

Supplementary material

Supplement to: Sanchez-Romero, M. (2021). Assessing the generational impact of COVID-19 using NTAs. *Vienna Yearbook of Population Research*, 20.
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S1. List of abbreviations

GDP	Gross Domestic Product
GE	General Equilibrium
NTA	National Transfer Accounts
NTTA	National Time Transfer Accounts
OLG	Overlapping Generations Model
UN	United Nations
VA	Value Added

Main codes for NTA age profiles

C	Consumption
CF	Private Consumption
CG	Public Consumption
CFE	Private Consumption, Education
CFH	Private Consumption, Health
CFX	Private Consumption, Other than Health and Education
CGE	Public Consumption, Education
CGH	Public Consumption, Health
CGX	Public Consumption, Other than Health and Education
RAF	Private Assets-Based Reallocations
T	Transfers
TF	Private Transfers
TG	Public Transfers
TFB	Private Transfers, Inter-household (between Households)
TGE[I/O]	Public Transfers, Education [Inflows/Outflows]
TGH[I/O]	Public Transfers, Health [Inflows/Outflows]
TGS[I/O]	Public Transfers, Social Protection Other than Pensions [Inflows/Outflows]
TGSOA[I/O]	Public Transfers, Pensions [Inflows/Outflows]
TGX[I/O]	Public Transfers, Other In-kind [Inflows/Outflows]
TGXC[I/O]	Public Transfers, Other Cash [Inflows/Outflows]
YL	Labour Income

S2. Impact of the COVID-19 pandemic on economic growth

To analyse the impact of the COVID-19 pandemic on economic growth, we regress the annual increase in the value added (the relative difference in the value added between 2020 and 2019 in the same quarter) to the change in the total fraction of people infected (FPI) between quarters

$$\Delta VA_{it} = \alpha + \beta \Delta FPI_{it} + \gamma IFR_i + \tau_t + u_{it}$$

where ΔVA_{it} is the annual change in the value added; ΔFPI_{it} is the increase in the total fraction of people infected between quarters; IFR_i is the infection fatality rate for country i , which is a proxy for the age of the population; and τ_t denotes the quarter of the year, with $t = \{1, 2, 3\}$. The independent variable of interest is the change in the fraction of total individuals infected, and the coefficient of interest is β . The results of running different models are shown in Table S1.

Table S1:
The impact of the COVID-19 pandemic on economic growth

	<i>Dependent variable:</i>				
	ΔVA_t				
	(1)	(2)	(3)	(4)	(5)
(Intercept)	−0.0428*** (0.0059)	0.0235 (0.0248)	0.0044 (0.0057)	0.0694*** (0.0154)	
ΔFPI_t	−0.7093* (0.3556)	−1.0245** (0.3657)	−0.6657** (0.2244)	−0.9782*** (0.2209)	−0.9782*** (0.2209)
IFR		−6.0028** (2.1835)		−5.9265*** (1.3168)	−5.9265*** (1.3168)
$\tau_{t=1}$					0.0694*** (0.0154)
$\tau_{t=2}$			−0.1074*** (0.0076)	−0.1072*** (0.0071)	−0.0378* (0.0155)
$\tau_{t=3}$			−0.0348*** (0.0077)	−0.0341*** (0.0072)	0.0353* (0.0156)
Observations	138	138	138	138	138
R^2	0.0286	0.0805	0.6202	0.6708	0.8078
Adjusted R^2	0.0214	0.0668	0.6117	0.6608	0.8005
F Statistic	3.978*	5.865**	72.4***	67.23***	110.9***

Notes: $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Data on value added by quarter are taken from Eurostat (GDP and main aggregates, NAIDQ_10_GDP), and the epidemiological data are taken from Sánchez-Romero et al. (2021). Regression (5), which is the most preferred among the five regressions, shows that a 1% increase in the number of people infected in a quarter leads to a decline of 0.98% in the value added in that quarter. Therefore, a 1% increase in the total fraction of people infected during a year leads to a decline of close to 0.25% in the annual value added; i.e. $\Delta VA_i = \frac{1}{4} \sum_{t=1}^4 \Delta VA_{it}$. The regression results are then used for calculating the relative change in the value added in the last quarter of 2020. The results of combining the relative change in the value added of the four quarters give the total relative change in the value added in 2020, which is transformed into the relative change in the total compensation of employees (or the total wage bill) by dividing this number by the labour share.

S3. Simulated NTA profiles in 2020 across selected countries

The following figures show per capita and aggregate national transfer accounts for 12 countries. In all simulated profiles, it is assumed that governments do not compensate workers for their labour income losses during the year 2020.

