditure-based estimate of Britain's black economy". *Journal of Public Economics*, 39(1), 17–32.
- Poole, E., 2017. "Essays on the Political Economy of Decentralization (PhD thesis). Department of Government of the London School of Economics and Political Science.

Appendix

	2014		2015	
Region	Thresholds	Surcharge (%)	Thresholds	Surcharge (%)
Lazio	Up to €15,000	1.73	Up to €15,000	1.73
	Above €15,000	2.33	Up to €35,000	2.33
			Above €35,000*	3.33
Abruzzo	Up to €15,000	1.54	Unique	1.73
	Up to €28,000	1.66		
	Above €28,000	1.73		
Campania	Unique	2.03	Unique	2.03
Marche	Up to €15,000	1.23	Up to €15,000	1.23
	Up to €28,000	1.53	Up to €28,000	1.53
	Up to €55,000	1.70	Up to €55,000	1.70
	Up to €75,000	1.72	Up to €75,000	1.72
	Above €75,000	1.73	Above €75,000	1.73
Molise	Up to €15,000	2.03	Up to €15,000	2.03
	Up to €28,000	2.23	Up to €28,000	2.23
	Up to €55,000	2.43	Up to €55,000	2.43
	Up to €75,000	2.53	Up to €75,000	2.53
	Above €75,000	2.63	Above €75,000	2.63
Tuscany	Up to €15,000	1.42	Up to €15,000	1.42
	Up to €28,000	1.43	Up to €28,000	1.43
	Up to €55,000	1.68	Up to €55,000	1.68
	Up to €75,000	1.72	Up to €75,000	1.72
	Above €75,000	1.73	Above €75,000	1.73
Umbria	Up to €15,000	1.23	Up to €15,000	1.23
	Up to €28,000	1.63	Up to €28,000	1.63
	Up to €55,000	1.68	Up to €55,000	1.68
	Up to €75,000	1.73	Up to €75,000	1.73
	Above €75,000	1.83	Above €75,000	1.83

Notes: * In December 2014 Lazio regional government approved a lower threshold (€15,000) to the 1 percentage point increase; however, in July 2015 the threshold was raised to €35,000. Therefore, the surcharge between €15,000 and 35,000 stayed at 2.33%.