

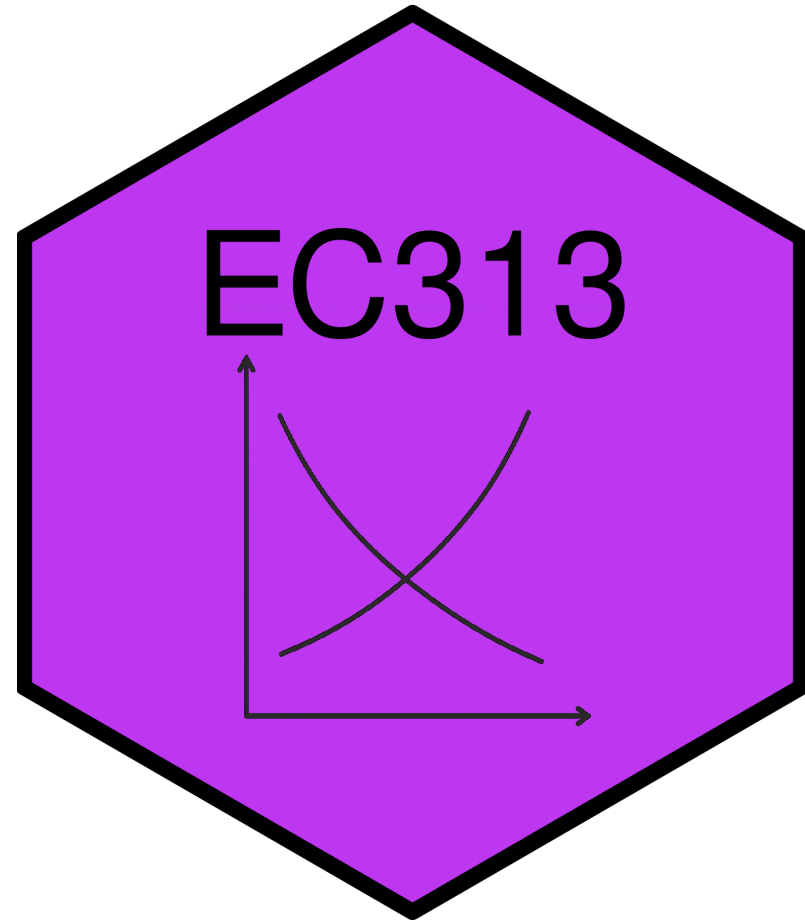
Personal Taxation and Behaviour

EC313 - Public Economics: Taxation

Justin Smith

Wilfrid Laurier University

Fall 2025



Goals of This Section

Goals of This Section

- Examine the effect of income taxation on labour supply
- Analyze how labour supply is related to tax revenues with the Laffer Curve
- Look at how taxation affects saving behaviour
- Discuss the preferential tax treatment of primary residences in Canada
- Examine taxation and portfolio allocation

Taxation and Labour Supply

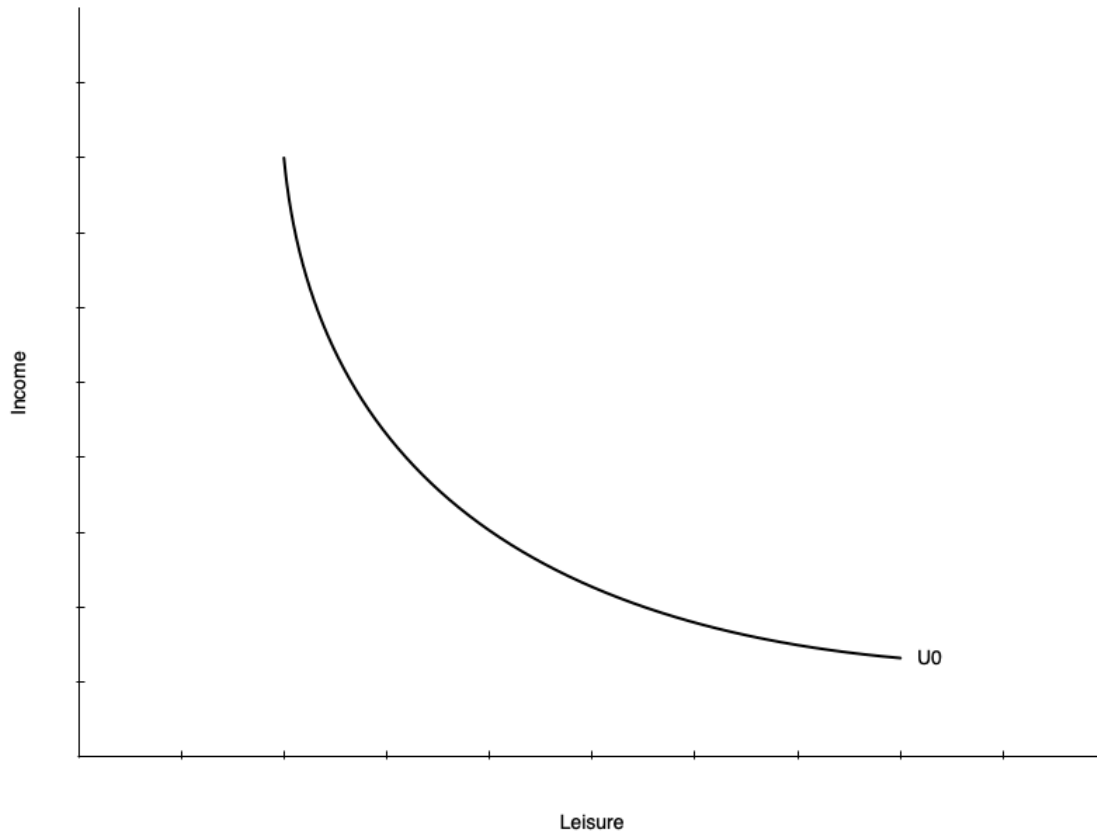
Introduction

- In this section we introduce a model we use throughout the course
- The model helps us understand how individuals make decisions about work
- Individual choose between two goods
 - Income
 - Leisure
- Choices are constrained by time and wage rate
- There are a few wrinkles that make this market unique

Preferences

- Individuals have preferences over Income (I) and leisure (L)
 - People like having income to consume goods/services
 - Also like having non-work time
 - Includes fun activities but also non-work tasks like chores, education, etc.
- The tradeoffs people are willing to make between I and L are represented by indifference curves
 - At every point along the curve the individual is equally happy
 - Curves further from the origin represent higher levels of utility

