Labour supply responses to fiscal reforms in Portugal: an illustration with recent PIT and child benefit reforms

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Roadmap

I. Motivation and research question
II. Policy changes
III. Data and methodology
IV. Labour supply elasticities
V. Non-behaviour effects
VI. Labour supply effects
VII. Concluding remarks

I. MOTIVATION AND RESEARCH QUESTION

Background: prolific decade on policy measures

- **In the last decade**, two major economic disruptions: the Great Recession (including a severe sovereign debt crisis) and the Covid-19 sanitary crisis

- **In the aftermath of the sovereign debt crisis and during the PFA Programme**: fiscal consolidation measures, including a reduction of the number of PIT brackets and of the child benefit amounts targeted to younger children and to families with higher incomes

- **After 2015, reversion of consolidation measures**: increase of the number of PIT brackets and of the coverage and amounts of the child benefit with focus on younger children and single-parent families

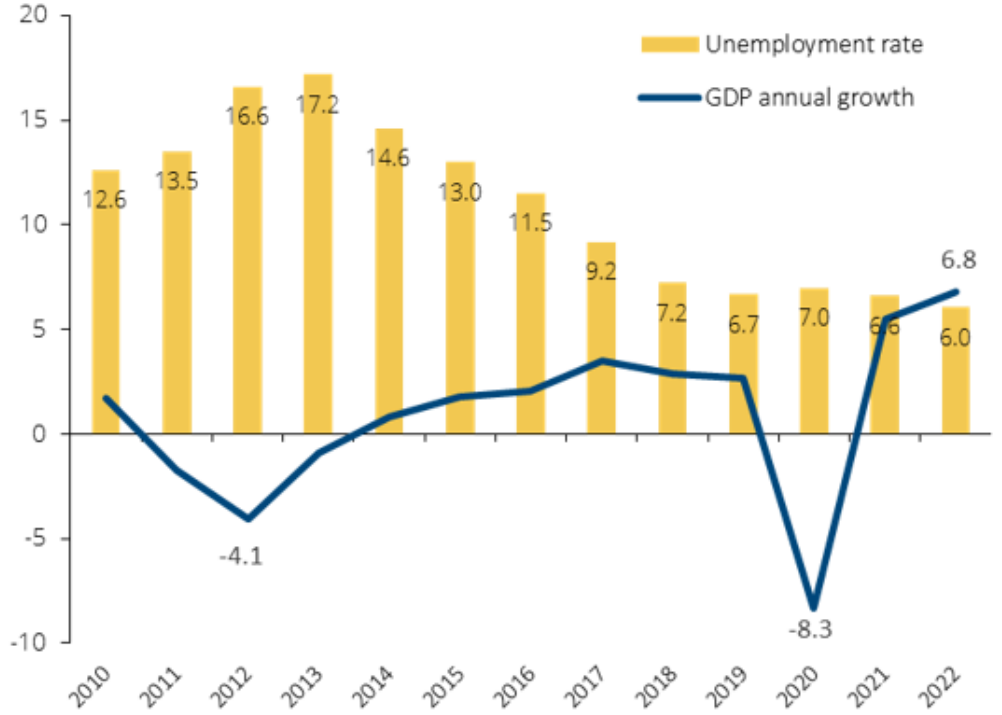
- **Pandemic crisis**: expansionary fiscal measures, mainly aimed at supporting employment (temporary lay-off schemes and reinforcement of social transfers)

- **From 2021 onwards**: PIT schedule changes and reinforcement of the child benefit; measures to mitigate the impact of the rising inflation in 2022 and 2023 (temporary cash benefits)

The Portuguese labour market: fast recovery of employment and unemployment rate at the lowest level in the decade

Employment, number of employees and hours worked
Index 2010=100

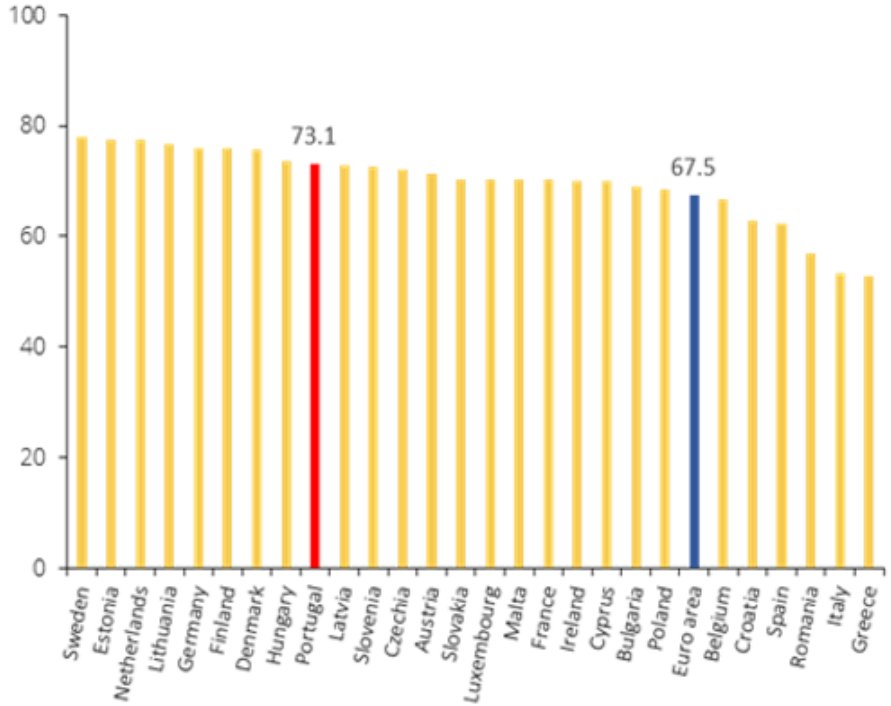
Unemployment rate and GDP annual growth
(%)



