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JEL Cassification: J20, J08, H31

Hypothetical tax-benefit reforms in Hungary: Shifting from tax relief to cash transfers for family support*

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May 22, 2023

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This paper evaluates two hypothetical budget-neutral reforms that shift resources from family tax expenditures to family cash transfers. We evaluate these reforms using a structural labor supply model based on the microsimulation EUROMOD model and EU-SILC data. We find that both reforms have an inequality-decreasing impact. However, when looking at labor supply responses for different household types, we show that the reforms have a non-negligible impact, especially for females in couple households. Additionally, we show that females in the middle of the income distribution in particular will reduce labor supply in response to the reforms.

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1 Introduction

In the context of the Hungarian government's recent policies that aim to support families with children, this paper simulates hypothetical reforms for existing family support measures. In particular, the analysis looks at the effects of two of the most significant forms of family support in Hungary: universal family allowance (a cash benefit) and family tax allowance (a personal income tax (PIT) relief).

The universal family allowance (csalàdi pòtlèk tartàsdìj) has not been indexed since 2008, which means that its real value has eroded significantly over the past few years. In contrast, the family tax allowance "was boosted by over ten times, from 0.05 percent to 0.67 percent of gross domestic product (GDP). Thus, there has been a visible shift from universal cash transfers to fiscal welfare, benefiting better-off families." In practice, the shift also implies the redirection of public resources toward "working families" (who receive employment income and benefit from tax relief on their PIT) instead of all families (who benefit from cash transfers). Furthermore, the erosion of the universal family allowance has not been repaired by the most recent family policies in Hungary, which include a loan program for families with at least two children for buying homes, subsidies for cars, and PIT waivers for women raising at least four children. Better-off families are believed to be the major beneficiaries of the new family support measures.

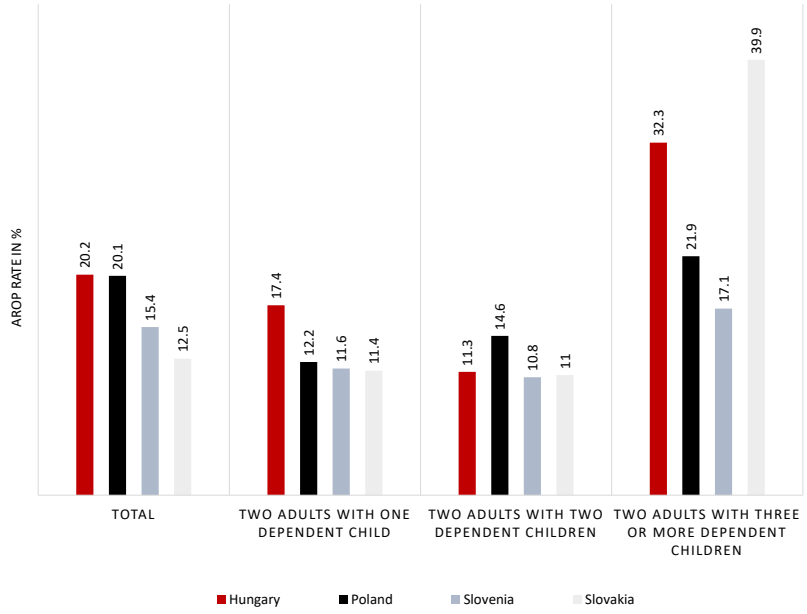
Figari et al. (2011) found that the child contingent support in Hungary was by far the most generous in Europe and had a regressive impact. Nowadays, the picture has changed slightly. Support for families with children in Hungary, measured in Euros (PPP), is higher compared to most other eastern European countries, as highlighted by Hernández and Picos (2021), but lower than in traditional European welfare states. About one-quarter of family support stems from tax allowance while 75% comes from universal benefit. In contrast to other Eastern European countries, such as Poland, the Hungarian model does not target across the income distribution but offers quite a similar Euro amount to all households, with rich households even benefiting slightly more.[1]

Overall, this leads to higher at-risk-of-poverty (AROP) rates for families with children in Hungary compared to other Eastern European countries, such as Slovakia, Slovenia, and Poland. Figure 1 compares the AROP rates of different household types in those countries. As we can see, the AROP rate of families with one dependent child is, at 17.4%, the highest among those countries. The AROP rate of families with two dependent children is only higher in Poland, while the AROP rate for families with three or more dependent children is only higher in Slovakia.

Against this background, this paper explores hypothetical reform scenarios that overturn the observed shift (from cash transfers to fiscal welfare) by increasing the universal family allowance while reducing the family tax allowance. Two possible extents of this hypotheti-

[1] Many thanks to Adrian Hernandez and Fidel Picos for providing this information based on Hernández and Picos (2021).

Figure 1: AROP rates in Eastern European countries for different household types, 2020



Source: Eurostat, EU Statistics on Income and Living Conditions (EU-SILC) data; downloaded from Eurostat's online database as dataset ilc_li03, AROP rate (cut-off point: 60% of mean equivalized income).

cal shift from tax relief to family transfers are considered, both in a budget-neutral way. In particular, Reform 1 updates the 2019 universal family allowance to maintain its 2008 real value, while the family tax allowance from PIT is reduced to maintain budget neutrality. Reform 2 abolishes the PIT family tax allowance as of 2019, and the budget outlays for universal family allowance are increased by the same total amount to ensure budget neutrality. We analyze in detail the impact of the benefit shift on the labor supply and focus on the fiscal and distributional impacts of these two reform scenarios.

From a theoretical point of view, a shift from family tax allowance to universal family benefit most likely decreases inequality by shifting more money from those who are working to those out of the labor market. Alternatively, such a shift increases the reservation wage, causing potentially negative labor supply effects, especially for childcare providers who are often women. Several studies have analyzed the labor supply effects of universal family benefit in other countries and highlight substantial negative influences of such benefits.[2].

Similar to Hanappi and Müllbacher (2016), we use a discrete choice labor supply model to analyze the overall labor supply effect of such a benefit shift. As argued by Scharle (2007) and Magda et al. (2018), the negative labor supply effect of cash benefits on female labor supply are especially high in Central and Eastern European countries, most likely due to lower income levels. This highlights the importance of analyzing the labor supply

[2]For example, Haan and Wrohlich (2011) argue that increasing childcare subsidies that are conditional on employment increases the labor supply of all women

effects on policy modeling. Other approaches in the literature are typically based on quasi-experimental analysis to estimate labor supply response to family-related tax-benefit reforms (e.g., see Milligan and Stabile (2009); González (2013); Schirle (2015); Ayala and Paniagua (2019)). These studies, in line with discrete choice literature, show strong negative labor supply effects for females due to universal family benefits. However, Haan and Wrohlich (2011) show that increasing childcare subsidies conditional on employment have positive labor supply effects for women.

Our paper presents two main contributions to the literature. First, we simulate and discuss two budget-neutral reforms that reduce income inequality by shifting family benefits to low income families. Second, we use a structural discrete choice model based on the tax-benefit microsimulation model EUROMOD to analyze the labor supply effects at intensive and extensive margins for various household types and across the income distribution. We show that both reforms reduce inequality but have a non-negligible negative labor supply effect. Our results highlight that when modeling family policies, there is typically a trade-off between targeting low income families and introducing negative labor supply responses, especially for females.

The paper is organized as follows. The second chapter provides an overview of the policies in focus as well as the two hypothetical reform scenarios discussed in this paper. In the third chapter, we describe the modeling approach based on the microsimulation EUROMOD model and a discrete choice labor supply model, which allows us to simulate the Hungarian tax-benefit system. In chapter four, we analyse the main results of the simulations, from the amounts of public budget involved in these two hypothetical reforms to the distributional, inequality, poverty risk, and work incentive effects of these alternative family policies. Finally, we outline our main findings and point out possible refinements that could be made to the simulations to better attain the desired policy objectives.

