

Introduction & Overview of the UK tax-benefit system

3080 Economic Policy Analysis II
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¹Thanks to Emmanuel Saez for sharing his teaching slides, many of which are reproduced in this course.

About me [\[webpage\]](#)

Ph.D. in Economics, UC Berkeley (Advisors: Saez, Auerbach, and Yagan)

- ▶ **Dissertation:** “Behavioral Responses of Workers and Businesses to Tax and Transfer Policies” [awarded the 2020 NTA's Outstanding Dissertation Prize]

I do empirical tax/spending research: plausibly exogenous policy changes combined with **quasi-experimental methods + big data**

Some topics I'm currently working on:

- ▶ **Income taxation:** Labour supply responses of high-wage earners
- ▶ **Tax incidence:** (i) Wage effects of cash transfers; (ii) Price and quantity effects of VAT cuts (pass-through)
- ▶ **Spillovers:** (i) Property tax (RCT), (ii) Firms as tax collectors
- ▶ **Tax avoidance/evasion:** Self-employed/large firms (bunching)

PUBLIC ECONOMICS

Public Economics = study of the Role of the Government in the Economy

Government is instrumental in most aspects of economic life:

- 1) Government in charge of huge **regulatory** structure
 - 2) **Taxes:** governments in advanced economies collect 30-50% of National Income in taxes
 - 3) **Expenditures:** taxes fund **public goods** (infrastructure, public order and safety, defense) and **social state** (Education, Retirement benefits, Health care, Income support)
 - 4) Macro-economic **stabilization** through central bank (interest rate, inflation control), fiscal stimulus, bailout policies
- ⇒ We pool a large share of our incomes through government

Bigger view on government (Saez 2021) - skip

Economists have a narrow-minded view of individual behavior: purely selfish and economically rational interacting through markets ⇒
Limitation to fully understand **public economics**

Social interactions are critical for humans: we naturally cooperate at many levels: families, workplaces, communities, nation states with very strong/versatile in-group attachments

We produce in teams and then we have to split production ⇒ We are cooperative and sensitive to distribution

Archaic human societies depended on social cooperation for protection and taking care of the young, sick, and old

⇒ Explains best why our modern nation states provide defense and education, health care, and retirement benefits

More modest role for economists - skip

Replacing social institutions by markets does not always work:

Education: is primarily government funded: student loans work in economic theory but in practice end up being a huge lifetime burden. For-profit education has a tendency to become a scam

Retirement benefits: Saving for your own retirement works in theory but in practice most people unable to do so unless institutions (government/employers) help them

Health care: Health care relies heavily on government/employers support everywhere. People are not able to afford or shop rationally for health care

Economists can still play a useful role in understanding when markets can help and how individualistic forces can undermine institutions

Three questions in public economics

- 1) When should the government intervene in the economy?
- 2) What is the effect of those interventions on economic outcomes?
Note: we will spend most of our time here
- 3) Why do governments choose to intervene in the way that they do?
Political economy (e.g., voters' preferences)

When should the government intervene in the economy?

Economists' traditional view:

1) Market Failures: Market economy sometimes fails to deliver an outcome that is efficient (e.g., externalities, imperfect competition, imperfect information, individual failures)

⇒ Government intervention may improve the situation

2) Redistribution: Market economy generates substantial inequality in economic resources across individuals

Inequality is an issue because we are “social beings”

⇒ People willing to pool their resources (through government taxes and transfers) to help reduce inequality

This class explores point 2) through the tax-benefit system

Inequality and Redistribution

Even if market outcome is efficient, society might not be happy with the market outcome because market equilibrium might generate very high economic disparity across individuals

Governments use taxes and transfers to redistribute from rich to poor and **reduce inequality**

Redistribution through taxes and transfers might reduce incentives to work (**efficiency costs**)

⇒ Redistribution creates an **equity-efficiency trade-off**

Income inequality has soared in the United States in recent decades, and has moved to the forefront in the public debate (Piketty's 2014 book success, stats from Piketty-Saez-Zucman '18)

Redistribution with Taxes and Transfers

Govt taxes people based on income & consumption and provides transfers: z is pre-tax income, $y = z - T(z) + B(z)$ is post-tax income

