

1 NO POVERTY



10 REDUCED INEQUALITIES



# Simulating UBI Policy Impacts

*Oxford Future Impact Group, Trinity Term 2024*



## Research Question:

*How can data on different tax policies be linked to better understand how income taxes and benefit programs interact to affect individuals at every income level – and simulate alternative tax systems?*

# Research Overview

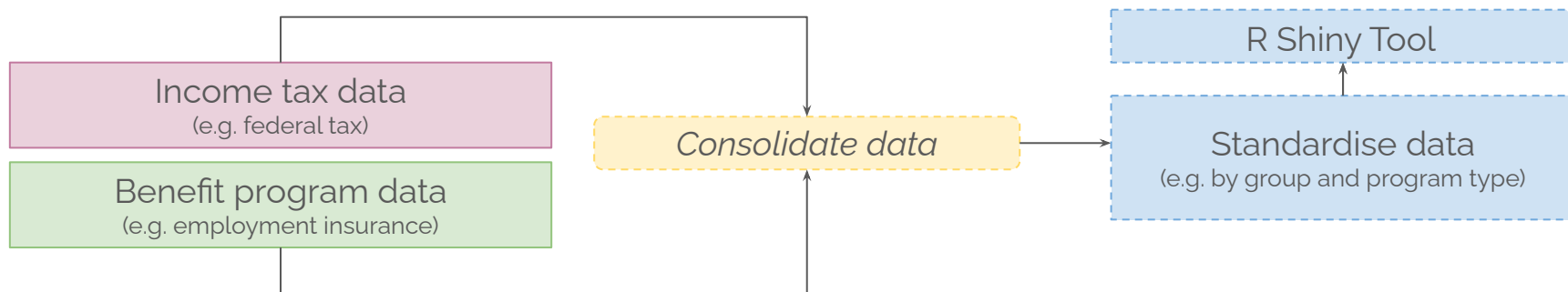
*The goal of the project is to produce a R Shiny tool that connects mitigation research with emission data*

## Problem

Universal basic income (UBI) has been proposed as a potential solution some of the biggest threats faced by modern workers: wage inequality, job insecurity – and the looming possibility of AI-induced job losses. However, the feasibility and relative benefits of such a program is highly dependent on existing taxation and benefit policies.

## Goal

Collect data on tax policies for G20 countries and develop an R Shiny app to simulate different taxation paradigms



# Background

*Attention has focused on reforming tax systems to address gaps and prepare for an automated economy*

A “trap” refers to a situation where an increase in gross earnings fails to translate into a net income increase that is felt by the individual to be a sufficient return for the additional effort. - OECD

## Welfare trap

🌐 5 languages ▾

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From Wikipedia, the free encyclopedia

*For the general concept of self-reinforcing mechanisms which maintain poverty, see [Poverty trap](#).*



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Find sources: “Welfare trap” – [news](#) · [newspapers](#) · [books](#) · [scholar](#) · [JSTOR](#) (May 2007) ([Learn how and when to remove this template message](#))

The **welfare trap** (or **unemployment trap** or **poverty trap** in British English) theory asserts that [taxation](#) and [welfare](#) systems can jointly contribute to keep people on [social insurance](#) because the withdrawal of [means-tested](#) benefits that comes with entering low-paid work causes there to be no significant increase in total income. According to this theory, an individual sees that the [opportunity cost](#) of getting a better paying job is too great for too little a financial return, and this can create a [perverse incentive](#) to not pursue a better paying job.<sup>[1]</sup>

## High Implicit Marginal Tax Rates Make Life Difficult for the Poor

November 15, 2013 • 2 min read

By: [Alan Cole](#)

This week, Slate published an [interview](#) with a food stamp recipient whose benefits were cut recently. The interviewee speaks well about the difficulty of providing her household with adequate nutrition. She also speaks well about the difficulty of improving her situation. She explains why she finds herself at a dead end:

If you've kept up with the development economics news over the past year or so, you've probably heard a lot of buzz about UBI. [UBI is a cash-transfer that is, as the name implies, universal, meaning that all people in a given area receive it. It is not targeted at specific populations, and there are no conditions placed on how the money may be used.](#) The transfer is regularly recurring, delivered over the long term, and sufficient to meet basic needs.

