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ORIGINAL PAPER

Trapped in inactivity? Social assistance and labour supply in Austria

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Abstract

Financial incentives affect the labour supply decisions of households. However, the impact usually varies significantly across household types. Whilst there is a substantial amount of literature on the labour supply effects of tax reforms and in-work benefits, the impact of changes in social assistance benefits has received less attention. This paper analyses labour supply responses to changes in social assistance. We show that labour supply elasticities vary substantially across gender and household type. Women exhibit higher labour supply elasticities, both on the intensive and the extensive margins. Additionally, labour supply elasticities are typically higher for singles and for households with children. Using these results, we analyse the impact of the Austrian reform proposal "Neue Sozialhilfe" (New Social Assistance), which was introduced in 2019 and substantially cut social assistance benefits for migrants and families with children. The overall effects of the reform are especially strong for men and migrants. Migrants and couples with children, that is, the groups hardest hit by the reform's social assistance reductions, show the strongest labour supply reactions to the New Social Assistance. Furthermore, we show that overall, the reform is expected to have a positive, but small, effect on the intensive margin of labour supply.

Keywords Social assistance · Reform · Labour supply · Discrete choice · Microsimulation · EUROMOD

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1 Introduction

It has often been argued that there is a strong link between the generosity of transfer and welfare programmes on the one hand and labour market outcomes on the other. A lot of research in this field has highlighted the importance of taking incentive effects into account when designing or reforming policies. Therefore, understanding labour market behaviour is crucial for policy design. Whilst numerous studies have analyzed the impact of certain tax and (in-work) benefit reforms on labour supply, studies on the impact of social assistance reforms have been scant. One reason for this is that social assistance reforms are less frequent than other benefit or tax reforms. Additionally, labour supply effects are not expected to be large, since typically only a small sub-group of the population is impacted.

The OECD[1] defines social assistance benefits as "transfers made by government units of non-profit institutions to households intended to meet the same kinds of needs as social insurance benefits but are provided outside of an organised social insurance scheme and are not conditional on previous payments of contributions". Social assistance benefits are typically means-tested. Social assistance is an important part of the social safety net which seeks to provide regular support to the most vulnerable people.

This paper aims to contribute to the literature in two ways: First, we estimate labour supply elasticities related to changes in social assistance and differences across gender and household types. Second, we use this information to estimate the impact of the 2019 social assistance reform in Austria to analyse the expected consequences of this specific social assistance reform.

As argued by Bargain and Doorley (2011), the evidence on participation elasticities of childless individuals is generally limited, even though in many European countries, such as Germany or France, but also Austria, singles are the core group of social assistance recipients. Therefore, we estimate detailed labour supply elasticities by different household types. We show that there are substantial differences across both gender and household type.

We then use the labour supply framework to analyze a specific reform in Austria. In 2019, the Austrian government decided to reform the social assistance scheme, which is based on a minimum income benefit that can be taken up if income falls below the defined guaranteed minimum level. The Austrian system is based on minimum standards, depending on the household type. The main goal of the reform proposal was to reduce the amount granted to large families, leading to an inactivity trap for large households. Additionally, the social assistance benefit for migrants with limited language skills was reduced to 65% of the standard benefit.

We combine EUROMOD, the tax-benefit microsimulation model for the European Union, with a discrete-choice behavioural model of household labour supply. This enables us not only to evaluate the overnight effects of the reform on social assistance, but also to see the reform impact on labour supply of specific sub-groups.

[1] See the OECD Glossary of Statistical Terms.

The analysis of the Austrian policy proposal is of special interest for a number of reasons. First, it substantially reduces the (relatively high) levels of social assistance for households with children. Households with children do not usually react strongly to changes in wages,[2] but it is not clear what happens in the case of reduced social assistance. Second, to the best of our knowledge, linking social assistance to literacy skills is a unique reform proposal without precedent in any other country. It was introduced to limit the access to social assistance for migrants and to increase incentives to learn the domestic language (German). Given the current political discussions about the welfare impact of migration, such reforms could be increasingly discussed by policy-makers. Therefore, a careful evaluation of such policies is needed.

The paper is organised as follows: Sect. 2 describes the literature on social assistance and labour supply, Sect. 3 gives an overview of the Austrian social assistance scheme, and Sect. 4 describes the data and the methodology used. In Sect. 5, results are presented on the fiscal, distributional, and labour supply impacts of changes to the social assistance scheme. Section 6 summarises and concludes.

2 Literature overview

Strong welfare systems have often been blamed for contributing to persistent unemployment, especially in Western European countries.[3] There is a very large body of literature on the work incentives of transfer programmes, especially on in-work benefits. Moffitt (2002) provides an overview of the literature for the US, suggesting that welfare programmes have an impact on labour supply.

Focusing on the effects of social assistance on labour supply, there have been several ex post analyses, which have either used changes in social assistance benefits or discontinuities in existing social assistance schemes. Lemieux and Milligan (2008) analysed a sharp discontinuity in the Canadian social assistance scheme, where recipients below the age of 30 and without children received 60% lower benefits than those with children. They found strong evidence to suggest that more generous social assistance led to a substantial reduction in employment, especially for less-educated males without children. In the case of Canada, an increase in social assistance led to a decrease in the employment rate in this group by 3 percentage point to 5 percentage point. Similarly, Bargain and Doorley (2011) exploit a discontinuity in the French social assistance scheme, where childless men below the age of 25 are not eligible for social assistance. They find that social assistance in France reduces employment by 7 to 10%.

Ex ante evaluation of policy reforms is typically based on standard labour supply models. Several papers describe ex ante analyses of reform impacts using a similar approach to the one used in our paper to calculate labour supply responses, but most of them focus on tax reforms or in-work benefits. Blundell et al. (2000), for example, analysed the labour effects of the so-called Working Families' Tax

[2] See e.g., Müllbacher and Nagl (2017) or Christl et al. (2019).

[3] See e.g., Laroque and Salanié (2002).

Credit (WFTC), an in-work benefit for families introduced in the UK. Using a similar labour supply model, Labeaga et al. (2008) analysed the impact of changes in the Spanish tax system. They found only minor labour supply effects related to the changes studied. Ayala and Paniagua (2019) measured the behavioural impacts of a hypothetical reform of in-work benefits in Spain. The existing Working Mother Tax Credit (WMTC) was replaced by the US-style Earned Income Tax Credit (EITC). They showed that the introduction of such an in-work benefit generates a substantial increase in labour supply at the extensive margin, but also a non-negligible reduction at the intensive margin.

Peichl and Siegloch (2013) studied the labour supply (and demand) effects of a hypothetical reform introducing the workfare concept[4] for Germany. Steiner and Wrohlich (2005) analysed the work incentives and labour supply effects of the German mini-jobs reform that introduced social security deductions for low-income earners. They showed that the small employment effects are outweighed by negative effects on hours worked among those already working. Mastrogiacomo et al. (2017) used a discrete choice model to analyse heterogeneity of labour supply effects across households in the Netherlands. They found large differences in labour supply elasticities between households with and without children and argue that these differences are much bigger than suggested in previous studies.

More closely related to our paper, Franz et al. (2012) analysed the employment effects of a reform of the German system, where unemployment assistance and social assistance were unified to create a single benefit ("Arbeitslosengeld II"). From a technical point of view, this paper is most closely related to ours, although the authors estimate general equilibrium effects, accounting additionally for labour demand.[5]

In Sweden, Flood et al. (2004) analysed a policy proposal that aimed to increase labour supply incentives for low-income families. They show that reducing social assistance in combination with increased tax deductions generates substantial positive welfare effects. However, the authors find only minor increases in labour supply and decreases in welfare participation. In general, they found that labour supply among two-parent families in Sweden was quite inelastic.

3 The Austrian social assistance system

The Austrian social assistance system is based on a minimum income benefit that can be taken up if the person has no income, or if their income is below the defined guaranteed minimum level. The social goal of this scheme is to provide people who cannot meet their daily living costs with sufficient resources to do so. Standard rates and means tests of the social assistance benefit have been to a great extent

[4] The workfare concept refers to a program in which recipients of benefits are obliged to work in public-services.

[5] Clauss and Schnabel (2008) use a similar approach with a similar framework, only estimating labour supply effects.

harmonised on the national level, but there are still some differences between federal states. Federal states can, for example, increase state-wide minimum standards.[6]

The Austrian system is characterised by substantial non-take-up of social assistance, as has been shown, for example, by Fuchs et al. (2020). The authors analysed the development of non-take-up over time and found that in 2009, the non-take-up rate of the Austrian social assistance benefit was about 50%, as measured both in terms of number of households and expenditure. It decreased until 2015 to about 30%.[7] According to the literature, the reasons for non-take-up can be manifold. Typically, non-take-up is attributed to several factors, such as information costs, administrative costs, asymmetric information and social and psychological costs.

Most of the social assistance receivers of 2018 in Austria were located in Vienna, as Table 1 reveals. Of 289,646 recipients, almost 58% were located in Vienna (about 167,000). Looking at the household level, about 63% of receiving households were located in Vienna, whilst only 3257 individual receivers of social assistance were located in Burgenland in the same year.

Investigating the household structure in more detail, the largest beneficiary group is single households (about 73,000 households or 63% of all households that receive social assistance), followed by couples with children (about 17,400 or 15.1%) and single parents (about 17,000 or 14.6%). The total cost of social assistance in Austria in 2018 was about 941 million euros, of which 621 million euros can be attributed to the federal state of Vienna, followed by Styria with costs of 67.4 million euros.