Figure S1:
Per capita and aggregate National Transfer Accounts for 12 countries

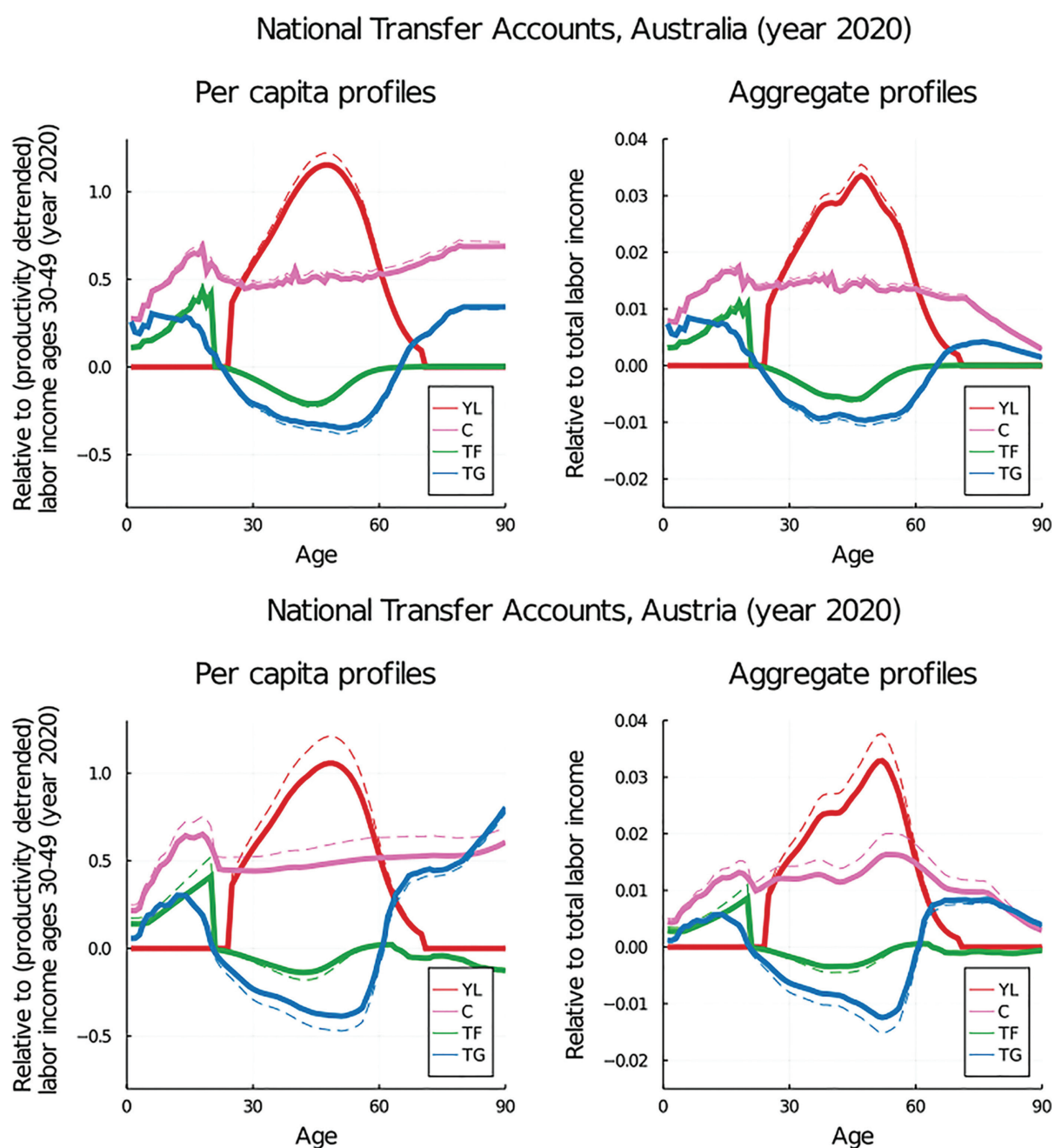


Figure S1:
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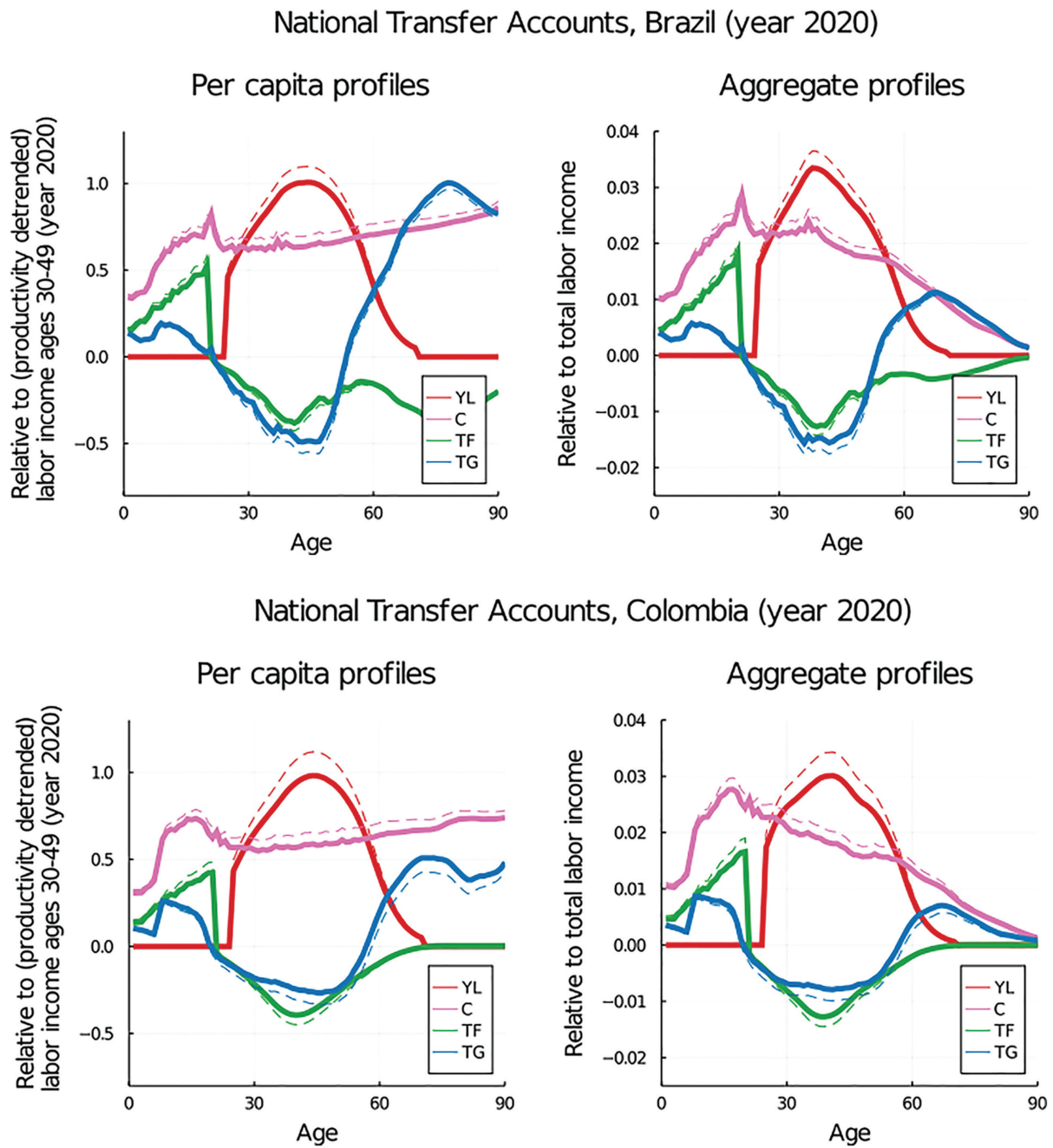