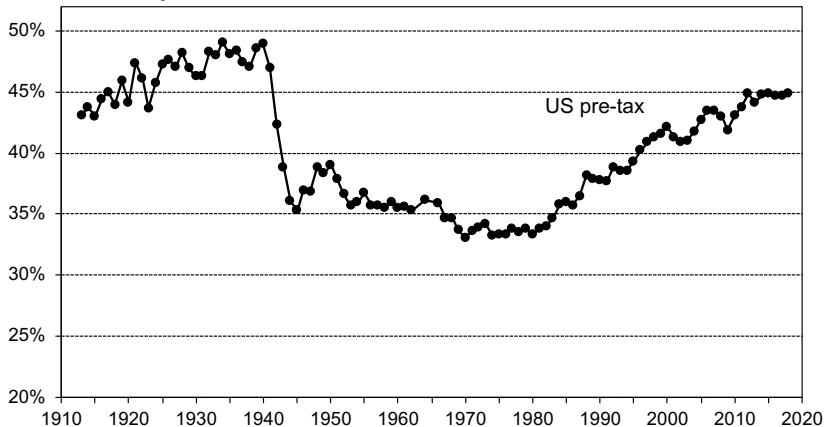
- 1) If inequality in y is less than inequality in $z \Leftrightarrow$ tax and transfer system is redistributive (o progressive)
- 2) If inequality in y is more than inequality in $z \Leftrightarrow$ tax and transfer system is regressive

For example, tax/transfer system is:

- a) **Neutral** if: $y = z \cdot (1 - t)$ with constant tax rate t
- b) **Progressive** if: $y = z \cdot (1 - t) + G$ where G is a universal (lumpsum) allowance
- c) **Regressive** if: $y = z - T$ where T is a uniform tax (poll tax)

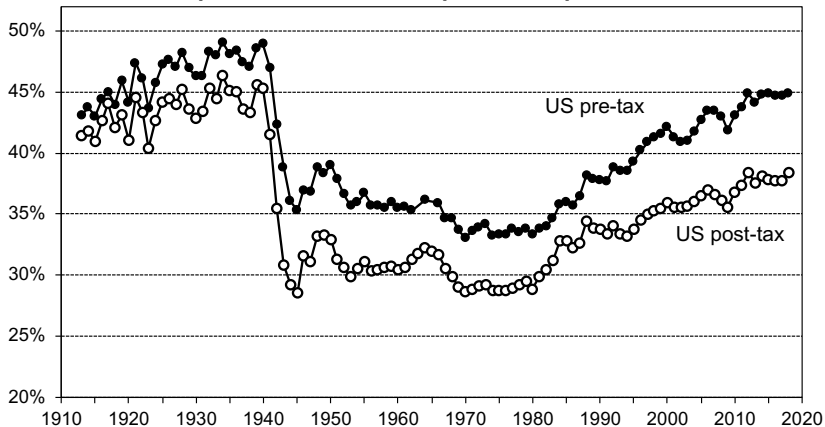
Current tax/transfer systems in most economies look roughly like b)

Top 10% Pre-tax Income Share in the US, 1913-2018



Top income shares of pretax national income among adults aged 20+ (income within couples equally split).
Source is World Inequality Database wid.world (from Piketty, Saez, Zucman 2018).

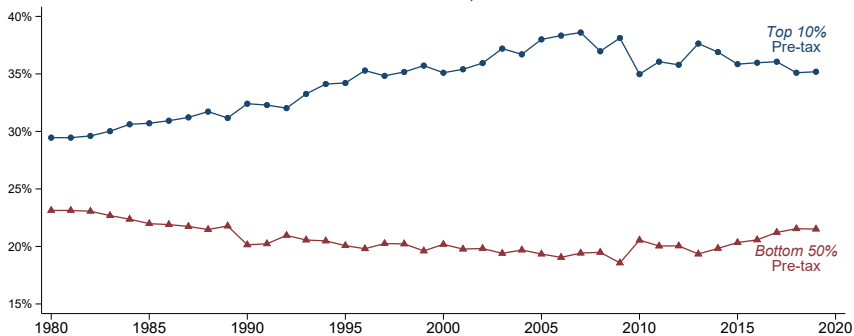
US Top 10% Income Shares pre-tax vs. post-tax, 1913-2018



Top income shares of pretax and posttax national income among adults (income within married couples equally split). Source is Piketty, Saez, Zucman (2018) for US and Piketty et al. (2020) for France.