2 Policies in focus

Our reform scenarios focus on two of the most significant family support measures in Hungary: universal family allowance (a cash benefit) and family tax allowance (a PIT relief). Both measures are substantial in size and two of the biggest redistributive instruments within the Hungarian tax-benefit system. The universal family allowance accounts for about 292,528 Mio. Hungarian forint (HUF) and is 65% of all total non-means-tested benefits in Hungary. Additionally, the monetary value of the family tax allowance is about 202,659 Mio. HUF, and in its absence, tax revenues would be 5.4% higher and social insurance contributions (SIC) would be about 1.2%. This section provides a short overview of the two policies as of 2019 as coded in EUROMOD.

The **family allowance (családi pótlék)** is a universal benefit financed by the state. It is paid to the parent from the birth of the child to the termination of studies in the

compulsory education system (usually 0-16 years) and then during the child's secondary school or vocational training (up to 20 years of age). Its amount depends on the number of children in the family, if they belong to a single-parent family, and whether the child is disabled. In July, double amounts are paid to support schooling. The monthly amounts of family allowance differ by the number of children and family composition as shown below. The detailed amounts in 2019 are listed in Table 1.

Table 1: Family allowance amounts (családi pótlék) in 2019 in detail

Family type	Amount per child		% of mean disposable income
1 child in the family	HUF	12,200	4.5%
1 child, single parent	HUF	13,700	5.0%
2 children in the family	HUF	13,300	4.9%
2 children, single parent	HUF	14,800	5.4%
3 or more children in the family	HUF	16,000	5.9%
3 or more children, single parent	HUF	17,000	6.2%
permanently ill or severely disabled child in the family	HUF	23,300	8.5%
permanently ill or severely disabled child, single parent	HUF	25,900	9.5%
child in foster home/with foster parent	HUF	14,800	5.4%

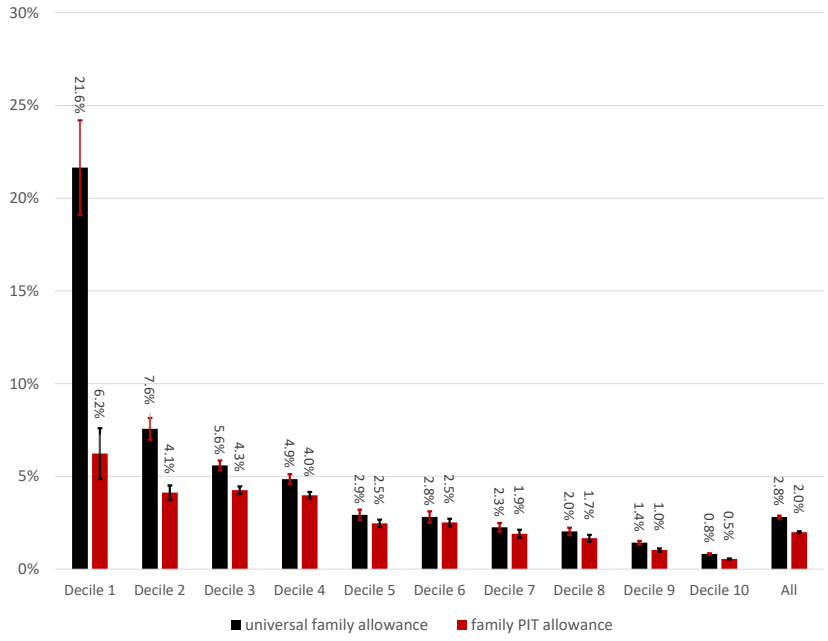
Family allowance amounts have not changed since 2008. The unit of analysis is the family, which comprises the head, the spouse or partner, and their children. An income test is not necessary.

The **family tax allowance (családi adókedvezmény)** was changed in 2011, transforming the family tax credit into a family tax allowance. Before 2011, family tax credit was deducted from income tax, but now, the tax base is reduced before calculating income tax. At the same time, the tax allowance amount changed to 62,500 HUF per month per child if there were one or two dependent children in the family and 206,250 HUF per month per child if there were three or more dependent children in the family. In 2016, the amounts changed to 66,670 HUF per month per child if there was one dependent child in the family, 83,330 HUF per month per child if there were two, and 220,000 HUF per month per child if there were three or more dependent children in the family. In 2018 and 2019, only the "two children category" changed to 116,670 HUF (2018) and 133,330 HUF (2019) per month per child if there were two dependent children in the family. A negative tax allowance is not allowed, but the possibility of sharing between parents remains. From 2014, if the tax payer has a lower income and cannot use the whole amount of the family tax allowance, their SIC is reduced by 16% (15% from 2016) of the remaining family tax allowance.

It is worth understanding the distributional implications of the existing policies as designed in 2019, which is the baseline year. Figure 2 plots the percentage change in households' mean equivalized disposable income across the income deciles that results from introducing each of the two family policies under analysis (i.e., with respect to a scenario where only the other policy is in place). While both measures provide relatively more benefit to lower income families, universal family allowance does so in a sharper manner, and it is

particularly advantageous for families in the first decile of equivalized income because their income increases by almost 22% on average. This effect decreases substantially when moving up the income distribution, adding an additional 0.8% in equivalized disposable income for the tenth decile. The family PIT allowance also has a bigger impact for lower deciles; however, the progressive effect is much less pronounced compared to universal family benefit. Interestingly, the effect of both tax-benefit instruments on higher incomes is very similar, but due to the universal design of the benefit, the impact is substantially higher for poorer households. Overall, the universal allowance increases families' equivalized incomes by 2.8% on average, while tax relief does so by 2.0%.

Figure 2: Distributional patterns of the family support measures in 2019: % change in households' mean equivalized disposable incomes by deciles



2.0.1 The reform scenarios in detail

We consider two reform scenarios and compare them to our baseline (current) system:

- **Baseline:** The simulation according to the EUROMOD 2019 tax-benefit system.
- **Reform 1:** Update the 2019 universal family allowance to maintain its 2008 real value. Implement the indexation in a budget-neutral way and reduce PIT family tax allowance proportionally for all family types (all existing amounts decreased by a constant factor).
- **Reform 2:** Abolish the PIT family tax allowance and increase the budget outlays for universal family allowance by the same total amount to ensure budget neutrality (all existing amounts increased by the same factor for each family type).

Both reform scenarios are simulated, and the design of the two instruments under examination are unchanged, for example, eligibility conditions, amounts, etc. (as of June 30, 2019). Hence, the analysis becomes informative about the equity and efficiency implications of putting more or less public resources into the spending or revenue side of public budgets, taking as given the design and parameters of the respective policy instruments.

Both reform scenarios are chosen because of their policy relevance in reflecting the current political discussions in Hungary. Both reforms are not only easy to implement and budgetary neutral but also allow the targeting of family benefits more toward those in need. Given the simple design and the fact that social benefits are automatically or semi-automatically adjusted to inflation in several other European countries, the first reform seems to be a realistic option for policymakers. The second reform is in line with several reforms implemented in countries, changing from family support in the form of a tax credit to a universal family benefit to target those in need.

3 Data and Methodology

We combine EUROMOD, the tax-benefit microsimulation model for the European Union, with a labor supply model. This allows us to not only evaluate the overnight effects of the reforms on social assistance but also see the impacts on labor supply. We first evaluate the distributional impact in a static microsimulation model and use the reform scenarios to estimate potential labor supply effects. In this section, we briefly discuss the models used to analyze the reforms.