Taking a closer look at the recipients, we can see that most social assistance recipients are Austrian citizens, as highlighted in Table 2. Of all recipients, around 47.2% are Austrians, and 40.4% are third-country citizens, meaning citizens from outside the EU, EEA and Switzerland, and only around 6.8% of social assistance recipients are migrants with EU or EEA citizenship.

Regarding the labour market status of recipients highlighted in Table 3, the results are quite diverse. About 36.2% of recipients are either children or people above the retirement age, 4.2% are students, and 4.9% are people with child-care obligations. About 7.1% are in work but earn below the minimum standards, so called "Aufstocker", and around 35.8% are available for the labour market but are not working.

3.1 The current system

Persons eligible for social assistance under the current law are those with authorization for permanent residency: Austrian citizens, persons entitled to asylum, EU citizens and their relatives, permanent residents (and their relatives) and persons with a settlement certificate. The income test for the benefit depends on the person's own income, their own assets and the income of other family members. Every type of

[6] The model we use for our analysis (EUROMOD) always refers to the regulations in Vienna, since firstly, most recipients of social assistance are in Vienna, and secondly, the regional component cannot be modelled with our data.

[7] Using a similar methodology, we observe a non-take-up rate of about 50% in our data. These differences can potentially stem from the time difference.

Table 1 Social assistance receivers and expenditures in 2018, by federal state. Source: Statistics Austria, Mindestsicherungsstatistik. downloaded 21-08-2019

Federal state	Individuals		Households	Expenditure
	(number)	(share of pop) (%)	(number)	(million euros)
Burgenland	3257	1.11	1835	8.4
Carinthia	6711	1.20	4176	16.0
Lower Austria	25,620	1.53	12,200	67.1
Upper Austria	18,941	1.28	10,530	42.2
Salzburg	12,967	2.34	7599	34.2
Styria	25,455	2.05	13,128	67.4
Tyrol	16,232	2.16	9102	53.1
Vorarlberg	13,180	3.35	5751	31.3
Vienna	167,283	8.84	108,126	621.4
Total	289,646	3.28	172,447	941.0

Table 2 Recipients of social assistance in 2018, by citizenship. Source: Statistics Austria, Mindestsicherungsstatistik. downloaded 21-08-2019

Citizenship	In thsd.	In %
Austria	98,523	47.2
EU and EWR	14,258	6.8
Third countries	84,388	40.4
Others	11,561	5.5

Third countries are citizens outside of the EU, EWR and Switzerland. EU and EWR includes Switzerland

Table 3 Recipients of social assistance in 2018, by labour market status. Source: Statistics Austria, Mindestsicherungsstatistik. downloaded 21-08-2019

LM status	In thsd.	In %
In work	14,306	7.1
Apprenticeship	1251	0.6
Available for the LM	71,995	35.8
Not available for LM	16,614	8.3
Students	8537	4.2
Child care	9874	4.9
Health care	549	0.3
Children and pensioners	72,800	36.2
Others	5323	2.6

Third countries are citizens outside of the EU, EWR and Switzerland. EU and EWR includes Switzerland

net income reduces assistance accordingly, but there are some exceptions (see Fuchs and Premrov (2019)). Assets of up to 4427.35 euros are disregarded in the wealth test for social assistance. Additionally, cars and other things necessary for work

Table 4 Minimum standards of social assistance in 2019, including housing needs. Source: Statistics Austria, Mindestsicherungsstatistik. downloaded 21-08-2019

Household type	Minimum standards (monthly in euros)
Singles and lone parents	885.47
Adults in non-single households (no family allowance)	664.10
Children of legal age (entitled to family allowance)	442.74
Minor children in non-single households (entitled to family allowance)	239.08

For persons younger than 60/65 (F/M) and capable of working, social assistance is paid 12 times a year. For persons older than 59/64 (F/M) or not capable of working, social assistance is paid 14 times a year

can be exempted. Homeowners can receive social assistance for at least six months before the state can enter it in the land register as an income.

Table 4 highlights the minimum standards that are applicable in the current Austrian system. These numbers include the basic amounts for covering housing needs. A single or lone parent receives 885.47 euros, in cases where the parent is capable of working, paid 12 times a year. The existence of a second adult in the household will increase the minimum standards by 664.10 euros. A dependent child increases the minimum standards by 442.74 or 239.08 euros, depending on the age of the child (full-aged or minor).

Considering the current social assistance system, Fig. 3 in the "Appendix" gives an overview of the disposable income of four different household types eligible for social assistance in the current system: a single household, a lone-parent household with two children below 14, a single-earner household (two adults) with three children below 14, and a single-earner household (two adults) with five children below 14. The calculations take the whole tax-benefit system of Austria into account, where social assistance falls under means-tested (non-pension) benefits. Depending on income, social security contributions, as well as direct taxes have to be paid. In addition, households receive other non-means-tested (non-pension) benefits, which are not accounted for in the income test for social assistance. Therefore, these benefits are accounted for in addition to social assistance.

3.2 The reform scenario

As early as 2018, a political discussion on two aspects of social assistance had begun. First, the migrants' access to social assistance driven by a strong influx of migrants during 2015 and 2016 was criticised by the right-wing parties. Second, a broad discussion about potential inactivity traps in the current system, driven by high social assistance benefits especially for households with (many) children, was started by the Austrian Public Employment Office.

As of 1 June 2019, the government introduced a new federal law in Austria, the "Neue Sozialhilfe" (New Social Assistance), to replace the "Mindestsicherung" (Minimum Income Benefit). The new framework law introduced limits for social

assistance so that families with children, persons entitled to asylum but not prepared for the labour market due to insufficient German language skills, and persons eligible for subsidiary protection were expected to receive lower benefits. The federal states were called to pass implementation laws by the end of 2019.

Regarding language skills, the new law stipulates that claimants must have sufficient language skills—at least level B1 in German or C1 in English—in order to be eligible for social assistance benefits. This has to be proven by producing school-leaving certificates, other certificates or linguistic skills classification statements, or by means of a face-to-face interview with the authorities. Linking social assistance to language skills is a unique policy that to the best of our knowledge, has never been analysed before. Limiting social assistance for migrants with limited language skills may have an impact on (labour market) integration. From a distributional point of view, those low-income households are losing a substantial part of their income. On the other hand, labour supply could be potentially increased by the reform, since the difference in income of not working and working will also be increased by the reform.

The main aspects of the new social assistance law were as follows. First, monthly social assistance is linked to the minimum pension and amounts to 885.47 euros for a single person. This is not changed by the reform. Second, each adult in a couple household receives 70% of the amount received by a single person, that is, in total 1239 euros. If the housing needs of the second person are included this will result in 1405 euros, which is a reduction in the benefit amount. Third, social assistance is staggered for families with children: 25% of the maximum amount for the first child (221.25 euros), 15% for the second child (132.75 euros) and 5% for the third child (44.25 euros). This results in a substantial decrease in benefits for families with children because in the current system each child receives the same amount (239.08 euros). Fourth, single parents will receive a bonus: 12% of the maximum amount for one child, 21% for two children and 27% for three children, and an additional 3% for any additional child. This will increase social assistance for lone parents in the reform scenario. Fifth, disabled persons will receive a bonus of 18% of the maximum amount. Sixth, migrants with insufficient German language skills (level B1 in German or C1 in English) shall receive only 65% of the maximum amount. This substantially reduces the amount of benefit for migrants with limited language skills. Seventh, people with subsidiary protection will only receive 325 euros per month under the basic scheme. In some regions (e.g., Vienna), people with subsidiary protection currently fall under the minimum income scheme.

We illustrate the impact of the reform for hypothetical households, namely the four households described in the previous section, and compare the disposable income (income after taxes and transfers) of those households by income level. Figure 1 shows that for families with children eligible for social assistance, disposable income is substantially reduced by the reform, for example, for a lone-earner household with five children, the maximum social assistance is reduced from 3695 to 2865 euros. One should note that this not only includes social assistance, but also other family benefits. In addition, for a single person with limited language skills, the reform reduces disposable income from 885 euros to 575 euros. In the case of a couple's household with many children (five children below the age of 14), disposable income is substantially reduced, from around 3710 euros in the old

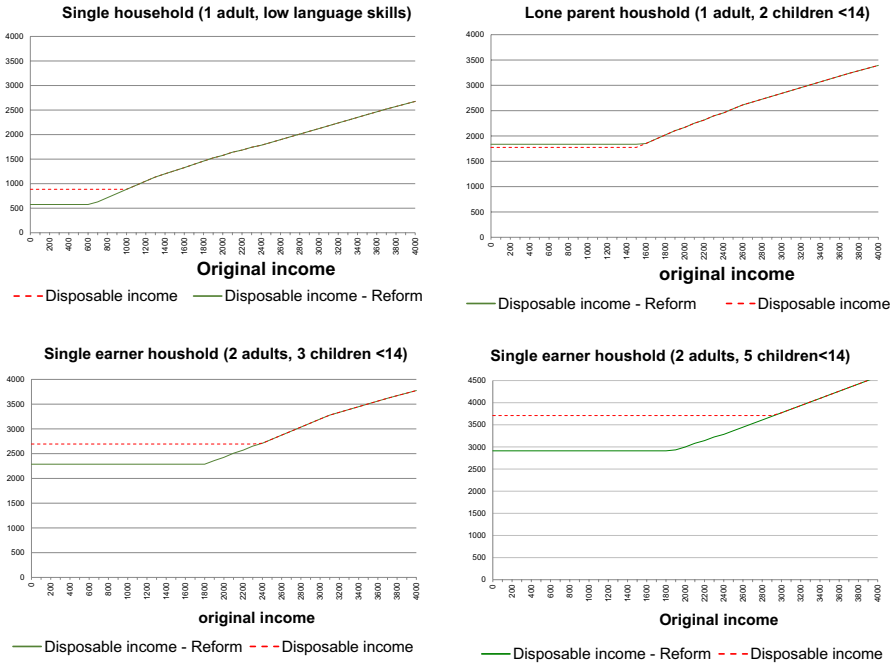

Fig. 1 Hypothetical households receiving social assistance by income level. *Note*: Calculations based on EUROMOD HHoT, see Hufkens et al. (2019)

system to around 2912 euros as a result of the reform that lowers benefits related to children. On the other hand, a lone-parent household with two children will receive more in the reform scenario: instead of 1775 euros in the current system, disposable income will be increased to 1836 euros (a bonus for single parents).

