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**How does labor supply react to different
tax rates? A field inquiry**

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How does labor supply react to different tax rates? A field inquiry

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Abstract

Participants (96 students) were divided into three groups. Subjects in Group 1 were asked their labor supply, being their income burdened by a 25% tax rate. Then they were asked their labor supply if the tax rate were 40%. Subjects in G2 were asked their labor supply with a 25% tax rate, and subjects in G3 with a 40% tax rate. We first compared labor supplies within G1; then we compared labor supplies between G2 and G3. Finally we compared the two comparisons. In G1, subjects' labor supply is different, negatively related with the tax rate: this is probably due to how the questions are put, which *suggest* different answers. In fact, comparing G2 and G3, the labor supply is almost the same. Students who are part-time workers and students who are not supply different amounts of labor. *There is no difference at all* when comparing G2 and G3 as for non-working students, being the whole difference between G2 and G3 due to working students, who probably compare the tax rate they pay on their real income to the ones suggested in the questionnaire. Singling out non-biased responders, i.e. non-working students in G2 and G3, the tax rate on income – if given, independently of its level – does not influence the labor supply.

Keywords: labour supply, taxation, individual behaviour

JEL Classification: D03, H39, J20

1. Introduction

The prevailing literature reports experiments that confirm the theoretical hypothesis of an inverse relation between the tax rate on income and the labor supply (or the exerted effort): see, among others, Lévy-Garboua et al., 2005; Swenson, 1988; Sillamaa, 1999; Sutter and Weck-Hannemann, 2002. This research tests, by means of a questionnaire, if this negative relation stands in any case or if it only appears in presence of the particular design and conditions on which the previous experiments were built. In these experiments, participants were asked how much labor they were willing to supply in presence of different tax rates on the income they were going to earn by carrying out a rather tiring job. As the tax rate grew, the supplied labor decreased.

In our questionnaire, one third of the 96 participants faced questions that reproduced the structure described above: they were asked how much labor they were willing to supply if their income were burdened by a 25% tax rate, and how much if the tax rate were 40%. Thirty-two were asked how much labor they were willing to supply if their income were burdened by a 25% tax rate. The last thirty-two were asked how much labor they were willing to supply if their income were burdened by a 40% tax rate.

Therefore: a) we can compare the labor supply within the participants that faced both the tax rates: if the quantity of labor supplied under the 25% tax rate is significantly higher than the one supplied under the 40% tax rate, then we can conclude that our questionnaire confirms the results of the experiments previously ran by our colleagues; but, b) if no significant difference appears between the quantity of labor supplied by the participants subjected only to the 25% tax rate and the quantity of labor supplied by the participants subjected only to the 40% tax rate, then we can conclude that the negative relation between tax rates and labor supply, found in former experimental researches (and asserted by economic theory), was not independent from the experimental design.

2. Structure

This experiment, as already said, was run by means of questionnaires: therefore the environment presented to the participants was hypothetical. There is abundant literature about the reliability of such kind of inquiries (see Laury and Holt, 2002; and, of course, Kahneman, Knetsch and Thaler, 1991). The overall indication appears to be that in some cases the results are reliable and in some not. This paper deals with a topic that, we believe, belongs to the former category: not one single factor – among those that have been singled out in the literature as likely to induce significantly different answers between real and hypothetical environments – is present.

Participants were students, all attending the same class. They were divided into three groups (G1, G2 and G3), each one including 32 subjects.

G1 received the following questionnaire.

You are: female, male. You: study full time; study and work part-time; study and work full time; study and take care of your family.

You are: younger than 30, 30 years old or more.

Imagine that you are offered a job with the following features:

- 1. You are asked to fill out bureaucratic forms on your home computer screen (it's a repetitious and non-creative job that requires constant attentiveness)*
- 2. It's the computer that determines the work timing: one hour per form, the pace is normal, neither too slow nor too heavy. The forms filled out wrongly will not be paid.*
- 3. Each form is paid 20 euro including taxes.*
- 4. There is a 25% fixed tax on your total income: that is to say that each form is paid 15 euro after taxes.*
- 5. You are asked how many forms you are willing to fill out before you begin the job, from 0 (i.e. you reject the proposal) to 1.600 (i.e. you are willing to work full time). The whole work you will have done must be delivered in 12 months independently of how much work you have chosen to do. Once you have made your choice you may no longer change your mind, neither filling out more forms (once you fill out the number of forms you declared at the beginning you will be disconnected from the site, if you fill up less forms you will receive only 10% of what would correspond to the number of forms you actually did fill out).*