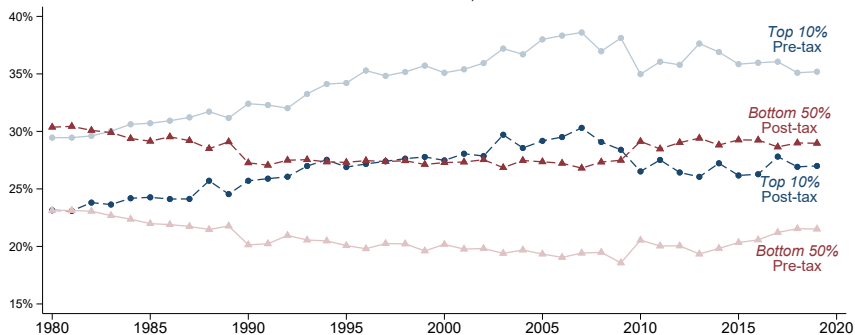
UK Top 10% and Bottom 50% Income Shares

Pre-tax vs Post-tax, 1980-2019



Notes: National income share held by a given percentile group before (Pre-tax) and after (Post-tax) taking into account the operation of the tax/transfer system (includes pensions). Source: based on <https://wid.world/country/united-kingdom/>

UK Top 10% and Bottom 50% Income Shares Pre-tax vs Post-tax, 1980-2019



Notes: National income share held by a given percentile group before (Pre-tax) and after (Post-tax) taking into account the operation of the tax/transfer system (includes pensions). Source: based on <https://wid.world/country/united-kingdom/>

What Are the Effects of Alternative Interventions?

1) Direct Effects: The effects of government interventions that would be predicted if individuals did not change their behavior in response to the interventions.

Direct effects are relatively easy to compute

2) Indirect Effects: The effects of government interventions that arise only because individuals change their behavior in response to the interventions (sometimes called **unintended effects**)

Empirical public economics analysis tries to estimate indirect effects to inform the policy debate

Example: increasing top income tax rates mechanically raises tax revenue but top earners might find ways to evade/avoid taxes, reducing tax revenue relative to mechanical calculation

Plan for EPA II (ECON-3080) Lectures

- 1) **Overview of the UK tax-benefit system:** Facts and institutional details.
- 2) **Optimal income taxation:** Theory.
- 3) **Optimal transfers:** Optimal design, participation responses.
- 4) **Empirical evidence on responses to taxation:** Labour supply responses.
- 5) **Empirical evidence on responses to taxation:** Taxable income responses.

Overview of UK Taxes and Transfers

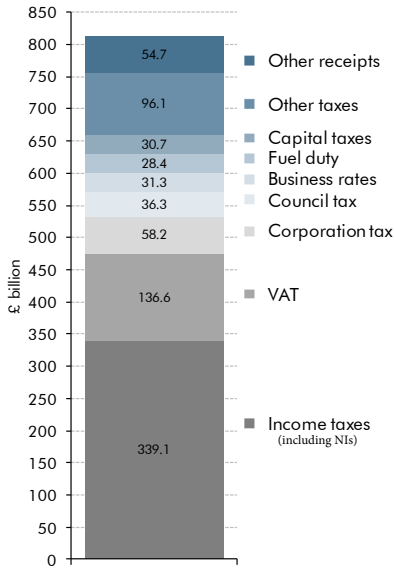
TAXATION AND REDISTRIBUTION

Key question: By how much should government reduce inequality using taxes and transfers?

- 1) Governments use **taxes** to raise revenue
- 2) This revenue funds **transfer** programs:
 - a) Universal Transfers: Public Education, Health Care (NHS), Retirement and Disability, Unemployment
 - b) Means-tested Transfers: In-kind (public housing, free childcare hours, free school meals) and cash benefits (WTC, UC)

Modern governments raise large fraction of GDP in taxes (30-45%) and spend significant fraction of GDP on transfers

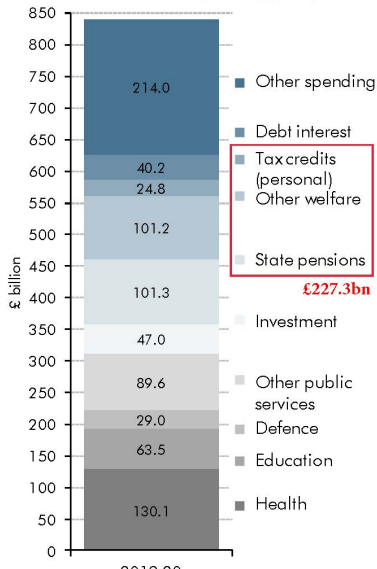
Public sector receipts (UK)



Source: OBR

2019-20

Public sector spending (UK)



Source: HMT, OBR

2019-20

FACTS ON UK TAXES AND TRANSFERS

References: Comprehensive description in:

“A brief guide to the public finances” (OBR)

[<https://www.gov.uk/browse/tax>]

[<https://www.gov.uk/browse/benefits>]

A) Taxes: (1) individual income tax, (2) payroll taxes on earnings (funds Social Security benefits, e.g. state pensions), (3) corporate tax, (4) VAT + excise taxes, (5) property taxes (council tax + stamp duty)

B) Means-tested Transfers: (1) refundable tax credits, (2) in-kind transfers: public housing, free meals, education, council tax support (3) cash welfare: pension credit, income support

The devil is in the details

A good public economist needs to know the institutional details. It's not boring. It's crucial.

