Introducing the Effective Marginal Tax Rate in Introductory Macroeconomics

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Abstract:

Introductory macroeconomics textbooks rarely cover the topic of marginal tax rates in sufficient depth to make it meaningful to students. We offer a simple method of introducing the concept of effective marginal tax rate that is interactive and will engage students to analyze the importance of including state income tax and FICA taxes. Our exercise will help students to observe the behavior of the effective marginal tax rate as income level increases. We also introduce an international component to the topic by comparing effective marginal tax rates across a group of socially diverse countries.

Article:

Introduction

How much time is devoted in a typical introductory macroeconomics course to the issue of taxation beyond the implementation of expansionary or contractionary fiscal policy through changes in government spending and taxation? Some courses, due to the proclivity of the instructor and textbook, may look at the burden of taxes and the supply-side implications of high marginal tax rates on investment and labor market activities. Other macroeconomics instructors may discuss taxation by defining marginal and average tax rates and their relationship to regressive, proportional and progressive taxes. It is our observation that many students do not understand the difference between marginal tax rates and average tax rates so the burden of taxation and supply-side analysis may be lost on them. According to a recent survey most Americans know very little about the tax code.[2] Our paper addresses this issue by encouraging the teaching of marginal tax rate in the principles of macroeconomic class.

The purpose of this paper is to propose a teaching methodology that includes FICA and the state income tax when computing marginal tax so that effective marginal taxes are revealed. Our method is simple yet meaningful and easy to use in the introductory macroeconomics class. Our analysis will also help students understand the behavior of effective marginal tax rates for different income brackets. We also include an international component to the topic by comparing tax rates across countries. We believe such a comparison will help students understand the link between a country's tax structure and its social structure.

Table 1
Filing Status and Income Tax Rates 2006

Tax rate	Married filing jointly or Qualified Widow(er)	Single	Head of household	Married filing separately
10%	$0 – 15,100	$0 – 7,550	$0 - $10,750	$0 – 7,550
15%	$15,101- 61,300	$7,551- 30,650	$10,751- 41,050	$7,551- 30,650
25%	$61,301- 123,700	$30,651- 74,200	$41,051- 106,000	$30,651- 61,850
28%	$123,701- 188,450	$74,201- 154,800	$106,001 171,650	$61,851- 94,225
33%	$188,451- 336,550	$154,801- 336,550	$171,651- 336,550	$94,226- 168,275
35%	Over $336,550	Over $336,550	Over $336,550	Over $168,275

Source: IRS Revenue Procedure 2005-70 (http://www.irs.gov/pub/irs-drop/rp-05-70.pdf)

Defining the Concept

It is useful to begin the discussion of marginal tax rates by handing out the most recent tax schedule as the one shown below as Table 1. With increased use of software such as TurboTax®, many students may be unaware of the federal marginal tax rate (column 1) on their adjusted gross income. We will assume that we are dealing with a single worker who has no deductions so adjusted gross income is equal to labor income.

The analysis of federal marginal tax rates on labor income is incomplete if FICA taxes and state income tax rates are not included in the calculation of the marginal tax rate. Most textbooks have limited data driven analysis of actual marginal tax rates faced by workers and seldom even mention that FICA taxes and state taxes should be included in an analysis of marginal tax rates.[3] It is important as well as interesting to include this discussion in the macroeconomics class as it not only gives a realistic explanation of marginal tax rates but it also highlights the inconsistent behavior of marginal tax rates as income increases.