To highlight the impact of the reform on work incentives for labour market participation, we calculate the net replacement rate—the ratio of net income out of work and net income in work—for all individuals and present them by different household types. For a detailed overview of the methodology of the net replacement rate, see Jara et al. (2020). Our results shown in Table 5 suggest that the reform would slightly increase incentives to stop working for singles with children, while on the other hand the reform will increase the incentives to remain employed for both couples with and without children.

Table 5 (Mean) net replacement rates by household type. Source: Calculations based on EUROMOD (methodology of Jara et al. 2020)

Household type	Baseline	Reform	Difference
Single no children	60.2	60.2	0.0
Single with children	79.7	80.5	0.8
Couple no children	78.2	78.0	− 0.2
Couple with children	81.5	81.0	− 0.5

The policy itself went through parliament and was implemented, but at the end of 2019, the Austrian Constitutional Court (VfGh) declared that both the reduction for children and linking social assistance to language skills for migrants was unconstitutional. This means that the government has to come up with a new reform proposal.

Furthermore, the reduction of the social assistance benefit for families with children led to a political debate on the negative work incentives of the current social system, because for benefit-dependent families with children, participating in the labour market could potentially lead to a substantial loss of income. In light of this, our paper is of special interest, since it analyses the expected effects of this reform, not only on inequality and poverty, but also on labour supply. Additionally, analysing the reform in detail may help to overcome unintended side effects and problems that might have not been considered by policy-makers in the reform proposals.

4 Data and methodology

We combined EUROMOD, the tax-benefit microsimulation model for the European Union, with a labour supply model. This enables us not only to evaluate the overnight effects of the reform on social assistance, but also to see the impact on labour supply. We first evaluated the distributional impact in a static microsimulation model and used the reform scenario to estimate potential labour supply effects. In this section, we briefly discuss the models we used to analyse the reform.

4.1 Microsimulation

4.1.1 Using EUROMOD for policy simulations

To evaluate the first-round fiscal and distributional effects of the reform, we use EUROMOD, the tax-benefit microsimulation model for the European Union (see, e.g., Sutherland and Figari 2013 or Sutherland 2007). EUROMOD relies on micro-data representative of the household population of Austria and each other EU member state. EUROMOD is not only a unique tool for international comparative research on the effects of taxes and benefits, but also a tool to simulate fiscal and redistributional effects of certain reforms within a country.

Our simulations are based on the EUROMOD 2019 tax-benefit system, using individual and household data from the European Union Survey of Income and Living Conditions (EU-SILC) 2017. The policies are implemented according to the new legislation passed by the government. As already mentioned, the standard rates and means tests for the social assistance benefit have been, to a great extent, harmonised on the national level, but there are still some federal state-specific differences. Our micro-data do not enable us to distinguish between federal states. In addition, the differences between states are not too big, and most recipients of social assistance are in Vienna. Therefore, EUROMOD used the social assistance regulations of the federal state of Vienna for our analysis.

EUROMOD replicated the eligibility conditions for social assistance and informed us of households that are eligible for social assistance. As already mentioned, there is substantial non-take-up in the Austrian system. Therefore, we assume that only those households reporting social assistance in the EU-SILC data have taken up the benefit.[8]

4.1.2 Adding information on literacy skills

The reduction of social assistance for people with limited literacy skills is an important part of the reform. According to the underlying EU-SILC data, about 7.6% of the population (about 658,000) are EU-migrants, about 7.6% (about 651,000) are non-EU migrants and about 84.8% (about 7,307,000) are Austrian citizen. To simulate this reform aspect of EUROMOD, we used additional data from the Programme for the International Assessment of Adult Competencies (PIAAC) data set. The major survey conducted as part of PIAAC is the Survey of Adult Skills. The survey measures adults' proficiencies in key information-processing skills—literacy, numeracy and problem-solving—and gathers information and data on how adults use their skills at home, at work and in the wider community.

OECD (2010) defines literacy as "the ability to understand and use information from written texts in a variety of contexts to achieve goals and develop knowledge and potential. This is a core requirement for developing higher-order skills and for positive economic and social outcomes. Previous studies have shown reading literacy to be closely linked to positive outcomes at work, to social participation and to lifelong learning."

Different from previous assessments of literacy (see also Jones et al. 2009), PIAAC evaluates reading skills in a digital environment as well as in traditional print-based text. To also provide information about the skills of adults with poor literacy skills, the survey includes a test of "reading component" skills. Jones et al. (2009) argue that these tests help to decode skills that enable individuals to extract meaning from written text, namely knowledge of vocabulary, the ability to process meaning and fluency in reading.

Similar to the standard reference levels that are typically used for language skills (A1, A2, B1, B2, C1, C2), PIAAC also has six categories. Figure 2 shows the distribution of literacy skills across natives and migrants.

We consider people with lower than Level 2 (less than 225 points) to have limited literacy skills. This holds true for around 25% of the migrants in the PIAAC sample. For those not participating in the labour market (unemployed or out of the labour force), this number is slightly higher. We use two distinct ways of modelling literacy skills. First, we make a random selection of migrant households with limited literacy skills. Second, we set up a standard probit model (instead to the random allocation) to estimate the probability of an individual having literacy skills below 225 points.

[8] This differs from the EUROMOD baseline, since there, full take-up is assumed. There could be under-reporting due to social stigma, when we only take people into account that report social assistance benefits in the survey. Our numbers can therefore be seen as the lower boundary of the fiscal impact.

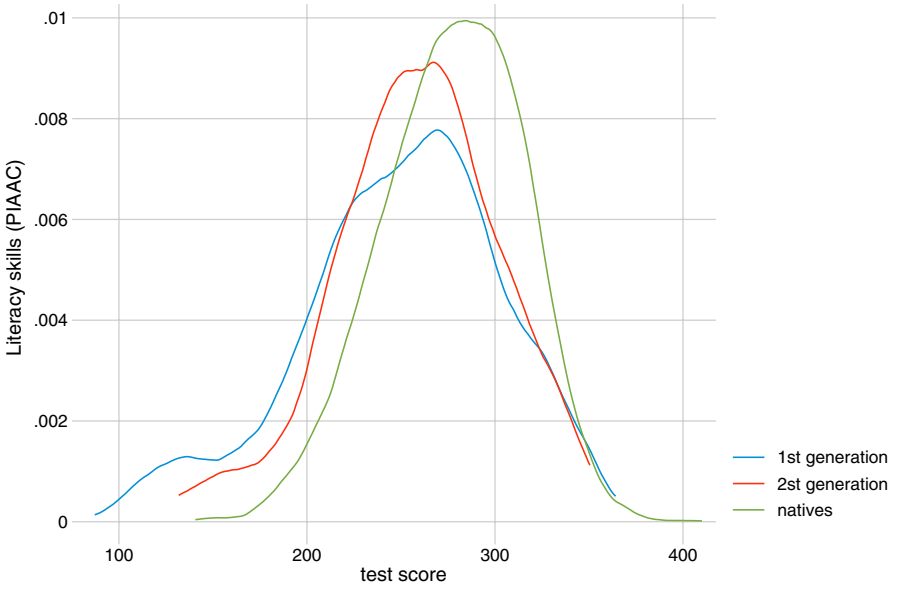

Fig. 2 Literacy skills by migration status

Using the obtained information of the probit model, we can estimate the probability of people in the EU-SILC data having limited literacy skills. In a further step, we define the 25% of migrants that show the highest probability of having limited literacy skills to be those migrants that suffer a reduction in social assistance benefits.

Table 6 highlights the results of the standard probit model. We can see that a higher education level is associated with a lower probability of having limited literacy skills. Additionally, being unemployed is associated with a higher probability of having limited literacy skills. This also holds true for retired and permanently disabled persons. On the other hand, being a student is significantly correlated with a lower probability of having limited literacy skills. Additionally, there seems to be a relationship between the probability of having limited literacy skills and living in a big household. The lower the number of persons in the household, the more likely it is that a person will have limited literacy skills. However, we do not find a significant relationship between having limited literacy skills and age. Most importantly, we find that having limited literacy skills is significantly more likely for non-EU migrants than for natives, while this relationship is not visible for EU migrants.[9]

[9] This might be related to the fact that many of the migrants from within the EU are German, who on average have higher literacy skills than natives (see, e.g., Christl et al. 2018).