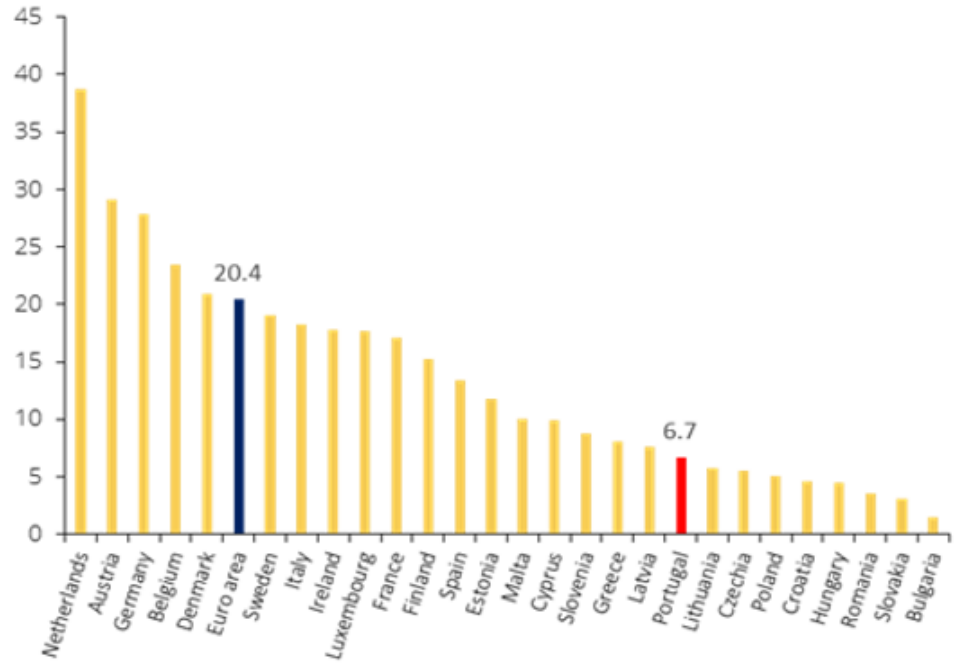
Source: Statistics Portugal

The Portuguese labour market: high female participation and low share of part-time jobs

Female employment rates in Europe, in 2021
(%)



Employees in part-time work rates in Europe, in 2021
(%)



Source: Eurostat | Note: Individuals aged between 20 and 64 years old.

We aim at comprehensively assess the impacts of recent tax and benefit reforms in Portugal

Threefold contribution:

1. Structural labour supply analysis, which is unique in the labour supply literature on the Portuguese case

2. Real time assessment of first and second order (potential) effects of fiscal reforms, which can be a guide for improving policy targeting

3. Estimation of labour supply elasticities, that can be further used for calibration purposes (designing other policies, calibrating general equilibrium models,…)