3.1 Microsimulation

To evaluate the first-round fiscal and distributional effects of the reforms within the Hungarian tax-benefit system, we use EUROMOD, the tax-benefit microsimulation model for the European Union (see Sutherland and Figari (2013)). Simulations are based on EUROMOD version I1.66+, using input data from the HU-SILC 2017 (European Union Statistics on Income and Living Conditions, which refers to 2016 incomes). Uprating factors are used to update income and price components to the year of interest, in this case, 2019. The baseline scenario uses tax-benefit policies from June 30, 2019.

The static microsimulation model EUROMOD employs information on individual characteristics and economic circumstances to simulate direct tax liabilities and (non-contributory) benefit entitlements for a representative sample of households. Instruments that are impossible to simulate because of a lack of relevant information are used as recorded in EU-SILC. The model enables analysis of the role played by each tax-benefit instrument in the formation of household disposable income and the interaction between them. It should be kept in mind that EUROMOD simulations are static and do not incorporate any behavioral effects that may also affect the fiscal and distributional outcome of a reform.

3.2 Labor supply modeling

The labor supply model used to analyze the impact of the two hypothetical reform scenarios is based on the methodology of Bargain et al. (2014). The model is a flexible discrete choice model that is commonly used in the literature to analyze tax and benefit reforms [3]. The model has roots in the Random Utility model introduced by McFadden et al. (1973), which was further developed at a later stage by Van Soest (1995) and Aaberge et al. (1995). Households maximize their utility function by choosing between consumption (income) and leisure, and preferences are defined by a quadratic utility function with fixed costs. Household utility has a deterministic part and an error term that reflects optimization errors in the household. We allow heterogeneity in household preferences by adding household characteristics to the utility function. A household's labor supply decisions are reduced to the choice between a discrete set of working hours. In our model, we use seven choice sets of hours worked: 0 hours, 1-10 hours, 11-20 hours, 21-30 hours, 31-40 hours, 41-50 hours, and 51-60 hours. We distinguish three household types: single females, single males, and couple households. [4]. The deterministic utility of a single male or female household depends only on the wage. For couple households, utility depends on the hours worked and the partner's wage. Formalizing the model, the utility of couple i at each discrete choice j can be written as:

$$\begin{aligned} U_{ij} = a_{ci}C_{ij} + a_{cc}C_{ij}^2 + a_{h_f i}H_{ij}^f + a_{h_m i}H_{ij}^m + \\ a_{h_f f i}(H_{ij}^f)^2 + a_{h_m m i}(H_{ij}^m)^2 + \\ a_{ch_f}C_{ij}H_{ij}^f + a_{ch_m}C_{ij}H_{ij}^m - \\ n_j^f 1(10 < H_{ij}^f < 40) - n_j^m 1(10 < H_{ij}^m < 40) \end{aligned} \tag{1}$$

where household consumption is C_{ij} and spouses' working hours are H_{ij}^f and H_{ij}^m. [5]. Taste-shifters are introduced into the model by allowing consumption and hours worked to vary by age, age squared, the presence of children, and their age and education:

$$\begin{aligned} a_{ci} &= a_c^0 + Z_C^i a_C + u_i \\ a_{h_f i} &= a_{h_f}^0 + Z_i^f a_{h_f} \\ a_{h_m i} &= a_{h_m}^0 + Z_i^m a_{h_m} \end{aligned} \tag{2}$$

We capture unobserved heterogeneity by adding an error term u_i and assume it to be

[3] (e.g., Blundell et al. (2000); Brewer et al. (2006); Christl and De Poli (2021); Christl et al. (2022)

[4] Please note that we treat couple households with a non-flexible partner as a single household in the utility function

[5] Please note that for singles, there is only a one-hour term denoting the discrete choice set of this individual

normally distributed. As mentioned before, we take fixed costs to start working (n_j^k) into account to improve the model. We allow those fixed costs to differ by gender k. The only model restriction we have to introduce is on the monotonicity of consumption on utility, which is the minimum requirement for a meaningful interpretation of the model. We introduce this directly in the likelihood maximization.

Each individual faces a discrete number of alternatives in their choice of hours worked. For each labor supply choice, we calculate consumption C_{ij} (which is equal to income) as a function of female earnings ($w_i^f H_{ij}^f$) and male earnings ($w_i^m H_{ij}^m$), as well as non-labor income (y) and specific household characteristics (X_i):

$$C_{ij} = f(w_i^f H_{ij}^f, w_i^m H_{ij}^m, y_i, X_i) \tag{3}$$

where f is the tax-benefit function used. For each discrete choice j, disposable income (consumption) C_{ij} is obtained by aggregating all sources of household income and simulating all benefits received as well as taxes and social security contributions paid. These simulations are carried out using the microsimulation EUROMOD model together with specific information about household characteristics (e.g., children composition).

For those not working, we have to estimate wages according to a standard wage equation using the Heckman correction. The results of the Heckman estimation are reported in Table 5 in the appendix. The wage equation reveals a strong impact of both age and education on female and male wages, and both effects are stronger for males. Additionally, there is a wage premium for married males, while females tend to earn less when married, but both effects are statistically insignificant. Regarding the selection equation, we see a strong negative impact on female participation when small children are present, which is an empirical regularity.

To minimize the division bias, we use the estimated wages for both non-workers and workers. Using the information on wages, our discrete choice framework allows us to estimate the structural parameters of the underlying utility function. We use a conditional logit model to estimate these parameters. Table 6 in the appendix highlights the results of the model.

Looking at couple households, our model suggests that being in work reduces the household utility significantly for both males and females; however, the effect seems to be stronger for females. Partners like to spend time together because the interaction effect between male and female leisure is significant and positive. The interaction term of leisure and children is positive, indicating that parents' use of leisure increases with the existence of children. Additionally, utility increases quadratically with consumption, but there is a significant trade-off between consumption and leisure (see the interaction term of consumption and leisure).

Single male and single female households show similar behaviour to couple households. Being in work reduces the utility substantially, and the individual models suggest increasing utility with higher consumption in quadratic form. However, there is a significant trade-off between consumption and leisure (see the interaction term of consumption and leisure).

The stochastic specification of the labor supply model includes an independently and

identically distributed (IDD) error term e_i that should account for possible optimization errors:

$$V_{ij} = U_{ij} + e_i \tag{4}$$

If we assume that e_i follows an extreme value distribution, we can estimate the probability for each household i choosing a labor supply j. Our sample only includes different household types (couple hh, single male hh, and single female hh), where the hh head(s) are aged between 18 and 59 and are available for the labor market. Disabled people in education, retirees, farmers, and the self-employed are excluded from our sample.

4 Results

4.1 Fiscal effects

Table 2 shows the budgetary effects of the two simulated 2019 reforms on the different tax and benefit aggregates and sub-components compared to the baseline (current system). The overall fiscal impact of both reforms is (by construction) revenue neutral on the government budget. There are some minor deviations due to the technical fact that the survey data does not allow a 100% revenue neutral reform. In Reform 1, the universal family allowance is uprated by inflation by about 33% to keep its real value as of 2008. According to the fiscal impact of the uprating, the family tax allowance is decreased in a budget-neutral way. The uprating of the universal family allowance in 2019 to keep its real value as of 2008 would cost the government about 97 Bio. HUF (0.23% of GDP). This should not be understood as the additional expenditure that would be needed annually to index the benefit because the uprate has been done in one shot for the full period 2008–2019. Tax revenues (+2.2%) and SIC (+0.7%) increase due to the reduction of the family tax allowance in a budget-neutral way (and the option to use the tax allowance for SIC).