# Background

*One of the most popular proposals for tax reform is Universal Basic Income (UBI)*

## UBI is the subject of debate

| The case for UBI  | The case against UBI  |
|---|---|
| <ul style="list-style-type: none"><li>• Efficiency gains</li><li>• Poverty reduction</li><li>• Flexibility and autonomy</li><li>• Unpaid labor recognized</li><li>• Possibilities from new tech</li></ul> | <ul style="list-style-type: none"><li>• Cost</li><li>• Feasibility</li><li>• Use of cash</li><li>• Culture and work ethic</li><li>• Payments infrastructure</li></ul> |

# Example Microdata Collection

Data for Ontario, Canada representing the effects of tax programs for a married single earner with no kids

| Gross Income | CPP   | EI    | Federal Tax | CAI  | CWB   | HST Credit | Provincial Tax | Provincial SurTax | OHIP | ONSTC | ON Works | Net Income | Effective Tax Rate | Marginal Tax Rate |
|--------------|-------|-------|-------------|------|-------|------------|----------------|-------------------|------|-------|----------|------------|--------------------|-------------------|
| 1000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |      | -616  | -13632   | 16047      | -15.047            | 0                 |
| 2000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |      | -616  | -13632   | 17047      | -7.5235            | 0                 |
| 3000         | 0     | 48.6  | 0           | -231 | 0     | -568       |                |                   |      | -616  | -13332   | 17698.4    | -4.899466667       | 0.3486            |
| 4000         | 25.5  | 64.8  | 0           | -231 | -260  | -568       |                |                   |      | -616  | -12832   | 18416.7    | -3.604175          | 0.2817            |
| 5000         | 76.5  | 81    | 0           | -231 | -520  | -568       |                | 0                 | 0    | -616  | -12332   | 19109.5    | -2.8219            | 0.3072            |
| 6000         | 127.5 | 97.2  | 0           | -231 | -780  | -568       |                |                   |      | -616  | -11832   | 19802.3    | -2.300383333       | 0.3072            |
| 7000         | 178.5 | 113.4 | 0           | -231 | -1040 | -568       |                |                   |      | -616  | -11332   | 20495.1    | -1.927871429       | 0.3072            |
| 8000         | 229.5 | 129.6 | 0           | -231 | -1300 | -568       |                |                   |      | -616  | -10832   | 21187.9    | -1.6484875         | 0.3072            |
| 9000         | 280.5 | 145.8 | 0           | -231 | -1560 | -568       |                |                   |      | -616  | -10332   | 21880.7    | -1.431188889       | 0.3072            |
| 10000        | 331.5 | 162   | 0           | -231 | -1820 | -568       |                | 0                 | 0    | -616  | -9832    | 22573.5    | -1.25735           | 0.3072            |
| 11000        | 382.5 | 178.2 | 0           | -231 | -2080 | -568       |                |                   |      | -616  | -9332    | 23266.3    | -1.115118182       | 0.3072            |
| 12000        | 433.5 | 194.4 | 0           | -231 | -2335 | -568       | 0              |                   |      | -616  | -8832    | 23954.1    | -0.996175          | 0.3122            |
| 13000        | 484.5 | 210.6 | 0           | -231 | -2335 | -568       | 0              |                   |      | -616  | -8332    | 24386.9    | -0.875915385       | 0.5672            |
| 14000        | 535.5 | 226.8 | 0           | -231 | -2335 | -568       | 0              |                   |      | -616  | -7832    | 24819.7    | -0.772835714       | 0.5672            |
| 15000        | 586.5 | 243   | 0           | -231 | -2335 | -568       | 0              | 0                 | 0    | -616  | -7332    | 25352.5    | -0.6825            | 0.5672            |

# Example Microdata Collection

Data for Ontario, Canada representing the effects of tax programs for different groups