The marginal tax rate on labor income is actually higher because individuals and households also pay state income taxes in most states and pay 50% of the FICA taxes that are matched by employer.[4] We define the Effective Marginal Tax Rate (EFMT) on labor income as the marginal tax rate on labor income after taking into consideration federal marginal income tax rates, FICA (social security taxes and Medicare taxes) and a representative state income tax rate.[5]

EFMT is thus defined as follows:

$$\text{EFMT} = (\text{Marginal income tax rate} + \text{FICA} + \text{state income tax rate})/(1 + \text{FICA})$$

To calculate EFMT, we use the marginal income tax rate given in Table 1. We use FICA of 15.30% for labor income up to $94,200 and 2.90% for income above $94,200 for 2006 tax year.[6] State income tax rate is assumed to be 7%.[7]

Thus EFMT for an individual who is in the income bracket, $74,201 - $94,200 is

$$\text{EFMT} = (25\% + 7.65\% + 7.65\% + 7\%) / (1.0765) = 46.6\%$$

Adjusting for Employer's Contribution

All the tax rates used in the calculation of EFMT are on the labor income received by an individual. Since the employer will reduce a worker's income by the amount of the employer contribution of FICA, the effective marginal tax rate has to be adjusted to reflect the true tax rate on the worker's income. Since social security taxes are completely phased out at $94,200, the discount factor is 1.0765 for incomes up to $94,200 and 1.0145 for incomes above $94,200.

Table 2
Calculation of Effective Marginal Rate of Tax
Using 2006 Tax Rates for Individuals

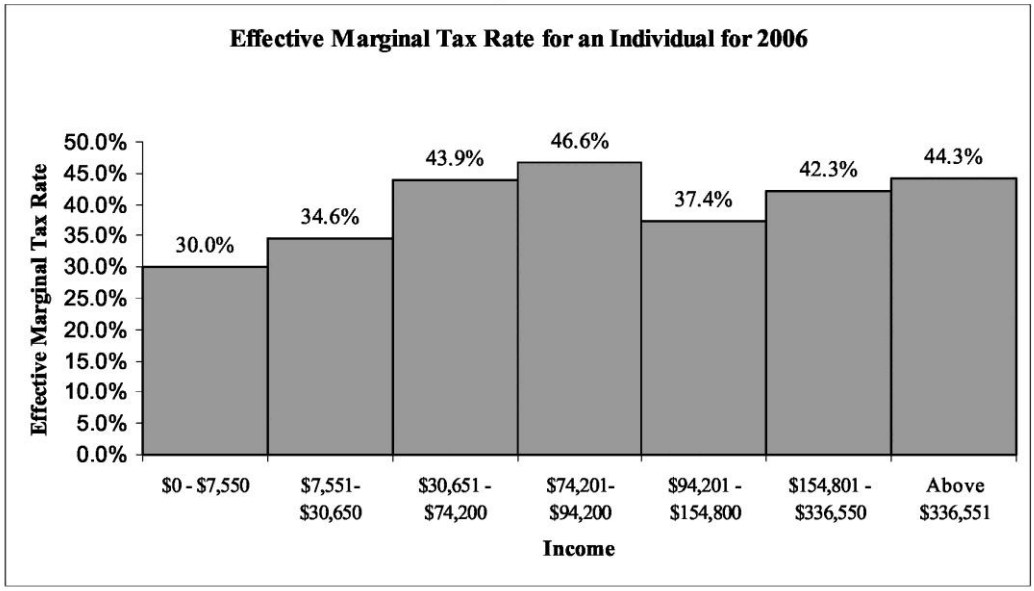
Income	(a) Federal tax Rate	(b) FICA + Medicare	(c) FICA + Medicare	(d) State tax rate	Total (a+b+c+d)	Effective Marginal tax rate*
$0 - $7550	10%	7.65%	7.65%	7%	32%	30.0%
$7,551-$30,650	15%	7.65%	7.65%	7%	37%	34.6%
$30,651 - $74,200	25%	7.65%	7.65%	7%	47%	43.9%
$74,201-$94,200	25%	7.65%	7.65%	7%	47%	46.6%
$94,201 - $154,800	28%	1.45%	1.45%	7%	38%	37.4%
$154,801 - $336,550	33%	1.45%	1.45%	7%	43%	42.3%
Above $336,551	35%	1.45%	1.45%	7%	45%	44.3%

Notes: Effective marginal tax rate for incomes up to $94,200 = Total /(1+0.0765) and for incomes above $94,200 = Total /(1+0.0145). In our calculation of EFMT, we have not included Earned Income Tax Credit. This will affect the EFMT for individuals whose income is in the $0 - $7,550 range.