Some interactions have means-tested benefits. Some people would lose social assistance due to higher family benefits, i.e., reductions in regular child protection benefits and social assistance. In Reform 2, the full abolishment of the family tax allowance increases universal family benefit by about 68.5%. The universal family allowance could increase by about 200 Bio. HUF (0.48% of GDP) in this reform scenario. Tax revenues would increase even more than in Reform 1 (+5.4%) along with SIC (+1.2%). Again, some interactions have means-tested benefits because some people would lose social assistance due to higher family benefits (an almost 2.5% reduction).

4.2 Distributional effects

Overall, both reforms have similar distributional impacts. The mean annual equivalized disposable income in the lowest deciles increases in both reforms as highlighted in Figure 3.

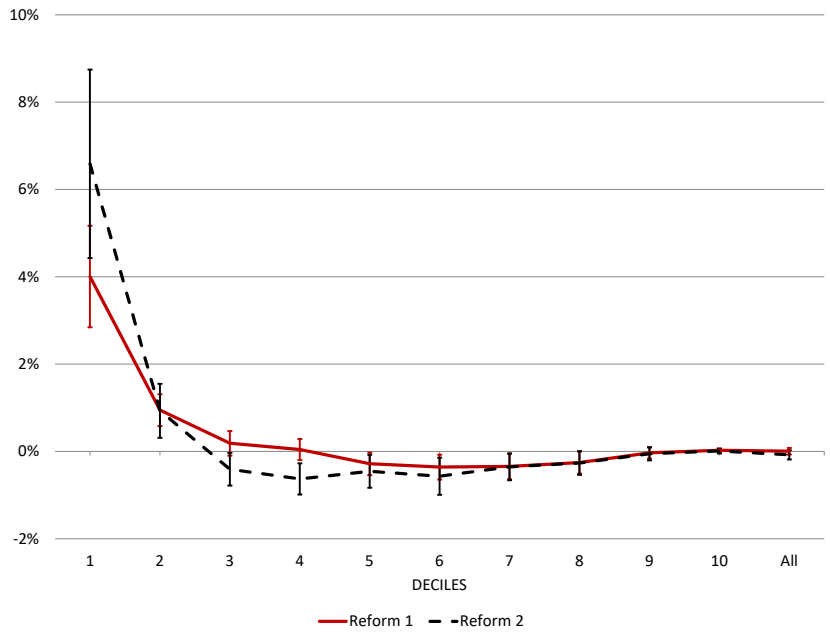
Table 2: Aggregate revenue and expenditure (Mio. HUF)

	Total			Diff. w.r.t. baseline		Diff. (% of base)	
Concept	Baseline	Reform 1	Reform 2	Reform 1	Reform 2	Ref 1	Ref 2
Total taxes	2,593,349	2,650,192	2,732,423	56,843	139,074	2.2	5.4
Total SIC	5,142,139	5,179,157	5,205,725	37,017	63,585	0.7	1.2
Total pensions	3,760,244	3,760,244	3,760,244	0	0	0	0
- Regular child protection benefit (rendszeres gyermekvédelmi támogatás)	2,412	2,315	2,311	-97	-101	-4	-4.2
- Education-related income (oktatással kapcsolatos támogatás)	18,910	18,910	18,910	0	0	0	0
- Social assistance (szociális segélyek)	82,732	81,763	79,975	-969	-2,757	-1.2	-3.3
- Housing benefit	10,730	10,730	10,730	0	0	0	0
Total means-tested benefits	114,783	113,717	111,925	-1,066	-2,858	-0.9	-2.5
- Maternity grant (anyasági támogatás)	4,545	4,545	4,545	0	0	0	0
- Childcare allowance (gyermekgondozási segély)	57,807	57,807	57,807	0	0	0	0
- Child raising support (gyermeknevelési támogatás)	20,672	20,672	20,672	0	0	0	0
- Family allowance (családi pótlék tartásdíj)	292,528	389,295	492,901	96,768	200,3733	33.1	68.5
- Unemployment benefits (munkanélküli ellátások)	64,599	64,599	64,599	0	0	0	0
- Job-seeker allowance	13,606	13,606	13,606	0	0	0	0
- Other regular benefits	0	0	0	0	0	-	-
- Other family benefits (includes maternity allowance, childcare fees, and nursing fees)	0	0	0	0	0	-	-
Total non-means-tested benefits	453,756	550,5243	654,129	96,768	200,373	21.3	44.2
Net budgetary effect	3,406,706	3,404,863	3,411,850	(-1,843)	(5,144)	(-0.1)	(0.2)

Note: Results in brackets are statistically insignificant at a 95% confidence interval. Standard errors are based on the methodology of Picos and Schmitz (2016).

A total shift of the resources now used for tax relief into additional family benefits would be the most advantageous alternative for families in the first decile of (equivalized) income. Households in the middle (equivalized) income deciles would undergo slight income losses in both reforms, meaning that, for them, tax relief is probably the most beneficial policy of the two under analysis, and they would lose from shifting resources to family benefits, albeit with relatively minor losses.

Figure 3: % change in mean annual equivalized disposable income with respect to the baseline by income decile



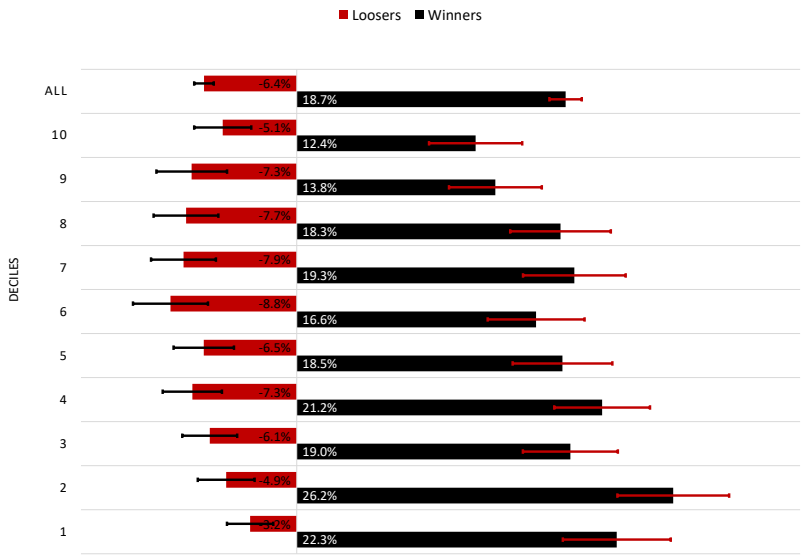
Note: The income deciles are kept at the baseline level. The CIs represent a 95% confidence interval based on the methodology of Picos and Schmitz (2016).

From this result, it can also be inferred that the recent increases in family tax allowances in Hungary may have mainly favored the middle class. The highest deciles are virtually unaffected by the changes in any of the reforms, meaning that both policies have similar effects on families with the highest (equivalized) income, and shifting resources from one to the other makes no difference to them.

To ascertain how many households would be affected by the reforms, Figure 4 highlights the number of winning and losing households in the first reform scenario by decile. When we update the 2019 universal family allowance to maintain its 2008 real value and reduce the family tax allowance from PIT simultaneously, most winning households can be found in the lower part of the income distribution. However, some households lose disposable income because some households profit more from the PIT reduction, especially the SIC allowance, than from the cash transfer.