| Gross Income | CPP   | EI    | Federal Tax | CWB  | HST Credit | Provincial Tax | Provincial SurTax | QHP | ONSTC | ON Works | Net Income | Effective Tax Rate | Marginal Tax Rate |        |
|--------------|-------|-------|-------------|------|------------|----------------|-------------------|-----|-------|----------|------------|--------------------|-------------------|--------|
| 1000         | 0     | 0     | 0           | -231 | 0          | -568           |                   |     | -616  | -13832   | 16047      | -15.047            | 0                 |        |
| 2000         | 0     | 0     | 0           | -231 | 0          | -568           |                   |     | -616  | -13832   | 17047      | -7.5235            | 0                 |        |
| 3000         | 0     | 48.6  | 0           | -231 | 0          | -568           |                   |     | -616  | -13332   | 17698.4    | -4.89946667        | 0.3486            |        |
| 4000         | 25.5  | 64.8  | 0           | -231 | -260       | -568           |                   |     | -616  | -12832   | 18416.7    | -3.60475           | 0.2817            |        |
| 5000         | 76.5  | 81    | 0           | -231 | -520       | -568           |                   | 0   | 0     | -616     | -12332     | 19109.5            | -2.8219           | 0.3072 |
| 6000         | 127.5 | 97.2  | 0           | -231 | -780       | -568           |                   |     | -616  | -11832   | 19802.3    | -2.30038333        | 0.3072            |        |
| 7000         | 178.5 | 113.4 | 0           | -231 | -1040      | -568           |                   |     | -616  | -11332   | 20495.1    | -1.92787429        | 0.3072            |        |
| 8000         | 229.5 | 129.6 | 0           | -231 | -1300      | -568           |                   |     | -616  | -10832   | 21187.9    | -1.6484875         | 0.3072            |        |
| 9000         | 280.5 | 145.8 | 0           | -231 | -1560      | -568           |                   |     | -616  | -10332   | 21880.7    | -1.43188889        | 0.3072            |        |
| 10000        | 331.5 | 162   | 0           | -231 | -1820      | -568           |                   | 0   | 0     | -616     | -9832      | 22573.5            | -1.23735          | 0.3072 |
| 11000        | 382.5 | 178.2 | 0           | -231 | -2080      | -568           |                   |     | -616  | -9332    | 23266.3    | -1.11018182        | 0.3072            |        |
| 12000        | 433.5 | 194.4 | 0           | -231 | -2336      | -568           | 0                 |     | -616  | -8832    | 23961.1    | -0.996175          | 0.3122            |        |
| 13000        | 484.5 | 210.6 | 0           | -231 | -2336      | -568           | 0                 |     | -616  | -8332    | 24386.9    | -0.87919385        | 0.5672            |        |
| 14000        | 535.5 | 226.8 | 0           | -231 | -2336      | -568           | 0                 |     | -616  | -7832    | 24819.7    | -0.77283571        | 0.5672            |        |
| 15000        | 586.5 | 243   | 0           | -231 | -2336      | -568           | 0                 | 0   | -616  | -7332    | 25252.5    | -0.6754            | 0.5672            |        |

Single, No Kids

Married, Four Kids, One Earner

| Gross Income | CPP   | EI    | Federal Tax | CAI  | CWB   | HST Credit | Provincial Tax | Provincial SurTax | QHP | ONSTC | ON Works | Net Income | Effective Tax Rate | Marginal Tax Rate |        |
|--------------|-------|-------|-------------|------|-------|------------|----------------|-------------------|-----|-------|----------|------------|--------------------|-------------------|--------|
| 1000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13832   | 16047      | -15.047            | 0                 |        |
| 2000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13832   | 17047      | -7.5235            | 0                 |        |
| 3000         | 0     | 48.6  | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13332   | 17698.4    | -4.899466667       | 0.3486            |        |
| 4000         | 25.5  | 64.8  | 0           | -231 | -260  | -568       |                |                   |     | -616  | -12832   | 18416.7    | -3.60475           | 0.2817            |        |
| 5000         | 76.5  | 81    | 0           | -231 | -520  | -568       |                | 0                 | 0   | 0     | -616     | -12332     | 19109.5            | -2.8219           | 0.3072 |
| 6000         | 127.5 | 97.2  | 0           | -231 | -780  | -568       |                |                   |     |       | -616     | -11832     | 19802.3            | -2.300383333      | 0.3072 |
| 7000         | 178.5 | 113.4 | 0           | -231 | -1040 | -568       |                |                   |     |       | -616     | -11332     | 20495.1            | -1.92787429       | 0.3072 |
| 8000         | 229.5 | 129.6 | 0           | -231 | -1300 | -568       |                |                   |     |       | -616     | -10832     | 21187.9            | -1.6484875        | 0.3072 |
| 9000         | 280.5 | 145.8 | 0           | -231 | -1560 | -568       |                |                   |     |       | -616     | -10332     | 21880.7            | -1.43188889       | 0.3072 |
| 10000        | 331.5 | 162   | 0           | -231 | -1820 | -568       |                | 0                 | 0   | 0     | -616     | -9832      | 22573.5            | -1.23735          | 0.3072 |
| 11000        | 382.5 | 178.2 | 0           | -231 | -2080 | -568       |                |                   |     |       | -616     | -9332      | 23266.3            | -1.11018182       | 0.3072 |
| 12000        | 433.5 | 194.4 | 0           | -231 | -2336 | -568       | 0              |                   |     |       | -616     | -8832      | 23961.1            | -0.996175         | 0.3122 |
| 13000        | 484.5 | 210.6 | 0           | -231 | -2336 | -568       | 0              |                   |     |       | -616     | -8332      | 24386.9            | -0.87919385       | 0.5672 |
| 14000        | 535.5 | 226.8 | 0           | -231 | -2336 | -568       | 0              |                   |     |       | -616     | -7832      | 24819.7            | -0.772835714      | 0.5672 |