Table 6 Estimated probit coefficients ((literacy score ≤ 225) = 1)

	Limited lit skills	
Children	− 0.238**	(− 2.64)
Education (base: primary)		
Lower secondary	− 0.788***	(− 4.77)
Upper secondary	− 1.320***	(− 8.06)
Post secondary	− 1.949***	(− 9.89)
Tertiary	− 2.066***	(− 11.20)
Migration status (base: native)		
EU	− 0.306	(− 1.04)
Non-EU	1.181***	(5.12)
LM status (base: employed)		
Unemployed	0.407***	(3.42)
Student	− 1.000***	(− 5.05)
Others	0.130	(1.31)
In retirement or early retirement	0.337**	(3.09)
Permanently disabled	0.751***	(3.70)
Household members (base: 1 person)		
2 persons	− 0.154	(− 1.68)
3 persons	− 0.245*	(− 2.37)
4 persons	− 0.264*	(− 2.44)
5 persons	− 0.316*	(− 2.43)
6 or more persons	0.204	(1.51)
Age group (base: aged ≤ 19)		
20–24	0.0271	(0.18)
25–29	− 0.342	(− 1.91)
30–34	− 0.112	(− 0.67)
35–39	− 0.235	(− 1.38)
40–44	− 0.009	(− 0.05)
45–49	− 0.230	(− 1.36)
50–54	− 0.114	(− 0.67)
55–59	− 0.092	(− 0.52)
60+	− 0.095	(− 0.49)
Constant	0.690*	(2.23)
Observations	4692	

t statistics in parentheses

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

4.1.3 The reform scenarios in detail

We consider three reform scenarios that we compare to our baseline system (the current system):

- **Baseline:** The baseline simulation is derived according to the EUROMOD 2019 tax-benefit system, assuming that only those reporting social assistance are taking it up.
- **Reform 1 (No lang):** This reform scenario assumes the full reform, except the deduction of social assistance for migrants with limited literacy skills.
- **Random model (25%):** This reform scenario assumes, in addition to reform 1 (No lang), that 25% of those receiving social assistance do not have sufficient language skills and therefore receive less social assistance. Migrants with limited literacy skills are chosen randomly within the migrant households receiving social assistance.
- **Probit model (25%):** This reform scenario assumes, in addition to reform 1 (No lang), that 25% of those receiving social assistance do not have sufficient language skills and therefore receive less social assistance. Migrants with limited literacy skills are chosen according to the predictions of the probit model within the migrant households receiving social assistance.

4.2 Labour supply modelling

Our labour supply modelling approach is based on the methodology of Bargain et al. (2014), who introduced a flexible discrete choice model as also used by, for example, Brewer et al. (2006) and Blundell et al. (2000) to evaluate the impact of tax reforms in the UK. This approach is based on the random utility model, first introduced by McFadden et al. (1973). The core assumption is that households maximise their utility function under the restriction of choosing between consumption (income) and leisure. These 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 for heterogeneity in household preferences by adding household characteristics in the utility function. A household's labour 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 h, 1–10 h, 11–20 h, 21–30 h, 31–40 h, 41–50 h and 51–60 h.

In general, we distinguish between three household types: single females, single males, and couple households.[10] The deterministic utility of a single male or female household depends only on their own wage, while for couple households, the utility depends also on the hours worked and the wage of their partner. Formalizing the model, the utility of a couple, i, at each discrete choice, j, can be written as:

$$U_{ij} = a_{ci}C_{ij} + a_{cc}C_{ij}^2 + a_{h_f i}H_{ij}^f + a_{h_m i}H_{ij}^m + a_{h_{ff} i}(H_{ij}^f)^2 + a_{h_{mm} i}(H_{ij}^m)^2 + a_{ch_f}C_{ij}H_{ij}^f + a_{ch_m}C_{ij}H_{ij}^m - n_j^f 1(0 < H_{ij}^f < 40) - n_j^m 1(0 < H_{ij}^m < 40)$$

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

where the couple's consumption is C_{ij} and the spouse's working hours are H_{ij}^{f} and H_{ij}^{m}.[11] We try to improve the fit of the model by introducing fixed costs of work, similarly modelled by Blundell et al. (2000). Fixed costs are able to explain why, in reality, we typically only observe a few cases with a small positive number of hours worked. These costs are denoted by n_j^k, which can differ by gender (k, either male m or female f) for non-zero or part-time hour choices and are introduced with the help of an indicator function. Taste shifters are introduced in the model by allowing consumption as well as hours worked to vary with age, age squared, the presence of children and their age and education:

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

We capture the unobserved heterogeneity by adding an error term u_i and assume it to be normally distributed. As mentioned before, we take fixed costs to start working (n_j^k) into account to improve the model. We allow these fixed costs to differ by gender, k. The only model restriction we have to introduce is on increasing monotonicity of consumption. This is the minimum requirement for meaningful interpretation of the model and is directly introduced into the likelihood maximization.

As already stated, in our model each individual faces a discrete number of alternatives in their choice of hours worked. For each labour supply choice, we calculate the 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-labour income (y) and specific household characteristics (X_i):

$$
C_{ij} = f(w_i^f H_{ij}^f, w_i^m H_{ij}^m, y_i, X_i) \tag{1}
$$

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 by using the microsimulation model EUROMOD, together with the specific information on household characteristics that are crucial for receiving certain benefits (e.g., family composition, etc.).

In the EU-SILC data, only wages for those who are working are reported. Therefore, we have to estimate the wages for those that are not working according to a standard Heckman-correction wage equation. The estimates from the wage equation are reported in Table 19 in the "Appendix". To minimise the division bias, we used the estimated wages both for non-workers and workers.

Using the information on wages, our discrete choice framework enables us to estimate the structural parameters of the underlying utility function. As in

[11] Please note that for singles, there will only be 1 h term denoting the discrete choice set of this individual.

Müllbacher and Nagl (2017) and Bargain et al. (2014), a multinomial logit model is used to estimate these parameters. Additionally, the stochastic specification of the labour supply model will include an i.d.d. error term, e_i, that represents possible optimization errors. Therefore, total utility, $V_{i,j}$, can be defined as:

$$V_{i,j} = U_{i,j} + e_i \tag{2}$$

We make the assumption that the error term follows an extreme value distribution, and therefore we calculate the probability for each household, i, of making a labour supply choice, j. We restrict our sample to couples, single men and single women, who are aged between 18 and 59, available for the labour market (not disabled, retired or in education) and additionally we exclude farmers and the self-employed. We only consider members of households available for the labour market as flexible, assuming that inactive persons are not participating in general. About 38% of social assistance recipients fulfil this criterion. As highlighted in Table 7, most of those excluded from the labour supply model are either retired (33%), inactive (11%) or students (8%).

As a robustness check, we also include inactive persons in our flexible sample, assuming that these individuals are also willing to take up jobs. Please note that when focusing only on the sample of migrants with poor language skills who are recipients of SA, we observe a higher proportion of inactive persons (37%).

Our approach has some shortcomings. First, since the take-up might be influenced by the reform, we have to assume full take-up in the labour supply model. Therefore, our employment effects should be seen as an upper bound on our estimates. Second, labour demand responses are not modelled at all in this paper, meaning that the employment effects have to be interpreted as only supply factors, ignoring the labour demand side completely. Third, models used by, for example, Kornstad and Thoresen (2007) and Figari and Narazani (2020) add to the standard model with fixed costs of starting to work and potential child-care costs that vary depending on the hours worked. Due to data limitations, we are not able to cover this aspect in our labour supply model.

Table 7 Flexible sample of the labour supply model

Sample	Population	Recipient SA	Low skill	Low skill & SA
Employee	0.40	0.18	0.37	0.04
Unemployed	0.04	0.20	0.15	0.27
Inactive	0.06	0.11	0.3	0.37
Student	0.21	0.08	0.00	0.00
Retired	0.23	0.33	0.14	0.23
Self-employed	0.04	0.04	0.01	0.07
Other	0.02	0.06	0.03	0.02
Flexible sample 1	0.44	0.38	0.51	0.31
Flexible sample 2	0.50	0.49	0.82	0.68

Flexible sample 1 (only unemployed); flexible sample 2 (unemployed plus inactive)

Table 8 Fiscal impact of the reform (2019, in million euros)

Concept	Baseline	Total			Diff. w.r.t. baseline		
		No lang	Random	Probit	No lang	Random	Probit
Total taxes	34,322	34,322	34,322	34,322	0 (–)	0 (–)	0 (–)
Total SIC	56,855	56,855	56,855	56,855	0 (–)	0 (–)	0 (–)
Total pensions	50,384	50,384	50,384	50,384	0 (–)	0 (–)	0 (–)
MT benefits	4203	4100	4087	4057	− 56 (26)	− 116 (39)	− 146 (46)
Social assistance	719	663	602	573	− 56 (26)	− 116 (39)	− 146 (46)
Non-MT benefits	10,857	10,857	10,857	10,857	0 (–)	0 (–)	0 (–)
Net budgetary	25,733	25,836	25,850	25,879	56 (26)	116 (39)	146 (46)

MT (means tested), non-MT (non-means tested); std. errors in brackets

However, this should not have a great impact on our results for two reasons. First, public child care in Austria is paid for by the state, questioning a strong impact on the labour supply decision when including child-care costs in our model.[12] Second, we assume that inactive persons (for child-care reasons) are not part of the flexible sample in our labour supply model. That means that we assume that parents who were inactive due to child-care reasons (e.g., because of lack of child-care facilities) will not change their behaviour due to the reform.

However, one might be interested in including these individuals in the model. As an additional robustness check, we extended our flexible sample to inactive households.[13] The results of the extended model are discussed in detail in Sect. 1 in the "Appendix".

5 Results

5.1 The fiscal and distributional impact of the reform

Independent of the scenario, we find that the reform substantially reduces total expenditure for social assistance as highlighted in Table 8. In the case of not reducing the social assistance for people with limited language skills (No Lang), the overall expenditure for social assistance benefits is expected to be around 56 million euros lower than the baseline scenario. The random assignment of limited literacy skills for migrants leads to a further decrease in expenditure, in total 116 million euros. In the model where we use the estimate probabilities from our probit model (probit), total expenditure drops by 146 million euros. This suggests that by using

[12] In the case of Vienna, where most social assistance receivers are living, public child care for children below the age of six is free of charge. Typically, there is only a food allowance to pay (e.g., in Vienna it is 68.23 euros per month), but low-income families are reimbursed for this expenses.