Figure S1:
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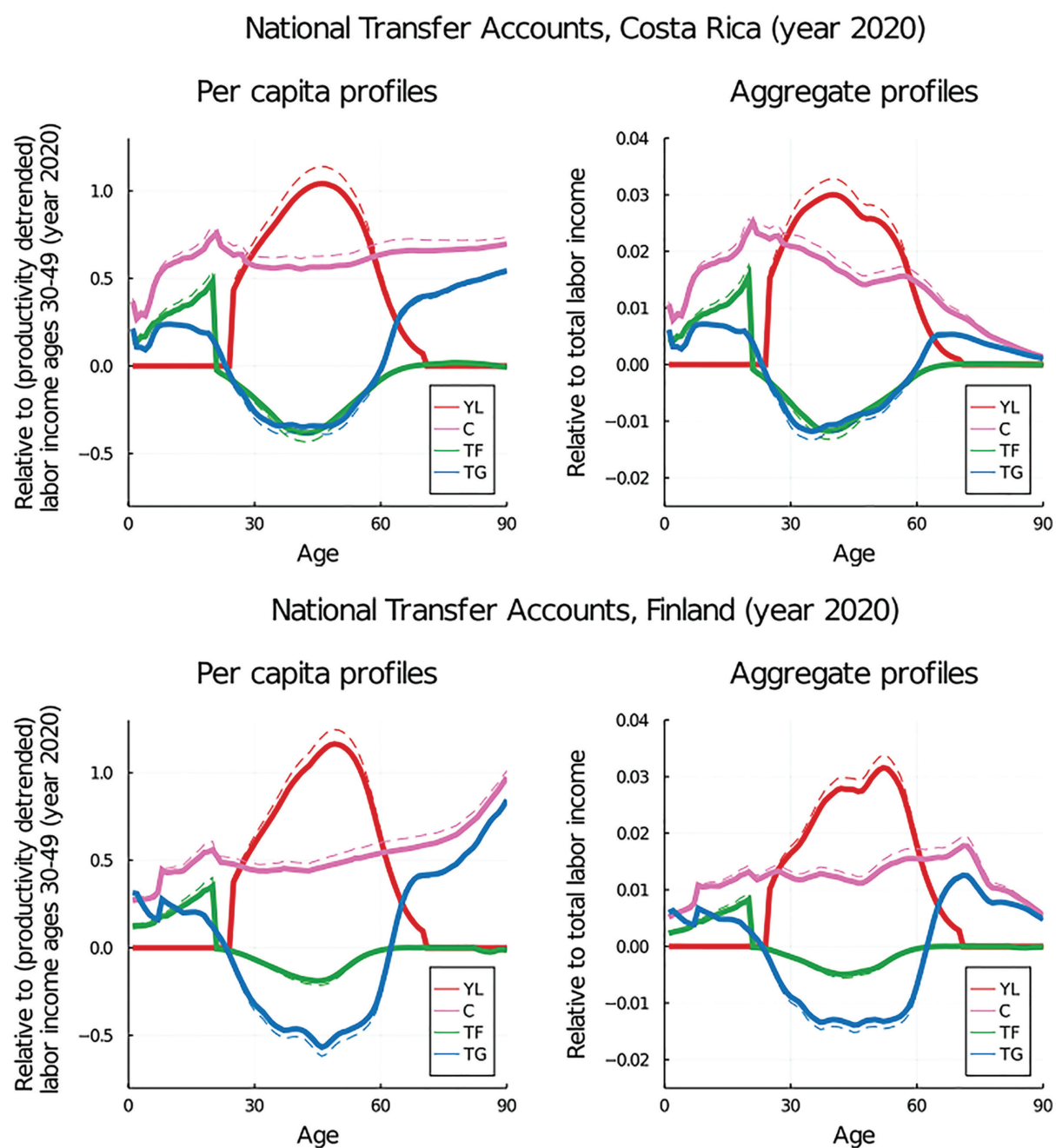