It would be weird to understand optimal tax theory and ignore how the income tax works in practice.

The tax system reflects:

- i) social judgements made by people and policy makers, and
- ii) lobbying, political economy, interest groups.

You must understand implicit social judgements behind the tax system.

Question them! Which constraints are truly “irremovable”?

UK INCOME TAX

A tax on an **individual's** income (not family income) over the course of a **tax year** (6 April to 5 April of the following year). UK Government's largest single source of tax revenue

Tax is paid on the amount of **Taxable Income** remaining after allowances have been deducted

Personal Allowance (PA) is £12.5k (no tax on first 12.5k earned); PA may be bigger in specific cases (Marriage Allowance, Blind)

1. Add up gross income (wages, pensions, rental income, bank interest, etc.)
2. Adjusted Net Income (ANI) = Deduct tax-free allowances (private pension contributions, Gift Aid charity donations)
3. Use ANI to work out Personal Allowance
4. Taxable Income = ANI – Personal Allowance

Note: National Insurance contributions are not deductible

5. Income Tax Liability: Apply the tax schedule to your Taxable Income

UK Income Tax: Tax Brackets/Bands

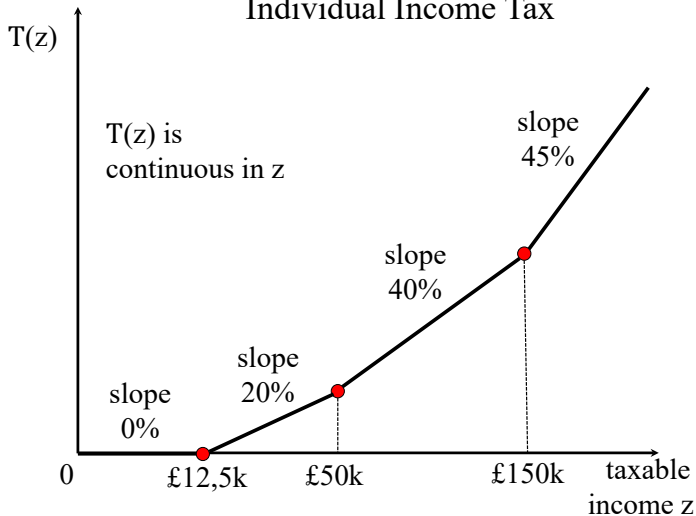
Tax $T(z)$ is a piecewise linear and continuous function of taxable income z with constant marginal tax rates (MTR) $T'(z)$ by bands

For 2020/21 tax year, 4 bands with MTR 0% (**personal allowance**), 20% (**basic rate**), 40% (**higher rate**), 45% (**additional rate**)

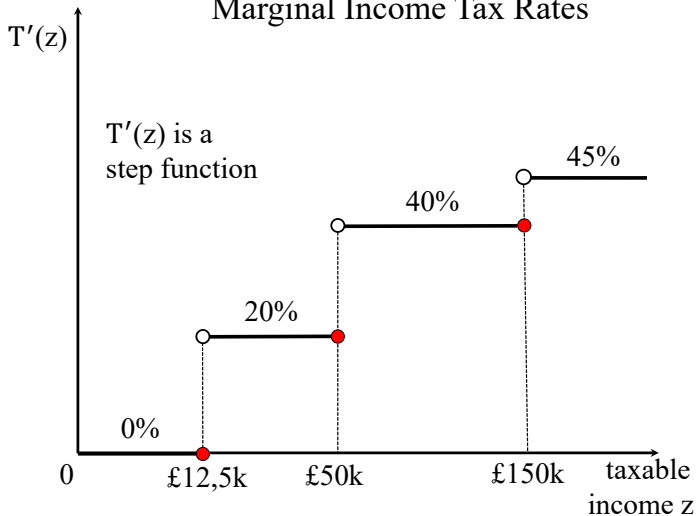
Note: **Marginal** bands mean you only pay the specified MTR on that portion of income. E.g., if your salary puts you in the 40% tax bracket, then you only pay 40% on that segment of earnings. For the lower part of your earnings, you'll still pay 20% and 0%.