Preferences

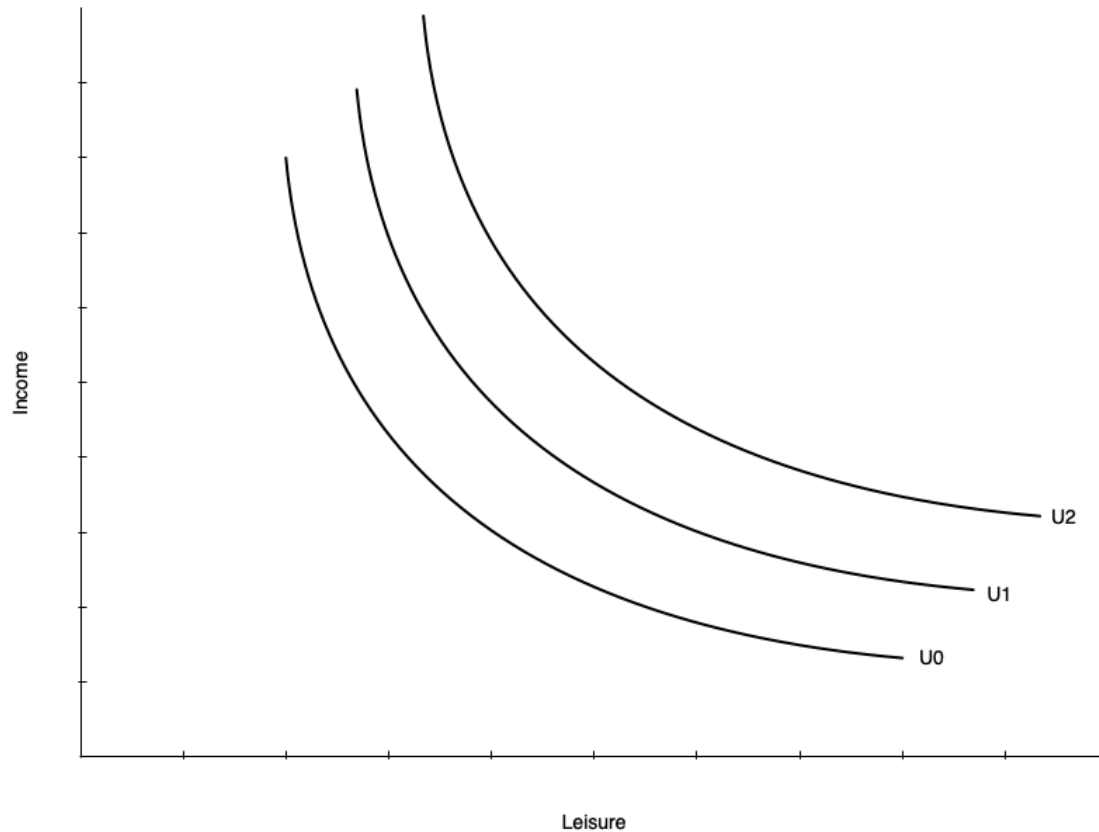


- On the left is a single indifference curve
- Any point represents equal utility (U_0)
- **Marginal Rate of Substitution (MRS):** the rate at which a person is willing to trade income for leisure while remaining equally happy
- The MRS is the slope of the indifference curve at a point
- Individuals have diminishing MRS
 - Willing to give up less income for additional leisure the more leisure they already have
 - Slope gets shallower with more leisure

Preferences

- Indifference curves do not have to be smooth curves like the one shown
- Could be straight lines
 - Means the tradeoff between income and leisure is constant
 - Willingness to trade away leisure for income does not depend on leisure
- Could be “L” shaped
 - Income and leisure must be consumed in fixed proportions
- Mostly we will deal with smooth preferences

Preferences

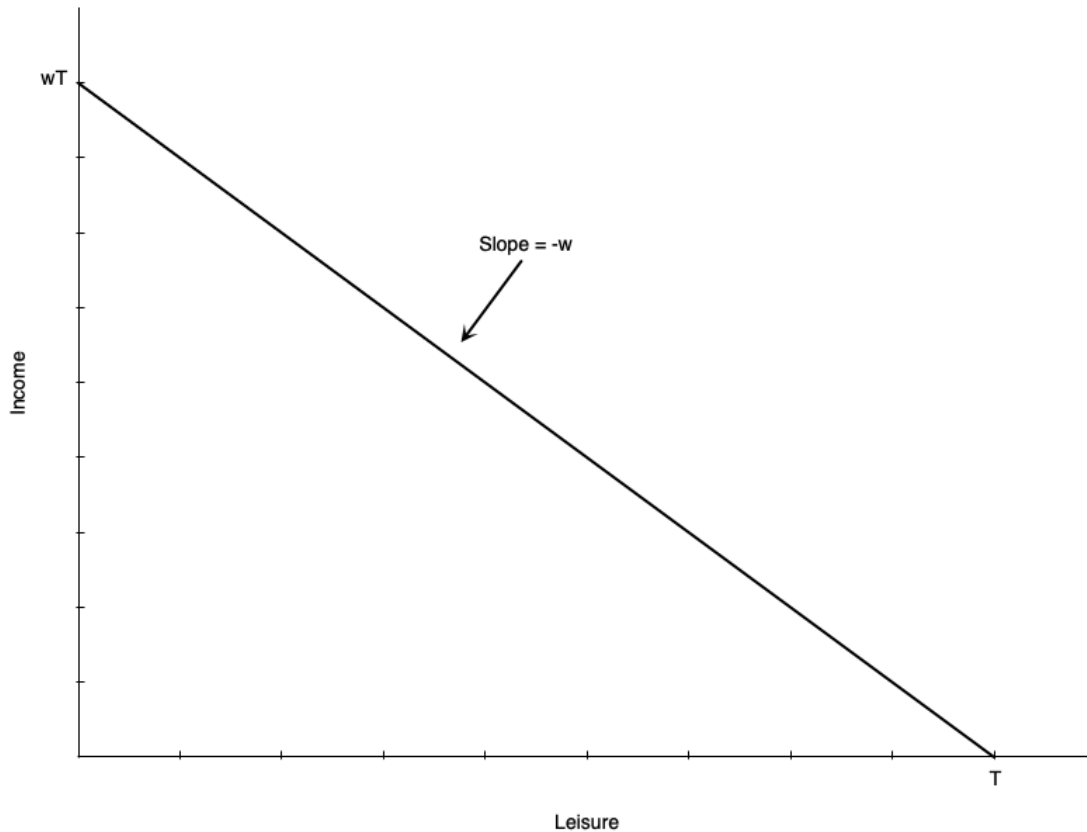


- Utility increases with curves further from the origin
 - $U_2 > U_1 > U_0$

Constraints

- Individuals do not choose income and leisure bundles on preference alone
- They are constrained by
 - The wage rate
 - Total number of hours available
- Budget constraint is also called
 - Potential income constraint
 - Full income constraint

Constraints



- Graph shows a linear budget constraint
- There are T total hours to allocate to work or leisure
- Each hour worked gets wage of w
- Person working T hours (no leisure) earns wT income
 - Called “full income”

