INCOME AND SUBSTITUTION EFFECTS: APPLICATIONS
INCOME AND SUBSTITUTION EFFECTS: APPLICATIONS

- Subsidy on one product only v. Increase in income (at equal cost to government)
- Consumption v. Saving (Inter-temporal choice)
- Labour v. Leisure
AN INCREASE in INCOME v. A SUBSIDY on ONE PRODUCT ONLY

- Involves equal cost to the government
- Example: food stamps used in the US for welfare recipients (Ireland: television licence, electricity, transport, ... )
AN INCREASE in INCOME v. A SUBSIDY on ONE PRODUCT ONLY

Budget constraint is given by

\[ p_1 x_1^A + p_2 x_2^A = M \]

The government can

(1) give a subsidy on food \( (x_1) \)

\[ (p_1 - t)x_1^B + p_2 x_2^B = M \]

(2) give a increase in income

\[ p_1 x_1^C + p_2 x_2^C = M + tx_1^B \]

Note: Equal cost to the government
AN INCREASE in INCOME v A SUBSIDY on ONE PRODUCT ONLY

But which makes the consumer better off?

\[ X_2 \]

\[ X_1 \]
AN INCREASE in INCOME v A SUBSIDY on ONE PRODUCT ONLY

But which makes the consumer better off?

The subsidy on food leaves the consumer at B (better off than at A)
AN INCREASE in INCOME v A SUBSIDY on ONE PRODUCT ONLY

But which makes the consumer better off?

The subsidy on food leaves the consumer at B (better off than at A)

\[ p_1 x_1^A + p_2 x_2^A = M \]

\[ (p_1 - t)x_1^B + p_2 x_2^B = M \]
AN INCREASE in INCOME v A SUBSIDY on ONE PRODUCT ONLY

To illustrate the equal cost nature of the subsidy v. the income increase, you draw a line parallel to the original budget constraint which passes through the point B (as B must be affordable after the income increase).
AN INCREASE in INCOME v A SUBSIDY on ONE PRODUCT ONLY

But which makes the consumer better off?

The increase in income leaves the consumer at C (better off than at B)
AN INCREASE in INCOME v A SUBSIDY on ONE PRODUCT ONLY

But which makes the consumer better off?

The increase in income leaves the consumer at C (better off than at B)

\[ p_1x_1^C + p_2x_2^C = M + tx_1^B \]
CONSUMPTION v. SAVING

- Persons often receive income in “lumps”, e.g. monthly salary, yearly bonus, tax rebate ...
- How is a lump of income spread over the following month, year, (saving now for consumption later)?
- How is consumption financed by borrowing now against income to be received at the end of the month?
CONSUMPTION v. SAVING

- Divide time into two periods (today and tomorrow)
  Assume that a person has income in the first period only (today)
  Assume that a person consumes in both periods (today and tomorrow)
CONSUMPTION v. SAVING

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

This is equivalent to the budget constraint we met before, so we can apply the same techniques to analyse changes in consumption and saving.

\[ p_1x_1 + p_2x_2 = M \]

Where \( C_t \) is consumption today, \( C_{t+1} \) is consumption tomorrow, \( i \) is the interest rate and \( Y \) is income.
CONSUMPTION v. SAVING

- Divide time into two periods (today and tomorrow)
- Assume that a person has income in both periods (today and tomorrow)
- Assume that a person consumes in both periods (today and tomorrow)
CONSUMPTION v. SAVING

With income in both periods the budget constraint looks like this

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]

Income in period t and t+1
CONSUMPTION v. SAVING

\[
C_t + \frac{1}{1+i} C_{t+1} = Y_t
\]

\[
C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1}
\]

1/ (1+i) represents the current “price” of future consumption

1/ (1+i) represents the current “price” or “value” of future income
CONSUMPTION v. SAVING

Consumption tomorrow is called saving
CONSUMPTION v. SAVING

(Income in period t only)

\[ Ct + \frac{1}{1+i} C_{t+1} = Y_t \]

What happens if the interest rate increases?
CONSUMPTION v. SAVING

(Income in period t only)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

What happens if the interest rate increases?

The budget line pivots out from \( Y_t \)

\( C_{t+1} \)

\((1+i)Y_t\)
CONSUMPTION v. SAVING

(Income in period $t$ only)

$C_t + \frac{1}{1+i} C_{t+1} = Y_t$

What happens if the interest rate increases?