Figure S1:
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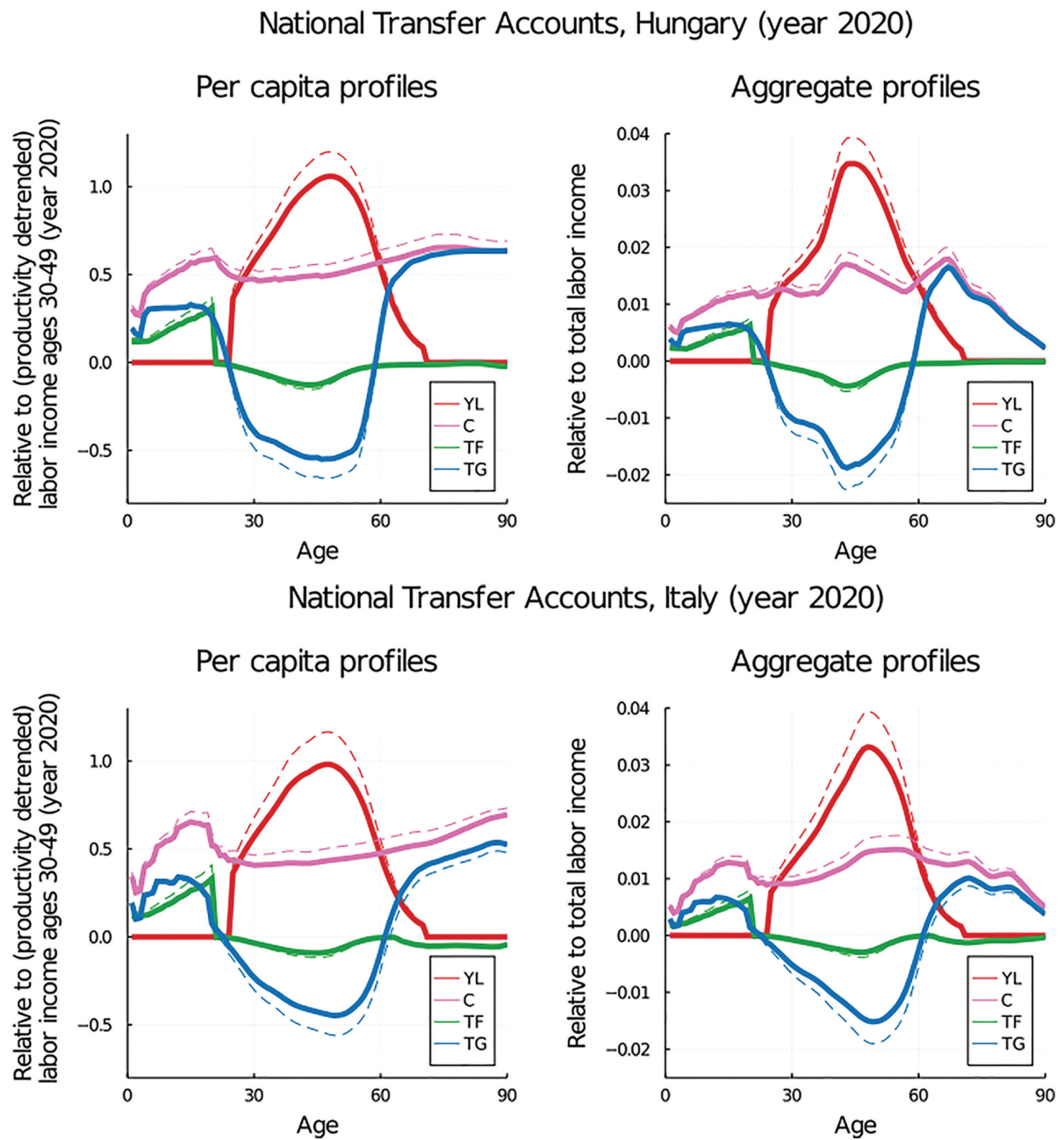