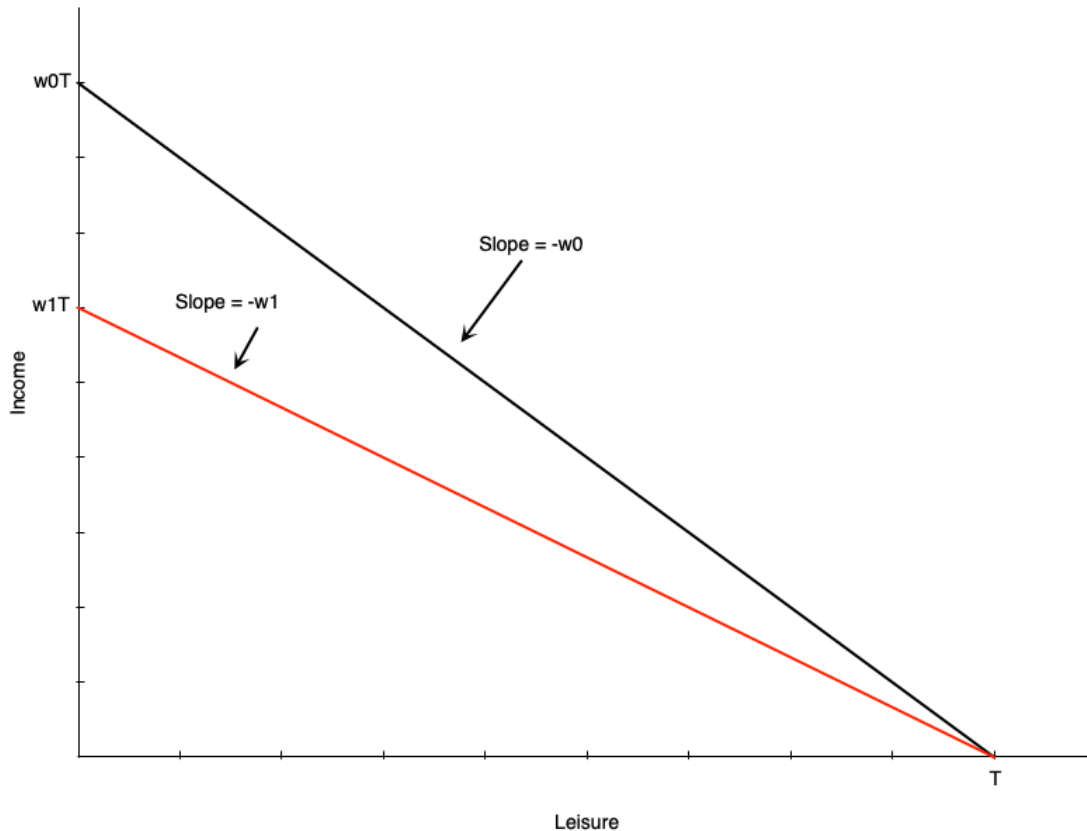
Constraints

- Mathematically, the budget constraint is

$$I = w(T - L)$$

- Income is equal to income from working ($w(T - L)$)
- The slope of the budget constraint is $-w$
 - The opportunity cost of leisure is the wage rate
 - Each hour of leisure means one less hour worked, which means w less income
- Someone who works zero hours has T leisure hours and no income
- Someone who works T hours has zero leisure hours and wT income

Constraints

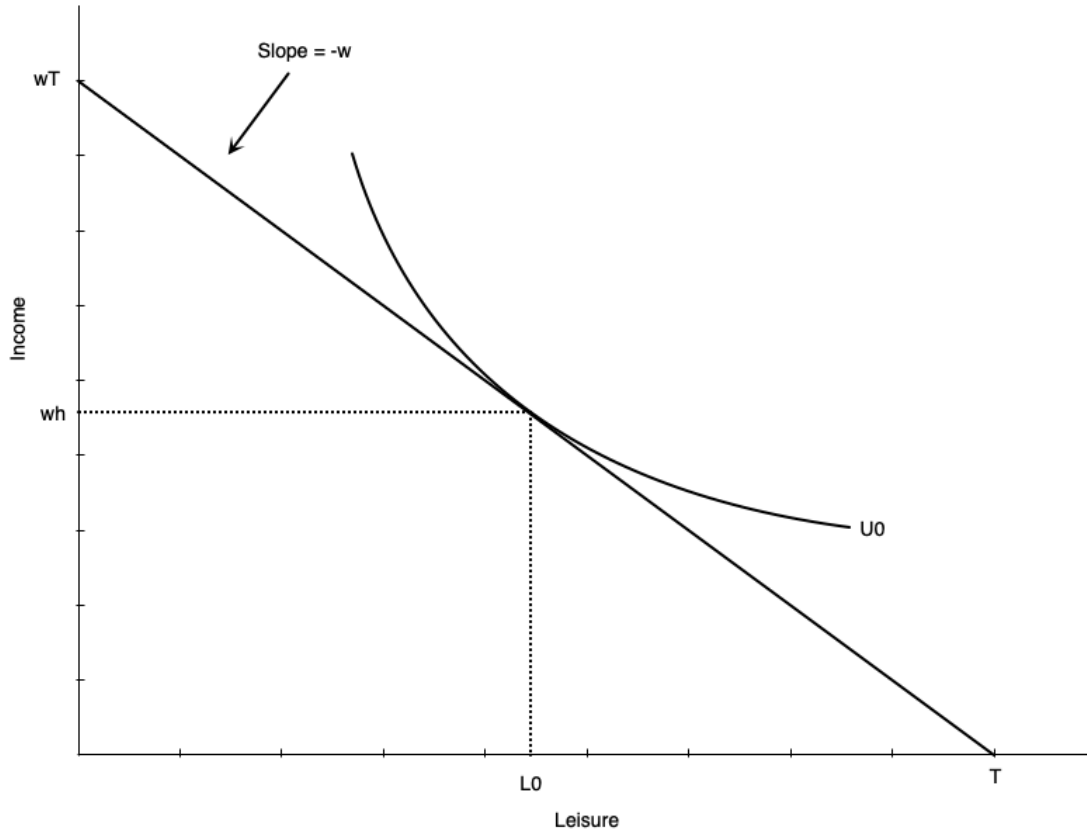


- Slope is the negative of the wage rate w
- A lower wage means shallower slope
 - If $w_1 < w_0$, the budget line swivels down
 - They intersect at leisure = T because there are no work hours
- Lower wage also means full income is lower
 - Working all hours leads to less total labour earnings

