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Financial Incentives to Work Decomposed: The Finnish Case

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ABSTRACT

This paper analyses financial incentives to work in Finland from three perspectives. First, the financial incentives to work are quantified i.e. the participation tax rate (PTR) levels are calculated with numerous classifications. Second, a question of how different parts of the tax and social security system affect work incentives is answered; the PTR is decomposed so that the quantitative contribution of different tax and social security components is given. Third, subgroup decomposition method is applied to explain how variation in PTR is explained by various characteristics of individuals. We found that taxation and unemployment benefits account the largest shares of the mean PTR. Another finding is that PTRs vary substantially and the benefit side and length of unemployment explain this variation quite well. However, the majority of the variation cannot be explained.

JEL Classification: H24, J22, J31, J65

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1 INTRODUCTION

As long as there has been social security or taxation, there has been incentive traps. Incentive trap refers to a situation where working more is not financially worthwhile. It is important to understand that in a second-best world, there will always be incentive traps. The negative effects of these traps can, however, be mitigated to a certain extent. This observation motives the writing of this paper.

The financial incentive to work has been an ongoing subject in the Finnish policy debate. All political parties in turn have suggested that incentive traps should be removed, but the means to do it are often vague or only partial. A common slogan is that "work should always pay off". It is unfortunate that there are no easy solutions – usually the measures at hand are either expensive or involve cuts to social security.

Both empirical and theoretical research give support to the notion that incentives matter. For example, there is a mountain of evidence that the organization of the unemployment benefit scheme matters in terms of employment.[1] More generally reforms that change financial incentives to work are found to induce behavioral changes in the labor market. The most recent review articles on labor supply elasticities all conclude that the elasticities are not negligible (see Chetty et al. (2011), Keane (2012) and Blundell (2016)).

This paper offers a static analysis of work incentives in Finland and dwells into the research question more deeply than papers before. In addition to the "usual analysis" of describing the static work incentives, the participation tax rate (PTR) is decomposed in two ways; i) the contributions of different parts of taxation and social security to the PTR are explored and ii) the contributions of different individual/household characteristics to the level of PTR are considered.

This paper contributes to earlier literature in three ways. First, it updates the analysis of static work incentives in Honkanen et al. (2007) and Kotamäki (2016) to cover the latest legislation of 2017.

The second contribution is to quantitatively measure how much different components of the tax regime or social security system affect work incentives. Once we know which parts of the system push up the PTR, we can also focus the policy measures primarily to those parts of the system, in other words, we learn something about which parts of the systems have space for optimization.

The third contribution to the literature is about how participation tax rates vary across different households and what characteristics explain the variation. We do this analysis

[1] See Tatsiramos and van Ours (2014) for an extensive review.

in two ways. First, we compare the average participation tax rates between different groups. The second step is to use simple subgroup decomposition to 'explain' the variation of the calculated participation tax rates. To our knowledge subgroup decomposition has not been used before in explaining the variation of participation tax rate.

The paper is organized as follows. The next chapter will briefly summarize how the Finnish social security system is constructed. The third chapter will concentrate on the calculation of the participation tax rate and the wage estimation. Methods used in explaining the variation of PTRs among the results will be presented in Chapter 4. The final fifth chapter is for conclusions and discussion.

2 THE FINNISH SOCIAL SECURITY SYSTEM IN A NUTSHELL

This section briefly summarizes the Finnish social security scheme from an unemployed person's perspective. The aim is to give a gross overview of the Finnish system, thus, many possibly important fine details of the system are not addressed here.

There are three types of unemployment benefits in Finland: 1) labor market subsidy, 2) basic unemployment allowance and 3) earnings-related unemployment allowance. *Earnings-related UA* is received by those who have (voluntarily) insured themselves against unemployment by joining an unemployment fund. Another important precondition is that the unemployed has fulfilled the employment condition (26 weeks in 28 months in 2017). An insured person is entitled to earnings-related UA for 400 days. There are two notable exceptions to this: individuals with less than 3 years of work history are entitled to 300 days and, on the other end, individuals born 1957 or later are entitled to up to 1500 days of benefits (the so called "unemployment tunnel"). *Basic UA* is granted to those that fulfill the employment condition, but are not members of an unemployment fund. The basic UA is identical to earnings-related UA, except that the amount of the allowance is not earnings-related - it is a lump-sum allowance. Finally, there is *labor market subsidy* which can be received indefinitely. The amount of the subsidy is equal to the basic UA. The average amounts and frequencies of different unemployment benefits are reported in table 1.

There are two additional subsidies that the unemployed typically receive: general housing allowance and/or social income support. These subsidies are means-tested and paid at the household level. *General housing allowance* directly subsidies housing of low income households and the amount is determined as a function of 1) the number of adults and children in the household, 2) the municipality in which the household is located in and 3) monthly income before taxes. Finally, *social income support* (or social assistance) is a last-resort temporary form of income security. It is granted by the

municipalities on the basis of need, income, available assets and expenses, social situation and an interview. In general, the amount of the support is the difference between household's eligible expenses and income.

Table 1 Unemployment benefits in Finland in 2014, average amounts and frequencies.

	Labor market subsidy	Basic UA	Earnings-related UA
Average daily amount	33 €	34 €	73 €
N	33,941	8,015	35,984
Share	43.5 %	10.3 %	46.2 %

Source: registry data of the SISU microsimulation model (15 % random sample all households in Finland). Adjusted unemployment benefits are excluded.

Many benefits of the social security scheme are received simultaneously. Table 2 summarizes the interdependencies of various subsidies in the Finnish scheme in 2014. Households that were paid labor market subsidy were the most likely to receive general housing allowance (GHA) or social income support (SIP); 57 % received GHA and 44.6 % received SIP in 2014. As expected, households with stronger attachment to the labor market received less of both benefits. Especially the insured unemployed received considerable less of both benefits; 12 % and 8 % of those that received earnings-related UA were paid GHA and SIP, respectively.

Table 2 Interdependencies of various subsidies at the household level in 2014.

	Labor market subsidy	Basic UA	Earnings-related UA	Total
General housing allowance	57.0 %	48.5 %	12.0 %	35.4 %
Social income support	44.6 %	32.2 %	7.9 %	26.4 %

Source: registry based data of the SISU microsimulation model.

3 MEASUREMENT OF FINANCIAL WORK INCENTIVES

This paper concentrates on agent's decision in the *extensive margin* – whether to supply labor into the labor market or not. The exercise is to measure the incentives of moving from unemployment (or non-employment) into full-time employment. These incentives

are captured with an indicator called the *participation tax rate* (PTR).[2] There are a number of assumptions to be made in the process of calculating the PTR. These assumptions are summarized in this section. First, the calculation of PTR is summarized after which the calculation of participation wage rate (PWR) is turned to.

3.1 Calculation of the Participation Tax Rate

The calculation of PTR is analogous to asking how much taxes increase and social security benefits decrease when an individual moves from unemployment into employment. In the analysis of this paper, also individuals on child home care allowance are included in the "unemployed" category.