Married, One Kid, One Earner

| Gross Income | CPP   | EI    | Federal Tax | CWB  | HST Credit | Provincial Tax | Provincial SurTax | QHP | ONSTC | ON Works | Net Income | Effective Tax Rate | Marginal Tax Rate |
|--------------|-------|-------|-------------|------|------------|----------------|-------------------|-----|-------|----------|------------|--------------------|-------------------|
| 1000         | 0     | 0     | 0           | -231 | 0          | -568           |                   |     | -616  | -13832   | 16047      | -15.047            | 0                 |
| 2000         | 0     | 0     | 0           | -231 | 0          | -568           |                   |     | -616  | -13832   | 17047      | -7.5235            | 0                 |
| 3000         | 0     | 48.6  | 0           | -231 | 0          | -568           |                   |     | -616  | -13332   | 17698.4    | -4.899466667       | 0.3486            |
| 4000         | 25.5  | 64.8  | 0           | -231 | -260       | -568           |                   |     | -616  | -12832   | 18416.7    | -3.60475           | 0.2817            |
| 5000         | 76.5  | 81    | 0           | -231 | -520       | -568           | 0                 | 0   | 0     | -12332   | 19109.5    | -2.8219            | 0.3072            |
| 6000         | 127.5 | 97.2  | 0           | -231 | -780       | -568           |                   |     | -616  | -11832   | 19802.3    | -2.300383333       | 0.3072            |
| 7000         | 178.5 | 113.4 | 0           | -231 | -1040      | -568           |                   |     | -616  | -11332   | 20495.1    | -1.92787429        | 0.3072            |
| 8000         | 229.5 | 129.6 | 0           | -231 | -1300      | -568           |                   |     | -616  | -10832   | 21187.9    | -1.6484875         | 0.3072            |
| 9000         | 280.5 | 145.8 | 0           | -231 | -1560      | -568           |                   |     | -616  | -10332   | 21880.7    | -1.43188889        | 0.3072            |
| 10000        | 331.5 | 162   | 0           | -231 | -1820      | -568           | 0                 | 0   | 0     | -9832    | 22573.5    | -1.23735           | 0.3072            |
| 11000        | 382.5 | 178.2 | 0           | -231 | -2080      | -568           |                   |     | -616  | -9332    | 23266.3    | -1.11018182        | 0.3072            |
| 12000        | 433.5 | 194.4 | 0           | -231 | -2336      | -568           | 0                 |     | -616  | -8832    | 23959.1    | -0.996175          | 0.3122            |
| 13000        | 484.5 | 210.6 | 0           | -231 | -2336      | -568           | 0                 |     | -616  | -8332    | 24386.9    | -0.87919385        | 0.5672            |
| 14000        | 535.5 | 226.8 | 0           | -231 | -2336      | -568           | 0                 |     | -616  | -7832    | 24819.7    | -0.772835714       | 0.5672            |
| 15000        | 586.5 | 243   | 0           | -231 | -2336      | -568           | 0                 | 0   | 0     | -7332    | 25319.7    | -0.6935            | 0.5672            |