II. POLICY CHANGES

PIT and child benefit measures

BETTER POLICIES FOR BETTER LIVES

Taxes: expansionary measures, increasing tax progressivity

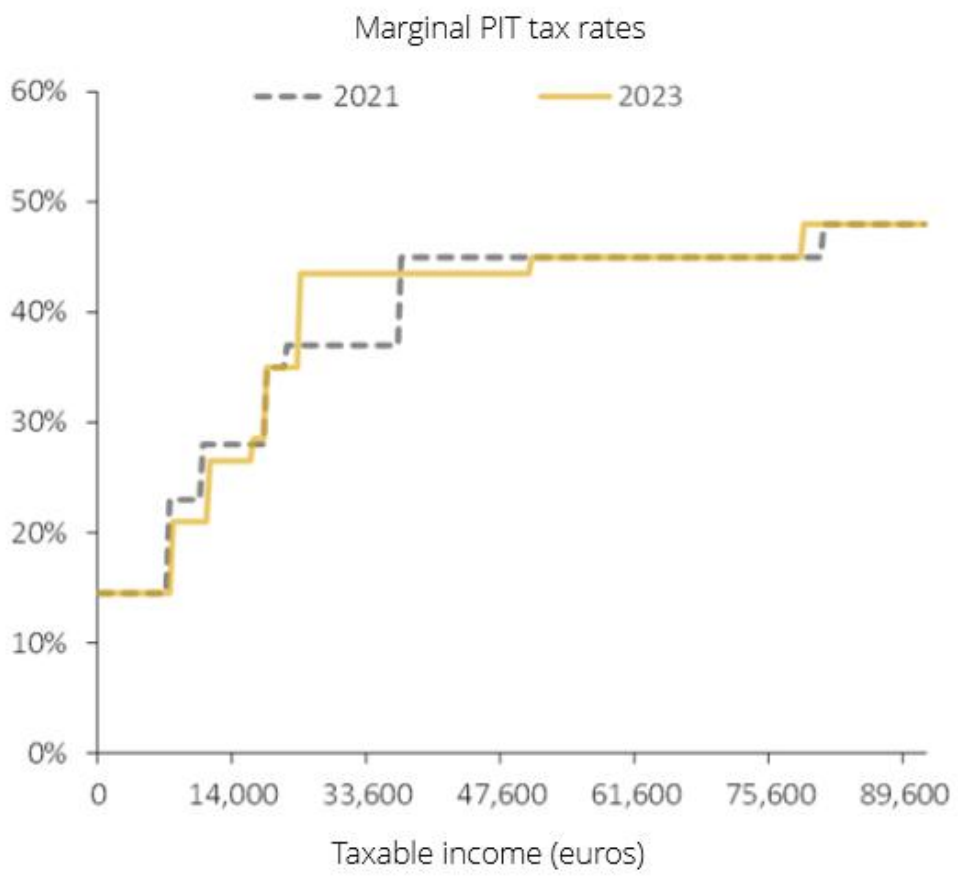
PIT schedule

- Increase of the number of tax brackets from seven to nine, in 2022
- Reduction of the second bracket tax rate from 23% to 21%, in 2023
- Update of tax brackets by 5.1%, to mitigate inflation drag, in 2023

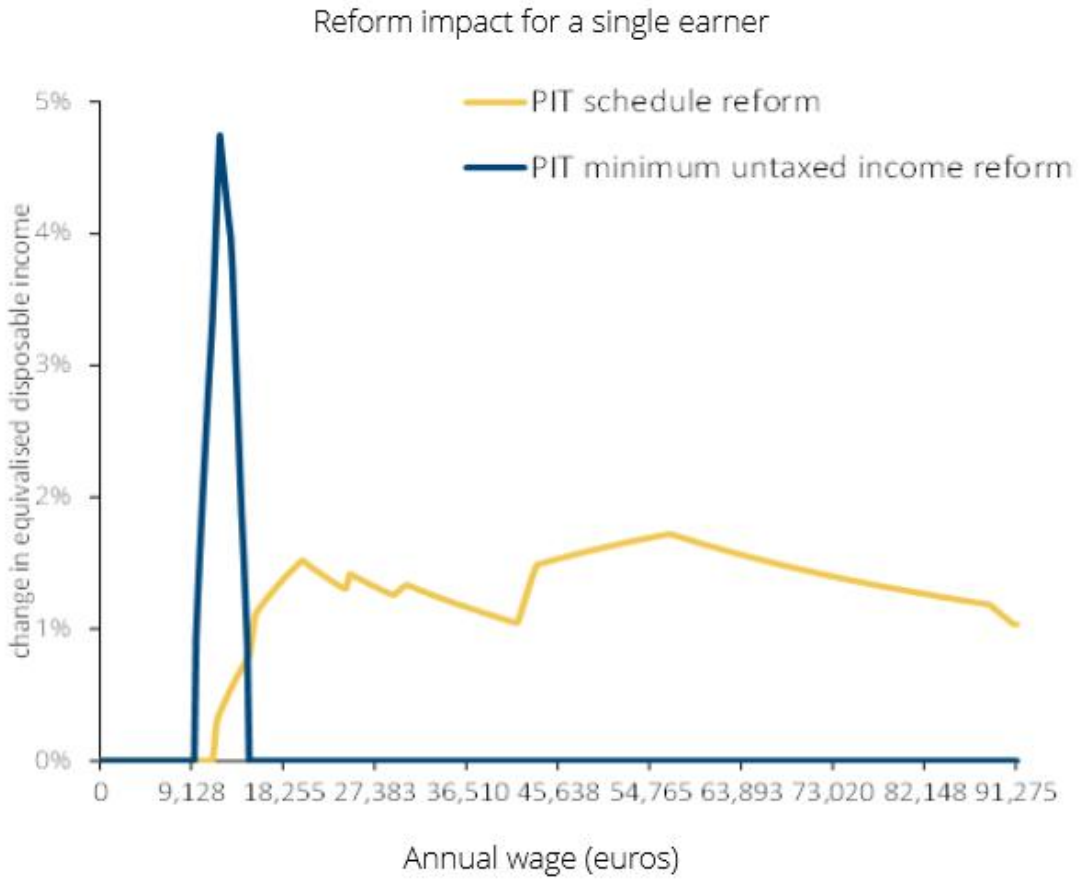
Minimum untaxed income

- Changes to the tax rebate ensuring a minimum untaxed income to all taxpayers (gradually introduced between 2022 and 2024)
- Aimed at avoiding 100% marginal tax rates applied to workers close to the minimum wage (steadily increasing in the last years)

Taxes: and balancing the gains across taxpayers' distribution



Source: Portuguese PIT legislation



Source: Authors' calculations based on EUROMOD simulations using the hypothetical household tool (Hufkens et al. (2019))