Figure S1:
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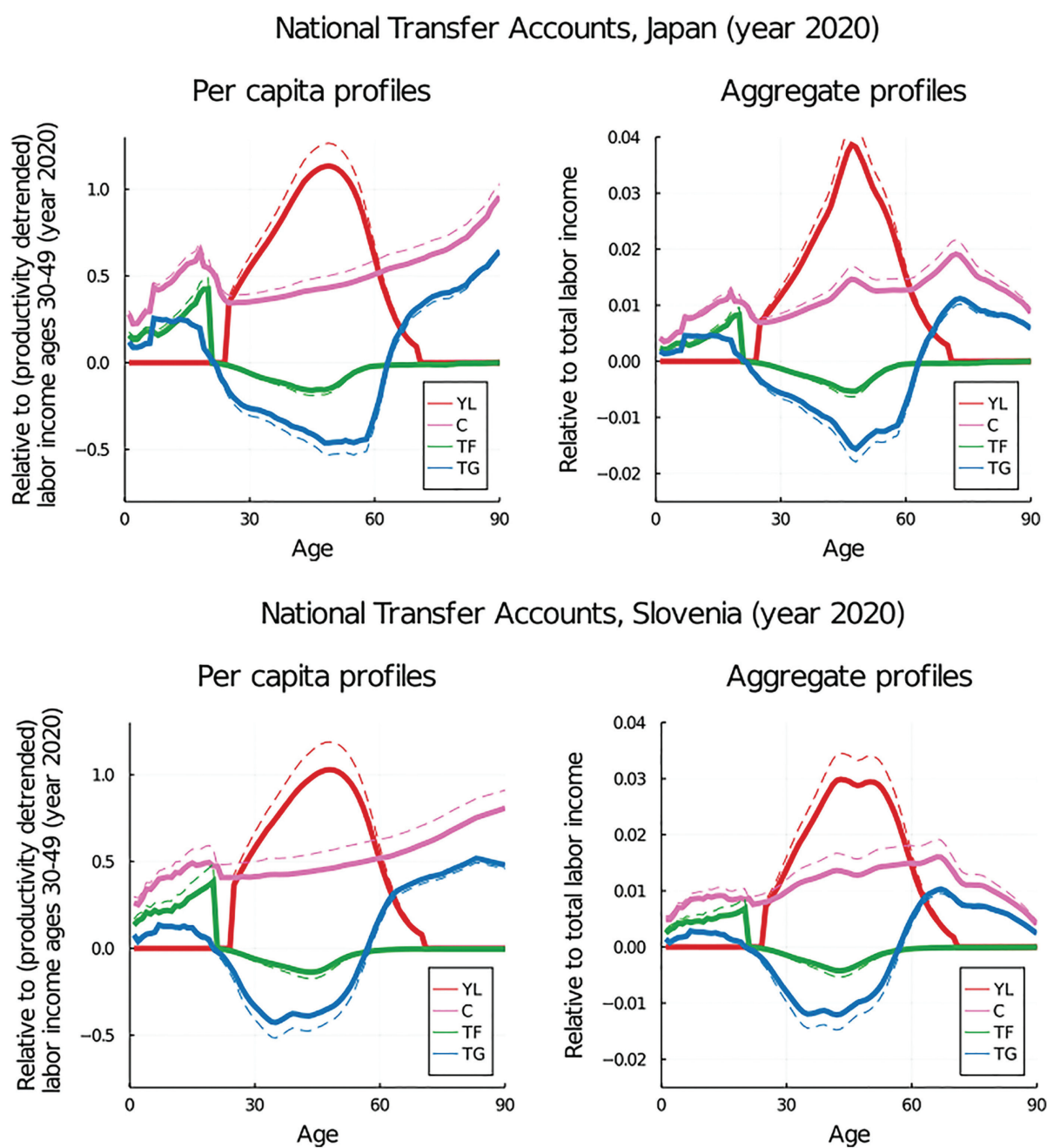
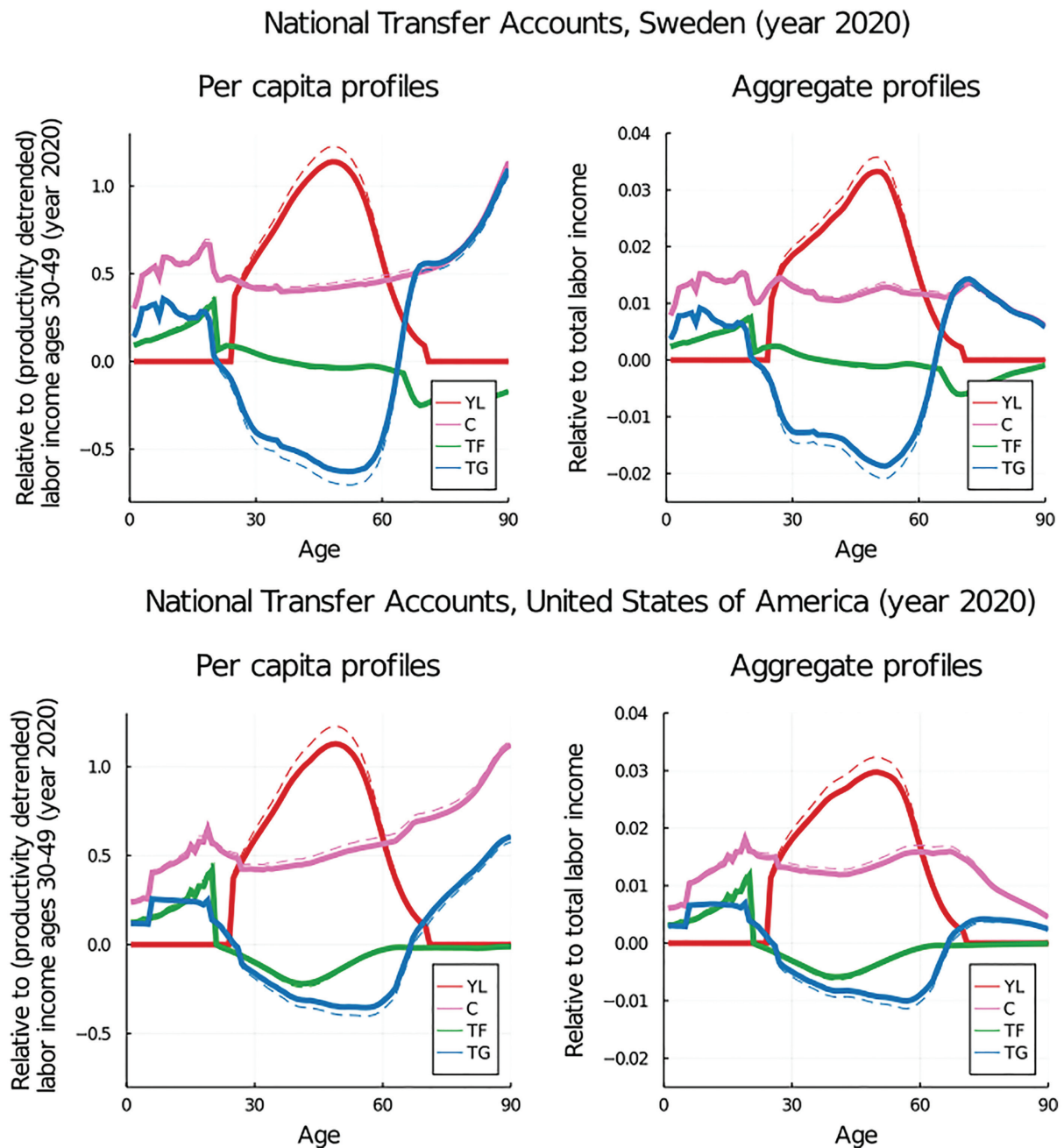


Figure S1:
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S4. Sensitivity analysis

In this section, we show how sensitive the results are to changes in the interest rate, and to changes in the labour income profiles by age groups.

S4.1. Different interest rates

Tables [S2–S5](#) show no significant quantitative changes in the results in response to different interest rates. In a general equilibrium model, this outcome should be expected, given that an increase in the interest rate is accompanied by a decline in the wage rate, which leaves the present value of consumption relative to labour income or the present value of transfers to labour income almost unchanged (see Tables [S2–S5](#)).

S4.2. Differential impact on the youth

To study the differential impact of the COVID-19 crisis on young people (under age 25) and adults (over age 25), we run additional simulations in which the labour income of young people declines 50% more than the labour income of adults (see ILO, 2021). Tables [S6–S9](#) show the differential impact of the COVID-19 pandemic on the results depicted in Tables [S2–S5](#), when the labour income of young people decreases 50% more than in the benchmark case. All of the results displayed in Tables [S6–S9](#) are in percentages. Thus, Tables [S6–S9](#) suggest that the greater decline in income among young people has a small impact at the aggregate level. This is because in the countries analysed, the labour income earned by young people is a small fraction of the total wage bill of the economy.

Table S2:

Sensitivity of the expected impact of the COVID-19 pandemic on debt and the total tax revenue (relative to the total wage bill) to different interest rates (1%, 2.5% and 4%): By level of labour income losses compensated by the government