There is an increase in the value of consumption tomorrow, i.e. the price of future consumption decreases.
CONSUMPTION v. SAVING

(Income in period t only)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

Slope of the budget line = \(-(1+i)\)

Slope of the budget line = \(1+i\)
CONSUMPTION vs. SAVING

(Income in period t only)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

Isolating the income and substitution effects
CONSUMPTION v. SAVING

(Income in period t only)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

The substitution effect is a to b. \( \downarrow C_t \) and \( \uparrow C_{t+1} \) (\( \uparrow S_t \))
CONSUMPTION v. SAVING

(Income in period t only)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

The income effect is \( b \) to \( c \), usually \( \uparrow C_t \) and \( \uparrow C_{t+1} \) (\( \downarrow S_t \))
CONSUMPTION v. SAVING

(Income in period t only)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t \]

Overall effect is unclear

Why? IE: \( \uparrow C_t \)
SE: \( \downarrow C_t \)
Overall: \( ?C_t \ ?S_t \)
CONSUMPTION v. SAVING

(Income in both periods)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]
CONSUMPTION v. SAVING

(Income in both periods)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]

A lender consumers less in period t than their income in period t \((C_t < Y_t)\)

A lender type person

\[ (1+i)Y_t + Y_{t+1} \]
CONSUMPTION v SAVING

(Income in both periods)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]

A borrower consumers more in period t than their income in period t \((C_t > Y_t)\)

A borrower type person
What happens if the interest rate increases?

The budget constraint pivots around \((Y_t, Y_{t+1})\) and the outcome can be different for borrowers and lenders.
CONSUMPTION v SAVING

(Income in both periods)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]

What happens if the interest rate increases?

LENDER
What happens if the interest rate increases?

Utility is higher but we cannot be certain if $C_{t+1}$ or $C_t$ rise or fall.
CONSUMPTION v SAVING

(Income in both periods)

What happens if the interest rate increases?

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]

LENDER

Could end up here

(\(Y_t, Y_{t+1}\))

C_{t+1}

Y_{t+1}

Y_t

C_t
CONSUMPTION v SAVING

(Income in both periods)

\[ C_t + \frac{1}{1+i} C_{t+1} = Y_t + \frac{1}{1+i} Y_{t+1} \]

What happens if the interest rate increases?

LENDER

Or here

\( (Y_t, Y_{t+1}) \)
CONSUMPTION v SAVING

(Income in both periods)

What happens if the interest rate increases?

BORROWER

Utility is lower but…….??
CONSUMPTION v SAVING

- Do the case of a decrease in interest rates.
- You can also show the income and substitution effects in the two period model.
LABOUR and LEISURE

Framework

- 24 hours a day
- There is only two things you can do with your time
  - Work (paid labour market)
  - Leisure
  - Ignores housework (extension possible)
- You divide all your time between these two activities.
- When you work in the paid labour market, you are paid a market wage.
LABOUR and LEISURE

$24 \cdot w = w \cdot \text{Leisure} + p \cdot \text{Consumption}$

Where $24 \cdot w$ is the value of initial endowment, $w \cdot \text{Leisure}$ is the amount of the endowment spent on leisure and $p \cdot \text{Consumption}$ is the amount of endowment spent on consumption.

Rearranging:

$C = \frac{24w}{p} - \frac{w}{p} \cdot \text{Leisure}$
LABOUR and LEISURE

What happens if the wage rate increases?

Slope = $-\frac{w}{p}$
LABOUR and LEISURE

What happens if the wage rate increases?

\[ \frac{C}{W} > W \]

The budget line pivots out from here

\[ W_2 > W_1 \]

Leisure
LABOUR and LEISURE

More labour or more leisure…….?  
Use income and substitution effects

NB: Is leisure a normal or an inferior good?
LABOUR and LEISURE

More labour or more leisure……?
LABOUR and LEISURE

More labour or more leisure……..?

Total Effect ?

Depends (to some extent) on whether Leisure is assumed to be normal or inferior
LABOUR and LEISURE

More labour or more leisure……..?

SE: A to B

IE: Depends on whether Leisure is assumed to be normal or inferior
LABOUR and LEISURE

More labour or more leisure………?

SE: A to B

IE: Depends on whether Leisure is assumed to be normal or inferior
LABOUR and LEISURE

More labour or more leisure…….? 

Overall we could end up here if leisure is "very normal"
LABOUR and LEISURE

More labour or more leisure…….? 

SE: A to B 

IE: B to C

Depends on whether Leisure is assumed to be normal or inferior
LABOUR and LEISURE

Increase in wage rate

Substitution effect: \( \uparrow w \Rightarrow \uparrow \) price of leisure \( \Rightarrow \)
\( \downarrow \) leisure and \( \uparrow \) labour supply

Income effect: \( \uparrow w \Rightarrow \uparrow \) income (value of
the initial endowment) \( \Rightarrow \)
\( \uparrow \) leisure and \( \downarrow \) labour supply

IF LEISURE IS A NORMAL GOOD

Overall effect: Leisure?? Labour Supply??