PTR can formally be defined as follows:

$$PTR = 1 - \left(\frac{Y_1 - Y_0}{w_1 - w_0}\right) \tag{1}$$

where Y_i and w_i denote household's disposable income and gross wage rate, respectively. The subscript i equals 1 when an agent is employed and 0 when unemployed. Effectively, the PTR answers the question of how much taxes increase and transfers decrease (with respect to the gross wage) when the agent becomes employed. Note that $Y_i = w_i - t_i$ where $t_i = \tau_i - b_i$ denotes net taxes which again is taxes paid (τ_i) less benefits received (b_i). Plugging this into equation (1) and rearranging we have:

$$PTR = \left(\frac{w_1 - w_0 - (w_1 - t_1 - (w_0 - t_0))}{w_1 - w_0}\right) = \frac{t_1 - t_0}{w_1 - w_0} = \frac{(\tau_1 - \tau_0) + (b_0 - b_1)}{w_1 - w_0} \tag{2}$$

As an example, consider a person who receives €1,000 of unemployment benefits (net) when unemployed and €3,000 of wage income when employed of which he or she pays €500 in taxes. This implies PTR of 50 % - when employed, taxes increase and social security benefits decrease, in total, by €1,500 which is 50 % of the gross wage rate.[3]

It is now evident what moves the PTR; high tax rate on labor, high level of income when unemployed or low level of PWR increase the PTR or, in other words, diminish the financial incentives to work.

In order to calculate the PTRs, we need information on individual τ_0, τ_1, b_0, b_1 and w_1. In practice, none of these variables are directly observed in the annual data (which we have), because individuals are frequently both employed and unemployed within a year, thus,

[2] Another indicator for the extensive margin could be a replacement rate that relates out of work family disposable income with in work family disposable income.

[3] Using equation (1), we have: PTR = 1 – (€2,500-€1,000)/€3000 = 50 %

often we do not observe the states of "full unemployment" or "full employment" in annual data. It then becomes necessary to modify the data in order to be able to approximate the disposable incomes in these two states. The procedure is described below.

1. The sample is chosen to include all 25-63-year-olds that received at least one day of unemployment benefits or home care allowance in 2014. Those receiving adjusted unemployment benefits are excluded from the sample. The upper limit of 63 is due to the fact that the statutory retirement age is 63-68 in Finland. The lower limit of 25 is chosen because the under 25-year-olds are not necessarily aiming to become employed – they are more likely to enter, for instance, studies. Also, in Finland there are slightly different ALMP measures for those under 25 years of age due to the "youth guarantee".

2. All sample individuals are transformed into "fully unemployed" state by setting all labor income to zero.[4] The SISU microsimulation model is then executed in order to determine the correct amount of unemployment benefits, home care allowance, housing allowance, social income support and taxes given the household structure and 2017 legislation. The disposable income (Y_0) for all sample households is saved for later use.

3. All sample individuals are transformed into "fully employed" state. Labor income (w_1) is obtained as the forecasted value from the PWR equation (see the next subsection). Individuals are not entitled to adjusted unemployment benefits, because the employment is assumed to be full-time. The microsimulation model is executed in order to solve for disposable income for all sample households (Y_1).

4. The PTRs can now be calculated making use of equation (1). By assumption, the decision unit is the individual.

3.2 Estimation of the Participation Wage Rate

When transforming individuals from "fully unemployed" state to "fully employed" state we need to estimate wages for these individuals. This is a crucial step in the calculation of participation tax rates as can be seen from the equation (1)-(2) and as is discussed in, for example, Kalb and Scutella (2003), Honkanen et al. (2007) and Savage et al. (2015). Unrealistically high or low PWR would lead to unrealistic values (high or low) for the PTR.

[4] Gross labor income is exogenous in the microsimulation model whereas unemployment benefits, home care allowance and other social security benefits are for the most part endogenously determined.

There are several features that we want to capture with the wage estimation and therefore we chose to use OLS estimation. With the OLS estimation we can capture the gender and family status differences in wages. We can use (within year) length of the unemployment spell to capture the wage scarring effect and we can control for other different individual characteristics that affect wages. We discuss more about these features shortly.

Standard OLS estimation is used for example by Honkanen et al. (2007) and in Savage et al. (2015), but there are also two other methods used in the research literature: a selection model (used in Kalb et al (2003a), Kalb and Scutella (2003b), Mercante and Mok (2014), Creedy and Mok (2015) or Siebertova et al (2015)) and a simple group means method (used in VATT (2013)). However, both of these two methods have problems that we do not encounter with the OLS estimation. Problem with selection models (the Heckman model) is that it requires information we do not have in our data. On the other hand, the simple group means is virtually a simplified OLS estimation, but it does not allow estimation with the same accuracy as the OLS estimation.

From the earlier research, we know that some variables behave very differently for men and women. Family status, for instance, is one important variable. Women without children are found to have higher wage rate and better labor market outcomes than their peers with children. On the other hand, the opposite is found for men. Also, we know that there are differences in the wage outcomes depending on the marital status of both men and women. Married men tend to have high wage premium whereas wage penalty is attached to married women (Savage et al. 2015). More discussion about the sources of these premia is presented in Pollmann-Schult (2011). When estimating these groups separately, we can take these factors into account. To capture these differences, we estimate the PWR separately for each household type and gender.[5]

There is a lot of international evidence that unemployment does not only affect current income, but it also affects future wages and incomes.[6] This effect is usually called wage scarring. Savage et al. (2014, 2015) try to capture it by an "ad hoc" 10 per cent reduction in predicted wages that is associated with unemployment. Our approach is closer to that of Honkanen et al. (2007); we include the number of months of unemployment as an explanatory variable in our wage regression. By doing so, we try to take into account the wage scarring effect found in the earlier literature more endogenously. Also in our wage estimations, the effect of unemployment on the wage rate is clearly negative. Other variables included in the wage regression are region, level and field of education, household type, age and the square of age, the age of the children, possible loans and other incomes.[7] The majority of the variables are first transformed to a set of indicator

[5] We do the estimation separately for ten different groups. For both genders, the groups are 1) Singles, 2) Childless couples, 3) Single parents, 4) Couples with children and 5) Others.

[6] See for instance Arulampalam (2001), Gregory and Jukes (2001) and Gregg and Tominey (2005).

[7] The variables used in regression and the estimated coefficients are presented with more

variables to better capture the effect of each characteristic in wage formation.

We could also do the analysis "the other way around" by transforming the employed (whose wage is known) into fully unemployed; with this method we wouldn't need to estimate wages. However, this would make the participation wage rates higher than they should be, which can be seen from the table 3. There are two main reasons for this observation. First, the characteristics of unemployed individuals are different in comparison with the characteristics of employed individuals.[8] Second, wages are usually higher for those who have been employed for a while compared with those who have recently entered employment.

We use a registry based individual data from 2014 which contains approximately 800,000 individuals in 400,000 households. The data is a 15 % random sample of all Finnish households. The same data is used in the Finnish microsimulation model (SISU). Our group of interest is the unemployed[9] of which there are approximately 71 700 in the data.