Country	Interest rate	Debt		Tax	
		Support 0%	Support 100%	Support 0%	Support 100%
Australia	1.0%	5.5%	8.3%	0.3%	0.5%
	2.5%	5.6%	8.6%	0.4%	0.5%
	4.0%	5.8%	8.8%	0.4%	0.6%
Austria	1.0%	14.5%	20.5%	0.8%	1.2%
	2.5%	14.9%	21.2%	0.9%	1.4%
	4.0%	15.2%	21.8%	1.1%	1.6%
Brazil	1.0%	11.1%	13.9%	0.5%	0.7%
	2.5%	11.4%	14.3%	0.6%	0.8%
	4.0%	11.6%	14.7%	0.7%	0.9%
Colombia	1.0%	15.3%	19.8%	0.8%	1.1%
	2.5%	15.6%	20.4%	0.9%	1.2%
	4.0%	15.9%	21.0%	1.1%	1.4%
Costa Rica	1.0%	7.0%	11.9%	0.4%	0.6%
	2.5%	7.1%	12.3%	0.4%	0.8%
	4.0%	7.3%	12.6%	0.5%	0.9%
Finland	1.0%	8.0%	11.1%	0.5%	0.6%
	2.5%	8.2%	11.4%	0.5%	0.7%
	4.0%	8.4%	11.8%	0.6%	0.9%
Hungary	1.0%	14.7%	19.8%	0.8%	1.1%
	2.5%	15.0%	20.3%	0.9%	1.3%
	4.0%	15.4%	21.0%	1.1%	1.5%
Italy	1.0%	19.7%	26.7%	1.1%	1.5%
	2.5%	20.1%	27.5%	1.3%	1.8%
	4.0%	20.6%	28.4%	1.5%	2.1%
Japan	1.0%	11.5%	16.8%	0.7%	1.0%
	2.5%	11.8%	17.3%	0.8%	1.2%
	4.0%	12.0%	17.8%	0.9%	1.4%
Slovenia	1.0%	13.0%	20.6%	0.7%	1.2%
	2.5%	13.3%	21.3%	0.8%	1.4%
	4.0%	13.6%	21.9%	1.0%	1.6%
Sweden	1.0%	13.5%	14.6%	0.7%	0.8%
	2.5%	13.8%	15.0%	0.8%	0.9%
	4.0%	14.1%	15.5%	1.0%	1.1%
US	1.0%	7.7%	12.2%	0.4%	0.7%
	2.5%	7.9%	12.6%	0.5%	0.8%
	4.0%	8.1%	13.0%	0.6%	0.9%

Table S3:

Sensitivity of the impact of the COVID-19 pandemic on the remaining lifetime consumption to the average labour income ratio in 2020 by age group and government support to three different interest rates (1%, 2.5% and 4%)

Country	Interest rate	Ages 0–24 in 2020		Ages 25–64 in 2020		Ages 65+ in 2020	
		Support 0%	Support 100%	Support 0%	Support 100%	Support 0%	Support 100%
Australia	1.0%	–4.6	–2.1	–5.1	–2.1	0.3	–0.4
	2.5%	–4.5	–2.0	–5.0	–2.2	0.0	–0.5
	4.0%	–4.4	–1.9	–4.9	–2.2	–0.4	–0.5
Austria	1.0%	–11.6	–5.2	–18.2	–11.6	–5.0	–7.0
	2.5%	–11.6	–5.9	–17.0	–10.9	–5.5	–7.0
	4.0%	–11.6	–6.2	–16.2	–10.5	–6.6	–7.0
Brazil	1.0%	–3.7	0.1	–8.9	–5.9	–8.5	–10.4
	2.5%	–4.3	–0.8	–7.8	–4.9	–7.7	–9.4
	4.0%	–4.6	–1.3	–7.0	–4.3	–7.3	–8.6
Colombia	1.0%	–8.6	–3.6	–11.5	–6.9	–2.3	–7.4
	2.5%	–8.3	–3.5	–10.8	–6.4	–2.2	–6.9
	4.0%	–8.1	–3.4	–10.3	–6.1	–2.5	–6.6
Costa Rica	1.0%	–6.7	–2.6	–6.1	–4.1	–4.4	–5.1
	2.5%	–6.1	–2.7	–6.1	–3.8	–4.2	–4.6
	4.0%	–5.7	–2.6	–5.9	–3.6	–4.3	–4.3
Finland	1.0%	–6.5	–2.7	–5.5	–2.3	–0.9	–1.0
	2.5%	–5.8	–2.6	–5.6	–2.3	–1.2	–1.0
	4.0%	–5.4	–2.4	–5.6	–2.4	–1.7	–1.0
Hungary	1.0%	–11.1	–6.7	–10.5	–4.9	–6.7	–4.7
	2.5%	–9.9	–6.6	–10.5	–4.9	–6.4	–4.2
	4.0%	–9.1	–6.4	–10.5	–4.9	–6.7	–3.8
Italy	1.0%	–9.6	–4.4	–19.4	–8.7	–1.2	–4.0
	2.5%	–10.4	–4.9	–18.0	–8.1	–1.5	–3.8
	4.0%	–10.9	–5.0	–17.0	–7.7	–2.3	–3.7
Japan	1.0%	–8.8	–4.2	–10.2	–3.4	1.0	–0.1
	2.5%	–8.4	–3.9	–10.0	–3.5	0.3	–0.2
	4.0%	–8.2	–3.6	–9.9	–3.6	–0.7	–0.3
Slovenia	1.0%	–12.8	–5.1	–13.5	–5.0	–5.5	–5.0
	2.5%	–11.8	–5.1	–13.1	–4.8	–5.8	–4.6
	4.0%	–11.1	–5.0	–12.8	–4.7	–6.8	–4.4
Sweden	1.0%	–2.8	–0.9	–7.5	–2.9	–2.3	–3.6
	2.5%	–3.6	–1.6	–6.6	–2.4	–2.0	–3.2
	4.0%	–4.1	–1.9	–6.1	–2.3	–2.1	–2.8
US	1.0%	–3.8	–1.5	–8.6	–3.8	–3.0	–4.9
	2.5%	–4.4	–1.6	–8.0	–3.6	–2.9	–4.4
	4.0%	–4.7	–1.7	–7.6	–3.5	–3.3	–4.1

Table S4:
Sensitivity of the impact of the COVID-19 pandemic on the remaining lifetime private transfers to the average labour income ratio in 2020 by age group and government support to three different interest rates (1%, 2.5% and 4%)