Consumer Optimum

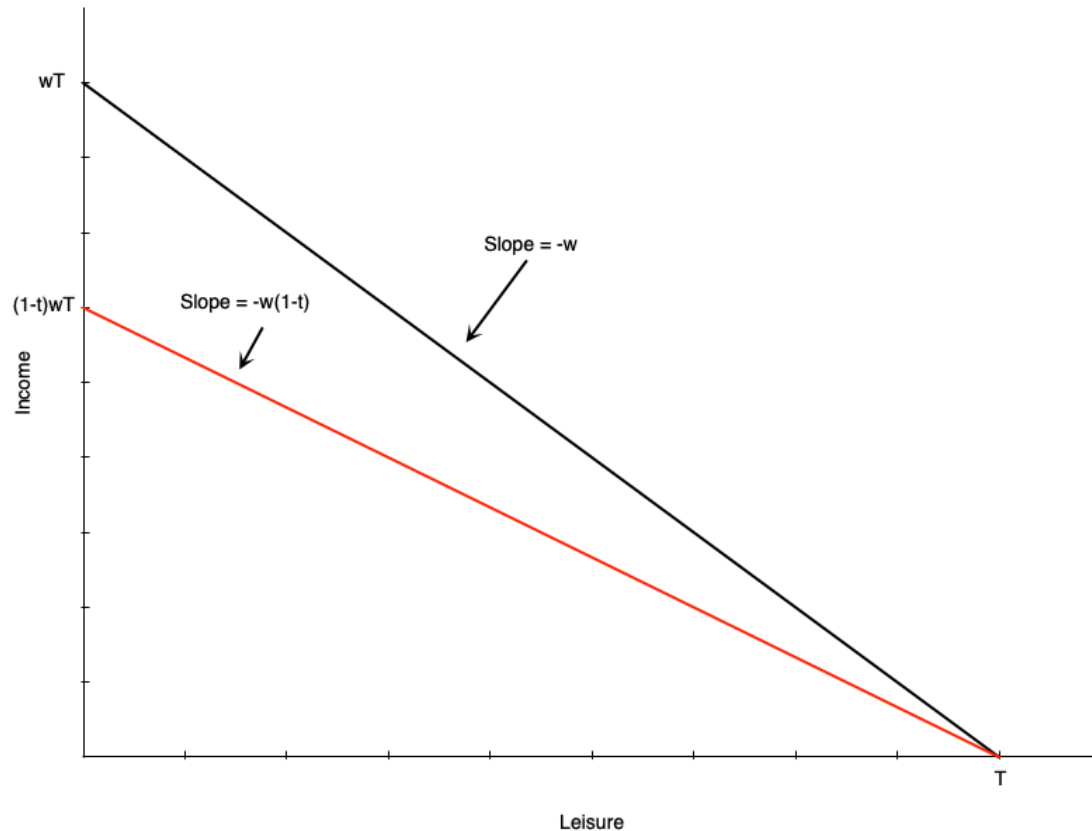
- Work hours are chosen using the combination of preferences and constraints
- The consumer optimum is the point that maximizes utility subject to the budget constraint
- The optimum occurs where the budget constraint is tangent to an indifference curve
- There are two possibilities for the optimum
 - Non-participation: optimum occurs at the end of the budget constraint (full leisure)
 - Participation: optimum occurs at an interior point (some leisure, some work)

Consumer Optimum



- Graph shows an optimum with participation
- Optimum is where indifference curve is tangent to budget constraint
- At the optimum, $MRS = \text{wage rate}$
 - Willingness to trade leisure for income (MRS) equals ability to trade them (wage)
- Optimal work hours are $h_0 = T - L_0$
- Optimal consumption is $I_0 = W_0 h_0$

Personal Income Tax

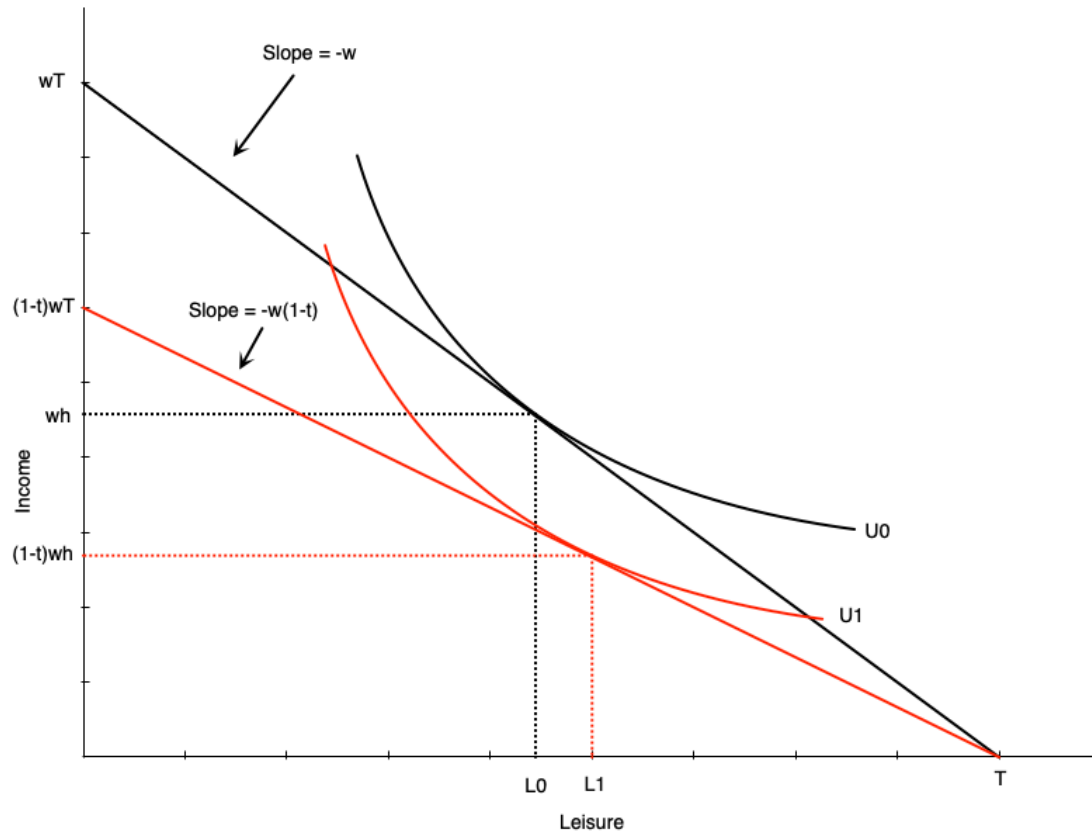


- The personal income tax affects the budget constraint
- Suppose a proportional income tax at rate t is introduced
- The after-tax wage is now $w(1 - t)$
- Tax causes the budget constraint to pivot inward
 - Slope is now $-w(1 - t)$
 - Full income is now $w(1 - t)T$

Personal Income Tax

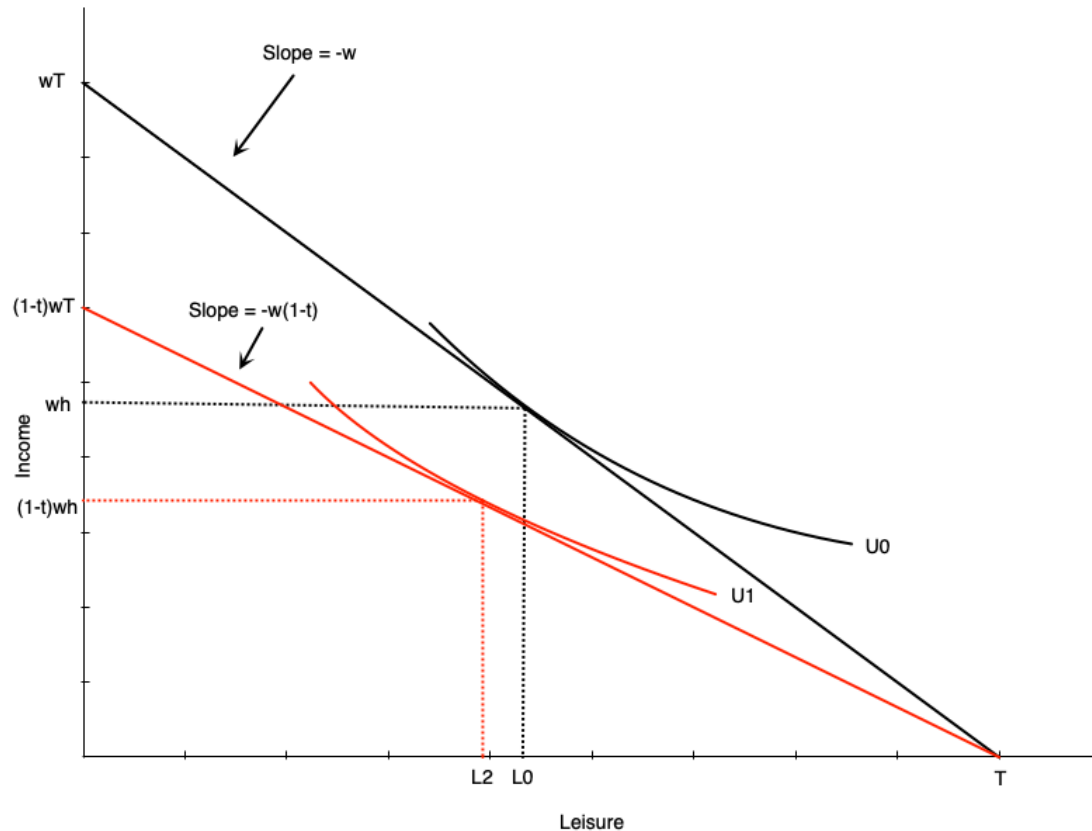
- When the budget constraint changes, so does the optimum
- Suppose there is a proportional income tax at rate t
- There are two effects of the tax on labour supply
 - **Substitution effect:** leisure is relatively cheaper, so people want more leisure (work less)
 - **Income effect:** people are poorer, so they want less leisure (work more)
- The effect on labour supply is therefore ambiguous
 - If substitution effect > income effect, labour supply decreases
 - If income effect > substitution effect, labour supply increases