Table 3 Predicted monthly wages (€/month) for the employed and for the unemployed with 25-63 years of age in mainland Finland.

	Employed*	**Unemployed****
N	209,349	71,671
10 %	2,532	2,056
25 % Q1	2,850	2,309
50 % Median	3,343	2,656
75 % Q3	4,052	3,124
90 %	4,938	3,761

* Individuals that haven't received unemployment benefits in 2014

** Individuals that did receive unemployment benefits in 2014

Before the wage estimation, we need to choose the threshold level for the wages and only those whose monthly wage is above a minimum level are included in the regression. This is necessary to make sure that the estimated wages aren't unrealistically low for the unemployed individuals. The "minimum wage" should not, however, be set too high; there is no point of estimating wages if almost every unemployed individual ends up with the minimum wage. Honkanen et al. (2007) use 1 200 €/month as a minimum wage when they estimate wages for the sample of 2004 which in 2014 euro is approximately equal to 1 450 €/month. Also, in the regression only those who worked at least 200 days within the last year are included. We do so to prevent unrealistic wage estimations associated

details in Appendix A.

[8] The characterizations of these two groups are presented with more details in Appendix B.

[9] A person is categorized as unemployed if he or she has received at least one day of unemployment benefits during 2014.

with the low number of work days. The distributions of the estimated wages are presented in the table 3.

It can be seen from table 3 that the estimated wages differ greatly between the two groups. As discussed earlier, this difference can be explained by the different characteristics among employed and unemployed individuals. The educational levels and the household types, for instance, differ considerably between these groups.

Other interesting question regarding our regression model and the minimum wage is which characteristics increase the probability of ending up with a very low wage. To answer this question, we calculate the unconditional probabilities for every characteristic found among those whose estimated wage is under 2 000 €/month. Unconditional probability is calculated for every characteristic *k* as

$$Pr = \frac{Number\ of\ unemployed\ \ in\ group\ k\ with\ PWR<2000\ €/month}{Total\ number\ of\ unemployed\ individuals\ in\ group\ k} \quad (3)$$

According to the calculations, the unconditional probabilities vary substantially between population groups. Single parents (unconditional probability of 34.5%) and individuals who are under 30 years old (23.7%) are found to have the highest probability to end up with (near) minimum wage when they become employed. We also find that individuals whose field of education is natural resources and the environment (19.2%) or primary education (14.0%) and whose unemployment spell is between 5 and 8 months (17.1%) have high probability to become minimum wagers. These findings are compatible with earlier research and support the choice of our estimation model. The full list of the calculated unconditional probabilities is presented in Appendix C.

3.3 Participation Tax Rates in Levels

First, an overview of PTR levels is in order. The underlying factors producing PTRs are discussed more closely in the next subsection, thus, the aim of this subsection is to provide a descriptive analysis of the current situation. Table 4 summarizes PTRs by family type, education level, the number of children, income quintiles and benefit type. The results are also reported separately for the unemployed and those that received home care allowance. Table that summarizes those receiving child home care allowance is reported in Appendix D.

Unemployed families without children appear to have better financial incentives to work than their peers with children. In total, about 63 % of the unemployed households have no children and correspondingly 37 % have at least one child.[10] According to the

[10] Unemployed household refers to a household where at least one member received some unemployment benefit within a year.

calculations, the more children there are in a household, the higher the PTR gets. The biggest differences in PTRs are found according to this variable. Families without children have an average PTR of only 62.9 % whereas families with four or more children face PTR of 75.4 %. The analysis, thus, suggests that there is something in the Finnish social security system that dis-incentivizes work in households with children.

Table 4 Participation tax rates of those receiving unemployment benefits by family type, education level, number of children, income quintiles and benefit type.

Unemployment Benefits					
Category	**Family type**				
	Childless singles	Childless couples	Lone parents	Couple parents	Others
Mean value	64.1	61.8	72.4	69.8	62.8
Share	31 %	28 %	7 %	29 %	5 %
Category	**Number of children**				
	0	1	2	3	≥4
Mean value	62.9 %	67.3 %	71.4 %	73.2 %	75.4 %
Share	63 %	17 %	13 %	5 %	2 %
Category	**Age**				
	<30	30-39	40-49	50-59	≥60
Mean value	66.5	68.1	65.3	62.6	65.1
Share	14 %	26 %	23 %	25 %	12 %
Category	**Education**				
	Pre-primary education	Upper secondary level	Lower-degree level tertiary		Higher-degree level tertiary
Mean value	65.8	65.8	65.3		63.9
Share	16 %	49 %	24 %		12 %
Category	**Income quintiles**				
	1	2	3	4	5
Mean value	64.2	65.2	66.0	66.9	68.1
Share	37 %	22 %	18 %	14 %	9 %
Category	**Social security benefit type**				
	Labor market subsidy	Basic unemployment allowance		Earnings-related allowance	
Mean value	60.6	59.8		70.3	
Share	41 %	8 %		50 %	

Large differences in PTRs are found when the results are categorized according to family type. Lone parents have PTRs of 72.4 % whereas childless couples have PTRs of only 61.8 %. Clear differences are also found when the results are categorized by benefit type. Individuals receiving labor market subsidy or basic UA have PTRs of 60.6 % and 59.8 %, respectively, whereas earnings-related UA produces average PTR of 70.3 %.

Obviously, in this case, the high level of earnings-related unemployment benefit creates challenges in terms of static financial incentives to work. Individuals receiving child home care allowance are found to have an average PTR level of 55.4 % which is expected as the allowance is in general lower than any unemployment benefit.[11]

In terms of age or education level, there are no strong patterns in financial work incentives between different categories of unemployed. The relative sizes of different groups are of expected form; most of the unemployed have, at most, upper secondary level education (65 %). For the educational levels, we account only 1.9 %-point difference between higher degree level tertiary (PTRs of 63.9 %) and pre- and primary education (PTRs of 65.8 %). We also found that the PTR is increasing with respect to the relative position in the income distribution. Average PTR in the lowest quintile is 64.2 % whereas in the top quintile it is 68.1 %. The majority of the unemployed belong to the lowest two quintiles (59 %).

The share of individuals in the unemployment trap is summarized in table 5. Qualitative results are of the expected form (cf. Kotamäki (2016)); households with children are the most likely to be in the unemployment trap. What is interesting is that couple parents are almost as likely to be trapped in unemployment as households without children. This is surprising since according to table 4 couple parents have the same level of PTRs as couples without children and lower levels of PTRs than singles without children.