[13] In the extended sample, 64% of mothers with a child up to two years old are inactive, 32% are employed and 4% are unemployed.

Table 9 Impact on equivalised disposable household income (annual, in euros)

Decile	Baseline in Euro	Diff. w.r.t. baseline		
		No lang	Random	Probit
1	10,210	− 66 (27)	− 123 (41)	− 168 (57)
2	15,928	− 81 (50)	− 123 (63)	− 134 (69)
3	19,167	− 1 (3)	− 1 (3)	− 1 (3)
4	21,875	3 (2)	3 (2)	0 (3)
5	24,591	0 (–)	0 (–)	0 (–)
6	27,176	0 (–)	0 (–)	0 (–)
7	30,217	0 (–)	0 (–)	0 (–)
8	34,141	0 (–)	0 (–)	0 (–)
9	39,891	0 (–)	0 (–)	0 (–)
10	62,531	0 (–)	0 (–)	0 (–)
All	28,543	− 15 (6)	− 24 (8)	− 30 (9)
SA recipients	13,374	− 105 (97)	− 503 (198)	− 682 (214)

Standard errors (SE) in brackets

the probit model, we are more likely to identify migrants with limited literacy skills within households with low income. Therefore, the part of the reform related to literacy skills is expected to reduce the costs of social assistance further by between 60 and 90 million euros, depending on the assumptions used to identify migrants with limited literacy skills.

To summarise our findings, three forces drive the fiscal impact. First, reduced social assistance for children reduces the benefits for bigger families, leading to less expenditure on social assistance. Second, the additional bonuses for disabled and lone-parent households will introduce some additional expenditure on social assistance. The net effect of both is the reduction of around 56 million euros, meaning that the first effect outweighs the second. Additionally, the reduction of social assistance for migrants with limited literacy skills leads to a further decrease in expenditure. The fiscal impact when assuming full take-up of social assistance benefits can be seen in Table 18 in the "Appendix".

Looking at the impact on equivalised disposable household income, as shown in Table 9, reform impact is especially high for low-income deciles (when equivalised disposable household income is considered as the income variable), which is where most of the social assistance recipients are located. [14] The impact of both reforms substantially reduces the income of the first two deciles. The reform also affects households in the third and fourth deciles, but the impact is minute and not statistically significant. As expected, including the reduction for migrants with limited literacy skills leads to further income losses in those deciles. While the average loss in the first decile was 66 euros in the first scenario (No lang), adding a cut in social

[14] About 59% of SA recipients (households) are located in the first decile, about 34% in the second and about 5% in the third.

assistance due to limited language skills increases the loss up to 123 euros. When we use the probit model to identify migrants with limited literacy skills, the cut is even greater (168 euros).

When looking at social assistance recipients only, the reduction in equivalised disposable household income is about 100 euros in the case of the first scenario. Accounting for the cut in social assistance for migrants with limitied literacy skills, the loss is expected to be substantially higher (about 500 to 700 euros, depending which model we use).

As mentioned earlier, some households profit from the reform (one-adult households with children), and others lose (households receiving social assistance with a lot of children and households with limited language skills). A closer look at the distribution of winners and losers in monetary terms reveals that most people who lose as a result of the reform can be found in the first decile, while the winners are equally distributed between the first and the second decile. Overall, around 38,400 households are losing due to the reform, while around 21,000 are winning. If we were to ignore the reductions for migrants with limited literacy skills, the number of losers would be substantially lower.

To analyse the impact on inequality, the Gini coefficient is usually used. However, in our case, it might not be the best inequality indicator since we only expect an impact on the lower tail of the income distribution. Therefore, we also look at the S80/S20 indicator (income quintile share ratio) in Table 10. As we would expect from the reduction of disposable income, inequality increases according to both indicators. Whilst the reform increases the Gini coefficient significantly from 0.2653 to 0.2659, the reduction for people with limited literacy skills further increases the Gini to 0.2665 (probit). The same holds true for other inequality measures such as the income quintile share ratio (S80/S20).

Looking at the impact on the at-risk-of poverty (AROP) rates (see Table 11), we can see that depending on the type of household, the rates may increase or decrease. Due to the increase in social assistance for single households with children, the AROP rate decreases from 34.7 to 33.9%. Due to the reduction in social assistance for households with more children (three or more), the AROP rate of these households increases substantially (from 15.7% to 17.3%). However, most of these results are not statistically significant. The overall effect on the AROP rate is negligible, because the group influenced by the reform (social assistance recipients) is very small, and additionally many of the households receiving social assistance benefits were already located below the poverty line before the reform.

5.2 Labour supply responses

This section reports the labour supply responses to the changes in social assistance suggested by the discrete choice labour supply model described in Sect. 4.2. We use the probit model to identify the 25% of migrants with limited literacy skills. The discrete choice framework allows us to estimate the structural parameters of the underlying utility function. The results of the multinomial logit model are listed in Table 20 in the "Appendix" for all three household types. All estimates show the

Table 10 Impact on inequality

	Value				Diff. w.r.t. baseline		
	Baseline	No lang	Random	Probit	No lang	Random	Probit
Gini coefficient	0.2653	0.2659	0.2663	0.2665	0.0006**	0.0010**	0.0012**
S80/S20	3.9153	3.9374	3.9525	3.9611	0.0222	0.0373	0.0458

**Significant on a 95% level, *significant on a 90% level

Table 11 Impact on at-risk-of-poverty rates (in %)

Household type	AROP rate				Diff. w.r.t. baseline		
	Baseline	No lang	Random	Probit	No lang	Random	Probit
1 adult < 65, no children	27.9	27.6	27.6	27.6	− 0.3	− 0.3	− 0.3
1 adult older 65, no children	23.3	23.3	23.3	23.3	0.0	0.0	0.0
1 adult with children	34.7	33.6	33.9	33.9	− 1.1*	− 0.8	− 0.8
2 adults < 65, no children	10.7	10.6	10.6	10.6	− 0.1	− 0.1	− 0.1
2 adults, 1+ older 65, no children	9.5	9.5	9.5	9.5	0.0	0.0	0.0
2 adults with 1 child	12.1	12.1	12.1	12.1	0.0	0.0	0.0
2 adults with 2 children	13.1	13.1	13.1	13.1	0.0	0.0	0.0
2 adults with 3 or more children	15.7	17.3	17.3	17.3	1.6	1.6	1.6
3 or more adults, no children	3.9	3.9	3.9	3.9	0.0	0.0	0.0
3 or more adults with children	12.9	12.5	12.5	12.5	− 0.3	− 0.3	− 0.3
All	13.7	13.7	13.7	13.7	0.0	0.0	0.0

Poverty line (anchored) is 15,495.20 euros (60% of median equivalised annual disposable income)

**Significant on a 95% level, *significant on a 90% level

expected signs for the main parameters and most are highly significant. As already discussed, we control for several of the taste-shifting parameters such as age, children and level of education.

For couple households, male and female leisure increases the household's utility with a diminishing effect as the level of leisure increases (squared term). We find no statistical evidence that partners like to spend time together since the interaction effect between male and female leisure is insignificant. As indicated by the interaction term of leisure and children, there are substantial gender differences in the assessment of leisure in the case of children. For males, the results are insignificant and sometimes even negative, while for women they are always positive and significant and especially strong in the case of young children. This implies that, especially when there are small children in the household, the utility for leisure (which might include time for taking care of the child) is higher for women than for men.

Singles (male and female) behave in a similar way to their married counterparts. Leisure in the model for male or female singles leads to a higher utility, with a decreasing effect as the level of leisure increases (squared term). The individual models suggest increasing utility with consumption even though the parameter for

income (consumption) is not significant for males, and here too differences can be found in the presence of children.

5.2.1 Labour supply elasticities

To get an initial idea of the possible reaction to the reform, we estimate wage elasticities for males and females (of both an increase and a decrease of social assistance). In general, we derive labour supply elasticities by numerical simulations. Intensive margin refers to the expected change in the number of hours worked for people already working in the original dataset, while the extensive margin refers to the expected change from people not participating in the labour market.

The Austrian reform changes the amount of social assistance, which can potentially have an impact on the labour supply reaction of households. This is what our analysis will focus on, especially labour supply responses of specific household types, since the reform affected different household types in different ways. First, we focus on labour supply elasticities for changes in social assistance. Therefore, we model a 1% increase in social assistance, which is reflected in our estimate as an increase in the basic amount of the minimum standards of social assistance by 1%.[15] Note that this concept is different to the traditional gross wage elasticities that are typically found in the literature, which we report by household type (Fig. 4 in the "Appendix") and by skill level (Table 21 in the "Appendix") to validate the labour supply model. The elasticities are in line with the findings of other studies, for example, Bargain et al. (2014) and Christl et al. (2019), but slightly higher than the results derived by Müllbacher and Nagl (2017).

Table 12 reveals the expected changes by household type and gender.[16] A 1% increase in social assistance leads to a 0.03% decrease in the average weekly working hours for males and a decrease of 0.07% for women. This indicates that females respond more strongly to an increase in social assistance on the intensive margin. We find weaker gender differences for the participation effect. A 1% increase in social assistance is expected to decrease participation of males by 0.03% and of females by 0.04%.

Looking in detail at the labour supply reaction of several household types, we can see that the reaction in couple households is quite similar across gender. The presence of children does not really have an impact on labour supply elasticities, either on the intensive or the extensive margin. The elasticities lie at around 0.02% and 0.04%, respectively. Looking at the elasticities for singles, we find a stronger impact on both the intensive and the extensive margin, with especially high elasticities for singles with children. Notably, the elasticities are higher for single males with children than for single females with children, while the opposite holds true for singles without children.