Benefits: strenghtening child benefit transfers and targeting poor families

Main child benefit changes in 2022 and 2023

- Increase in the amounts transferred to families at extreme poverty risk
- Increase in the amounts transferred to families with older children
- Creation of a complementary transfer for families with children ensuring that, in the sum of the child benefit with the PIT child tax deduction, every family receives a minimum monthly amount (benefiting mostly middle-income families)

III. DATA AND METHODOLOGY

EUROMOD and EUROLAB

BETTER POLICIES FOR BETTER LIVES

Combination of models that run upon EU-SILC data

EUROLAB
[Narazani, Colombino and Palma, 2021]

- Discrete choice labour supply model (Aaberge et al., 1995; Van Soest, 1995)
- Based on the Random Utility Maximization approach (McFadden, 1974)
- Following a sectoral labour supply model (Dagsvik & Strom, 2006)
- Allows to estimate a set of structural parameters and apply them to predict labour supply behaviour

EUROMOD
[Sutherland and Figari, 2013]

- EU tax-benefit microsimulation model
- Simulates direct taxes & cash benefits based on fiscal rules and assesses distributional/budgetary effects of policy reforms
- Static model ("morning after" impacts) but can be used to build counterfactual reform scenarios
- Identification mechanism in the EUROLAB context: simulation of counterfactual budget constraints

EU-SILC data (Portuguese module for 2020)

- Representative survey of the Portuguese population
- Detailed information on socio-demographic characteristics at the individual and household level
- Information on individuals' job search efforts (allows to distinguish unemployment from voluntary non-participation)

EUROLAB: Main building blocks

Choice set

Households assumed to choose within a set of alternatives Ω: **market job (employment), job-search (unemployment), non-market activities (non-participation)**, characterized by **(H,w)**, where **H hours of work and w is the wage rate**

- ✓ If **market job**: H in the ranges [1-5], [6-18], [19-31], [32-44] and [44-57]
- ✓ If **job-search**: H random value drawn from [1 - 5] as time devoted to job search; w is the unemployment subsidy
- ✓ If **non-market activity**: H = w = 0

Utility function

Utility attained by **household i** when choosing **type j:**

$$U_{ij} = V(C_{ij}, T - h_j; \gamma_i) + \varepsilon_{ij}$$

where

- $C_{ij} = \tau(w_{ij}h_j, I_i)$ is disposable income computed according to the tax-transfer rule τ as a function of labour income $w_{ij}h_j$ *and* other exogenous income I_i
- T is total available time and $\boldsymbol{T - h}$ **is leisure**
- **ε~Gumbel(0,1)** is a random variable that accounts for unobserved factors affecting utility
- γ_i is a vector of parameters that characterize the preferences of household

Random utility maximization

Rational couple/individual chooses the alternative available in the market that maximizes utility.

The probability that couple/individual i is willing to accept an alternative of type k (Aaberge et al. 1995, 1999) is:

$$P_{ik} = \frac{exp\{V(C_{ik}, T - h_k; \gamma_i)\}}{\sum_{j\in\Omega} exp\{V(C_{ij}, T - h_j; \gamma_i)\}}$$

$$= \frac{exp\{V(C_{ik}, T - h_k; \gamma_i) + D'_{ik}\delta_i\}}{\sum_{j\in\Omega} exp\{V(C_{ij}, T - h_j; \gamma_i) + D'_{ij}\delta_i\}}$$

EUROLAB II: Empirical specification and selected estimation results

Quadratic regression equation

$$V(C, T-h; \gamma)$$
$$= \gamma_C C + \gamma_{CC} C^2 + \gamma_F (T-h_F) + \gamma_{FF} (T-h_F)^2 + \gamma_M (T-h_{MM}) + \gamma_{MM} (T-h_M)^2$$
$$+ \gamma_{FM} (T-h_F)(T-h_M)$$

Preference parameters

$$\gamma_C = \beta_C hhsize$$

$$\gamma_M = \beta_{M1} numch_3 + \beta_{M2} numch_6 + \beta_{M3} numch + \beta_{M4} age + \beta_{M5} age^2 + \beta_{M6} Migrant + \beta_{M7} Mortgage + \beta_{M8} Capital$$

$$\gamma_F = \beta_{F1} numch_3 + \beta_{F2} numch_6 + \beta_{F3} numch + \beta_{F4} age + \beta_{F5} age^2 + \beta_{F6} Migrant + \beta_{F7} Mortgage + \beta_{F8} Capital$$