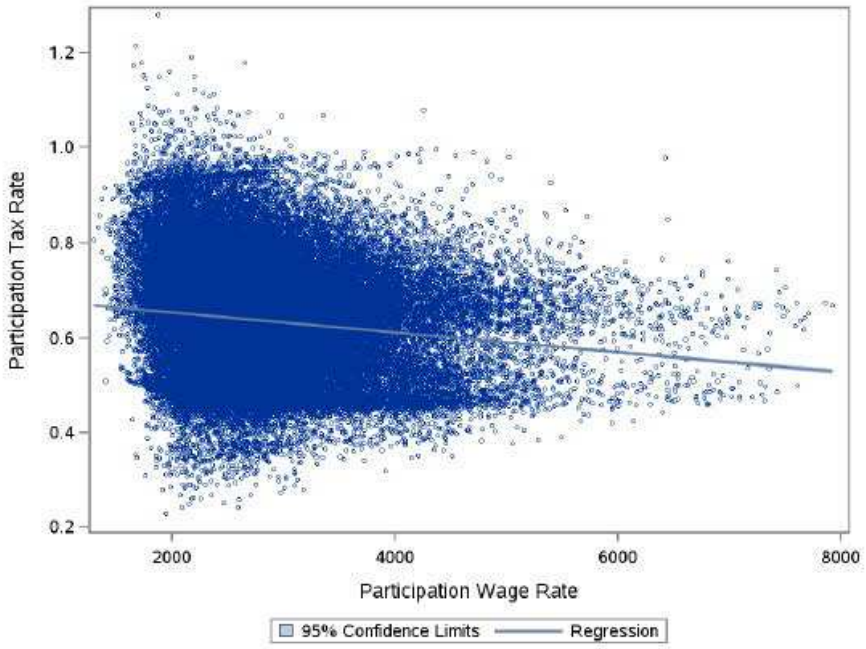
Table 5 Individuals in unemployment trap (PTR>80%) with 2014 data and 2017 legislation.

	Share (%)	
	Unemployed	Receive Child Home care allowance
Childless singles	4.0	2.8
Childless couples	4.6	5.3
Lone parent	22.5	19.1
Couple parents	19.4	3.3
Others	15.5	9.2
	10.3	**4.9**

Finally, as discussed earlier, the participation wage rate is an important factor determining the PTR. Figure 1 depicts PTR as a function of PWR. The regression line in the figure is somewhat flat indicating that although PWR is an important factor defining PTR, on average, there are clearly other more important effects at play. The variation around the regression line is huge especially in the lower end of the wage level. The correlation between labor market subsidy, basic unemployment allowance and child home care allowance and PWR are clearly larger than that of earnings-related UA (see figures 2-5 in Appendix E).

[11] More detailed results for households receiving child home care allowance are shown in table 12 in Appendix D.

Figure 1 Participation tax rate as a function of participation wage rate.



Note: One point is a cell of three observations.

The results of this subsection can be summarized as follows. Families with children appear to have relatively speaking the worst financial incentives to work. An extreme example would be an unemployed family with four children or more, where the average PTR is 75.4 %. Age, educational level or position in the income distribution do not appear to play a major role in terms of economic work incentives. Finally, the level of unemployment benefit is a very significant factor in determining PTR. Individuals on labor market subsidy have almost 10 pp. lower PTR than individuals on earnings-related UA. These observations raise a number of interesting questions for the core reasons of why this is the case. These factors are analyzed next.

3.4 Decomposing the Participation Tax Rate

There is no comprehensive analytical decomposition of the PTR in the previous research literature in Finland. The only Finnish paper we are aware of is Kotamäki (2016) who conducts some sensitivity checks on day-care fees, general housing allowance and social income support, but the analysis is only partial. Related articles in an international context are Brewer et al. (2012) and Brewer et al. (2013) where the UK PTR and METR are

decomposed into nine components.[12]

In this section, the PTR is decomposed into eight components that explain which parts of the Finnish social security and tax scheme, on average, contribute most to the financial (dis)incentives to work. The components we analyze are 1) social income support, 2) general housing allowance, 3) day care fees, 4) the income tax scheme and, finally, 5) the unemployment benefit system. Some components are further decomposed, but this is returned to later. It is important to keep in mind that large contribution to the PTR doesn't necessarily mean that there is a problem in the system. The financial incentives to work and the distribution of income are, often, at odds. Bad policies in terms of employment can be intended due to the potential welfare gains from favorable distributional effects.

Table 6 Participation tax rate decomposition by PTR band

	PTR band				
	20-40	40-60	60-80	>80	
Taxation					
(1) Social insurance contributions	+5.9	+6.0	+6.1	+6.2	**+6.0**
(2) Taxation without credits and deductions	+26.3	+27.3	+26.9	+25.4	**+26.9**
(3) Credits and deductions	-6.2	-5.6	-5.9	-6.9	**-5.9**
Unemployment benefits					
(4) Unemployment benefits without UI benefits	+0.0	+0.9	+11.2	+14.7	**+7.5**
(5) Unemployment insurance benefits	+0.8	+14.2	+20.8	+24.9	**+18.5**
(6) Home care allowance	+6.1	+3.4	+1.4	+2.4	**+2.3**
(7) Day care fees	+2.6	+3.8	+2.2	+4.8	**+3.0**
(8) General housing allowance	+0.3	+1.6	+4.0	+6.2	**+3.2**
(9) Social income support	+0.1	+0.4	+2.0	+8.5	**+1.9**
Total	35.3	50.8	69.5	86.3	**63.6**
Share of individuals	0.9 %	38.0 %	51.8 %	9.3 %	**100 %**

Technically the decomposition in table 6 is conducted in a straightforward manner. First the baseline PTRs are calculated after which all relevant parameters of scheme *j* (say, unemployment benefit scheme) are set to zero, which allows us to simulate the data as if

[12] The components are childcare, income tax, national insurance, working tax credit, child tax credit, income support, housing benefit, council tax benefit and other (Page 35 table 4.2 in Brewer et al (2013)).

there was no scheme *j* in place. The difference between baseline PTRs and PTRs without *j* is taken to be the contribution of scheme *j* on PTR. This exercise is repeated N times where N is the number of different decompositions of PTR. It is worth mentioning that the ordering of *j*s is relevant in certain places - especially with respect to social income support. In the analysis presented here, the ordering proceeds from the most compulsory (taxes) towards totally voluntary forms of assistance (social income support).

The results of the first decomposition are reported in table 6 below, where the results are categorized into 5 PTR bands. Table 7 shows the results of the same decompositions by each household type.