| Gross Income | CPP   | EI    | Federal Tax | CAI  | CWB   | HST Credit | Provincial Tax | Provincial SurTax | QHP | ONSTC | ON Works | Net Income | Effective Tax Rate | Marginal Tax Rate |        |
|--------------|-------|-------|-------------|------|-------|------------|----------------|-------------------|-----|-------|----------|------------|--------------------|-------------------|--------|
| 1000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13832   | 16047      | -15.047            | 0                 |        |
| 2000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13832   | 17047      | -7.5235            | 0                 |        |
| 3000         | 0     | 48.6  | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13332   | 17698.4    | -4.899466667       | 0.3486            |        |
| 4000         | 25.5  | 64.8  | 0           | -231 | -260  | -568       |                |                   |     | -616  | -12832   | 18416.7    | -3.60475           | 0.2817            |        |
| 5000         | 76.5  | 81    | 0           | -231 | -520  | -568       |                | 0                 | 0   | 0     | -616     | -12332     | 19109.5            | -2.8219           | 0.3072 |
| 6000         | 127.5 | 97.2  | 0           | -231 | -780  | -568       |                |                   |     |       | -616     | -11832     | 19802.3            | -2.300383333      | 0.3072 |
| 7000         | 178.5 | 113.4 | 0           | -231 | -1040 | -568       |                |                   |     |       | -616     | -11332     | 20495.1            | -1.92787429       | 0.3072 |
| 8000         | 229.5 | 129.6 | 0           | -231 | -1300 | -568       |                |                   |     |       | -616     | -10832     | 21187.9            | -1.6484875        | 0.3072 |
| 9000         | 280.5 | 145.8 | 0           | -231 | -1560 | -568       |                |                   |     |       | -616     | -10332     | 21880.7            | -1.43188889       | 0.3072 |
| 10000        | 331.5 | 162   | 0           | -231 | -1820 | -568       |                | 0                 | 0   | 0     | -616     | -9832      | 22573.5            | -1.23735          | 0.3072 |
| 11000        | 382.5 | 178.2 | 0           | -231 | -2080 | -568       |                |                   |     |       | -616     | -9332      | 23266.3            | -1.11018182       | 0.3072 |
| 12000        | 433.5 | 194.4 | 0           | -231 | -2336 | -568       | 0              |                   |     |       | -616     | -8832      | 23959.1            | -0.996175         | 0.3122 |
| 13000        | 484.5 | 210.6 | 0           | -231 | -2336 | -568       | 0              |                   |     |       | -616     | -8332      | 24386.9            | -0.87919385       | 0.5672 |
| 14000        | 535.5 | 226.8 | 0           | -231 | -2336 | -568       | 0              |                   |     |       | -616     | -7832      | 24819.7            | -0.772835714      | 0.5672 |