Overall, Reform 1 creates about 18.7% (755,000) of winning households, whereas around 6.4% (286,000) of households are worse off. We define winners as households that are financially better off in the reform scenario compared to the baseline scenario. The winners are distributed all over the income distribution; however, most of them can be found in the lower part of the distribution. For example, in the tenth decile, about 12.4% (53,000) of households would be better off in the reform scenario, whereas about 5.1% (22,000) of households would be worse off. Alternatively, in the first decile of the income distribution, about 22.3% (92,000) of households would be financially better off, but about 3.2% (16,500) of households would lose in terms of disposable income. Results in absolute numbers can be found in Table 10 in the appendix.

Figure 4: Number of winning and losing households by decile (Reform 1)

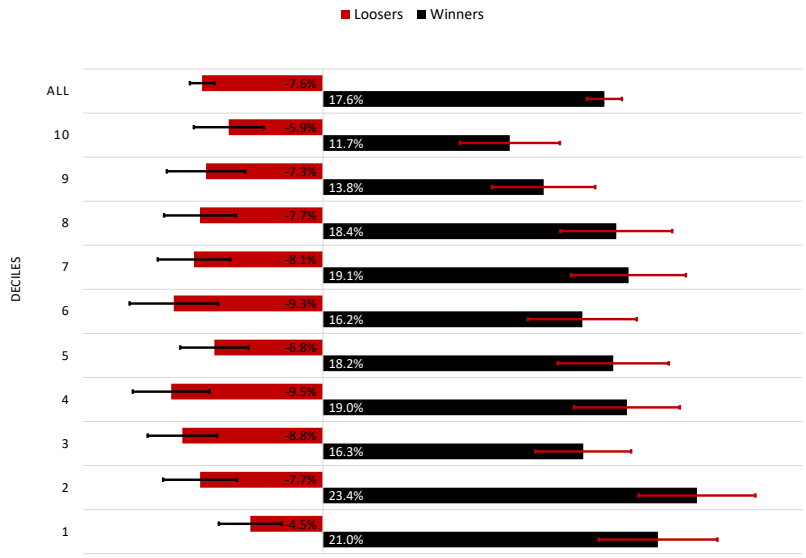


Note: Winners are defined as households that are financially better off in the reform scenario compared to the baseline scenario. The income deciles are kept at the baseline level. The CIs represent a 95% confidence interval based on the methodology of Picos and Schmitz (2016).

When estimating the affected households in Reform 2, where the family tax allowance is completely abolished and the budget is used one-to-one to increase universal family allowance, we can see similar patterns. Figure 5 shows that around 17.6% (729,000) of households are better of financially, while about 7.6% (313,000) would lose disposable income. Results in absolute numbers can be found in Table 11 in the appendix.

Looking at the distribution of winners and losers, this reform scenario would lead to a stronger impact on the lower part of the income distribution. In the first decile, about 21% (89,000) of households would be financially better off, while about 4.5% (19,000) would lose

Figure 5: Number of winning and losing households by decile (Reform 2)



Note: Winners are defined as households that are financially better off in the reform scenario compared to the baseline scenario. The income deciles are kept at the baseline level.

disposable income. However, in the tenth decile, about 11.7% (50,000) of households would be better off by the reform, while about 5.9% (25,000) of households would lose financially.

Although the winners in both reforms can be found mostly in the lower part of the income distribution, with a proportional decrease in the number of winners when moving up the income distribution, the losing households are more concentrated in the middle of the income distribution (third to sixth decile).

As already suggested by the allocation of winners and losers across the income distribution and the drop in disposable household income, both reforms reduce inequality, as shown in Table 7 in the appendix. The Gini coefficient of disposable income is reduced from 0.3131 to 0.3120 (Reform 1) and to 0.3123 (Reform 2). Therefore, both reforms reduce inequality to a similar extent (although Reform 1 by slightly more). This result also indicates that the benefit erosion due to the non-adjustment of the family tax allowance over the last few years and the simultaneous redirection of resources toward tax relief has had a notable impact on inequality. A similar conclusion can be drawn from looking at another measure of inequality such as the income quintile share ratio (S80/S20: the ratio of the total income received by the top income quintile to that received by the bottom income quintile). This decreases, especially in Reform 2, as it is more beneficial for the first decile. The social welfare indicator (or Sen's welfare index) takes both efficiency and equity aspects into consideration in this static setting and reveals that, in general, these reforms will improve welfare due to equity

rather than efficiency.

In general, Reform 1 reveals a higher social welfare indicator than Reform 2. This is especially interesting because it seems that a complete shift from family tax allowance to universal family benefit might be better in terms of equity but worse in terms of efficiency in comparison with only a partial shift of resources to universal family benefit.

4.3 Effects on poverty risk

As well as looking at inequality measures, we calculate the AROP rate, which measures the number of persons with an income (equivalized disposable household income) below the risk-of-poverty threshold. This threshold is defined as 60% of the Hungarian median equivalized disposable household income. According to EUROMOD calculations, Hungary had an AROP rate of 20.4% in 2019, as highlighted in Table 3. The AROP rate is especially high for single adults with children (33%) and households with two adults and three or more children (29.5%). This already highlights the need for and importance of family policies, as families with children have a particularly high AROP rate.

Table 3: AROP rates (%) for different types of households

Household type	# of hh	Value			Diff. w.r.t. baseline	
		Baseline	Reform 1	Reform 2	Reform 1	Reform 2
One adult <65, no children	743,812	21.7	21.7	21.7	0	0
One adult above 65, no children	652,054	12.4	12.4	12.4	0	0
One adult with children	97,038	33	34.1	30.2	1.1	(-2.8)
Two adults <65, no children	696,772	19.6	19.6	19.6	0	0
Two adults, at least one above 65, no children	516,959	22.6	22.6	22.6	0	0
Two adults with one child	288,905	20.1	19.8	19.3	-0.4	(-0.8)
Two adults with two children	229,597	20	22.8	22.6	2.7	2.6
Two adults with three or more children	99,405	29.5	27.5	29.2	-1.9	(-0.2)
Others	287,561	21.5	20.1	20.1	-1.4	(-1.4)
All	4,141,857	20.4	20.3	20.2	-0.1	(-0.1)

Note: The poverty line is HUF 112,763,011 (60% of median equivalized annual disposable income). Results in brackets are statistically insignificant at a 95% confidence interval. Standard errors are based on the methodology of Picos and Schmitz (2016).

The overall impact on the AROP rate is small, although it depends on the type of household. By definition of the reform scenarios, only households with children are influenced by the reforms (no change in AROP for households without children). We can see that AROP rates decrease for most families with children except, notably, for two adult households with two children, for whom both reforms are poverty-increasing. It seems that those families profit more from the existing tax allowance than from increasing the universal family benefit. Overall, as a result of the opposite impact on different household types, the AROP rate for

the whole population decreases by only 0.1 point. This is mostly explained by the number of different household types. Although the AROP rate increases for households with two adults and two children by about 2.6pp, it decreases in single households with children by 2.8pp and in households with two adults and one child by 0.8pp.

For single households with children, Reform 1 leads to a significant increase in the AROP rate, while Reform 2 results in an insignificant decrease in the AROP rate. In Reform 1, the poverty-increasing effect of the reduction of the family allowance (PIT tax credit) for working single parents outweighs the positive effect of the increase in the universal family allowance. In Reform 2 (the complete abolishment of the family allowance), the opposite holds true. Please note that due to the low observations for those households, the confidence intervals are quite big.