Table 7 Participation tax rates decomposed by household type

	Household type					
	Childless singles	Childless couples	Lone parents	Couple parents	Others	
Taxation						
(1) Social insurance contributions	+6.1	+6.2	+6.2	+5.9	+6.0	**+6.0**
(2) Taxation without credits and deductions	+26.5	+27.9	+24.9	+27.1	+26.1	**+26.9**
(3) Credits and deductions	-5.8	-5.5	-7.5	-5.8	-6.2	**-5.9**
Unemployment benefits						
(4) Unemployment benefits without UI benefits	+7.3	+11.1	+5.8	+6.3	+4.6	**+7.5**
(5) Unemployment insurance benefits	+21.6	+20.2	+23.2	+14.6	+18.1	**+18.5**
(6) Home care allowance	0.0	+0.0	+3.5	+4.7	+3.8	**+2.3**
(7) Day care fees	0.0	0.0	+ 0.9	+ 7.0	+ 5.3	**+3.1**
(8) General housing allowance	+ 5.7	+ 1.1	+ 8.0	+ 2.1	+ 2.3	**+3.2**
(9) Social income support	+ 2.6	+ 0.7	+ 6.8	+ 1.3	+ 2.2	**+1.9**
Total	64.1	61.7	71.9	63.3	62.2	**63.7**
Share of individuals	25.5 %	23.2 %	7.3 %	38.4 %	5.6 %	**100%**

Income taxation is one of the biggest single bodies that contribute to the PTR. It is further decomposed into social insurance contributions, credits and deductions and the rest of the tax system. *(1) Social insurance contributions* include national health insurance contribution, unemployment insurance contribution and employee pension insurance contribution which together adds approximately 6.4 pp. to the PTR. The social insurance contributions as a whole are almost equivalent to a proportional tax, thus, the effect is rather uniform across groups.

(2) The taxation (without credits and deductions) includes progressive state taxation, municipal taxation, church taxes and public broadcasting tax. The contribution of this part on PTR is very sizable (26.9 pp. on average) and it is more important in the lower end of the PTR distribution. This reflects the progressive nature of the Finnish tax code. The final component in taxation, *(3) credits and deductions*, includes the earned-income tax credit[13], earned-income deduction, deduction for the production of income, basic deduction and tax credit on home loan interest. It is evident that the system of credits and deductions on labor income is not a simple one in Finland and presumably this is not irrelevant with respect to how individuals perceive their change in disposable income when income changes.

Another very important contributor to the PTR is the unemployment benefit scheme. *(4) Unemployment benefits without UI benefits* (insured are assumed to receive only the basic benefit level) adds on average 7.5 pp. on the PTR. The contribution to the PTR is bigger the higher the PTR is. Adding the earnings-related UI benefits, *(5)*, increases the PTR on average by 18.5 pp. The effect is very concentrated on the right tail of the PTR, that is, those with PTRs higher than 60 %. It appears that for the most part those with lower than 60 % PTR are not insured in the earnings-related UI scheme.

Finally, there are three household level benefits/fees that are included in the analysis. First, it is assumed that parents take their children (1-6 years of age) to the public day care when they become employed, that is, approximately 37 % of the sample is affected by the day care fees of the municipalities (see table 4). Although the average contribution of the day care fees is only 3.0 pp, in practice and on an individual level, the effect is higher. Households with two adults, for instance, observe a PTR hike of over 7 pp.

3.5 Contribution of Individual Characteristics on the PTR

Our interest is not only to study factors behind the participation tax rate but also to study how and why PTRs vary across individuals. In other words, we also try to 'explain' the variation of PTRs by different characteristics of the individuals. In order to answer these questions, we use subgroup decomposition introduced by Shorrocks (1984) and

[13] This is also known as the standard tax credit for work income in the Finnish tax code.

Mookherjee and Shorrocks (1982). This is a widely used method in the literature of economic inequality (see for example Jenkins (1995) and Brewer and Wren-Lewis (2016)), but it can also be used to "explain" the variation or diversity of other variables.

The idea is to first divide the population into non-overlapping subgroups. Then, the total inequality or variation is expressed as a sum of within group inequalities and between group inequality: [14]

$$I_{total} = I_W + I_B \tag{4}$$

where subscripts W and B indicates to within and between groups, respectively.

The above decomposition can be done by using inequality measures that are part of the generalized entropy family.[15] However, the values of these indices are not very intuitive to use. To tackle this issue, we adopt a summary measure which accounts the amount of variation "explained" by each group. This measure is developed by Cowell and Jenkins (1995) from the basis of R^2-measure. It is calculated by dividing the between group inequality with the total inequality:

$$R_B = \frac{I_B}{I_{total}} \tag{5}$$

One thing to be noted here is that chancing the grouping does not alter the total inequality and therefore we can easily compare the levels explained between different groupings.

However, there is one major drawback with the subgroup decomposition. It only allows us to study the contribution of each subgroup separately. Therefore, we check the robustness of the results by doing multivariate regression based on decomposition introduced in Fields (2003).[16]

We are conducting the analysis by using three different measures. We do so to study the robustness of the results and to see if the tails of the distribution (extreme values) have an impact on the results. Measures we are using are $GE(0)$, $GE(1)$ and $GE(2)$ which are also known as the mean log-deviation, Theil index and half the square of the coefficient of variation. The larger the value in the brackets is the more sensitive the inequality measure is to the top (extreme values) of the distribution.

The results of the subgroup decomposition are presented in table 8. The results seem to confirm our preconception. As suggested in tables 4, 6 and 10, type of the benefit received

[14] Calculations are done by using ineqdeco Stata package, written by Jenkins (1999).

[15] See for instance Shorrocks (1980) and Mookherjee and Shorrocks (1982).

[16] Authors are aware of the problems associated with this method in these kinds of settings and therefore we do it only to check the validity of results obtained.

(around 24%) explains most of the variation in participation tax rate and it is the only variable that explains the observed variation well. Other variables explaining the variation of PTRs at some level are household type (around 4.8%) and (within-year) length of the unemployment spell (around 4.7%). Other variables do not seem to have great explanatory power on the variation of PTRs.

Table 8 Shares explained by each population subgroup

Subgroup	Share explained		
	GE(0)	GE(1)	GE(2)
Type of the unemployment benefit	23.8 %	24.0 %	23.9 %
Household type	4.6 %	4.8 %	5.0 %
Length of the unemployment spell	4.6 %	4.7 %	4.7 %
Participation wage (Quintiles)	2.9 %	3.0 %	3.1 %
Level of education	2.5 %	2.5 %	2.5 %
Number of children	1.5 %	1.6 %	1.6 %
Field of education	1.5 %	1.5 %	1.5 %
Participation wage (Deciles)	0.7 %	0.7 %	0.7 %
Gender	0.5 %	0.5 %	0.5 %
Region	0.5 %	0.5 %	0.5 %
Age	0.4 %	0.4 %	0.4 %

Note: Type of the UI benefit is categorized into four groups: 1) Social income support 2) basic unemployment allowance, 3) labor market subsidy and 4) child home care allowance

As mentioned before, the variables might be correlated and therefore we did the analyses also with the Fields' method.[17] The results obtained from the multivariate regression based decomposition are similar to the results obtained from subgroup decomposition – the levels explained slightly differ, but this was expected. The same variables that were important (unimportant) are important (unimportant) in both of the methods.

Two interesting features arise from the results: 1) the result for the benefit type is very robust for the choice of the method and 2) residual accounts for about 58% of the variation, indicating that there is a lot of variation that we cannot explain with these variables.

Another finding from the results is that the share explained rises with nearly every population group when more weight is put on the top of the distribution. This indicates that almost every variable used are slightly better explaining the high PTRs than the low PTRs. Still, the values of the different measures are fairly close to each other, which indicates that the results are quite robust to the choice of the measure.