Choose: 0; from 1 to 10; from 11 to 30; from 31 to 60; from 61 to 100; from 101 to 150; from 151 to 200; from 201 to 250; from 251 to 300; from 301 to 350; from 351 to 400; from 401 to 450; from 451 to 500; from 501 to 600; from 601 to 700; from 701 to 800; from 801 to 900; from 901 to 1000; from 1001 to 1100; from 1101 to 1200; from 1201 to 1300; from 1301 to 1400; from 1401 to 1500; from 1501 to 1600

Now imagine that the offer described above never existed.

Instead, imagine that you were offered a job identical to the one described above, except for point 4, that reads:

4. There is a 40% fixed tax on your total income: that is to say that each form is paid 12 euro after taxes.

You are now asked how many forms you want to fill out, under the same conditions described at point 5.

Choose: 0; from 1 to 10; from 11 to 30; from 31 to 60; from 61 to 100; from 101 to 150; from 151 to 200; from 201 to 250; from 251 to 300; from 301 to 350; from 351 to 400; from 401 to 450; from 451 to 500; from 501 to 600; from 601 to 700; from 701 to 800; from 801 to 900; from 901 to 1000; from 1001 to 1100; from 1101 to 1200; from 1201 to 1300; from 1301 to 1400; from 1401 to 1500; from 1501 to 1600.

The central value of the selected answer was considered when elaborating the responses.

To half of the G1 members, the same questions were put the other way round (first 40%, then 25%). There was no significant difference in the answers supplied by these two sub-groups.

G2 received only the first half of the questionnaire described above, i.e. the hypothesis with the 25% tax rate. G3 received the second half, i.e. the hypothesis with the 40% tax rate.

3. Results

Table 1. Average labour supply for different treatments and different tax rates

	Tax rate 25%	Tax rate 40%	Level of significancy
Full sample	735	568	**
Sample with alternative	774	517	**
Sample without alternative	696	618	°
Working students (all)	466	293	°
Non-working students (all)	896	756	°
Working-students with alternative	486	265	°
Non-working students with alternative	971	689	*
Working students without alternative	422	320	°
Non-working students without alternative	829	822	°

** significant at 5% level, * significant at 10% level, ° non significant at the usual levels

The methodology applied here is based on comparing couples of sub-sample means and test whether they are statistically significant. In particular Hotelling's tests are adopted and usual significance levels are considered (i.e. 1, 5 and 10 percent). The two tables presented in this paper refer to the average labor supply for each group (G1 on one side and G2 and G3 on the other). Note that, although the gender and the age composition of each sub-sample varies slightly, this variation is sufficiently small not to induce any significant difference in the answers.

Table 1 shows the average amount of labor supplied by subjects, conditional to different tax rates. Our results indicate that when subjects compare different tax rates (such as in G1), they change significantly their labor supply, and in a larger extent than the difference between the two after taxes incomes per output unit. Actually, the average labor supply is 774 if the tax rate is 25% and 517 if the tax rate is 40%, and the ratio between the two is 1.5, whereas the ratio between the two after taxes income per output unit is 1.25.

This implies an elasticity of the labor supply to after taxes income much higher than 1, and close to 1 (0.9375) to the tax rate. This means that taxes in the G1 condition have a very strong effect on labor supply.

On the other hand, differences are under the borderline of statistical significance if we compare the average amount of labor supplied by subjects in G2 and in G3 (696 with the 25% tax rate vs. 618 with the 40% one, which implies a 1.126 ratio), i.e. subjects supply more or less the same quantity of labor when facing one single tax rate, independently of its level.