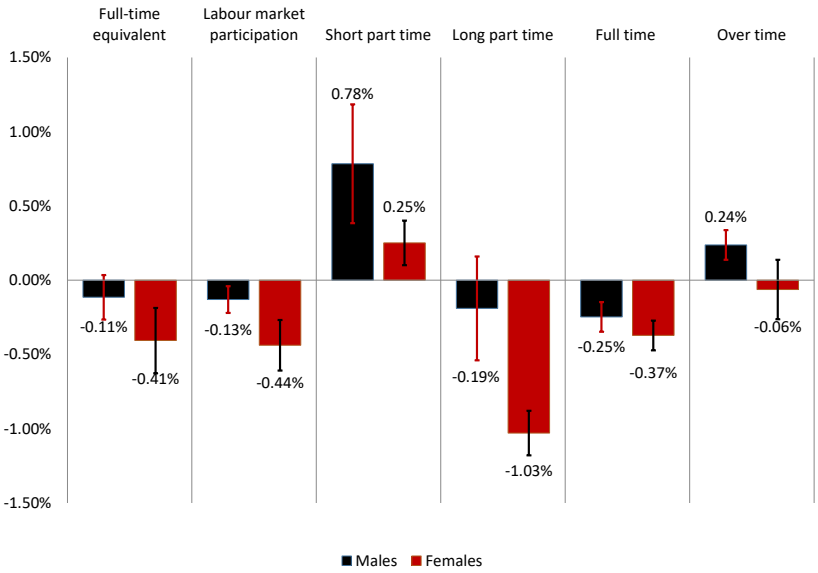
To put these numbers into context, most households with children in Hungary comprise two adults with one child (about 229,000), followed by families with three or more adults with children (287,561), and two adults with two children (229,597). Two adults with three children (99,405) and single adults with children (97,038) are less common family household types in Hungary.

4.4 Effects on labor supply

This section analyzes the labor supply responses that can be attributed to the hypothetical reforms. Figure 6 shows the impact of the first reform (indexation of the universal family benefit). Overall, the reform has a negative effect on the labor supply of both females and males. The full-time equivalent for females is expected to decrease by 0.41%, and we expect it to fall by 0.11% for males. This is especially driven by the effect on the extensive margin. Participation drops significantly for both females and males, and the reform is expected to reduce female participation by a total of 2,200 and male employment by 7,200. This result can also be explained intuitively. When shifting from a tax allowance to a universal benefit, the transfer income of non-working individuals with children will increase, while the income from working individuals will decrease due to a higher tax burden. Given the general low participation of females in the labor market, this side-effect of the reform could be seen as problematic.

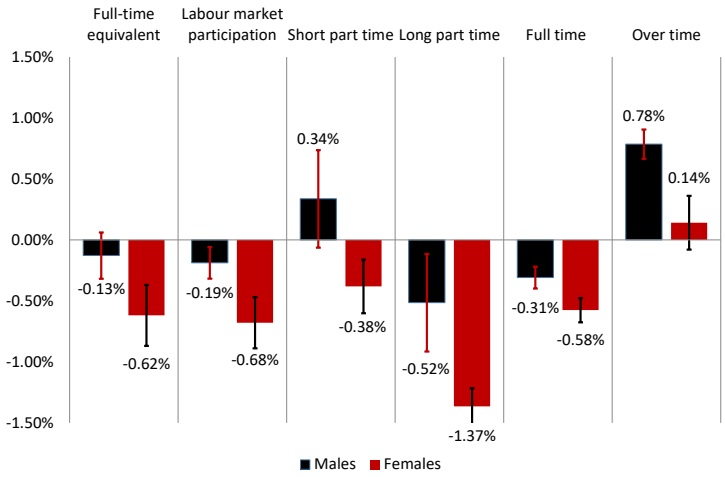
Focusing on the second reform (the abolition of the PIT tax credit and the proportional increase of universal benefit), the negative labor supply effects are even stronger. As highlighted in Figure 7, the reduction of full-time equivalent for males is similar to the one estimated for Reform 1, but the effect on female full-time equivalent is more severe (-0.62%). The same holds true for participation, where we can see a decrease of -0.19% and -0.68% for males and females, respectively. In absolute terms, this is a reduction in participation by 3,100 for males and 10,500 for females.

Figure 6: Labour supply effects by gender (Reform 1)



Note: Short part-time (1-19 hours), long part-time (20-39), overtime (50+), change in number of individuals. Standard errors are calculated by bootstrapping with n=50.

Figure 7: Labour supply effects by gender (Reform 2)



Note: Short part-time (1-19 hours), long part-time (20-39), overtime (50+), change in number of individuals. Standard errors are calculated by bootstrapping with n=50.

Digging further, we observe that those negative labor supply effects on the extensive margin (participation) are especially strong for couple households and females. Table 4 summarizes the findings for different household types on the hour and participation choices. The participation of single females decreases by about 666 and 1,326, respectively, for Reform 1 and Reform 2, while for single males, the effect is negligibly small. Looking at the effects on couple households, we estimate a strong negative effect on male participation (-2,135 and -2,984, respectively) but an even stronger reduction in the participation of females living with a partner (-6,501 and -9,220). This effect is by design of the reforms purely driven by households with children (only households with children are influenced by the reform).

Table 4: Labour supply effects by household type

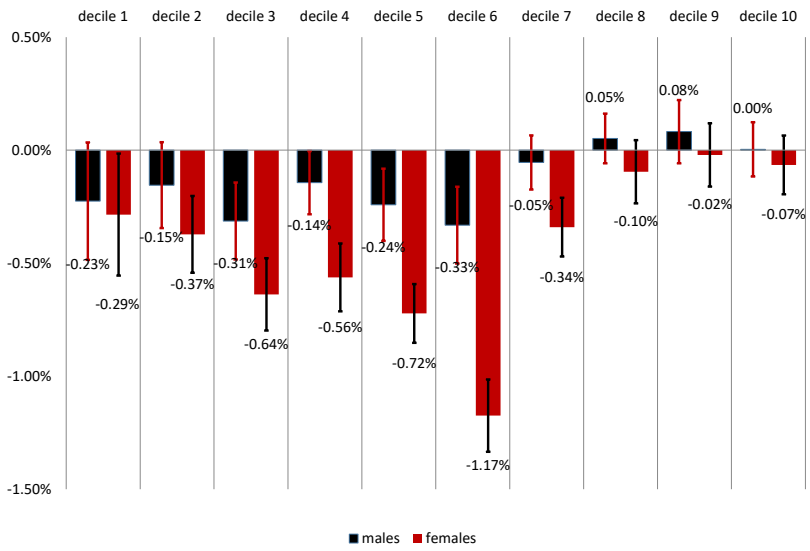
	Single females				Single males			
	Hours	$\Delta hours$	Participation	$\Delta part$	Hours	$\Delta hours$	Participation	$\Delta part$
Baseline	34.37		703,836		35.78		644,590	
Reform 1	34.34	-0.03	703,170	-666	35.77	-0.01	644,521	-68
Reform 2	34.31	-0.05	702,509	-1,326	35.77	-0.01	644,453	-137
	Couples female				Couples male			
	Hours	$\Delta hours$	Participation	$\Delta part$	Hours	$\Delta hours$	Participation	$\Delta part$
Baseline	30.49		931,866		36.98		1,047,921	
Reform 1	30.29	-0.20	925,365	-6,501	36.92	-0.06	1,045,787	-2,135
Reform 2	30.21	-0.27	922,646	-9,220	36.91	-0.07	1,044,937	-2,984
	Total females				Total males			
	Hours	$\Delta hours$	Participation	$\Delta part$	Hours	$\Delta hours$	Participation	$\Delta part$
Baseline	32.05		1,635,702		36.52		1,692,511	
Reform 1	31.92	-0.13	1,628,535	-7,168	36.48	-0.04	1,690,308	-2,203
Reform 2	31.87	-0.18	1,625,156	-10,546	36.48	-0.04	1,689,390	-3,121

Taking a closer look at the hours choice, we can see a stronger reduction effect on hours worked for females than for males, especially in couple households. Although females reduce their average hours worked by 0.13 hours and 0.18 hours (Reform 1 and Reform 2), males reduce their hours by about 0.04 hours in both reform scenarios. In couple households, the average hours worked decreases by 0.20 (Reform 1) and 0.27 (Reform 2), which is substantially more than for single females (0.3 hours and 0.5 hours, respectively). For males, the same holds true. For males in couple households, the average hours worked decrease by 0.06 hours (Reform 1) and 0.07 hours (Reform 2), but for single males, the effect is lower and close to zero (0.01 hours in both scenarios).