[17] Both the method and the results are presented in Appendix F.

We also examined the within group variation[18] and we found only small differences between them. The largest differences were found, as expected, between the types of unemployment benefits and the household types. Within households receiving labor market subsidy the Gini coefficient of the PTRs was 6.9%, whereas within households' receiving child home care allowance the Gini coefficient was 11.4%. Between the household types the single parents (Gini coefficient 7.5 %) and the singles (Gini coefficient 7.6 %) had the smallest variation and the largest variation was accounted for couples with children (12.6 %). Also, small variation was found between other population groups.

4 CONCLUSIONS

This paper discusses financial incentives to work in Finland. We first analyze the current situation by calculating PTR levels using 2014 data and 2017 legislation. We make a number of categorizations and find that the number of children correlates positively with PTR. Also we confirm an earlier result that the unemployment benefit type appears to have big impact on PTR – individuals receiving earnings-related UB are found to have considerably higher PTR than individuals receiving some other benefit type. Age, education level or the position in the income distribution don't seem to have much effect on PTR level.

Secondly, we decompose the PTR using microsimulation methods. We divide the PTR into eight components: (i) social insurance contributions, (ii) taxation without credits and deductions, (iii) credits and deductions, (iv) unemployment benefit without the UI part, (v) the unemployment benefit scheme in total, (vi) day care fees, (vii) general housing allowance and (viii) social income support. The components are not of equal size and their structures vary considerably. It would be interesting to dwell into each component in more detail. This is left for future research.

We find that taxation and unemployment benefit scheme together make up approximately 83 % of the average PTR level, thus, a bulk of the PTR level can be traced back to those two big components. Credits and deductions lower the PTR by 6 pp. or 9 percentages, thus, obviously various credits and deductions to work income are important part of work incentives.

Unemployment benefit scheme constitutes 41 % of the PTR level. Especially earnings-related UI is concentrated on higher PTRs – individuals with lower than 60 percent PTR are not practically receiving earnings-related UI benefits. This is simply the result of the organization of the UI scheme – the higher the pre-unemployment wage rate, the higher the predicted wage rate and the UI benefit, which leads to higher PTR.

[18] We do not display these values here, but those are available from request.

Day-care fees are found to have, on average, only small effect on the financial incentives to work. This is a mechanical result as day-care fees are targeted only towards those with small children and therefore the aggregate effect is small. Those that are affected, however, are affected strongly. Couple parents with small children, for instance, see a PTR hike of 7 pp. due to day-care fees.

The story is the same with general housing allowance and social income support. Not all receive these benefits which is why the aggregate effect is not very big. At the same time, those that in the end receive general housing allowance, for instance, see a somewhat dire deterioration in their financial incentives to work. Out of the unemployed sample, childless singles and lone parents often receive either general housing allowance or social income support. This is not the case with couples, because often the spouse is working even if the other person is unemployed.

Finally, we consider how individual characteristics contribute to the financial incentives to work using formal decomposition methods due to Shorrocks (1984) and Mookherjee and Shorrocks (1982). We find that the majority of the variation of PTR cannot be explained with the characteristics we used. There is still work to do in order to explain exactly what factor are creating huge differences in incentives to work. However, we observed that the benefit type and the length of the unemployment spell explain the variation in the PTR. The level of education, the household type and the field of education seems to explain variation in the PTR only moderately. The participation wage rate and age have very little explanatory power.

Our results suggest that the policy recommendations will vary depending on the targeted population group. If the objective is to decrease PTRs at the aggregate level, it is better to do by modifying taxation. On the other hand, if the aim is to increase incentives to work in a particular population subgroup, it is more efficient to adjust the benefits according to the aim.

Subjects for future research include even more in depth decomposition of various components of the system than what is conducted in subsection 4.2. The task is, however, daunting to say the least as the modern tax and social security schemes are very complicated and some simplification is inevitably needed.

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APPENDIX A: PWR REGRESSION

The participation wage rate regression results are presented here. The regression is conducted using logarithmic incomes and done separately for single-, married women single- and married men. In the participation tax rate estimation logarithmic incomes are transformed back to original incomes.

Table 9 Estimated coefficients of the participation wage rate

	Men: Childless singles		Women: Childless singles	
Parameter	**Estimate**	**Std. Err.**	**Estimate**	**Std. Err.**
Intercept	7.3152	(0.078)	7.6642	(0.0814)
Region				
Uusimaa	0.0146	(0.0258)	-0.0269	(0.026)
Varsinais-Suomi	-0.0785	(0.0266)	-0.1318	(0.0265)
Satakunta	-0.0431	(0.0275)	-0.1244	(0.0277)
Kanta-Häme	-0.0385	(0.0278)	-0.1068	(0.0278)
Pirkanmaa	-0.0641	(0.0264)	-0.1214	(0.0265)
Päijät-Häme	-0.0610	(0.0277)	-0.1218	(0.0275)
Kymenlaakso	-0.0036	(0.028)	-0.1400	(0.028)
Etelä-Karjala	-0.0052	(0.0286)	-0.1593	(0.0289)
Etelä-Savo	-0.1050	(0.0289)	-0.1649	(0.0285)
Pohjois-Savo	-0.0827	(0.0276)	-0.1526	(0.0274)
Pohjois-Karjala	-0.0965	(0.0286)	-0.1486	(0.0285)
Keski-Suomi	-0.0885	(0.0274)	-0.1376	(0.0274)
Etelä-Pohjanmaa	-0.1153	(0.0284)	-0.1454	(0.0284)
Pohjanmaa	-0.0736	(0.0283)	-0.1383	(0.0286)
Keski-Pohjanmaa	-0.0612	(0.0329)	-0.1698	(0.0326)
Pohjois-Pohjanmaa	-0.0579	(0.0268)	-0.1426	(0.0269)
Kainuu	-0.0681	(0.0324)	-0.1676	(0.0318)
Lappi	-0.0374	(0.0286)	-0.1438	(0.0282)
Level of education				
Elementary school	-0.3394	(0.0557)	-0.4691	(0.0553)
Secondary education	-0.5355	(0.0218)	-0.6430	(0.0183)
First stage of tertiary education	-0.3882	(0.0227)	-0.5003	(0.0184)
Second stage of tertiary education	-0.3096	(0.0223)	-0.4406	(0.0185)
Master’s or equivalent level	-0.1036	(0.0222)	-0.1609	(0.0184)