Country	Interest rate	Ages 0–24 in 2020		Ages 25–64 in 2020		Ages 65+ in 2020	
		Support 0%	Support 100%	Support 0%	Support 100%	Support 0%	Support 100%
Australia	1.0%	–3.3	0.0	1.7	0.3	0.0	0.0
	2.5%	–3.2	–0.1	1.7	0.3	0.0	0.0
	4.0%	–3.2	–0.1	1.7	0.3	0.0	0.0
Austria	1.0%	–7.9	1.6	1.2	–0.9	0.4	0.4
	2.5%	–7.4	0.7	2.1	–0.2	0.4	0.4
	4.0%	–7.2	0.2	2.6	0.2	0.3	0.3
Brazil	1.0%	–3.3	1.3	3.7	–0.1	3.7	3.6
	2.5%	–3.1	0.8	3.8	0.1	3.2	3.0
	4.0%	–3.1	0.6	3.9	0.3	2.8	2.6
Colombia	1.0%	–5.9	0.1	6.4	0.7	0.1	0.0
	2.5%	–5.5	0.1	6.4	0.8	0.1	0.0
	4.0%	–5.2	0.1	6.4	0.8	0.2	0.0
Costa Rica	1.0%	–5.6	0.3	5.2	0.3	–0.1	–0.1
	2.5%	–4.6	0.1	4.7	0.4	0.0	–0.1
	4.0%	–4.0	0.1	4.5	0.4	0.0	–0.1
Finland	1.0%	–4.7	0.0	2.4	0.3	0.0	0.0
	2.5%	–3.9	0.0	2.2	0.3	0.0	0.0
	4.0%	–3.6	0.0	2.1	0.3	0.0	0.0
Hungary	1.0%	–6.8	0.1	3.1	0.6	0.1	0.1
	2.5%	–5.3	0.0	2.6	0.6	0.1	0.1
	4.0%	–4.5	0.0	2.4	0.6	0.1	0.0
Italy	1.0%	–5.5	1.3	0.4	–0.9	0.3	0.3
	2.5%	–6.2	0.7	1.4	–0.4	0.2	0.2
	4.0%	–6.7	0.3	2.1	0.0	0.2	0.2
Japan	1.0%	–6.1	–0.1	2.9	0.4	0.0	0.0
	2.5%	–5.8	–0.1	2.9	0.4	0.0	0.0
	4.0%	–5.7	–0.2	2.9	0.4	0.0	0.0
Slovenia	1.0%	–10.5	0.2	3.5	0.4	0.1	0.0
	2.5%	–9.0	0.1	3.2	0.4	0.1	0.0
	4.0%	–8.2	0.0	3.0	0.4	0.1	0.0
Sweden	1.0%	–1.1	1.1	0.1	–0.4	1.2	1.2
	2.5%	–1.7	0.7	0.8	–0.1	1.0	1.0
	4.0%	–2.1	0.4	1.2	0.1	0.9	0.9
US	1.0%	–2.9	0.0	1.9	0.3	0.1	0.1
	2.5%	–3.3	0.0	2.1	0.3	0.1	0.1
	4.0%	–3.6	–0.1	2.3	0.4	0.1	0.1

Table S5:

Sensitivity of the impact of the COVID-19 pandemic on the remaining lifetime public transfers to the average labour income ratio in 2020 by age group and government support to three different interest rates (1%, 2.5% and 4%)

Country	Interest rate	Ages 0–24 in 2020		Ages 25–64 in 2020		Ages 65+ in 2020	
		Support 0%	Support 100%	Support 0%	Support 100%	Support 0%	Support 100%
Australia	1.0%	–0.8	–1.8	1.5	2.2	1.2	0.0
	2.5%	–0.7	–1.7	1.4	2.1	1.1	–0.1
	4.0%	–0.7	–1.6	1.3	1.9	1.1	–0.2
Austria	1.0%	–3.1	–6.8	0.2	0.5	–2.4	–6.4
	2.5%	–3.2	–6.8	0.0	0.2	–2.3	–6.3
	4.0%	–3.3	–6.7	–0.2	–0.1	–2.2	–6.2
Brazil	1.0%	1.2	–0.3	1.6	2.8	–8.1	–10.9
	2.5%	0.4	–1.0	1.9	3.1	–6.6	–9.4
	4.0%	0.0	–1.4	2.0	3.1	–5.5	–8.3
Colombia	1.0%	–0.1	–2.5	1.8	4.1	2.5	–4.0
	2.5%	–0.3	–2.6	1.7	4.0	2.7	–3.7
	4.0%	–0.4	–2.7	1.6	3.8	2.9	–3.5
Costa Rica	1.0%	–0.5	–2.3	2.3	3.5	–1.8	–3.4
	2.5%	–0.7	–2.4	2.4	3.4	–1.4	–2.9
	4.0%	–0.8	–2.4	2.3	3.3	–1.1	–2.6
Finland	1.0%	–1.4	–2.5	2.3	3.2	0.4	–0.5
	2.5%	–1.3	–2.4	2.2	3.0	0.4	–0.6
	4.0%	–1.2	–2.2	2.1	2.8	0.4	–0.6
Hungary	1.0%	–3.6	–6.0	5.2	5.4	–3.8	–3.1
	2.5%	–3.7	–5.9	4.9	5.1	–3.2	–2.5
	4.0%	–3.6	–5.6	4.6	4.8	–2.7	–2.1
Italy	1.0%	–2.0	–4.7	4.8	6.6	1.9	–2.4
	2.5%	–2.0	–4.6	4.5	6.2	2.1	–2.2
	4.0%	–2.0	–4.4	4.2	5.9	2.2	–2.1
Japan	1.0%	–1.7	–3.5	3.4	5.5	2.8	0.4
	2.5%	–1.5	–3.2	3.2	5.2	2.6	0.3
	4.0%	–1.3	–2.9	3.0	5.0	2.5	0.2
Slovenia	1.0%	–0.9	–4.6	4.8	7.3	–1.3	–2.8
	2.5%	–1.1	–4.6	4.7	7.1	–0.9	–2.4
	4.0%	–1.2	–4.6	4.6	6.8	–0.5	–2.1
Sweden	1.0%	–0.3	–1.4	3.9	4.4	–1.3	–3.4
	2.5%	–0.7	–1.7	3.8	4.3	–0.7	–2.7
	4.0%	–0.9	–1.9	3.5	4.1	–0.3	–2.3
US	1.0%	0.2	–0.9	2.7	3.9	0.0	–2.8
	2.5%	–0.1	–1.1	2.6	3.8	0.4	–2.3
	4.0%	–0.3	–1.2	2.4	3.6	0.8	–2.0