In the next step, we have a closer look at the different labor supply impacts of both reforms across the income distribution. As highlighted in Figure 8, the labor supply impact across income deciles and gender is quite different when increasing the universal family benefit and reducing the family tax credit (Reform 1). In general, and in line with the general results, the negative labor supply impact is stronger for females than for males in all deciles. In the upper income deciles, we even see slightly positive labor supply impacts, at least for males. The strongest impact on labor supply can be found in the sixth decile

(-1.17% for males and -0.33% for females). The impact on lower deciles is substantially lower (between -0.2% and -0.4%), which is driven by the fact that both the number of hours worked and participation is lower in the lower income distribution. Additionally, families with children (that are influenced by the reform) are mostly concentrated in the middle part of the income distribution.

Figure 8: Labor supply effects (hours worked) by decile and gender (Reform 1)



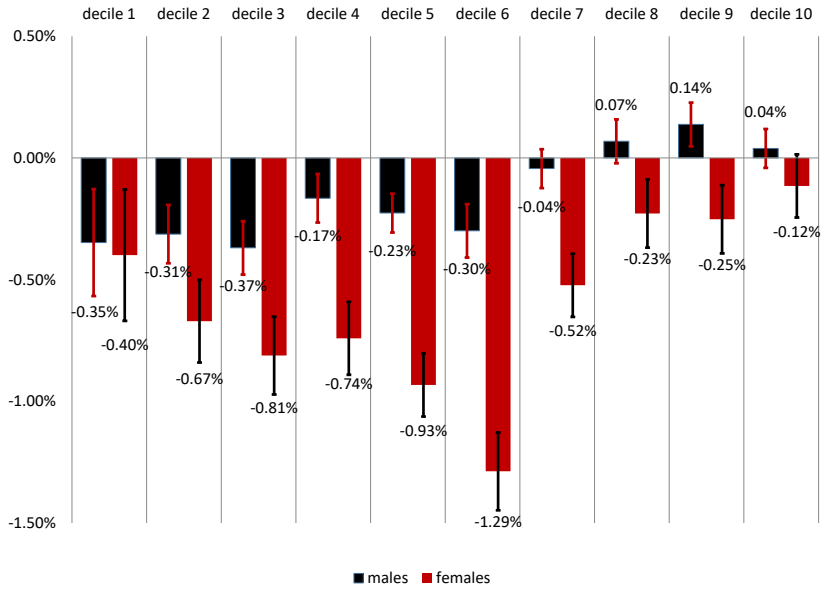
Note: The income deciles are kept at the baseline level. Standard errors are calculated by bootstrapping with n=50.

The impact of Reform 2, the complete abolishment of family tax credit, is similar but stronger, as expected. In the middle of the income distribution, the average hours worked dropped by up to -1.29% for males and -0.37% for females, but the effect on lower incomes is slightly lower for females (-0.35%) and substantially lower for males (-0.40%). The same holds true for higher income levels, where the negative impact on labor supply is stronger compared to Reform 1, at least for females.

The labor supply analysis highlights that both reforms notably reduce work incentives, leading to a significant decrease in labor supply, especially for females. We show that the impact of the reform is very different across the income distribution, as the labor supply (measured by the average hours worked) decreases especially for females in the middle of the income distribution.

Participation rates of females and males in 2019 in Hungary are high for males (77.3%) but low for females (63.0%), according to latest EUROSTAT data. Given the difference of more than 15pp in the participation rates of males and females, Hungary performs quite

Figure 9: Labor supply effects (hours worked) by decile and gender (Reform 2)



Note: The income deciles are kept at the baseline level. Standard errors are calculated by bootstrapping with n=50.

badly regarding equal participation in the labor market. Only Italy, Malta, Romania, and Greece have a bigger discrepancy in this respect. Keeping this in mind, both reform scenarios are expected to increase the gender differences in participation even further, highlighting a negative side-effect of changing from the PIT tax allowance to a universal tax allowance.

5 Conclusion

In view of the focus on recent family policies in Hungary, analyzing different policy reforms in the current tax-benefit system for supporting families with children is highly relevant. This is particularly important because of the erosion of family benefits due to the non-adjustment of the universal family allowance for more than a decade. Therefore, the choice of directing resources to "working families" via tax deductions should be discussed.

Using the EUROMOD tax-benefit microsimulation model, we simulate two budget-neutral reforms that could be implemented without any first-round costs in Hungary. Both hypothetical reforms shift resources, to different extents, from the family tax allowance (a tax relief that can be taken up by families with employment income, i.e., paying PIT) to the universal family allowance (a cash transfer received by all families). In Reform 1, the 2019 universal family allowance is indexed to maintain its 2008 real value. In Reform 2, the PIT family tax allowance is abolished altogether.

The EUROMOD-based simulations show that both potential reforms have an inequality-reducing effect. Moving from the PIT family tax allowance to higher universal family allowances would decrease the Gini coefficient and increase social welfare in the first round. This indicates that the benefit erosion due to the non-adjustment of the universal family allowance for more than a decade and the simultaneous redirection of resources toward tax relief has had an impact on inequality over the last few years.

From a distributional point of view, the simulations indicate that, among the two policies under analysis, direct transfer is the most advantageous policy for families in the first decile, whilst middle-income families benefit relatively more from tax relief. At the highest end, both policies have similar effects. Most winning households in both reforms can be found in the lower part of the income distribution, but there are still some losing households as well. The overall impact on poverty of the shift from tax relief to direct transfer is small and depends strongly on the type of household. The shift decreases the AROP rates for all family types with children except, notably, for two adult households with two children, for whom both reforms are poverty-increasing.

Our labor supply analysis highlights that both reforms reduce work incentives, leading to a severe decrease in labor supply, especially for females. Furthermore, we show that the labor supply effects are strongly driven by the participation decisions of females and are especially strong for couple households. We estimate that about 10,500 females and 3,100 males would not participate in the labor market due to a complete shift of expenditures from family tax credit to universal benefit. This implies that even though the policy decreases inequality, it will likely decrease female labor supply in Hungary, which is already one of the lowest in Europe.

Given that our model predicts a strong negative impact on labor supply, especially for females in the middle of the income distribution, it is quite likely that the second-round effects of both reforms will be negative on the fiscal side but might also increase inequality given the lower labor market attachment and higher benefit dependency.