Field of education				
Generic programmes and qualifications	0.2843	(0.0521)	0.3242	(0.0533)
Education	0.0544	(0.0569)	0.1478	(0.0533)
Arts and Humanities	0.0378	(0.0532)	0.0877	(0.053)
Social Sciences, Business and Administration	0.1949	(0.0518)	0.2302	(0.0526)
Natural Sciences	0.1476	(0.053)	0.2282	(0.054)
Technology, Communications and Transport	0.2646	(0.0515)	0.2576	(0.0529)
Natural Sciences	0.1576	(0.053)	0.1533	(0.054)
Technology, Communications and Transport	0.2513	(0.0528)	0.2627	(0.0526)
Natural Resources and the Environment	0.2374	(0.052)	0.1653	(0.0528)
Loans				
No mortgage or other loans	-0.1266	(0.0043)	-0.0762	(0.0038)
Number of children				
No children between 7 and 18 years	0.0546	(0.0087)	-0.0182	(0.0064)
Length of the unemployment spell				
0 months	0.1880	(0.0308)	0.0435	(0.0459)
1 - 4 months	0.0386	(0.032)	-0.0592	(0.0475)
5 - 8 months	-0.0397	(0.0368)	-0.1910	(0.0594)
Age	0.0334	(0.0018)	0.0271	(0.0016)
Age^2	-0.0003	(0)	-0.0002	(0)
Log of other incomes	0.0033	(0.0007)	-0.0026	(0.0006)

	Men: Childless couples		**Women: Childless couples**	
Parameter	**Estimate**	**Std. Err**	**Estimate**	**Std. Err**
Intercept	7.2073	(0.0722)	7.3399	(0.069)
Region				
Uusimaa	0.0752	(0.0256)	0.0550	(0.0184)
Varsinais-Suomi	-0.0406	(0.0262)	-0.0499	(0.0189)
Satakunta	0.0067	(0.027)	-0.0644	(0.0195)
Kanta-Häme	0.0007	(0.0272)	-0.0346	(0.0198)
Pirkanmaa	-0.0220	(0.0261)	-0.0448	(0.0188)
Päijät-Häme	-0.0147	(0.0272)	-0.0375	(0.0197)
Kymenlaakso	0.0253	(0.0274)	-0.0457	(0.0198)

Etelä-Karjala	0.0166	(0.0281)	-0.0531	(0.0204)
Etelä-Savo	-0.0824	(0.0279)	-0.0777	(0.0201)
Pohjois-Savo	-0.0563	(0.0269)	-0.0767	(0.0194)
Pohjois-Karjala	-0.0856	(0.0277)	-0.0890	(0.02)
Keski-Suomi	-0.0403	(0.0268)	-0.0638	(0.0194)
Etelä-Pohjanmaa	-0.0814	(0.0275)	-0.0859	(0.0198)
Pohjanmaa	-0.0379	(0.0274)	-0.0838	(0.0198)
Keski-Pohjanmaa	-0.0371	(0.0309)	-0.0829	(0.0224)
Pohjois-Pohjanmaa	-0.0244	(0.0264)	-0.0654	(0.0191)
Kainuu	-0.0712	(0.0302)	-0.1032	(0.0216)
Lappi	-0.0088	(0.0276)	-0.0694	(0.0199)
Level of education				
Elementary school	-0.4621	(0.0459)	-0.4951	(0.0437)
Secondary education	-0.6016	(0.0158)	-0.6436	(0.0135)
First stage of tertiary education	-0.4078	(0.0164)	-0.4957	(0.0136)
Second stage of tertiary education	-0.3178	(0.0163)	-0.4097	(0.0137)
Master's or equivalent level	-0.0894	(0.0161)	-0.1402	(0.0136)
Field of education				
Generic programmes and qualifications	0.2952	(0.044)	0.3090	(0.0422)
Education	0.0003	(0.0465)	0.1216	(0.042)
Arts and Humanities	-0.0515	(0.0449)	0.0690	(0.0419)
Social Sciences, Business and Administration	0.1852	(0.0434)	0.2066	(0.0415)
Natural Sciences	0.1010	(0.0445)	0.2200	(0.0427)
Technology, Communications and Transport	0.2136	(0.0432)	0.2164	(0.0418)
Natural Sciences	0.0988	(0.0445)	0.1607	(0.0429)
Technology, Communications and Transport	0.1805	(0.0444)	0.2066	(0.0415)
Natural Resources and the Environment	0.1970	(0.0437)	0.1180	(0.0417)
Loans				
No mortgage or other loans	-0.0843	(0.004)	-0.0585	(0.003)
Number of children				
No children between 7 and 18 years	-0.0055	(0.0046)	0.0047	(0.0036)
Length of the unemployment spell				
0 months	0.2621	(0.0323)	0.1139	(0.04)

1 - 4 months	0.1025	(0.0336)	0.0117	(0.0415)
5 - 8 months	-0.0367	(0.0387)	-0.0163	(0.0528)
Age	0.0321	(0.0016)	0.0248	(0.0013)
Age^2	-0.0003	(0)	-0.0002	(0)
Log of other incomes	0.0142	(0.0019)	0.0185	(0.0015)
	Men: Lone parents		**Women: Lone parents**	
Parameter	**Estimate**	**Std. Err**	**Estimate**	**Std. Err**
Intercept	8.1589	(0.359)	7.8504	(0.1615)
Region				
Uusimaa	-0.0911	(0.1287)	0.0261	(0.0392)
Varsinais-Suomi	-0.2261	(0.132)	-0.0787	(0.0404)
Satakunta	-0.1217	(0.1343)	-0.0866	(0.0418)
Kanta-Häme	-0.2817	(0.1362)	-0.0641	(0.0428)
Pirkanmaa	-0.2459	(0.1311)	-0.0590	(0.0403)
Päijät-Häme	-0.1898	(0.1372)	-0.0864	(0.0424)
Kymenlaakso	-0.2044	(0.1357)	-0.0773	(0.0424)
Etelä-Karjala	-0.2010	(0.1371)	-0.0788	(0.0441)
Etelä-Savo	-0.3694	(0.1429)	-0.0951	(0.0444)
Pohjois-Savo	-0.3023	(0.1368)	-0.0810	(0.0422)
Pohjois-Karjala	-0.3420	(0.1409)	-0.0659	(0.0444)
Keski-Suomi	-0.2358	(0.1332)	-0.0854	(0.0419)
Etelä-Pohjanmaa	-0.3079	(0.1397)	-0.0893	(0.0434)
Pohjanmaa	-0.1777	(0.137)	-0.1183	(0.0439)
Keski-Pohjanmaa	-0.1923	(0.1794)	-0.0575	(0.0549)
Pohjois-Pohjanmaa	-0.2650	(0.1323)	-0.0738	(0.041)
Kainuu	-0.3523	(0.1547)	-0.1549	(0.0509)
Lappi	-0.2649	(0.1373)	-0.1003	(0.0437)
Level of education				
Elementary school	-0.6610	(0.1078)	-0.5145	(0.0928)
Secondary education	-0.6217	(0.0995)	-0.6720	(0.0353)
First stage of tertiary education	-0.4344	(0.1025)	-0.5246	(0.0356)
Second stage of tertiary education	-0.3015	(0.102)	-0.4756	(0.0357)
Master's or equivalent level	-0.0279	(0.1016)	-0.1336	(0.0357)
Field of education				
Generic programmes and qualifications	0.1898	(0.0551)	0.3437	(0.0872)
Education	-0.3273	(0.1329)	0.0780	(0.0867)