Table S6:

Differential impact of the COVID-19 pandemic on the debt to labour income ratio when the labour income of young people declines 50% more than in the baseline (in %)

Country	Government support	
	0%	100%
Australia	0.100	0.052
Austria	0.231	0.119
Brazil	0.334	0.169
Colombia	0.500	0.251
Costa Rica	0.185	0.085
Finland	0.141	0.077
Hungary	0.226	0.120
Italy	0.312	0.180
Japan	0.157	0.088
Slovenia	0.182	0.101
Sweden	0.226	0.126
US	0.160	0.089

Table S7:

Differential impact of the COVID-19 pandemic on tax revenue relative to the total wage bill when the labour income of young people declines 50% more than in the baseline (in %)

Country	Government support	
	0%	100%
Australia	0.0063	0.0033
Austria	0.0143	0.0066
Brazil	0.0169	0.0061
Colombia	0.0276	0.0111
Costa Rica	0.0106	0.0037
Finland	0.0093	0.0052
Hungary	0.0140	0.0069
Italy	0.0205	0.0118
Japan	0.0106	0.0060
Slovenia	0.0121	0.0071
Sweden	0.0143	0.0079
US	0.0095	0.0048

Table S8:

Differential impact of the COVID-19 pandemic on lifetime consumption to the average labour income ratio when the labour income of young people declines 50% more than in the baseline (in %)

Government support	0%			100%		
Age group	0–24	25–64	65+	0–24	25–64	65+
Australia	0.263	–0.032	0.023	0.028	0.052	0.019
Austria	0.680	–0.052	0.064	0.093	0.160	0.076
Brazil	0.514	–0.106	0.035	0.066	0.127	0.079
Colombia	0.716	–0.142	0.041	0.095	0.200	0.150
Costa Rica	0.493	–0.102	0.032	0.070	0.117	0.048
Finland	0.334	–0.039	0.031	0.034	0.059	0.018
Hungary	0.599	–0.051	0.068	0.085	0.108	0.008
Italy	0.843	–0.055	0.066	0.074	0.137	0.052
Japan	0.502	–0.054	0.043	0.039	0.069	0.022
Slovenia	0.637	–0.043	0.071	0.065	0.088	0.028
Sweden	0.336	–0.039	0.040	0.034	0.062	0.025
US	0.399	–0.049	0.047	0.035	0.085	0.050

Table S9:

Differential impact of the COVID-19 pandemic on lifetime transfers to the average labour income ratio when the labour income of young people declines 50% more than in the baseline (in %)

(A+B) Total lifetime transfers						
Government support	0%			100%		
Age group	0–24	25–64	65+	0–24	25–64	65+
Australia	0.074	–0.041	0.000	–0.121	0.053	0.020
Austria	0.152	–0.073	0.000	–0.313	0.164	0.077
Brazil	0.092	–0.130	–0.005	–0.258	0.131	0.076
Colombia	0.112	–0.171	–0.007	–0.366	0.207	0.152
Costa Rica	0.089	–0.122	–0.003	–0.245	0.120	0.047
Finland	0.085	–0.051	0.000	–0.163	0.061	0.019
Hungary	0.134	–0.074	0.000	–0.293	0.110	0.001
Italy	0.190	–0.078	0.000	–0.444	0.140	0.050
Japan	0.119	–0.069	0.000	–0.265	0.071	0.024
Slovenia	0.151	–0.064	–0.001	–0.315	0.090	0.021
Sweden	0.092	–0.052	0.000	–0.161	0.063	0.021
US	0.090	–0.066	0.000	–0.212	0.087	0.045

Continued

Table S9:
Continued.

(A) Public lifetime transfers						
Government support	0 %			100 %		
Age group	0–24	25–64	65+	0–24	25–64	65+
Australia	0.000	0.000	0.000	−0.125	0.060	0.020
Austria	0.000	0.000	0.000	−0.323	0.176	0.077
Brazil	0.000	0.000	0.000	−0.261	0.148	0.076
Colombia	0.000	0.000	0.000	−0.370	0.235	0.153
Costa Rica	0.000	0.000	0.000	−0.249	0.138	0.047
Finland	0.000	0.000	0.000	−0.167	0.068	0.019
Hungary	0.000	0.000	0.000	−0.300	0.121	0.001
Italy	0.000	0.000	0.000	−0.454	0.150	0.050
Japan	0.000	0.000	0.000	−0.271	0.077	0.024
Slovenia	0.000	0.000	0.000	−0.320	0.097	0.021
Sweden	0.000	0.000	0.000	−0.164	0.070	0.021
US	0.000	0.000	0.000	−0.215	0.095	0.045

(B) Private lifetime transfers						
Government support	0 %			100 %		
Age group	0–24	25–64	65+	0–24	25–64	65+
Australia	0.074	−0.041	0.000	0.004	−0.006	0.000
Austria	0.152	−0.073	0.000	0.010	−0.012	0.000
Brazil	0.092	−0.130	−0.005	0.003	−0.017	0.000
Colombia	0.112	−0.171	−0.007	0.004	−0.028	0.000
Costa Rica	0.089	−0.122	−0.003	0.003	−0.017	0.000
Finland	0.085	−0.051	0.000	0.004	−0.007	0.000
Hungary	0.134	−0.074	0.000	0.007	−0.011	0.000
Italy	0.190	−0.078	0.000	0.010	−0.010	0.000
Japan	0.119	−0.069	0.000	0.005	−0.006	0.000
Slovenia	0.151	−0.064	−0.001	0.004	−0.007	0.000
Sweden	0.092	−0.052	0.000	0.002	−0.007	0.000
US	0.090	−0.066	0.000	0.003	−0.008	0.000

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