Lower preferential rates (up to a max of 38.1%) apply to dividends, realized capital gains [in part to offset double taxation of corporate profits]

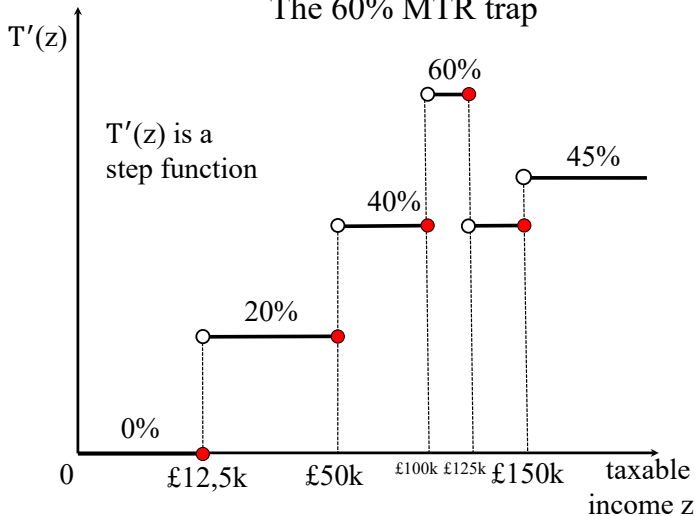
Individual Income Tax



Marginal Income Tax Rates



The 60% MTR trap



The £100k tax trap

Since 2010-11, Personal Allowance drops by 50p for every £1 earned over £100k (so, for PA of £12.5k, no PA on taxable income over £125k)

Withdrawal of PA effectively creates extra tax rates in the system:

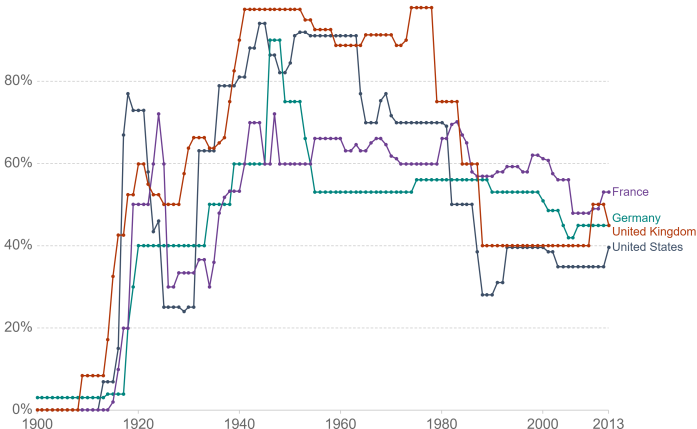
★ For each extra £1 of income, 50p of previously untaxed income is now taxed at 40% (so, an extra 20p of tax on that marginal pound) \Rightarrow MTR is 60% not 40% (on incomes up to £125k);

MTR drops back to 40% above £125k

Example: Someone on £100k who receives a £1k pay rise must pay £400 in income tax, but will also lose £500 of her PA. That extra £500 is taxed at 40%, costing the person an extra £200. So from the £1k, she loses £600 in tax, an effective 60% tax rate. [More here: The £100k tax trap]

Top marginal income tax rate, 1900 to 2013

Top marginal tax rate of the income tax (i.e. the maximum rate of taxation applied to the highest part of income)



Source: Piketty (2014)

OurWorldInData.org/taxation/ • CC BY

Tax rates change frequently over time. Top MTRs have declined drastically since 1970s (as in many OECD countries)

Historically, high MTRs above 80% not unusual (See)

UK Income Tax: National Insurance

In addition to income tax, most UK workers also have **National Insurance (NI) contributions** deducted from their pay

NI kicks in based on your earnings from the age of 16, and you usually stop paying when you reach state pension age

There are different 'classes' of NI. The type people pay depends on their employment status and how much they earn. Rates for most employees for the 2020/21 tax year:

Your pay	Class 1 NI rate
£183-£962 a week (£792-£4,167 a month)	12%
Over £962 a week (£4,167 a month)	2%

See the [HMRC website](#) for full rates. More info [here](#).