Table 2. Labour supply conditioned to the job status

	Working students	Non-working students	Level of significancy
Tax rate 25%			
Full sample	466	896	***
With alternative	486	971	**
Without alternative	442	829	**
Tax rate 40%			
Full sample	293	756	***
With alternative	265	689	***
Without alternative	321	822	***

*** significant at 1% level ** significant at 5% level

Table 2 analyzes our results under another point of view. Although only students compose the sample, some of them have some kind of job. Here we test whether the labor supply of working and non-working students differs in presence of different tax rates or not. The figures shown in the table indicate that working students always supply less labor than non-working students, under the same conditions. This may be due to the fact that money has a lower marginal utility for working students than for non-working students, as they already have some income, whereas the others have not. In this case the difference is persistent both comparing the two responses in G1 and comparing G2 with G3. But there is an interesting additional result. As table 2 shows, under a 25% tax rate non-working students' labor supply is 1.9 times the working students' labor supply. When the tax rate is 40% the distance between the two groups increases to 2.6 times. It is also worthy to notice that in G2 and G3, the difference between the two groups of students is always smaller than when they face both the tax rates (as in G1). This means that the elasticity of the labor supply is not equal for both working and non-working students.

If we deepen our analysis, we see other important differences between the answers supplied by non-working students and working students.

a) As for the non-working students, there is no difference at all as for the hours supplied in G2 and in G3, whereas the difference, as long as we single out the working students' labor supply, is relevant (with a 1.377 ratio), although slightly below the borderline of statistical significance (see table 1).

b) Working students supply more labor under the 25% condition rather than under the 40% condition, when they face both tax rates (1.834 ratio). The same do non-working students, but less markedly (1.41 ratio).

c) The working students that face only the 25% condition, i.e. in G2 (differently from non-working students) supply more labor than those who face only the 40% condition, i.e. in G3. But it must be remarked that the ratio (1.377) is significantly lower than the one that occurs in G1 (1.5).

d) When facing only one tax rate, the ratio between the amounts of labor supplied by non-working students and by working students (1.875) under the 25% is much smaller than the corresponding ratio (2.56) under the 40% condition.

4. Comments

The difference between G1 on one hand and G2 and G3 on the other, is mostly due to the fact that the G1 structure *suggests* the participants that they should give different answers, negatively related to the tax rate. Subjects clearly show to be “tax averse”: 1.25 is the ratio between the two after taxes incomes per output unit, 1.6 is the ratio between the two tax rates, and 1.5 is the ratio between the two labor supplies in G1: Therefore it looks as if the ratio between tax rates has a greater explanatory role than the ratio between after taxes incomes, showing a rather clear aversion for taxes. In spite of this, when subjects face only one tax rate – as noted above – no significant difference appears in their labor supply.

This indicates that subjects tend to substitute leisure and work only when they can observe and appreciate a difference in the relative prices: otherwise the supply is almost neutral to the tax rate. This is a very interesting result, as it suggests that the labor supply of the new entrants in the job market is not affected by the current tax rate, while this would influence – in the case of a change – the decisions of those who already work.

The difference between non-working students and working students is probably due to the fact that the latter compare the tax rates suggested in the questionnaire with the tax rate they pay on their own wage in real life. The average tax rate that burdens wages is much closer to the lower one (25%) and therefore they do not seem to be enthused about the 40% tax rate.

The main result of this research is that the tax rate on income, if given once for all, does not influence (or, at least, not significantly) the labor supply, when not biased either by the structure of the questionnaire or by the reference to factors existing outside the ones suggested and described in the questionnaire itself. A similar result was found, although in different conditions, in an experiment ran in the lab (see Ortona et al., 2008).

5. Conclusions

Which of the two environments presented in this paper reflects reality more accurately? The one represented by G1 or the one represented by G2 and G3?

In real life taxpayers cannot choose between different tax rates (except, in some cases, for marginal rates that imply marginal differences in net income). Americans face lower tax rates, Italians (and most of Europeans) higher ones: there is no choice. Relying to the results of this inquiry it seems that the reason why Americans work more hours than Italians (and more than most of Europeans) has not much to do with their lower tax rates, contrary to Prescott's (2004) opinion, but rather with different values and institutions: in terms of values, Americans would appear to give more importance to income whereas Italians (and Europeans) give more importance to having more time to spend their (relatively lower) income; in terms of institutions, the American labor market is more flexible and in particular has more flexible time tables than the European.

Summing up, we suggest that, in researches on how workers react to different tax rates, one should use the methodology here adopted in G2 and G3, and not the one adopted in G1.

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