Dummy variables

Migrant, mortgage, living in the capital

Conditional logit results

	Couples	Single Women
In-work dummy	-4.359***	-3.478***
	(-7.99)	(-7.26)
Part-time dummy	0.0545	0.129
	(0.27)	(0.65)
Full-time dummy	2.072***	2.116***
	(17.84)	(17.19)
Over-time dummy	-0.0988	-0.335*
	(-0.73)	(-2.33)
Unemployment dummy	-19.23	-18.55
	(-0.03)	(-0.04)
Leisure	0.198***	0.163***
	(4.50)	(4.12)
Leisure square	-0.00187***	-0.00121***
	(-5.13)	(-3.56)
Leisure x age	-0.00221	-0.00332**
	(-1.70)	(-3.05)
Leisure x age square	0.0000287*	0.0000423***
	(2.03)	(3.53)
Leisure x #children < 3 year	0.00573	-0.00372
	(1.29)	(-0.47)
Leisure x #children 2+	0.0124	0.00108
	(1.61)	(0.08)
Leisure x Migrant	-0.00555	0.00361
	(-0.47)	(0.31)
Leisure x Living in Lisbon	-0.0103*	0.00176
	(-2.19)	(0.42)
Leisure x Mortgage	-0.000656***	-0.000698***
	(-4.67)	(-4.07)
Leisure Male x Leisure Female	0.000278*	
	(2.43)	
Net income	0.0136***	0.0133***
	(6.59)	(7.13)
Net income square	-0.00000213**	-0.000000745
	(-3.03)	(-0.71)
Net income x household size	0.000315	0.0000846
	(1.06)	(0.22)
Net income x Leisure	-0.00000132	0.0000218*
	(-0.13)	(2.15)
Observations	102636	13956
ll	-4884.9	-2103.1
r2_p	0.522	0.495
aic	9837.8	4242.1
bic	10162.1	4377.9

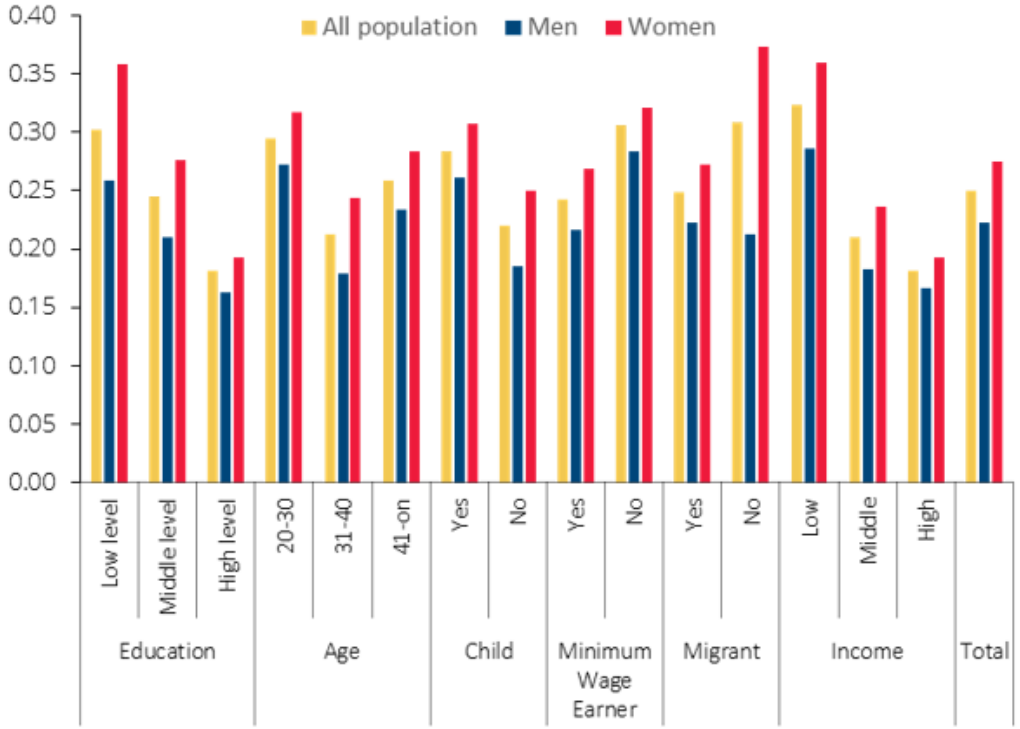
t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

IV. LABOUR SUPPLY ELASTICITIES

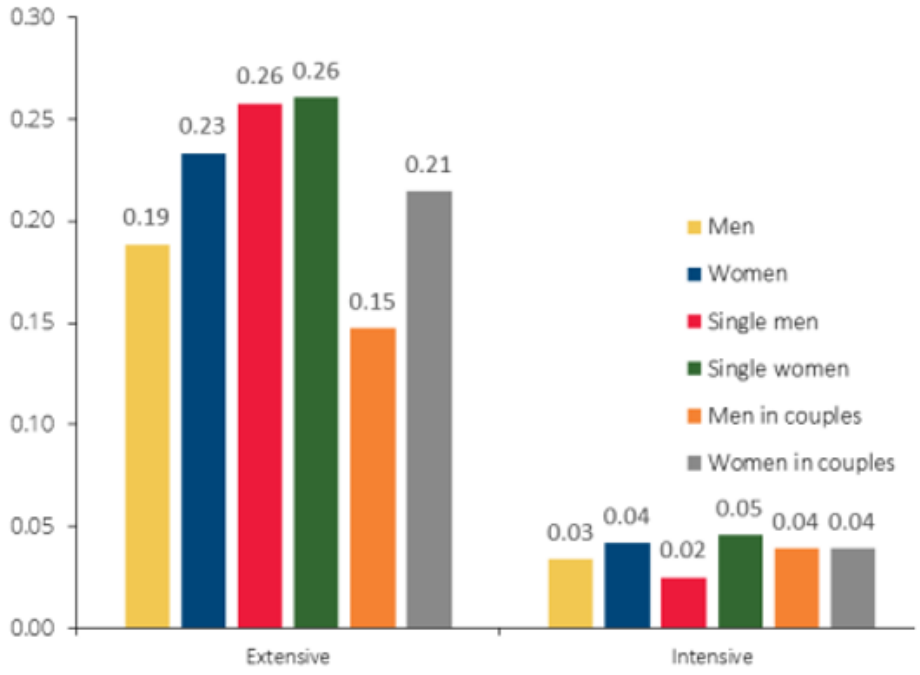
By population groups, intensive and extensive margin