UK Income Tax: Tax Filing

(1) **Pay As You Earn (PAYE)**: Is the system employers or pension providers use to withhold Income Tax and NI contributions before paying wages/pension

An individual's **tax code**, provided by HMRC, tells the employer how much to deduct; normally starts with a number and ends with a letter (e.g., 1250L used for most people with 1 job)

(2) **Self Assessment**: You must fill in a tax return if your financial affairs are more complex (e.g., you're self-employed, have rental income, earn more than 100k)

Most taxpayers in the UK are taxed at source through PAYE and so do not need to complete a Self-Assessment Tax Return

ASSIGNMENT NUMBER [REDACTED]		EMPLOYEE NAME [REDACTED]			LOCATION [REDACTED]		
DEPARTMENT [REDACTED]		JOB TITLE Nursing Assistant			PAYSCALE DESCRIPTION Review Body Band 3		
		SAL/WAGE 21142.00		INC. DATE 18 MAR 2020		STANDARD HRS. 37.5	
		PT SAL/WAGE 21142.00		TAX OFFICE NAME [REDACTED]		TAX OFFICE REF [REDACTED]	
		TAX CODE 1250L CUMUL		NI NUMBER [REDACTED]			
PAY AND ALLOWANCES (- = MINUS AMOUNT)					DEDUCTIONS (R INDICATES REFUND)		
DESCRIPTION	WKD/EARNED	PAID/DUE	RATE	AMOUNT	DESCRIPTION	AMOUNT	BALANCE C/F
Basic Pay	162.95	162.95	10.8124	1761.83	PAYE	339.40	
Night Duty EN	99.00	33.00	10.8124	356.78	NI A	211.54	
Saturday EN	8.00	2.67	10.8124	28.84	NHS Pension 9.3%	223.32	
Sunday EN	26.00	17.33	10.8124	187.41			
WTD Pay				66.41			
Year To Date Balances (This Employment Only)					This Period Summary		
GROSS PAY 14732.94		TAXABLE PAY		13362.78	PENSIONABLE PAY 2401.27	TAXABLE PAY	2177.95
NI LETTER		A TAX PAID		2089.00	TAX PERIOD 6	NON-TAXABLE PAY	0.00
NI PAY 15664.51	OTHER NI PAY -931.57	PREVIOUS TAXABLE PAY		0.00	FREQUENCY Monthly	TOTAL PAYMENTS	2401.27
NI CONTS 1309.50	OTHER NI CONTS	PREVIOUS TAX PAID		0.00	PERIOD END DATE 30 SEP 2020	TOTAL DEDUCTIONS	774.26
PENSIONABLE PAY 14732.94		PENSION CONTS		1370.16	PAY DATE 25 SEP 2020	NET PAY	1627.01
SD REF NUMBER [REDACTED]		EMPLOYEE NO. [REDACTED]			PAY METHOD BACS		

UK BENEFIT SYSTEM

The largest single area of government spending. Current system consists of many components:

- ★ **Tax credits** (Working Tax Credit, Child Tax Credit); **Families with children** (Child Benefit, Guardian's Allowance, etc); **On low income** (Income Support, Housing Benefit, Council Tax Reduction); **Unemployed** (Jobseeker's Allowance); **Sick and disabled** (Employment and Support Allowance, Disability Living Allowance); **Older people** (Retirement pensions, Winter Fuel Payment); **Bereaved people**; and many other

Recipients can be *in-work* or *out-of-work*; some are *means-tested*

Universal Credit is gradually replacing 6 means-tested benefits (CTC, HB, IS, JSA, ESA, WTC) by one single payment

Overall, very complex system (govt **calculators** available)

A complete review is beyond the scope of this course

UK TAX CREDITS

Working Tax Credit (WTC) & Child Tax Credit (CTC)

Unlike income tax, based on *family income* from year $t - 1$

You may qualify for just one, both, or neither [More info]

- (1) **WTC**: in-work support for those on a low income
Hours-per-week requirement: E.g., lone parents (16+ hours),
childless aged 25-59 (30+ hours), couples (24+ hours btw them &
one partner 16+ hours)
- (2) **CTC**: supports families with children, not an in-work credit

Benefit amount: comprises several elements (see table below)

It depends on your income. Max award tapered away by 41p for every
£1 of income above a threshold (41% phase-out rate)

Two tax credits:

Apr-20

Child Tax Credit

Family element	£545*
Child element (per child)	£2,830
Disabled child element	£3,415
Severely disabled child element	£4,800