[15] The underlying wage equations can be found in Table 19 in the "Appendix".

[16] Note that the average hours worked are more or less in line with external statistics from the OECD for 2017 that suggest average weekly working hours of around 39.7 for men and 31.4 for women.

Table 12 Labour supply reaction to 1% increase in social assistance

Household type	Sex	Average working hours			Participation		
		Baseline	Reform	Diff (%)	Baseline	Reform	Diff (%)
Total	Male	39.77	39.76	− 0.03	1,600,302	1,599,825	− 0.03
	Female	30.17	30.15	− 0.07	1,449,807	1,449,239	− 0.04
Couple with child	Male	40.90	40.89	− 0.03	626,562	626,385	− 0.03
	Female	26.26	26.25	− 0.04	496,487	496,402	− 0.02
Couple w/o child	Male	39.93	39.92	− 0.02	631,413	631,296	− 0.02
	Female	31.32	31.31	− 0.03	641,419	641,306	− 0.02
Single with child	Male	40.04	39.86	− 0.44	5765	5758	− 0.13
	Female	31.73	31.64	− 0.27	61,222	61,153	− 0.11
Single w/o child	Male	37.47	37.45	− 0.06	336,562	336,381	− 0.05
	Female	34.55	34.49	− 0.18	250,680	250,400	− 0.11

However, when we look at the impact of a 1% decrease in the social assistance benefit, elasticities are substantially different. Obviously, only recipients of social assistance will react to the decrease and might increase labour supply. The labour supply elasticities are summarised in Table 13. Regardless of whether or not we include inactive persons in the flexible sample, we can see that females react substantially stronger to a decrease in social assistance than males on both the intensive and the extensive margins. A 1% decrease in the benefit amount would lead to a 0.29% increase in hours worked by females and to an increase of 0.16% in participation of females. For males the increase is estimated to be 0.10% and 0.09%, respectively. Given the small sample size of social assistance recipients, we will not divide the elasticities by household type.

However, we also see that there is a substantial difference depending on whether we include inactive persons in the flexible sample. It turns out that inactive persons have, on average, lower labour supply elasticities than the unemployed. This leads to lower estimated labour supply elasticities when keeping them in the flexible sample.

5.2.2 General labour supply reactions to the reform

The impact of the reform on labour supply is not clear when considering only the elasticities of social assistance. The reform did increase social assistance for some households, especially for lone parents who seem to react more strongly to changes in social assistance. On the other hand, couples (with many children) and migrant households are eligible for lower social assistance in the reform scenario, but it seems that the reaction to social assistance changes is lower. The overall effect is therefore ambiguous.

Therefore, we analyse the impact of the reform within the discrete choice framework of our labour supply model. Table 14 summarises the expected labour-supply effects by gender. Our model predicts that the reform would have a positive effect,

Table 13 Labour supply reaction of SA recipients to a 1% decrease in social assistance

		Hours (%)	Participation (%)
W/o inactive	Male	0.10	0.09
	Female	0.29	0.16
With inactive	Male	0.05	0.04
	Female	0.19	0.13

Table 14 Labour supply effects of the reform

	Gender	Base	Reform	Diff (%)
Social welfare	Total	2382	2384	0.08
Hours	Male	39.77	39.87	0.25
	Female	30.17	30.21	0.11
Participation	Male	1,600,302	1,603,850	0.22
	Female	1,449,807	1,450,880	0.07
Short part-time	Male	36,985	36,426	− 1.51
	Female	280,361	279,912	− 0.16
Long part-time	Male	206,280	206,753	0.23
	Female	467,010	467,770	0.16
Full-time	Male	713,229	715,170	0.27
	Female	502,049	502,669	0.12
Over-time	Male	643,807	645,501	0.26
	Female	200,387	200,529	0.07

Short part-time (1–19 h), long part-time (20–39)

especially on the extensive margin. In numbers, this would translate to an additional 3500 males and 1100 females willing to participate in the labour market due to the reform. If we also include inactive persons in our sample, we can see a shift from male to female participation (2100 male and 1700 females would like to participate), which can be explained by the fact that it is mostly females who are inactive in Austria (e.g., due to child care). Additionally, we expect an increase in weekly hours worked on average for men from 39.77 to 39.87 and for women from 30.17 to 30.21. On aggregate, a small change from part-time to full-time is visible. The overall results are similar if we include inactive persons in our flexible sample as discussed in Sect. 2 in the "Appendix".

Participation increases by around 0.22% for males and 0.08% for females. The higher impact for males might be driven by the fact that the negative participation effect due to the higher social assistance for single-parent households is more likely to affect women than men. The intensive margin is only slightly affected. This is probably driven by so-called "Aufstocker", who are not able to receive additional social assistance to supplement their earnings due to the reform (e.g., one-earner households with a lot of children). In general, we can see a shift from part-time to full-time, which is stronger for males than for females. Overall, the reduction in social assistance for couples, for households with many children, and for migrants

with limited language skills, seem to outweigh the effect of the higher social assistance for lone parents, leading to a small but positive effect on labour supply.

5.2.3 Digging further: labour supply reactions for specific household groups

While the overall assessment of the reform's effects on the labour supply suggests a positive impact on labour market participation, the key drivers of this increase in labour supply are not yet clear. Therefore, we looked more closely at household types, and in addition, since there was a substantial decrease in social assistance for migrants with limited language skills, we split our sample into natives and migrants.

Taking a closer look at the household types summarised in Table 15, we can see that couple households with children, (i.e., households facing substantial losses in social assistance due to the reform), react by increasing their participation. This is the group with a stronger reaction both on the intensive and extensive margins. Overall, 0.33% of males and 0.14% of females of the households with children would like to participate in the labour market under the new social assistance scheme. The effect on the labour supply is also positive for couples and singles without children. This is mainly driven by migrants with limited language skills who also suffer substantial losses in social assistance. On the other hand, we can see that single households with children, which are the only households gaining from the reform, would react by decreasing their labour supply. The effect would be stronger for females, who would reduce their participation by 0.64% and the number of hours worked by 1.03%. Similar results are obtained when we include inactive persons in our flexible sample. However, we can see a shift from male to female participation in couple households, indicating that for some households labour market participation of inactive females might be more favourable than male participation (see Sect. 1 in the "Appendix").

Focusing more on the reduction in social assistance for people with limited language skills, we divided our sample by migration status: migrants (by citizenship) and natives. By looking separately on native and migrant households (see Table 16), we can see no reaction to the reform by native singles without children, either in terms of hours worked or participation. This is in line with our expectations, since single households without children are not influenced by the reform.

On the other hand, the reaction of native singles with children is relatively strong. The reform would decrease participation by 0.83% for females (in absolute terms by

Table 15 Labour supply reactions by household type—total sample

	Males			Females		
	Hours	Participation		Hours	Participation	
Couple w child	0.39%	2066	0.33%	0.29%	691	0.14%
Couple w/o child	0.19%	1175	0.19%	0.13%	643	0.10%
Single w. child	− 0.25%	− 13	− 0.23%	− 1.03%	− 391	− 0.64%
Single w/o child	0.10%	320	0.09%	0.06%	130	0.05%
Total		3548			1073	

Table 16 Labour supply reactions by household type—native and migrant sample

	Males			Females		
	Hours	Participation		Hours	Participation	
Natives						
Couple w child	0.27%	1115	0.24%	0.11%	184	0.05%
Couple w/o child	0.15%	739	0.15%	0.12%	451	0.09%
Single w. child	− 0.21%	− 8	− 0.20%	− 1.32%	− 413	− 0.83%
Single w/o child	0.00%	0	0.00%	0.00%	0	0.00%
Total		1846			221	
Migrants						
Couple w child	0.72%	951	0.59%	0.85%	508	0.40%
Couple w/o child	0.36%	436	0.36%	0.19%	192	0.15%
Single w. child	–	− 5	–	–	22	–
Single w/o child	0.72%	320	0.66%	0.41%	130	0.35%
Total		1702			851	

Please note that for migrant households in the flexible sample w/o inactive, the group of singles with children is very small, so we have not analysed them in detail

413 persons). This reaction is expected, since these households were the only financial winners from the reform, due to the bonus introduced for single parents. Looking at native couple households, the reaction is especially strong for men who seem to react more strongly to the decrease in social assistance than the women in native couple households.

This result might be surprising, since the labour supply elasticity is higher for females than males (see Fig. 4). However, it is worth remembering that the reform affects a specific sub-group of the population (i.e., low-income households), that usually have higher elasticities (see Bargain et al. 2014). Looking at the utility function of couple households (see Table 20 in the "Appendix"), we observe a higher utility for female leisure than male leisure, especially in the presence of children. This could be explained by social norms regarding gender roles,[17] in fact the utility for female leisure is higher in the presence of children up to two years old and decreases with the age of the children. Additionally, at the couple level, the utility might be higher if males increase the number of hours at work, because it would probably correspond to a higher expected wage.

The labour supply reactions of migrants are more complex given that they are not only influenced by changes in social assistance due to household type but are also due to the reductions in social benefits for migrants with limited language skills. Therefore, their reactions could potentially differ from those of natives. Table 16 additionally highlights the results for the migrant population, assuming that some migrants receive social assistance cuts due to their limited language skills. We can see that in relative terms, the positive impact on hours worked and on participation

[17] See, e.g., Ichino et al. (2019).