Higher elasticities for women and for the extensive margin

Total labour supply elasticities, by gender and individual characteristics
(%)



Intensive and extensive margin labour supply elasticities, by gender and marital status
(%)



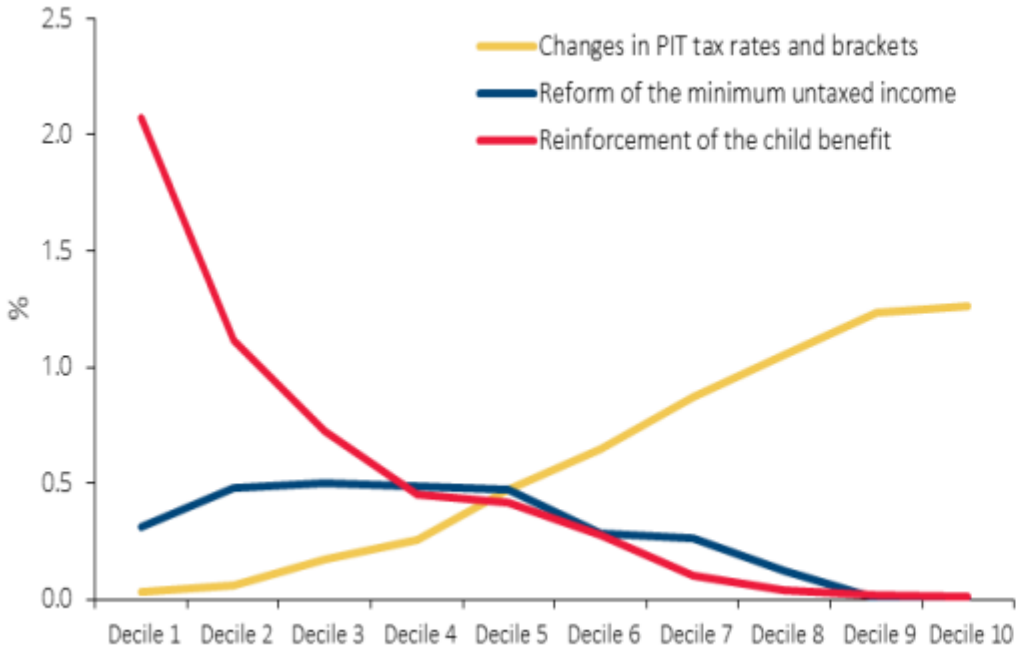
Source: EUROLAB

V. NON-BEHAVIOUR EFFECTS

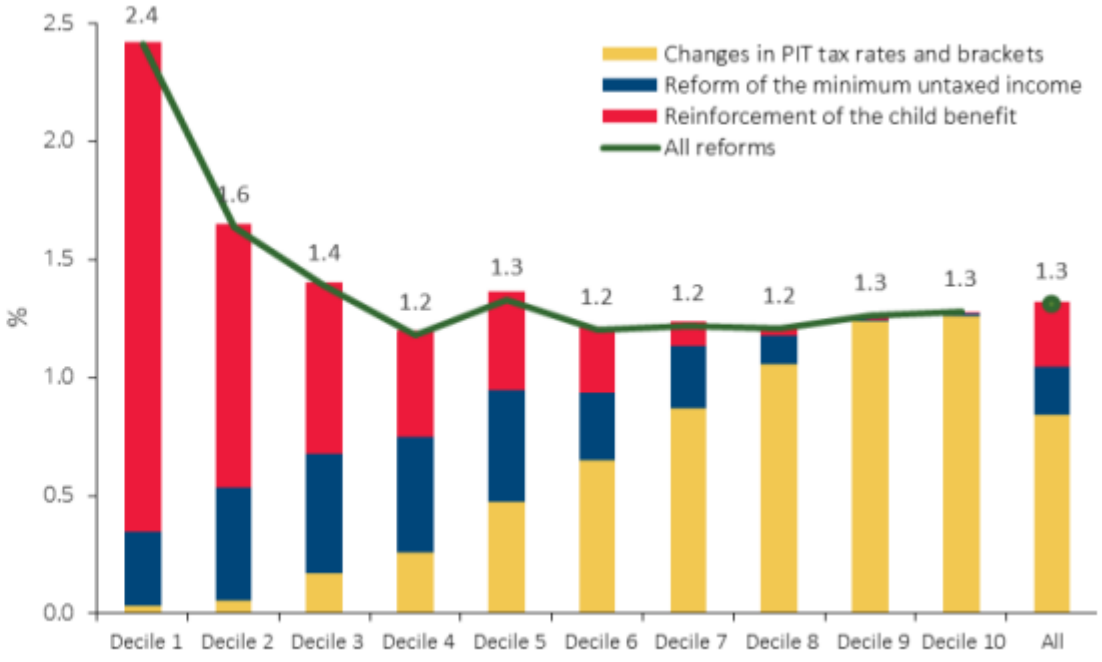
Impacts across the income distribution

The reinforcement of the child benefit smooths the regressive pattern of the PIT reforms