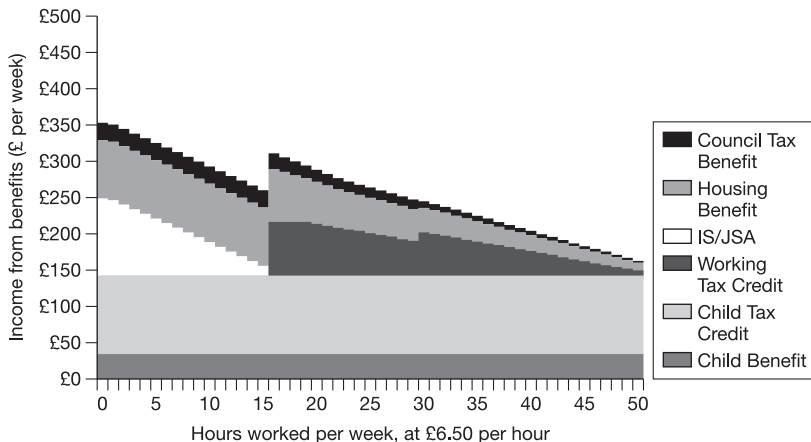
Working Tax Credit

Basic element	£3,040
Couple/lone parent element	£2,045
30 hour element	£825
Disabled worker element	£3,220
Severe disability element	£1,390
Childcare element: Max eligible cost for 1 child	£175 pw
Childcare element: Max eligible cost for 2+ children	£300 pw
Eligible childcare costs covered (%)	70%

Income thresholds and withdrawal rates

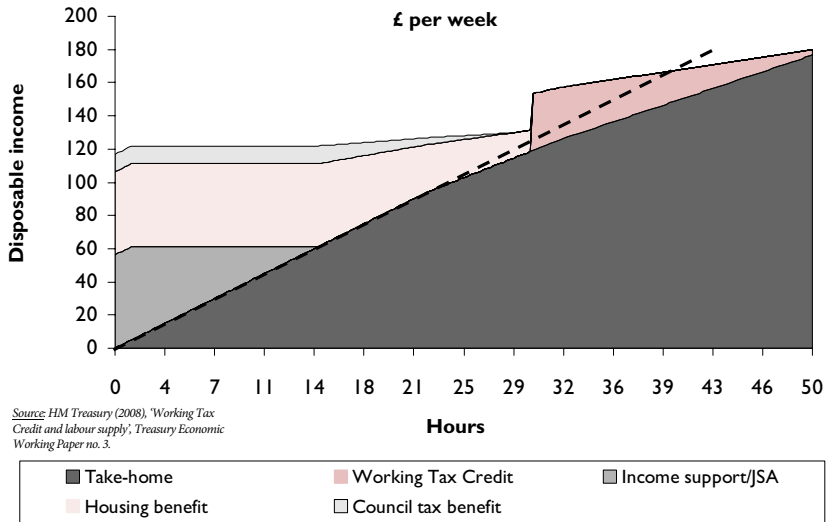
Threshold for max CTC where neither partner gets WTC	£16,385
Threshold for families who meet conditions for both tax credits	£6,530
Withdrawal rate (% of income >threshold taken off the credit)	41%

Current system of welfare entitlements for an example family



Notes: The entitlements are based on an assumed couple with two children. Only one person in the couple is in work, and they can choose how many hours to work at a given wage rate, £6.50 per hour. The family has no disabled members and no unearned income. Its Local Housing Allowance (LHA) or eligible rent is £80 per week and its council tax liability is £24 per week. *Source: Brewer, Browne, and Jin (2012), Universal Credit: A Preliminary Analysis. Fiscal Studies, 33: 39-71.*

Example: 25-yo single childless min-wage earner in 2004-05



U.S. INCOME TAX CREDITS

Earned Income Tax Credit (**EITC**) and Child Tax Credit (**CTC**): major in-work tax credits for low income working families

Eligibility: taxpayer's earned income and # of qualifying children
Benefit schedule (3 regions): phase-in, plateau, phase-out

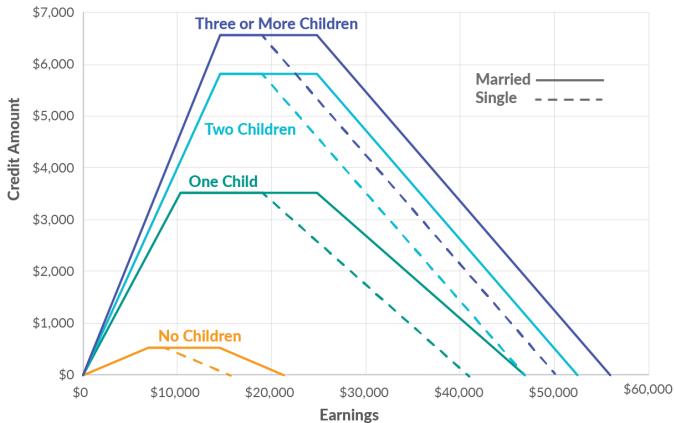
[EITC provides up to \$3.5k, \$5.7k, \$6.5k for families with 1, 2, 3+ kids; CTC up to \$2k per kid]