Table 17 Participation effect of the reform

	Males	Females	Total
Natives	1846	221	2068
Migrants	1702	852	2553
Total	3548	1073	4621

is stronger for migrants than for natives. The relative effect is especially strong for singles and couples with children, indicating that the social assistance cuts are more decisive for the labour market decisions of these household types.

Additionally, Table 17 shows that the participation effect of the reform is mainly driven by migrant households. Even though they are the smaller part of social assistance recipients compared to natives, the participation increases more strongly than for natives, even in absolute terms. Migrants increase their labour supply by about 2500, while only about 2100 native households will start participating in the labour market due to the reform. The results are mainly driven by males, who seem to be more strongly affected by the reform. This is also related to the fact that single parents with children (who are often females) will decrease their labour market participation.

6 Conclusion

Using a discrete choice labour supply model, we analyse labour supply elasticities in response to changes in social assistance by household type and show that elasticities are especially high for single households, compared with elasticities for couple households. Additionally, the existence of children seems to increase the elasticities of both males and females. In general, females exhibit higher labour supply elasticities related to changes in social assistance than men.

We apply the labour supply framework to a social assistance benefits reform ("Neue Sozialhilfe") in Austria. The reform had two political goals: first, the abolition of potential inactivity traps for families with (many) children. In the pre-reform system, such families had been eligible for social assistance benefits that frequently exceeded the potential income offered in the labour market. Second, the Austrian government wanted to reduce the benefits available to migrants with poor language skills. This was meant to increase migrants' incentives to learn German, or English. Knowledge of one of these languages was seen as a necessity for successful labour market integration. The political merits of both these aspects of the reform were heavily debated. Eventually, however, the entire reform was judged to be unconstitutional by the Austrian Constitutional Court.

We use data from the Programme for the International Assessment of Adult Competencies (PIAAC) to determine a key variable for the proper analysis of this reform: the number of migrants with limited literacy skills. We show that around 25% of migrants in the PIAAC sample appear not to possess the B1 level of language skills that was required to receive the full amount of social assistance benefits

under the reform. This proportion is even higher among migrants not participating in the labour market (unemployed or out of the labour force). We use a parametric approach (probit model) to identify migrants with a high probability of having limited language skills in the EU-SILC data.

Using the labour supply model, we show that the impact of the reform on singles is very low and driven exclusively by its impact on migrants. According to our estimates, the Austrian social assistance reform would lead to a small increase in labour market participation. Even though women exhibit higher labour supply elasticities, the overall effects of the reform would be especially strong for men and migrants. This result is driven by the fact that the reform involves comparatively higher reductions in social assistance benefits for migrants with limited language skills and for households with children. According to our estimates for the latter group, the household utility is higher if men rather than women increase their labour supply in response to the reform.

Our in-depth analysis of the "Neue Sozialhilfe" reform not only sheds light on whether the reform would meet its stated goals, but also helps inform potential future reforms of Austria's social assistance scheme. Currently, the cost of social assistance benefits in Austria is around 900 million euros, a small part of total social expenditure. Our model suggests that the "Neue Sozialhilfe" reform would reduce these costs by between 116 and 146 million euros, depending on the selection of migrant households with limited literacy skills (random or probit model). Not surprisingly, the policy would also increase inequality and poverty, especially for households with three or more children. On the other hand, poverty for single parents would decrease because the reform consists of a special bonus payment for such households that increases their benefits.

As a recommendation for possible future reforms, our model suggests that the labour supply effect of the Neue Sozialhilfe reform is greatest for families with children. We argue that this outcome is driven by the large financial impact of the reform on the income of these households, because they typically show lower labour supply elasticities. Our analysis additionally highlights the importance of taking particular care when evaluating both benefit cuts and increases for single parents. Single households, and especially single parents, exhibit particularly high labour supply elasticities in response to changes in social assistance. Increasing their benefits might make such households better off when not working. This could potentially decrease their labour market participation, even if they have access to child care. On the other hand, decreasing their benefits, without providing sufficient child-care facilities would leave single parents financially worse off, especially if they have very low incomes or are unable to find jobs. As a recommendation for policy-making, linking bonus payments for single parents to the availability of public child-care services could be a potential option to both support single parents who do not have access to public child care, and avoid creating negative incentives for single parents to leave the labour market or to stay out of the labour market.

The largest group of social assistance recipients, namely native singles, without children, were not affected by the New Social Assistance reform at all. Since single people form the group that reacts most strongly to changes in social assistance benefits, a policy that aims to increase labour supply incentives should probably not

overlook this group. Additionally, the impact of the unequal treatment of migrants with limited language skills has an effect on the labour supply side, but this group typically has less chance of finding work in the labour market (demand-side bias). Therefore, the different treatment of natives and migrants might counteract the idea of closing a potential inactivity trap. Furthermore, these cuts in social assistance risk leaving people with insufficient income, especially if they are unable to find a job on the labour market. If this is the case, the expected positive second-round effects (due to higher employment) might be limited. In general, our analysis is not meant to be exhaustive regarding the welfare effects of the Austrian social assistance reform. A detailed assessment of labour demand, as well as the implied second-round effects would be required to draw welfare conclusions.

Appendix

Additional graphs and tables

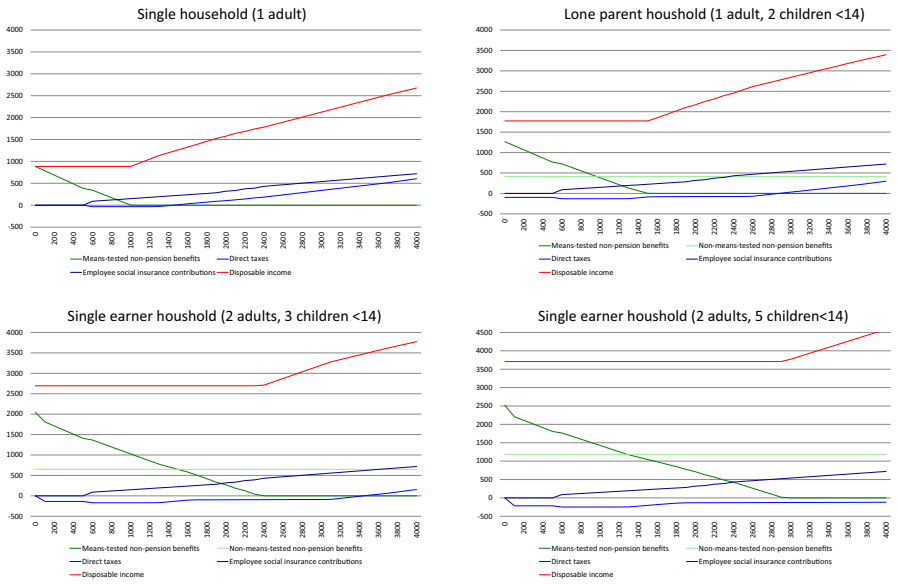

Fig. 3 Hypothetical households receiving social assistance by income level. *Note*: Calculations based on EUROMOD HHoT, see Hufkens et al. (2019)

Robustness of the LS model

In this section, we will briefly describe the results, when extending the flexible sample of the labour supply model to inactive persons. First of all, as seen in Table 13,

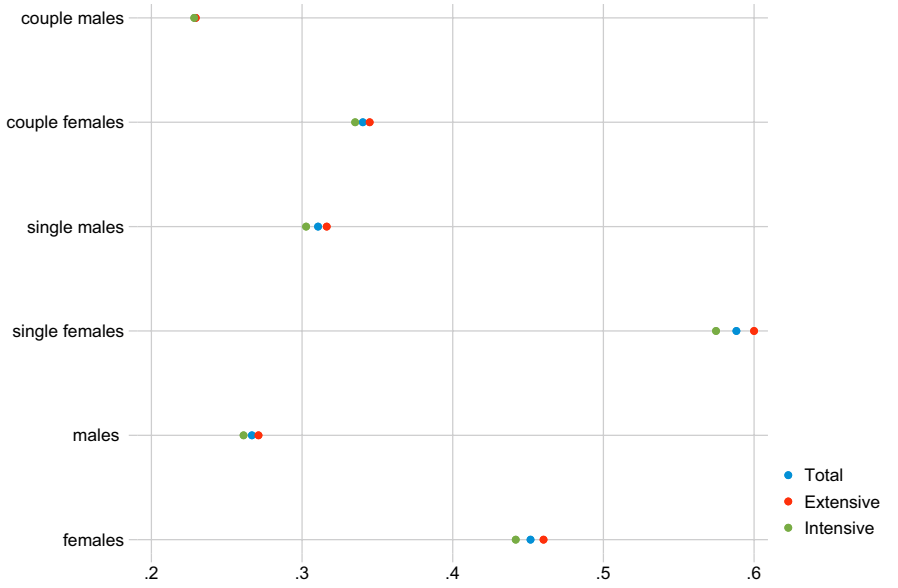

Fig. 4 Labour supply elasticities (gross wage)

Table 18 Fiscal impact of the reform—full take-up (2019, in million euros)

Concept	Total			Diff. w.r.t. baseline	
	Baseline	Random	Probit	Random	Probit
Total taxes	34,322	34,322	34,322	0	0
Total SIC	56,855	56,855	56,855	0	0
Total pensions	50,384	50,384	50,384	0	0
MT benefits	5748	5410	5384	− 338 (56)	− 364 (73)
Social assistance	2264	1926	1900	− 338 (66)	− 364 (73)
Non-MT benefits	10,857	10,857	10,857	0	0
Net budgetary	24,188	24,526	24,552	338 (56)	364 (73)

MT, means tested; Non-MT, non-means tested; SE in brackets

labour supply elasticities when taking into account inactive persons are substantially lower, meaning that the estimates of the labour supply reaction to changes will be smaller. This is mainly driven by changes to the estimates of our multinomial logit model.