Personal Income Tax



- Graph shows when substitution effect > income effect
 - Budget swivels down
 - Person optimizes at lower indifference curve
 - Leisure increases from L_0 to L_1
 - Work hours decrease from h_0 to h_1
- Happens when people are more willing to trade income for leisure

Personal Income Tax

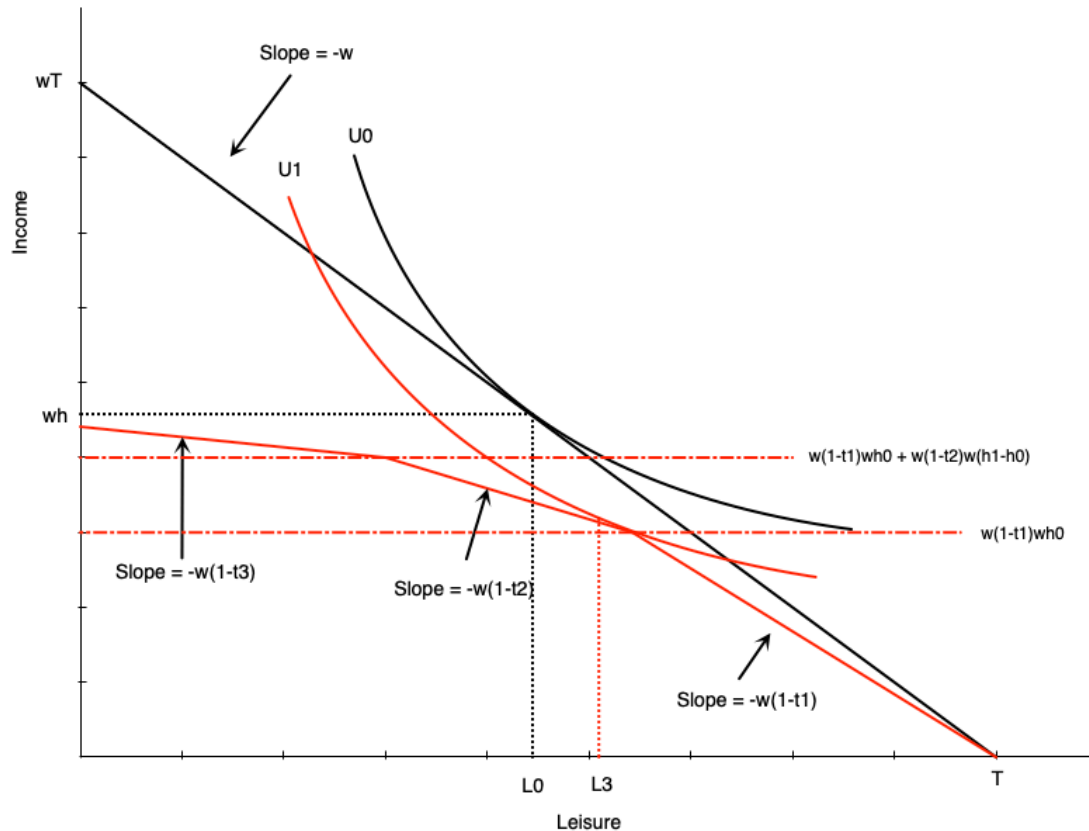


- Graph shows when income effect $>$ substitution effect
 - Budget swivels down
 - Person optimizes at lower indifference curve
 - Leisure decreases from L_0 to L_2
 - Work hours increase from h_0 to h_2
- Happens when people are less willing to trade income for leisure

Personal Income Tax

- In reality taxes are not flat
 - Canada has a progressive income tax system
 - Higher income is taxed at higher rates
- This implies that the budget constraint becomes kinked
 - As income goes up, the tax rate increases
 - When the tax rate changes, the slope changes
- The basic principles are the same
 - Substitution and income effects still apply
 - Labour supply effect is still ambiguous

Personal Income Tax



- Graph shows a proportional income tax with three brackets
- Tax rates are $t_3 > t_2 > t_1$
- Slope changes at each kink
 - First kink happens with work hours h_0
 - Second kink happens with work hours h_1
- Graph shows increased leisure, but effect is ambiguous

Evidence on Labour Supply

- The theory discusses effect of tax *holding all else equal**
- In statistical work, this is not easy to do
 - Many factors affect labour supply
 - Isolating the effect of taxes is difficult
- Studies show that
 - Elasticity of hours worked for working age men is between -0.2 and 0.2
 - For women is between -0.2 and 0.5
- Means that a reduction in wage based on income tax has a small effect on work hours
- Effect on labour force participation is larger

Caveats on Taxation and Labour Supply

Individual vs Group Effects

- We simplified the discussion by analyzing one specific type of person
- But tax changes affect many types of people differently
- A change from a flat to progressive tax might
 - Increase the tax rate for some people
 - Decrease the tax rate for others
- The way they react will be different and for policy analysis we need to consider the group effects

Human Capital

- Taxes can affect decisions about education and training
- We saw that taxes affect an individual's optimal labour supply at each wage
- If a tax increases the optimum hours at each wage, it would increase the desire to get education/training
 - This would make the worker more productive, and increase their wage
 - Could lead to further increases in supply
- The reverse would happen if tax decreases optimum hours at each wage

Total Compensation

- Wages are not the only part of compensation
 - There are non-wage benefits like health insurance, retirement contributions, etc.
- If taxes rise, firms may switch to non-taxed forms of compensation
- The effect of the tax may be muted if firms can do this easily