US vs UK: EITC/CTC aligned with the income tax system; paid as an annual lump sum; no hours requirement; CTC phased out high in the income distribution; EITC has a high phase-in rate and weak out-of-work safety net; UK provides more generous cash benefits to non-working families; much higher phase-out rate in the UK [See Brewer & Hoynes (2019) for more detail]

★ EITC: useful benchmark to learn optimal theory; many studies

The Phase-In and Phaseout of the EITC

Credit Amount by Marital Status and Number of Children

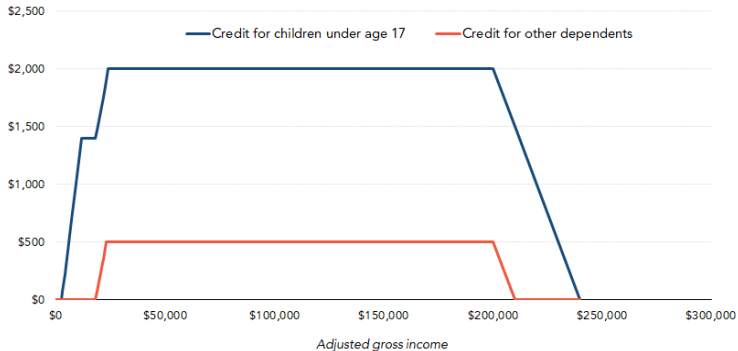


Source: Amir El-Sibaie, "2019 Tax Brackets," Tax Foundation, Nov. 28, 2018.

TAX FOUNDATION

@TaxFoundation

FIGURE 1
Child Tax Credit, Single Parent
For one child, tax year 2020



Source: Urban-Brookings Tax Policy Center calculations.

Notes: Assumes all income comes from earnings, and child meets all tests to be a CTC-qualifying dependent. Credit for married parents begins to phase out at \$400,000 of income. Only citizen children qualify for the \$2,000 CTC for children under 17. Noncitizens under age 17 who meet the dependency tests of eligibility can qualify for the credit for dependents over age 17.

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Appendix

Key slides:

- ★ 11-13: pretty important figure + the takeaway
- ★ 20-26: understand the legal framework (how the income tax works, brackets, the 60% MTR trap, NICs)
- ★ 28: payslip (withholding of income tax and NICs)
- ★ 33: pretty important figure
- ★ 34: how US and UK tax credits differ

Example: How MTRs work

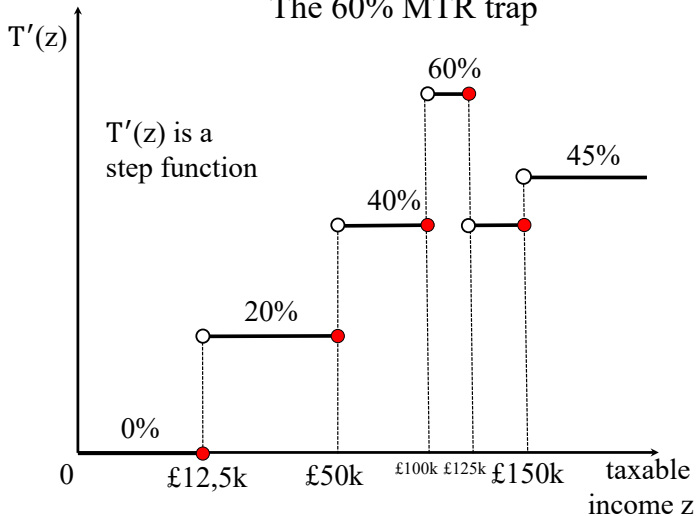
(1) If you earn £30,000 (gross) per year, you will pay:

- Nothing on the first £12,500
- 20% (£3,500) on the next £17,500
- Total annual income tax = £3,500
- Take-home pay = £26,500

(2) If you earn £55,000 (gross) per year, you will pay:

- Nothing on the first £12,500
- 20% (£7,500) on the next £37,500
- 40% (£2,000) on the next £5,000
- Total annual income tax = £9,500
- Take-home pay = £40,500

The 60% MTR trap



Pay slip example

Worker earns an annual salary of £21,142 (1761.83 per month)

Falls in the “basic rate” band with MTR of 20% on the portion of salary between 12.5k and 50k:


- No tax is paid on the first £12,500 (Tax code: 1250L)
- Pays 20% (£1728.4) on the next $(21,142 - 12,500 = 8,642)$

Total annual income tax = £1728.4

Take-home pay = £19413.6

Exact withholding of income tax and NICs by employers (monthly) – see lines “PAYE” and “NI A”

Wage components: (i) Basic Pay (more rigid); (ii) Night and weekends (more flexibility). (ii) could be more respondent to income taxation

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