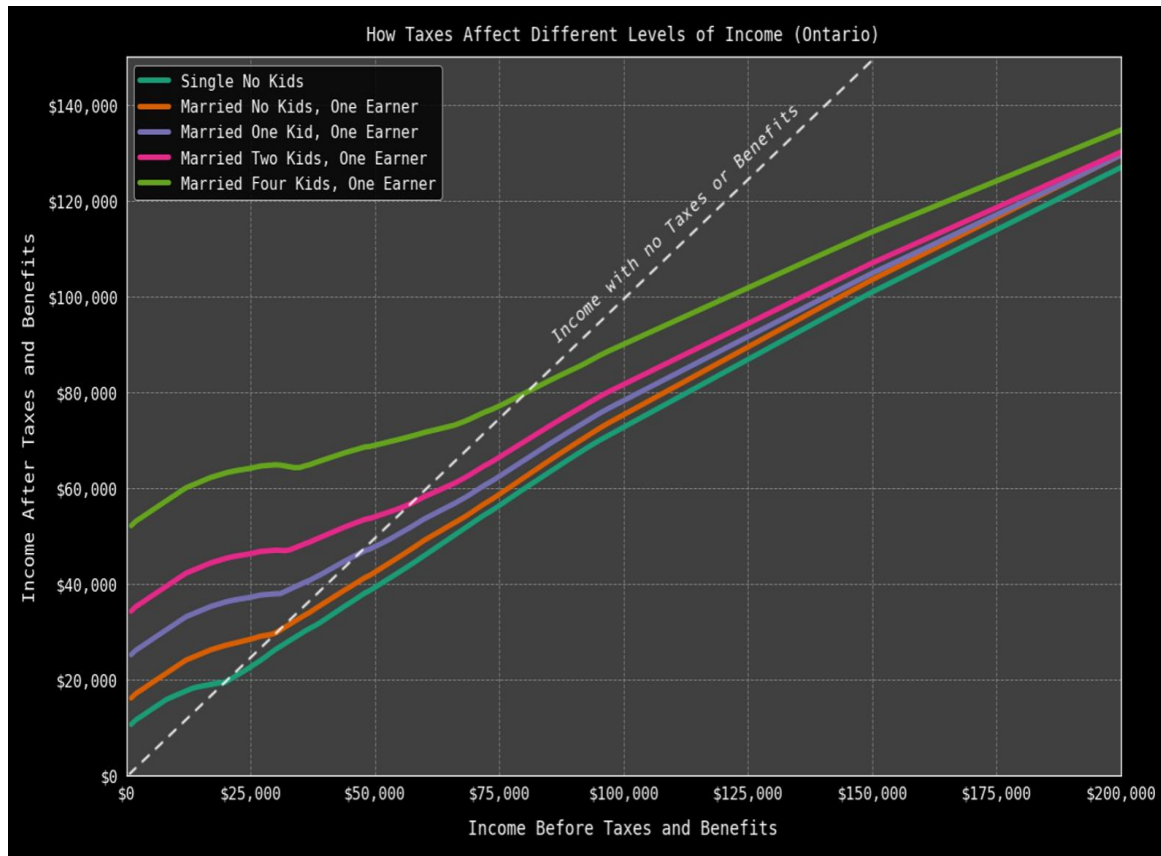
Married, No Kids, One Earner

| Gross Income | CPP   | EI    | Federal Tax | CAI  | CWB   | HST Credit | Provincial Tax | Provincial SurTax | QHP | ONSTC | ON Works | Net Income | Effective Tax Rate | Marginal Tax Rate |
|--------------|-------|-------|-------------|------|-------|------------|----------------|-------------------|-----|-------|----------|------------|--------------------|-------------------|
| 1000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13832   | 16047      | -15.047            | 0                 |
| 2000         | 0     | 0     | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13832   | 17047      | -7.5235            | 0                 |
| 3000         | 0     | 48.6  | 0           | -231 | 0     | -568       |                |                   |     | -616  | -13332   | 17698.4    | -4.89946667        | 0.3486            |
| 4000         | 25.5  | 64.8  | 0           | -231 | -260  | -568       |                |                   |     | -616  | -12832   | 18416.7    | -3.60475           | 0.2817            |
| 5000         | 76.5  | 81    | 0           | -231 | -520  | -568       |                | 0                 | 0   | 0     | -12332   | 19109.5    | -2.8219            | 0.3072            |
| 6000         | 127.5 | 97.2  | 0           | -231 | -780  | -568       |                |                   |     | -616  | -11832   | 19802.3    | -2.300383333       | 0.3072            |
| 7000         | 178.5 | 113.4 | 0           | -231 | -1040 | -568       |                |                   |     | -616  | -11332   | 20495.1    | -1.92787429        | 0.3072            |
| 8000         | 229.5 | 129.6 | 0           | -231 | -1300 | -568       |                |                   |     | -616  | -10832   | 21187.9    | -1.6484875         | 0.3072            |
| 9000         | 280.5 | 145.8 | 0           | -231 | -1560 | -568       |                |                   |     | -616  | -10332   | 21880.7    | -1.43188889        | 0.3072            |
| 10000        | 331.5 | 162   | 0           | -231 | -1820 | -568       |                | 0                 | 0   | 0     | -9832    | 22573.5    | -1.23735           | 0.3072            |
| 11000        | 382.5 | 178.2 | 0           | -231 | -2080 | -568       |                |                   |     | -616  | -9332    | 23266.3    | -1.11018182        | 0.3072            |
| 12000        | 433.5 | 194.4 | 0           | -231 | -2336 | -568       | 0              |                   |     | -616  | -8832    | 23959.1    | -0.996175          | 0.3122            |
| 13000        | 484.5 | 210.6 | 0           | -231 | -2336 | -568       | 0              |                   |     | -616  | -8332    | 24386.9    | -0.87919385        | 0.5672            |
| 14000        | 535.5 | 226.8 | 0           | -231 | -2336 | -568       | 0              |                   |     | -616  | -7832    | 24819.7    | -0.772835714       | 0.5672            |