In contrast to the model where only the unemployed are included in the flexible sample (see Table 20), we observe a slightly higher utility for male leisure than female leisure in couple households in Table 24. This is an interesting finding potentially leading to different labour supply reactions in couple households. In general, when including inactive persons in the flexible sample, the coefficient for leisure is higher than when excluding inactive persons.

Table 19 Wage equations—male and female

	Males (1)	Female (2)
ln_hourly_wage		
Age	0.07571***	0.04095***
	9.024	3.46
Age squared	− 0.07225***	− 0.02753
	− 6.666	− 1.795
Secondary education	0.2487***	0.1414*
	4.588	2.405
Tertiary education	0.5176***	0.3939***
	9.065	6.409
Married	− 0.008694	0.02454
	− 0.2675	0.6923
Constant	3.18***	3.612***
	20.53	16.14
Selection		
Children 0–2	− 0.1261	− 0.5462*
	− 0.6793	− 2.288
Children 3–6	− 0.04465	− 0.2044
	− 0.3091	− 1.063
Children 7–12	− 0.06113	− 0.1115
	− 0.5492	− 0.7803
Children 13–17	− 0.09429	− 0.3651**
	− 0.8685	− 2.994
Children above 17	0.08123	− 0.08778
	0.3743	− 0.5131
Age youngest child	− 0.01307	− 0.01047
	− 1.078	− 0.7316
Age	0.01005	0.07881
	0.2471	1.923
Age squared	0.003318	− 0.08584
	0.06092	− 1.542
Secondary education	0.5555***	0.5588***
	3.501	3.891
Tertiary education	0.6337**	0.6936***
	3.201	4.166
Older than 70 in HH	− 0.1209	0.01626
	− 0.5942	0.08729
Married	− 0.4009**	0.1968
	3.188	1.708
Other hh income	− 0.01662	0.01902
	− 1.011	1.506
Wealth	0.004556***	0.001732
	3.448	1.582

Table 19 (continued)

	Males (1)	Female (2)
Constant	0.4587	− 0.6585
	0.6231	− 0.8334
athrho	−1.145***	− 1.153***
	− 9.2	− 10.68
lnsigma	− 0.7203***	− 0.5216***
	− 33.98	− 23.62
Observations	1412	1334

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

Table 20 Estimates of the discrete choice model of labour supply

Choice	Couples	Single male	Single female
In-work male	− 4.556***	− 3.038***	
	− 6.376	− 6.039	
Part-time male	0.1376	0.01855	
	0.3745	0.06034	
Full-time male	0.7591	0.9877*	
	1.529	2.331	
Over-time male	0.4095	0.9626	
	0.7031	1.894	
In-work female	1.583***		− 0.6677*
	4.687		− 2.365
Part-time female	0.05689		0.2266
	0.4114		1.19
Full-time female	0.4319		0.9513***
	1.918		3.455
Over-time female	0.2334		0.5888
	0.6363		1.499
Leisure male	0.3377**	0.3211***	
	2.965	4.493	
Leisure male^2	− 0.004212***	− 0.003477***	
	− 7.118	− 6.668	
Leisure male * age	− 0.001075	0.001779	
	− 0.3492	0.8166	
Leisure male * age^2	0.002214	− 0.0005769	
	0.6245	− 0.2292	
Leisure male * children	− 0.006227	− 0.008789	
	− 0.8035	− 1.395	
Leisure male * children (0–2)	− 0.00257	0.001758	
	− 0.2124	0.2308	

Table 20 (continued)

Choice	Couples	Single male	Single female
Leisure male * children (3–6)	0.0003432	0.005192	
	0.04762	0.6031	
Leisure female	0.383***		0.3696***
	3.923		6.053
Leisure female^2	− 0.003646***		− 0.003098***
	− 8.929		− 8.192
Leisure female * age	− 0.00252		0.0009701
	− 0.9002		0.439
Leisure female * age^2	0.00675*		0.002554
	2.008		.9793
Leisure female * children	.02541***		− 0.01162
	3.605		− 1.881
Leisure female * children (0–2)	.06247***		0.01254
	5.634		0.858
Leisure female * children (3–6)	.03056***		0.02729**
	4.737		2.97
Leisure female * leisure male	0.0004845		
	0.7649		
Consumption	− 0.001383	0.004662	0.01619***
	− 0.175	1.05	4.907
Consumption^2	2.70e−06	8.04e−07	4.39e−07
	1.527	0.5194	0.4162
Consumption * hh size	− 0.0002463	− 0.0000336	− 0.002381***
	− 0.4488	− 0.09617	− 5.405
Consumption * leisure male	0.0000678	3.33e−06	
	1.367	0.07435	
Consumption * leisure female	0.0000196		9.06e−07
	0.4773		0.03235
Observations	63504	7546	7518

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

Table 21 Labour supply elasticities (gross wage) by skills

	ls elasticity
Total	0.3413
High skilled	0.3321
Middle skilled	0.3377
Low skilled	0.4032

Comparing the resulting labour supply impact of the reform, the differences in the estimates of the logit model also lead to different labour supply reactions. Table 22 highlights a stronger increase of female participation due to the reform, whilst male

Table 22 Labour supply effects of the reform including inactive

	Gender	Base	Reform	Diff (%)
Social welfare	Total	2435	2436	0.04
Hours	Male	39.46	39.51	0.14
	Female	27.09	27.12	0.11
Participation	Male	1,619,655	1,621,746	0.13
	Female	1,606,082	1,607,751	0.10
Short part-time	Male	39,136	38,941	− 0.50
	Female	347,789	347,913	0.04
Long part-time	Male	210,195	210,444	0.12
	Female	499,683	500,498	0.16
Full-time	Male	722,272	723,396	0.16
	Female	536,924	537,512	0.11
Over-time	Male	648,052	648,966	0.14
	Female	221,685	221,829	0.06

Short part-time (1–19 h), long part-time (20–39)

participation decreases compared to the model without inactive (see Table 14). Also regarding the hours worked, males are now less willing to increase their working hours compared to when excluding inactive persons.

The overall effect of the reform when including inactive persons in the flexible sample are highlighted in Table 23. Male participation increases by 2092 (compared to 3548 before), while female participation increases by 1669 (compared to 1073). So we see a shift from male to female participation when comparing our results without inactive persons in the flexible sample. This is driven mostly by couple households, where more females and fewer males participate. The total effect on participation is slightly smaller (3761 compared to 4621), which can be explained by the changes in the logit model that also imply changes in household preferences when inactive persons are included in the flexible sample (Table 24).

Table 23 Labour supply reactions by household type—total sample with inactive

	Males			Females		
	Hours	Participation		Hours	Participation	
Couple w child	0.18%	1055	0.16%	0.24%	1074	0.17%
Couple w/o child	0.09%	581	0.09%	0.14%	855	0.13%
Single w. child	− 0.29%	− 15	− 0.26%	− 0.88%	− 405	− 0.62%
Single w/o child	0.15%	471	0.14%	0.06%	145	0.06%
Total		2092			1669	

Table 24 Estimates of the discrete choice model of labour supply—extended flexible sample

Choice	Couples	Single males	Single females
In-work male	− 5.204***	− 2.811***	
	− 8.799	− 5.155	
Part-time male	− 0.07239	0.1425	
	− 0.2303	0.4089	
Full-time male	0.5068	1.188*	
	1.177	2.48	
Over-\,time male	0.1832	1.128	
	0.3605	1.956	
In-work female	− 1.023***		− 1.341***
	− 5.806		− 5.546
Part-time female	0.07395		0.414*
	0.5805		2.259
Full-time female	0.4461*		1.216***
	2.198		4.608
Over-time female	0.1596		0.8665*
	0.4838		2.302
Leisure male	0.525***	0.236**	
	6.117	2.856	
Leisure male^2	− 0.005011***	− 0.00266***	
	− 10.22	− 4.315	
Leisure male *age	− 0.002347	0.0007177	
	− 0.9692	0.3183	
Leisure male * age^2 male	0.003121	0.0006253	
	1.111	0.2394	
Leisure male * children	0.003206	− 0.01817	
	0.5415	− 1.866	
Leisure male * children(0–2)	− 0.004828	− 0.01513	
	− 0.7366	− 0.2918	
Leisure male * children(3–6)	− 0.0001756	0.02037	
	− 0.03121	1.022	
Leisure female	0.521***		0.3166***
	7.091		5.888
Leisure female * leisure female	− 0.003548***		− 0.002434***
	− 10.87		− 7.293
Leisure female * age	− 0.006199**		− 0.001929
	− 3.071		− 1.018
Leisure female * age^2	0.01008***		0.005119*
	4.156		2.291
Leisure female * children	0.03026***		− 0.01083*
	5.732		− 2.051
Leisure female * children(0–2)	0.04071***		0.0323***
	7.459		3.479

Table 24 (continued)

Choice	Couples	Single males	Single females
Leisure female * children(3–6)	0.01937***		0.02522**
	4.296		3.29
Leisure male * leisure female	− 0.000194		
	− 0.4392		
Consumption	0.007712	0.0005789	0.008942***
	1.444	0.12	3.45
Consumption * consumption	− 6.50e− 07	2.27e−06	1.32e−06
	− 0.5702	1.328	1.713
Consumption * hh size	0.0004104	− 0.0003968	− 0.002197***
	1.042	− 0.8495	− 6.487
Consumption * leisure male	− 0.0000327	0.0000493	
	− 0.9838	0.9592	
Consumption * leisure female	− 0.0000461		0.000037
	− 1.655		1.702
Observations	79723	5397	8176

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

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