Individual impact of reforms on the equivalized disposable income across deciles
(%)



Total impact of reforms on the equivalized disposable income across deciles and all the population
(%)



Source: Authors' calculations based on EUROMOD simulations and EU-SILC| Note: Decile groups rank the individuals according to their equivalised disposable income in the baseline scenario. We follow the OECD-modified scale, in which the first individual is counted as 1, additional people aged 14 or above 0.5 and children up to 14 years-old 0.3.

VI. LABOUR SUPPLY EFFECTS

By household composition, gender and income groups
Employment and wage effects, in equilibrium

Small overall impact on hours of work and participation, with PIT (child benefit) reforms positively (negatively) affecting labour variables

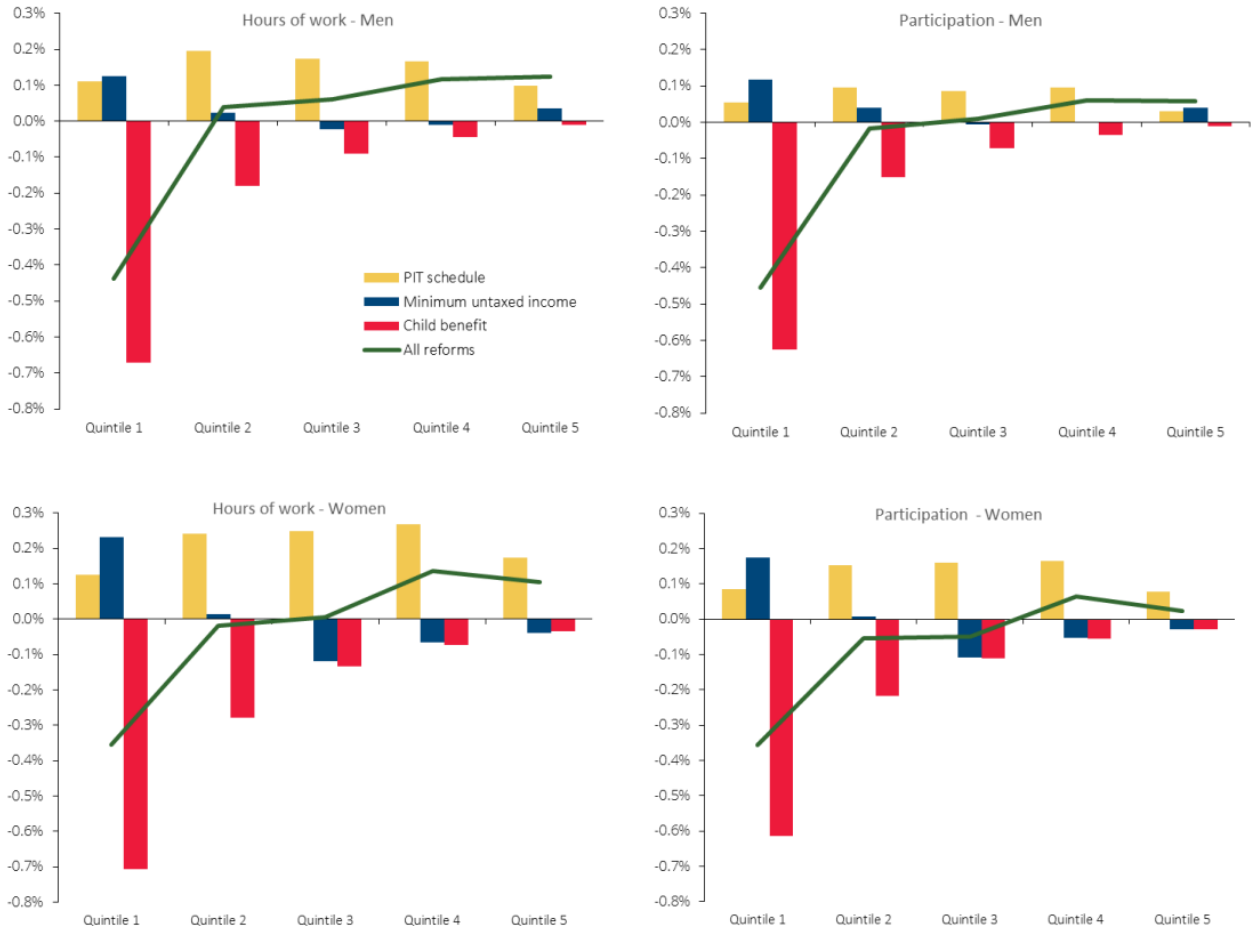
Labour supply changes by gender and household type, all population