Married, Two Kids, One Earner

# Example Microdata Collection

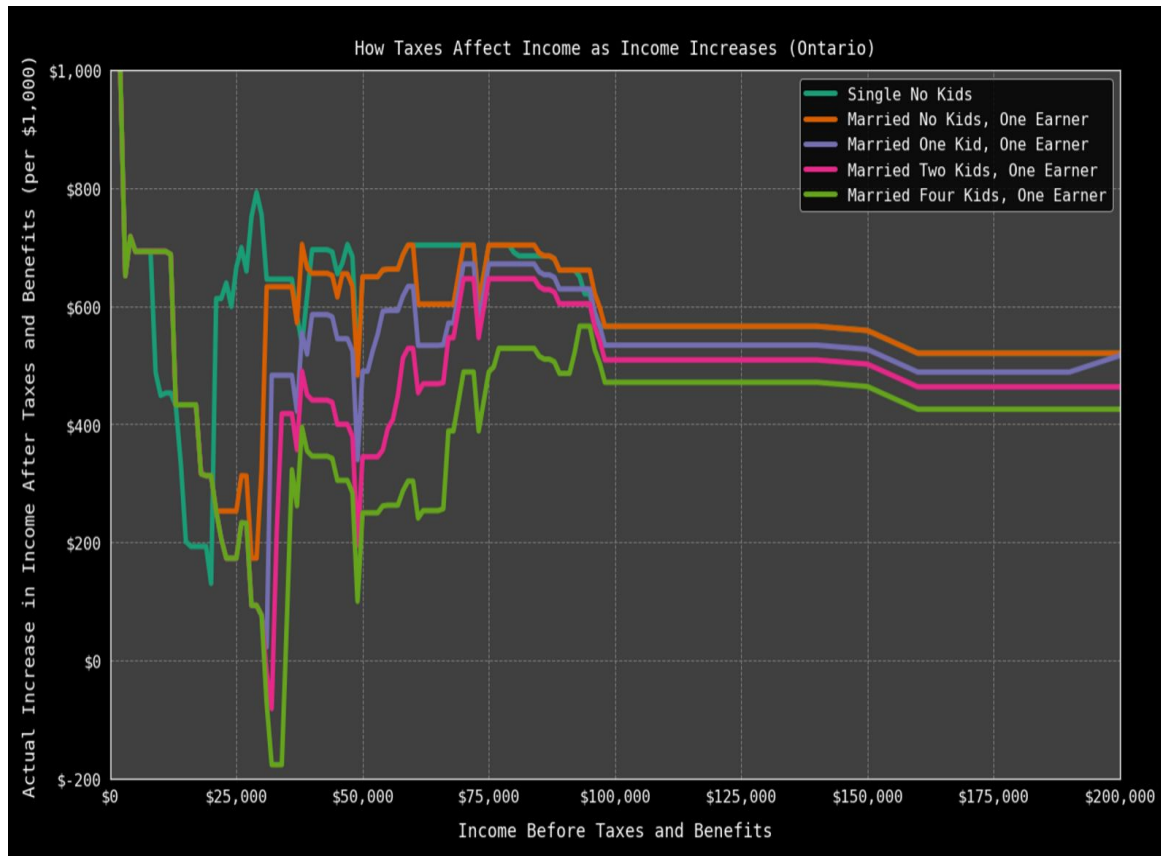
*Data for Ontario, Canada representing the effects of tax programs for a married single earner with no kids*





# Example Microdata Collection

*Data for Ontario, Canada representing the effects of tax programs for a married single earner with no kids*



# Collaborator

*Policy Engine (non-profit) will tax the data and simulation tool we produce and integrate it into their website*

POLICY  
ENGINE

RESEARCH

ABOUT

DONATE

COMPUTE POLICY IMPACT

Computing  
Public Policy  
for Everyone

COMPUTE MY TAXES AND  
BENEFITS

COMPUTE POLICY REFORM  
IMPACTS

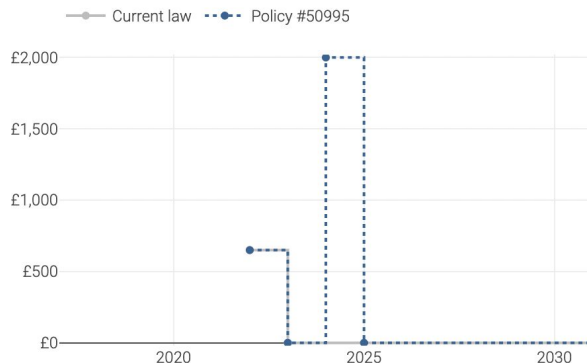
## Payment to households on means-tested benefits

Payment to households on means-tested benefits. This parameter is yearly.