Results

To involve students in the calculation of effective marginal tax rate, we can include the exercise in Table 2 in the classroom. The bar graph of the effective marginal tax rates can also be included as part of the exercise. Creating Table 2 will make an interesting exercise as students will find the disturbing observation in the calculation of Effective Marginal Tax Rate that the peak rate is felt by the middle to upper middle classes because the EFMT spikes to 44% at an income above $30,651 and stays in a narrow band of 44% to 47% to $94,200. The EFMT then drops to 37% when social security taxes are completely phased out for incomes above $94,200 (see Figure 1).[8]

Figure 1



[8] According to Table 1 in Piketty and Saez (2007) the average family pre-tax income in the 40th to 60th percentile in the U.S. was $29,870 in 2004. By 2006 it is safe to assume that roughly 50% of the family tax units enjoyed incomes above $30,651 where marginal tax rates spike upwards. Income is defined as "all sources of market income reported on income tax returns" (p.5).

The lowest marginal tax rates above an income level of $30,651 are enjoyed by those individuals earning between $94,201 and $154,800 assuming that the alternative minimum tax does not apply. Individuals and family tax units who earn above $94,200 a year are clearly in the upper class since the average earned total income in the 90th to 95th percentile is $117,709 in 2004. Such individuals and families also enjoy the deductibility of interest expense on their mortgages and home equity loans, are more likely to enjoy the favorable treatment of lower marginal tax rates on capital gains and dividends and may enjoy a disproportionate amount of the benefits from non-taxable employer-provided health care.

The U.S. federal income tax system is clearly progressive according to Pikett and Saez (see Table 2, p. 13) because average tax rates "remain substantially below the top marginal tax rate of 35 percent even at the very top." The total Federal tax system may be effectively progressive but it disguises an EFMT that is often higher than 40% for income levels above $30,651.

International Comparisons

It will be useful to do some international comparisons of tax rates to understand the differences in tax rates across countries. A good handout for this can be Table 3 which provides marginal tax rates for a sample of five OECD countries.[9] The effective marginal tax rate or total tax wedge is shown for four groups, individuals earning 67% of average wage (AW), 100% of AW, 133% of AW and 167% of AW.

Students can use this table to analyze and discuss questions such as the following:

- How does the total tax wedge change as income increases in each of these countries?
- How does the total tax wedge affect labor market incentives in each country?
- Why do you think Sweden's total tax wedge is at such a level?