Expenditures

- Governments use tax revenues to fund public services
- That spending may itself affect labour supply
 - Spending on child care would increase supply
 - If spent on recreational facilities, parks, etc., may decrease supply
- Need to think about this from a general equilibrium lens

Labour Supply and Tax Revenues

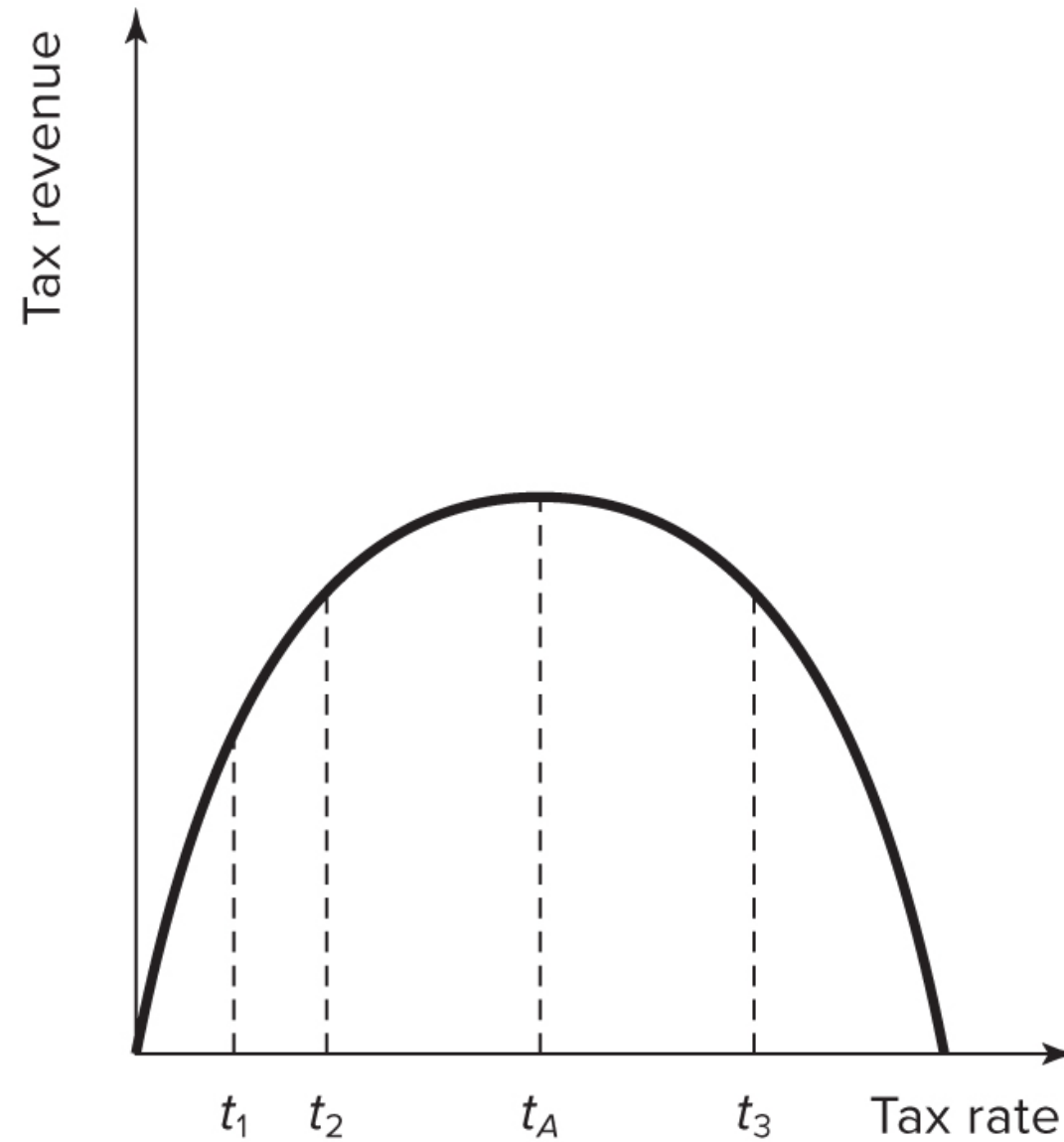
Introduction

- As just noted, governments tax labour income to raise revenue
- The tax revenue collected from this exercise is the tax rate times the tax base
 - Tax base is the amount of income earned
 - Which in our model is $w \times h$
- So the tax revenue is $R = t \times w \times h$
- As we saw, if the substitution effect is larger than the income effect, higher tax rates reduce labour supply
- Means that as t increases, wh decreases

Laffer Curve

- The fact that higher tax rates may reduce labour supply has implications for tax revenue
- The relationship between tax rates and tax revenue is called the **Laffer Curve**
- The Laffer Curve shows that tax revenue is zero at both 0% and 100% tax rates
- Initially as tax rates rise, revenue rises
- But at some point, further increases in tax rates reduce revenue
 - Because the reduction in labour supply is large enough that the tax base shrinks significantly

Laffer Curve



Laffer Curve

- The Laffer Curve suggests there is an optimal tax rate when it comes to revenues
 - At the peak of the curve where additional increases in tax rates do not increase revenue
- Also suggests that when tax rates are too high, reducing them could increase revenue
- However, determining the optimal tax rate is difficult in practice
 - Depends on how responsive labour supply is to tax changes
 - Empirical estimates suggest we are not near the peak of the Laffer Curve for labour income taxes in Canada

Saving

Introduction

- In addition to labour supply, taxes affect saving
- Saving is important because it funds investment
 - Investment leads to capital accumulation
 - Capital accumulation leads to economic growth
- Taxes affect saving through reductions in the return
 - Interest earned through saving counts as income
 - That income is taxable
- In this section we will look at how taxes affect saving behaviour in a life-cycle model

Life-Cycle Model

- The life-cycle model assumes individuals plan their consumption and saving over their lifetime
- To keep things simple, we consider two time periods
 - Present and future
- Individuals have preferences for consumption in both periods
 - Represented by indifference curves
- They also have a budget constraint based on their income in both periods
 - Says that the present value of consumption equals the present value of income

Life-Cycle Model

- Algebraically, the budget constraint is

$$c_0 + \frac{c_1}{1+r} = I_0 + \frac{I_1}{1+r}$$

- Where
 - c_0 = consumption in present period
 - c_1 = consumption in future period
 - I_0 = income in present period
 - I_1 = income in future period
 - r = real interest rate