2024-01-01 → 2024-12-31 

£ 2,000 

^  
v



# Collaborator

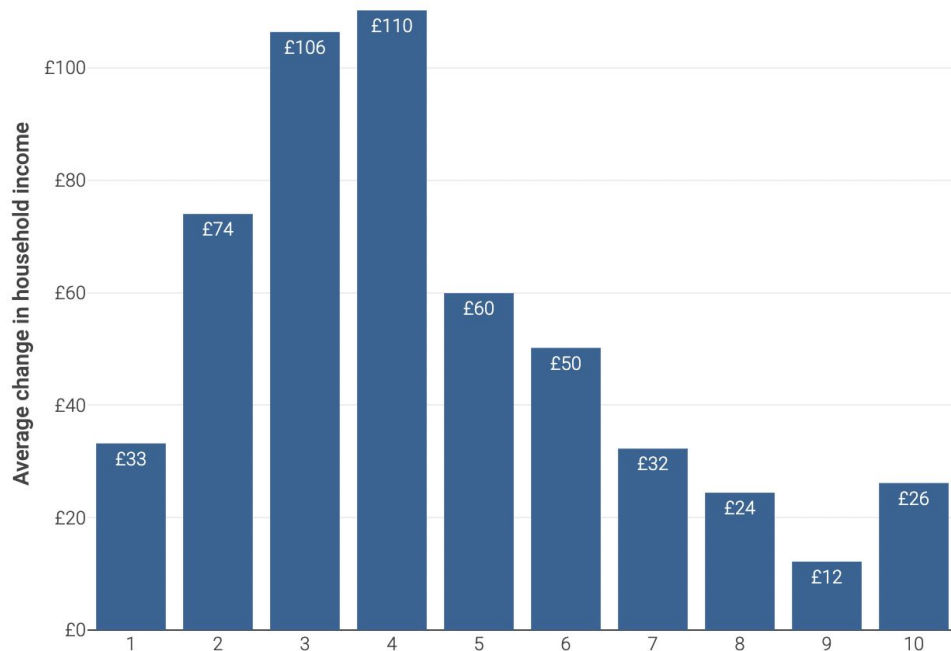
*Policy Engine (non-profit) will tax the data and simulation tool we produce and integrate it into their website*

Simulating the impact of your policy...



This usually takes around 295 seconds, but may take longer.

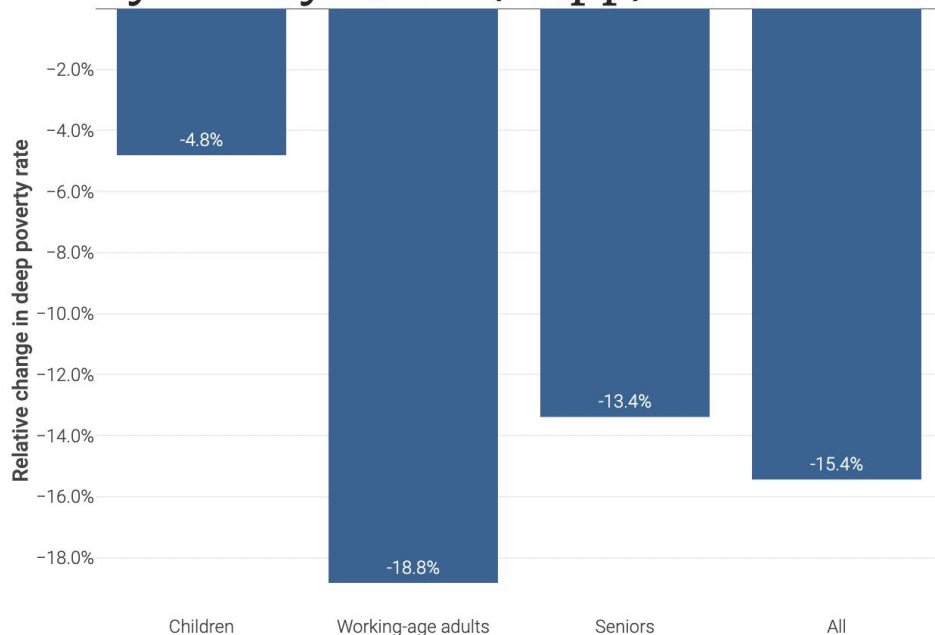
Policy #50993 would increase the net income of households by £55 on average



# Collaborator

*Policy Engine (non-profit) will tax the data and simulation tool we produce and integrate it into their website*

Policy #50994 would decrease the deep poverty rate by 15.4% (0.4pp)



# Collaborator

*Policy Engine (non-profit) will tax the data and simulation tool we produce and integrate it into their website*

## Analysis

[Read more about PolicyEngine's automatic GPT4-powered policy analysis.](#) Generation usually takes around 60 seconds. Please verify any results of this experimental feature against our charts.

ELI5

Normal

Wonk

GENERATE AN  
ANALYSIS

SHOW PROMPT

# Optional Follow-Up Work

*There are additional opportunities for further work on this product, dependent on research outcomes*

## Reports

- Report on impact of proposed tax reforms on individual income
- Policy recommendations for specific international bodies or regional governments
- Describe tool for non-technical audience

## Collaboration

- Ensure GitHub repo is reproducible and user-friendly for open-source contributions
- Work with Policy Engine to host tool and data on their website

## Presentation

- Present work to reporters at G20 Rio Summit
- Potential future opportunities to present to other interested parties