Overall, the effects shown in the paper are the result of shifting resources from tax expenditures to cash transfers. We show that when modeling family policies, there are typically several trade-offs. First, there is an equity-efficiency trade-off when looking at the overnight effects of reform. While the shift from family tax allowance to universal benefit seems to be preferable from an equity point of view, it also reduces efficiency. In general, we show that a combination of both tax-benefit instruments seem to be preferable in terms of social welfare measures than spending all the money on universal family benefit. Second, when estimating the behavioral effects (second-round effects on labor supply) of the shift, we can also see a clear trade-off between targeting low income families and introducing negative labor supply responses, especially for females. However, as also argued by Hanappi and Müllbacher (2016), policy parameters (e.g., example, eligibility conditions, allowance amounts, phasing out the tax allowance, etc.) could be designed in a way to attain the

intended distributional and work incentive effects. This is also in line with the findings of Figari (2010) who argues that "in-work benefits might be one of the pillars of a redesigned welfare system in the southern European countries in order to enhance the economic position of the working poor and to increase female labour market participation, in particular of women in couples."

We want to acknowledge that our results have to be interpreted carefully as we only report the overnight effects of both reform scenarios. However, future research could also try to model the second-round effects of these reforms. Similar to Barrios et al. (2019) or Christl et al. (2022), one could use a macroeconomic model for the Hungarian economy to properly account for the second-round effects of the reforms such as changes in wages, prices, and employment.

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Table 5: Wage equations - male and female

	male	female
ln_hourly_wage		
age	.06156***	.03001**
	6.769	3.286
age squ.	-.06911***	-.03237**
	-5.971	-2.796
education middle	.2191***	.1192***
	6.125	3.426
education high	.6638***	.4597***
	13.79	11.26
married	.05528	-.00733
	1.742	-.2779
Constant	7.689***	8.319***
	45.9	47.61
selection		
children (0-2)	.1155	-1.065***
	1.172	-10.09
children (3-6)	-.02471	-.2104**
	-.3391	-2.598
children (7-12)	-.0387	-.07123
	-.6903	-1.016
children (13-17)	-.05765	-.09363
	-1.072	-1.5
children (above 17)	.04601	.1348
	.6557	1.726
chage_min	-.0125	-.002311
	-1.887	-.3747
age	.09022***	.05204*
	3.892	2.333
age squ.	-.1102***	-.03898
	-3.703	-1.33
education middle	.426***	.3339***
	5.034	4.433
education high	.3565**	.4354***
	2.973	4.505
partner old	-.01699	-.008755
	-.1823	-.1208
married	-.02061	-.1723**
	-.2578	-2.643
other hh income	.001022***	.0007464***
	4.569	4.806
financial assets	-.000125	-.000012
	-1.766	-.4867
Constant	-.7766	-.6282
	-1.744	-1.488
athrho	-1.271***	-1.198***
	-16.87	-16.06
lnsigma	-.4443***	-.5318***
	-25.07	-28.33
Observations	2249	2480

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Estimates of the individual and household models

	couples	single male	single female
choice			
in work male	-2.592***	-1.014***	
	-10.72	-3.614	
part-time male	1.627***	1.044***	
	6.99	4.13	
full-time male	2.773***	2.099***	
	8.818	5.797	
over-time male	-.04223	-.6112	
	-.0947	-1.145	
inwork female	-3.179***		-1.787***
	-15.35		-7.835
part-time female	.9859***		.7924***
	4.614		3.592
full-time female	1.892***		1.487***
	6.027		4.511
over-time female	-2.22***		-2.318***
	-4.452		-4.458
leisure male	-.1968***	-.1024***	
	-6.33	-3.439	
leisure*age male	.0004826*	.0008723**	
	2.248	3.175	
leisure*nchild male	-.006988**	-.001935	
	-2.938	-.4098	
leisure female	-.1263***		-.06774**
	-4.772		-2.673
leisure*age femalef	-.001726***		.0004013
	-9.148		1.646
leisure*nchild female	.001924		.003705
	.9844		.9869
leisure male* leisure female	.001878***		
	8.589		
consumption	-.0001084**	-.0000652	.0000111
	-3.153	-1.488	.2818
consumption*consumption	4.69e-10***	4.82e-10*	2.96e-10
	4.079	2.176	1.412
consumption*hhsize	-8.95e-06***	-5.02e-06	-6.89e-06
	-5.345	-1.192	-1.573
consumption*leisure m	1.06e-06***	9.92e-07*	
	4.633	2.54	
consumption*leissure f	1.01e-06***		5.77e-07
	5.123		1.809
Observations	90944	7021	9044

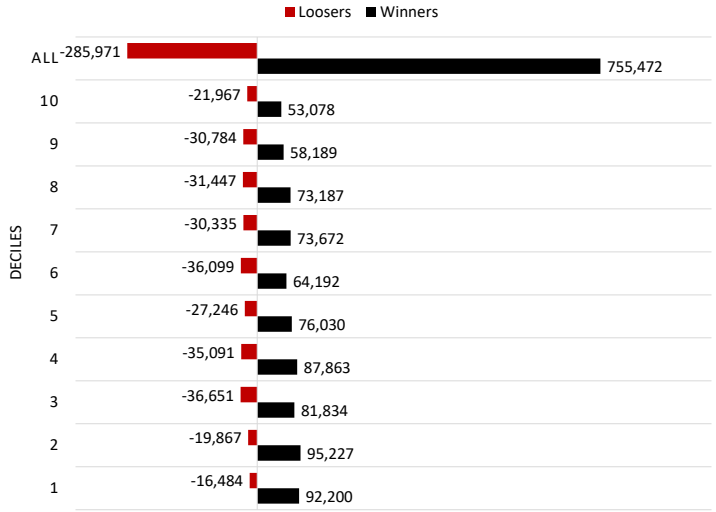
Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Inequality and distributive effects of the reform

	Value			Diff. w.r.t. baseline	
	Baseline	Reform 1	Reform 2	Reform 1	Reform 2
Gini coefficient (disposable income, EQ_INC20)	0.3131	0.3120	0.3123	-0.0011	-0.0008
Redistribution index	0.1758	0.1769	0.1766	0.0011	0.0008
Social welfare index	116,860	117,048	116,906	188	47
Income quintile share ratio = S80/S20	5.8549	5.7500	5.7079	-0.1049	-0.1470

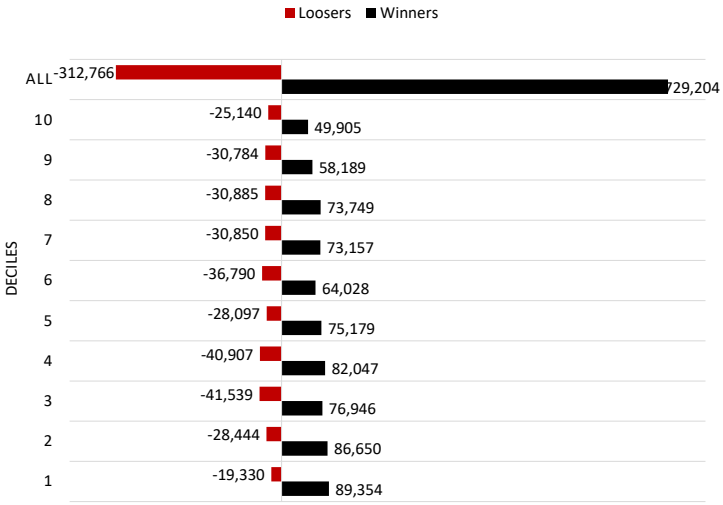
Note: Results in brackets are statistically insignificant at a 95% confidence interval. Standard errors are based on the methodology of Picos and Schmitz (2016).

Figure 10: Number of winning and losing households by decile (Reform 1)



Note: Winners are defined as households that are financially better off in the reform scenario compared to the baseline scenario. The income deciles are kept at the baseline level.

Figure 11: Number of winning and losing households by decile (Reform 2)



Note: Winners are defined as households that are financially better off in the reform scenario compared to the baseline scenario. The income deciles are kept at the baseline level.