		Baseline	% change after PIT schedule reform	% change after minimum untaxed income reform	% change after child benefit reform	% change after all reforms
Hours of work						
Men	In couple - with children	39.92	0.16%	-0.02%	-0.26%	-0.11%
	In couple - without children	37.68	0.15%	-0.11%	0.00%	0.04%
	Single - with children	37.55	0.26%	0.24%	-0.42%	0.07%
	Single - without children	34.59	0.14%	0.23%	-0.03%	0.33%
	Total	37.66	0.15%	0.03%	-0.18%	-0.01%
Women	In couple - with children	35.01	0.26%	-0.02%	-0.34%	-0.10%
	In couple - without children	34.02	0.23%	-0.31%	0.00%	-0.06%
	Single - with children	34.78	0.17%	0.07%	-0.40%	-0.16%
	Single - without children	33.43	0.16%	0.34%	-0.01%	0.47%
	Total	34.14	0.22%	-0.01%	-0.22%	0.00%
All	**Total**	35.85	0.18%	0.01%	-0.20%	-0.01%
Participation						
Men	In couple - with children	0.94	0.07%	-0.01%	-0.23%	-0.17%
	In couple - without children	0.90	0.07%	-0.11%	0.00%	-0.03%
	Single - with children	0.89	0.17%	0.26%	-0.36%	0.06%
	Single - without children	0.83	0.08%	0.25%	-0.02%	0.29%
	Total	0.90	0.07%	0.04%	-0.17%	-0.06%
Women	In couple - with children	0.89	0.17%	-0.02%	-0.29%	-0.14%
	In couple - without children	0.87	0.16%	-0.30%	0.00%	-0.12%
	Single - with children	0.88	0.07%	0.07%	-0.31%	-0.17%
	Single - without children	0.86	0.07%	0.31%	-0.01%	0.35%
	Total	0.87	0.13%	-0.01%	-0.18%	-0.06%
All	**Total**	0.88	0.10%	0.01%	-0.17%	-0.06%

Source: EUROLAB| Note: Children are defined as son-daughter of the decision-making unit. They are not older than 18 years, or if older, in education. Income quintiles are constructed based on equivalized disposable income under the baseline system.

Stronger effects for income groups more targeted by the policy changes

Labour supply changes by gender and income quintiles



Source: EUROLAB| Note: Children are defined as son-daughter of the decision-making unit. They are not older than 18 years, or if older, in education. Income quintiles are constructed based on equivalized disposable income under the baseline system.

Labour demand dampens the impacts and the effects of the policies on the equilibrium wage are small

Participation and wage changes, in equilibrium

	Employment	Inactivity	Unemployment	Wage % change
Baseline	3004003	371412	477302	
% change after PIT schedule reform				
No equilibrium	0.24%	-0.73%	-0.13%	
Equilibrium	0.16%	-0.46%	-0.66%	-0.3
% change after minimum untaxed income reform				
No equilibrium	0.04%	-0.11%	-0.13%	
Equilibrium	0.02%	-0.07%	-0.09%	0.0
% change after child benefit reform				
No equilibrium	-0.42%	1.39%	1.54%	
Equilibrium	-0.28%	0.92%	1.05%	0.6
% change after all reforms				
No equilibrium	-0.14%	0.53%	0.45%	
Equilibrium	-0.09%	0.38%	0.29%	0.2

Source: EUROLAB | Note: Elasticity of demand calibrated to 0.5. Only the individuals in the behavioural sample are considered in these calculations.

All reforms are welfare enhancing

Welfare and efficiency indicators

	Baseline	PIT schedule reform	Minium untaxed income reform	Child benefit reform	All the reforms
Social Welfare	790	795	792	793	801
Gini index	0.298	0.300	0.297	0.296	0.297
Marginal Cost of Public Funds		0.11	-0.03	-0.27	0.01
Winners		0.70	0.24	0.22	0.88

Source: EUROLAB | Note: Social Welfare is computed as the product of the average disposable income of all households and the Gini index; the Gini index is computed on the equivalized disposable income; the marginal cost of public funds is calculated as 1 minus the ratio between the change in net revenues with behavioural effect on the change in net revenues without behaviour; the winners is the share of the sample experience an increase in the equivalized disposable income due to the reform.

VII. CONCLUDING REMARKS

Main findings

- Labour supply elasticities are overall relatively small, higher for females than males and especially rigid in the intensive margin, reflecting the characteristics of the Portuguese labour market (high participation, also from females, and low prevalence of part-time jobs)

- “Morning-after” effects are diverse: changes to the PIT tax schedule are regressive while the ones on the minimum exempted income have a flatter profile. On the contrary, the child benefit reform has a progressive nature.

- Labour supply responses are overall of small magnitude with PIT reforms producing positive effects on both labour margins and child benefit changes having the opposite effect.
  - Effects concentrated on certain groups, higher for single parents or those concentrated in the bottom half of the income distribution

- All the reforms are assessed as social welfare increasing

Future work

- Enrich the model with inclusion of sector of activity and type of employment on the choice set

- Refine the unemployment alternative and the equilibrium with a more realistic labour demand calibration

Thank you!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