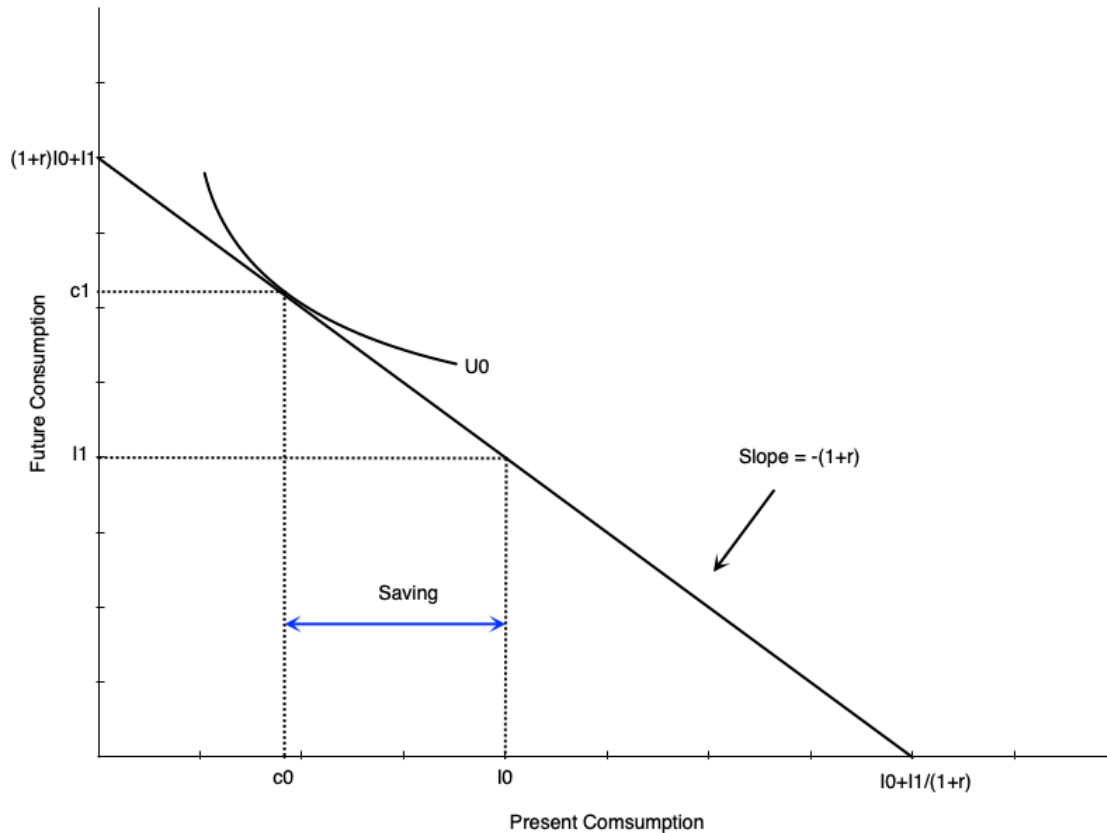
Life-Cycle Model

- You can plot this on a graph with c_0 on the x-axis and c_1 on the y-axis
- Rearrange to get c_1 on left side

$$c_1 = (1 + r)(I_0 - c_0) + I_1$$

- Slope of budget constraint is $-(1 + r)$
 - Consuming a dollar today means giving up $(1 + r)$ dollars tomorrow
- When a person consumes I_0 today, they consume I_1 tomorrow
 - The budget line passes through (I_0, I_1)

Life-Cycle Model



- Graph shows intertemporal budget constraint
- Slope is $-(1 + r)$
- Optimal consumption occurs where budget constraint is tangent to indifference curve
- In this case, the person saves in period 0 to consume more in period 1
 - Saving is the difference between income and consumption in period 0

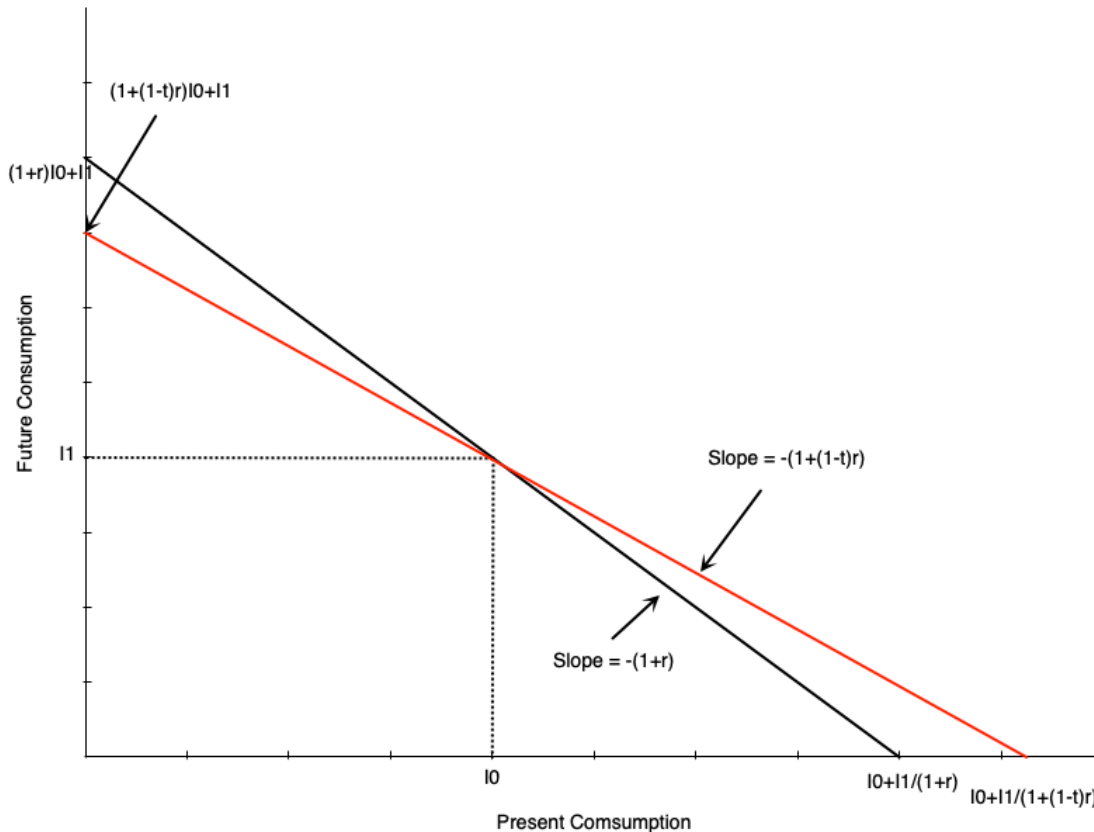
Tax on Interest Income with Deductible Interest

- Now suppose there is a tax on interest income at rate t
- A person who saves \$1 in period 0 receives interest $r - rt$ in period 1
 - Because the interest earned is taxed they must pay rt on the interest
 - This lowers the return
- Means that foregoing \$1 in period 0 leads to consuming $\$1 + r - rt = 1 + (1-t)r$ \$ in period 1
 - The after-tax interest rate is $r(1 - t)$

Tax on Interest Income with Deductible Interest

- A person who borrows \$1 in period 0 will need to pay interest $r - rt$ in period 1
 - They pay interest r
 - But because it is *tax deductible* they save rt on taxes
 - Means that total interest paid is $r - rt$
- Means that borrowing \$1 in period 0 leads to foregoing $\$1 + r - rt = 1 + (1-t)r$ \$ of consumption in period 1
 - The after-tax interest rate is $r(1 - t)$
- So whether saving or borrowing, the after-tax interest rate is the same