Table 3
Effective and Marginal Tax Rates for Selected OECD Countries

Country		% AW			
		67%	100%	133%	167%
Germany					
AW=41074	Central government	30.5%	37.0%	43.4%	44.3%
	Sub-central	0.0%	0.0%	0.0%	0.0%
	Combined	30.5%	37.0%	43.4%	44.3%
	Employee SSC	20.8%	20.8%	13.0%	0.0%
	′All-in′	51.3%	57.8%	56.4%	44.3%
	Employer SSC	20.8%	20.8%	13.0%	0.0%
	Total tax wedge	59.7%	65.1%	61.4%	44.3%
Japan					
AW=4953747	Central government	4.7%	5.5%	12.5%	13.6%
	Sub-central	2.5%	5.8%	6.6%	8.5%
	Combined	7.1%	11.2%	19.1%	22.1%
	Employee SSC	11.8%	11.8%	11.8%	4.9%
	′All-in′	19.0%	23.1%	31.0%	27.0%
	Employer SSC	12.8%	12.8%	12.8%	5.8%
	Total tax wedge	28.2%	31.8%	38.8%	31.0%
Sweden					
AW=309854	Central government	-6.1%	-6.1%	20.0%	25.0%
	Sub-central	34.5%	31.3%	31.6%	31.6%
	Combined	28.4%	25.2%	51.6%	56.6%
	Employee SSC	7.0%	7.0%	0.0%	0.0%
	′All-in′	35.4%	32.2%	51.6%	56.6%
	Employer SSC	32.5%	32.5%	32.5%	32.5%
	Total tax wedge	51.2%	48.8%	63.5%	67.2%
United Kingdom					
AW=28571	Central government	22.0%	22.0%	40.0%	40.0%
	Sub-central	0.0%	0.0%	0.0%	0.0%
	Combined	22.0%	22.0%	40.0%	40.0%
	Employee SSC	11.0%	11.0%	1.0%	1.0%
	′All-in′	33.0%	33.0%	41.0%	41.0%
	Employer SSC	12.8%	12.8%	12.8%	12.8%
	Total tax wedge	40.6%	40.6%	47.7%	47.7%
United States					
AW=31666	Central government	15.0%	15.0%	25.0%	25.0%
	Sub-central	6.3%	6.3%	6.3%	6.3%
	Combined	21.3%	21.3%	31.3%	31.3%
	Employee SSC	7.6%	7.7%	7.7%	7.6%
	′All-in′	28.9%	28.9%	38.9%	38.9%
	Employer SSC	7.6%	7.7%	7.7%	7.6%
	Total tax wedge	34.0%	34.0%	43.3%	43.3%

Source: www.oecd.org

Notes: AW=Average Wage in Currency Units; SSC=Social Security Contribution

[9] www.oecd.org provides data on tax wedge for all OECD countries.

Discussion of questions such as the above will broaden students' understanding and knowledge about effective marginal tax rates and set the foundation for a deeper discussion about the relationship between tax rates and social structure.

Conclusion

Discussion of the marginal tax rate in macroeconomics courses and textbooks is so limited that students find the topic boring and not very relevant to real life application. It is important to educate students to understand marginal tax rates as this will give them a good foundation to analyze fiscal policy issues. We have put forth a simple and meaningful exercise to explain marginal tax rates to students in an introductory macroeconomics course by including FICA and state tax so that effective marginal tax rates are revealed. We have also included an international component to the topic by comparing effective tax rates across countries. We suggest that standard introductory macroeconomics textbooks include this analysis. While the discussion of this topic will not take too much class time or textbook pages, it is an engaging as well as a useful exercise which will greatly benefit students in a macroeconomics class.

Notes:

2 H&R Block Consumer Behavior Survey (2007) polled over 1,000 taxpayers age 22-64. The results showed a surprising lack of education about basic tax information.

3 Hubbard and O'Brien (2006) use the Social Security tax as an example of the tax wedge in the labor market. Frank and
Bernanke (2007) discuss the fact that the effective marginal tax rate depends on "federal income taxes, state income taxes, and Social Security Disability and Medicare taxes" and provide a table for the self-employed single person in the United States in Table 28.3 (p. 822). Mankiw (2007) notes that income, Social Security and Medicare taxes result in a marginal tax rate on labor that is almost 50%.

4 We will assume that the tax burden of FICA is 100% borne by the individual worker.

5 Our definition of EFMT is the OECD's definition of "tax wedge".

6 The 15.30% includes employees FICA contribution of 7.65% and employer contribution of 7.65%. Social security taxes are phased out completely for income above $94,200. Only Medicare taxes are paid if income is above $94,200.

7 North Carolina's peak rate is 8% and half of the states had a top marginal tax rate of 6% or higher in 2006.

8 According to Table 1 in Piketty and Saez (2007) the average family pre-tax income in the 40^{th} and 60^{th} percentile in the U.S. was $29,870 in 2004. By 2006 it is safe to assume that roughly 50% of the family tax units enjoyed incomes above $30,651 where marginal tax rates spike upwards. Income is defined as "all sources of market income reported on income tax returns" (p.5).

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