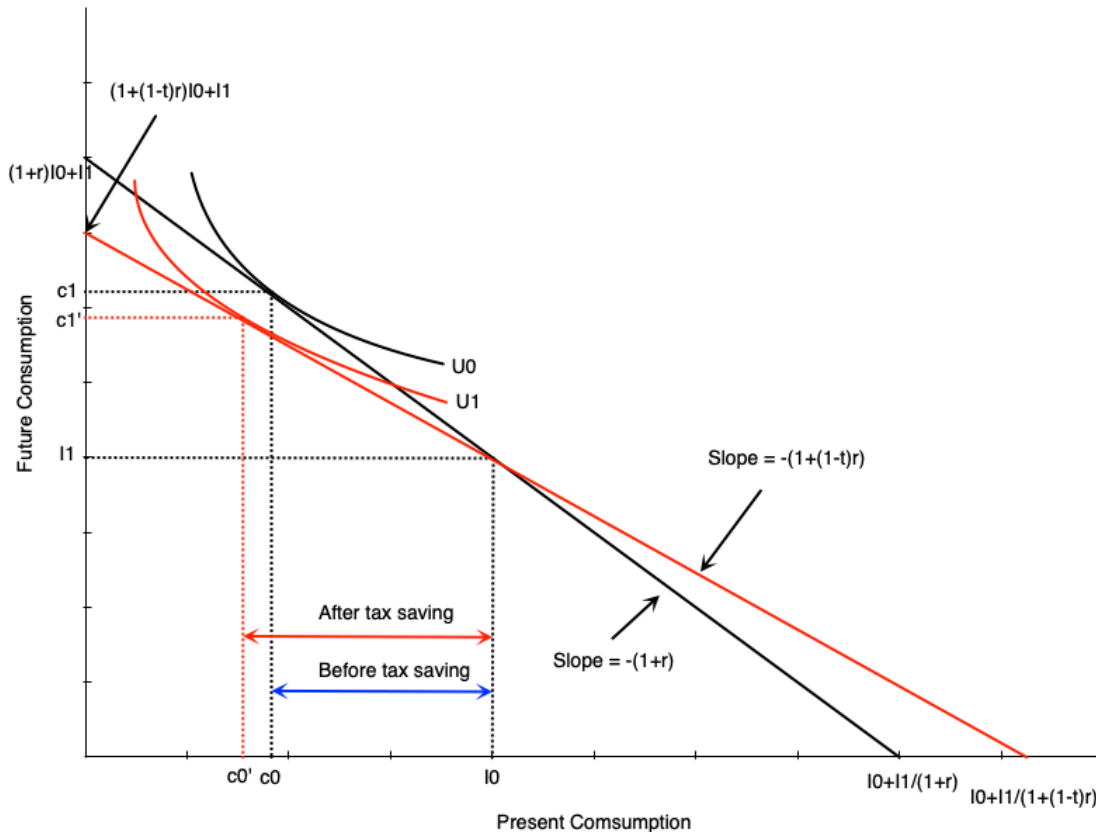
Tax on Interest Income with Deductible Interest



- Graph shows effect of tax on interest income on optimum
- Tax rotates budget constraint around (I_0, I_1)
 - Slope falls from $-(1+r)$ to $-(1+r(1-t))$
 - Passes through (I_0, I_1) because no tax paid if no saving/borrowing
- Two effects of taxation
 - Substitution effect: opportunity cost of consumption today is lower, so consume more today (save less)
 - Income effect: lower real income, so consume less in both periods (save more)
- Total effect is ambiguous

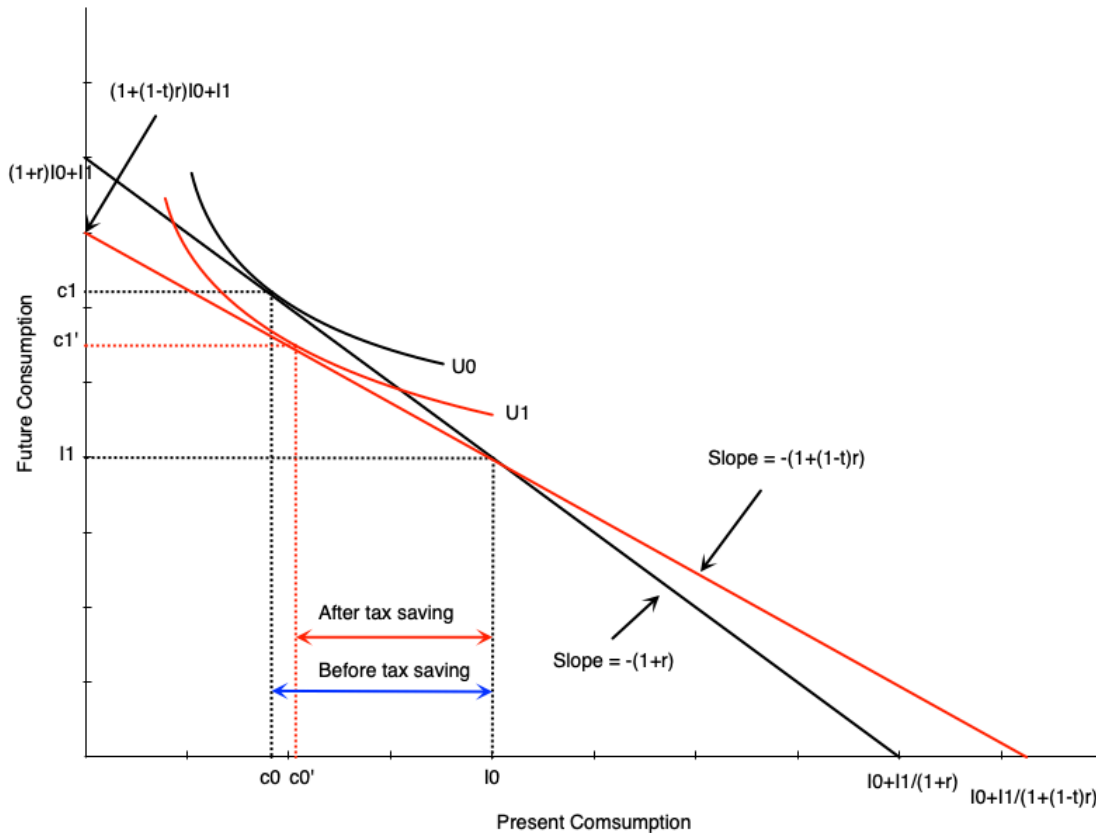
Tax on Interest Income with Deductible Interest

- Graph shows case when saving increases
 - Income effect > substitution effect
- Saving increases today
- But consumption in both periods falls



Tax on Interest Income with Deductible Interest

- Graph shows case when saving decreases
 - Substitution effect > income effect
- Saving falls today
- Consumption increases today, but falls in the future



References

References

- Rosen, Harvey S., and Lindsay M. Tedds, and Trevor Tombe, and Jean-Francois Wen, and Tracy Snoddon. Public Finance in Canada. 6th Canadian edition. McGraw-Hill Ryerson, 2023.
- Gruber, Jonathan. Public Finance and Public Policy. 7th edition. Worth Publishers, 2022.
- Bazel, Philip. Marginal Effective Tax Rates for Working Families in Canada. Fraser Institute, 2024.
- Hansen, Jeff, and Devan Mescall, and Graham Purse. “Policy Forum: The Effects of Indexation and Inflation on Tax System Design.” Canadian Tax Journal 71, no. 2 (2023): 398-404.