Arts and Humanities	-0.2800	(0.0872)	0.0901	(0.0864)
Social Sciences, Business and Administration	0.0296	(0.0435)	0.2267	(0.0854)
Natural Sciences	-0.1494	(0.0704)	0.2293	(0.089)
Technology, Communications and Transport	0.0382	(0.0363)	0.2525	(0.0861)
Natural Sciences	0.0031	(0.0672)	0.1980	(0.0891)
Technology, Communications and Transport	-0.0410	(0.0606)	0.2242	(0.0853)
Natural Resources and the Environment	0.0000	(0)	0.1553	(0.0857)
Loans				
No mortgage or other loans	-0.1327	(0.0229)	-0.0980	(0.0075)
Number of children				
No children under 3 years	-0.0495	(0.0882)	0.0688	(0.021)
No children between 3 and 7 years	-0.0155	(0.0414)	0.0105	(0.0113)
No children between 7 and 18 years	-0.0899	(0.0519)	-0.0263	(0.014)
Length of the unemployment spell				
0 months	0.2488	(0.1516)	0.1645	(0.0721)
1 - 4 months	0.0970	(0.1573)	0.1140	(0.075)
5 - 8 months	0.0948	(0.1806)	-0.0160	(0.0919)
Age	0.0257	(0.0124)	0.0211	(0.0048)
Age^2	-0.0002	(0.0001)	-0.0002	(0.0001)
Log of other incomes	-0.0179	(0.0038)	-0.0368	(0.0039)
	Men: Couple parents		**Women: Couple parents**	
Parameter	**Estimate**	**Std. Err**	**Estimate**	**Std. Err**
Intercept	6.8324	(0.0876)	7.2439	(0.0927)
Region				
Uusimaa	0.0399	(0.0255)	0.0403	(0.0198)
Varsinais-Suomi	-0.1030	(0.026)	-0.0590	(0.0203)
Satakunta	-0.0908	(0.0269)	-0.0825	(0.0211)
Kanta-Häme	-0.0779	(0.0272)	-0.0271	(0.0213)
Pirkanmaa	-0.0859	(0.026)	-0.0558	(0.0202)
Päijät-Häme	-0.0877	(0.0271)	-0.0658	(0.0213)
Kymenlaakso	-0.0734	(0.0273)	-0.0575	(0.0214)
Etelä-Karjala	-0.0542	(0.0281)	-0.0590	(0.0222)
Etelä-Savo	-0.1475	(0.0281)	-0.0826	(0.0219)
Pohjois-Savo	-0.1398	(0.0268)	-0.0583	(0.0209)

Pohjois-Karjala	-0.1556	(0.0278)	-0.0826	(0.0219)
Keski-Suomi	-0.1168	(0.0266)	-0.0798	(0.0208)
Etelä-Pohjanmaa	-0.1640	(0.0273)	-0.0785	(0.0212)
Pohjanmaa	-0.0849	(0.027)	-0.0987	(0.0211)
Keski-Pohjanmaa	-0.1001	(0.03)	-0.0955	(0.0239)
Pohjois-Pohjanmaa	-0.0934	(0.0261)	-0.0703	(0.0204)
Kainuu	-0.1412	(0.0307)	-0.0844	(0.0243)
Lappi	-0.0640	(0.0275)	-0.0501	(0.0214)
Level of education				
Elementary school	-0.3640	(0.0449)	-0.4643	(0.0492)
Secondary education	-0.5208	(0.0143)	-0.6486	(0.0133)
First stage of tertiary education	-0.3468	(0.015)	-0.5188	(0.0134)
Second stage of tertiary education	-0.2537	(0.0146)	-0.4601	(0.0133)
Master's or equivalent level	-0.0125	(0.0145)	-0.1409	(0.0131)
Field of education				
Generic programmes and qualifications	0.3588	(0.0435)	0.3403	(0.048)
Education	-0.1032	(0.0451)	0.0675	(0.0473)
Arts and Humanities	-0.0834	(0.0442)	0.0831	(0.0474)
Social Sciences, Business and Administration	0.2257	(0.0428)	0.2303	(0.047)
Natural Sciences	0.1202	(0.0438)	0.1602	(0.048)
Technology, Communications and Transport	0.2162	(0.0426)	0.2822	(0.0473)
Natural Sciences	0.0952	(0.044)	0.1670	(0.0485)
Technology, Communications and Transport	0.1572	(0.0436)	0.2116	(0.047)
Natural Resources and the Environment	0.1878	(0.043)	0.1471	(0.0472)
Loans				
No mortige or other loans	-0.0944	(0.0052)	-0.0780	(0.0041)
Number of children				
No children under 3 years	0.0086	(0.006)	0.0784	(0.0066)
No children between 3 and 7 years	-0.0065	(0.0045)	0.0378	(0.0042)
No children between 7 and 18 years	-0.0251	(0.0056)	0.0112	(0.0053)
Length of the unemployment spell				
0 months	0.2565	(0.0389)	0.1148	(0.0506)
1 - 4 months	0.0737	(0.0405)	0.0199	(0.0521)

5 - 8 months	-0.0444	(0.0458)	-0.0517	(0.0632)
Age	0.0407	(0.0025)	0.0184	(0.0025)
Age^2	-0.0004	(0)	-0.0001	(0)
Log of other incomes	0.0423	(0.0031)	0.0278	(0.0027)
	Men: Others		**Women: Others**	
Parameter	**Estimate**	**Std. Err**	**Estimate**	**Std. Err**
Intercept	7.5227	(0.1571)	7.6157	(0.163)
Region				
Uusimaa	0.0242	(0.0675)	0.0343	(0.0482)
Varsinais-Suomi	-0.0726	(0.0695)	-0.0492	(0.0504)
Satakunta	-0.0715	(0.0732)	-0.0714	(0.054)
Kanta-Häme	-0.0556	(0.0723)	-0.0434	(0.0547)
Pirkanmaa	-0.0219	(0.0696)	-0.0472	(0.0502)
Päijät-Häme	0.0291	(0.0732)	-0.0492	(0.0543)
Kymenlaakso	-0.0756	(0.0752)	-0.0552	(0.056)
Etelä-Karjala	-0.0847	(0.0769)	-0.0539	(0.058)
Etelä-Savo	-0.0763	(0.0764)	-0.0993	(0.0561)
Pohjois-Savo	-0.0554	(0.0728)	-0.0827	(0.0536)
Pohjois-Karjala	-0.0596	(0.0774)	-0.0744	(0.0579)
Keski-Suomi	-0.0489	(0.0716)	-0.0894	(0.0527)
Etelä-Pohjanmaa	-0.0880	(0.0752)	-0.0489	(0.0547)
Pohjanmaa	-0.0694	(0.0741)	-0.0935	(0.0551)
Keski-Pohjanmaa	-0.0749	(0.0828)	-0.1540	(0.0636)
Pohjois-Pohjanmaa	-0.0466	(0.0709)	-0.0812	(0.052)
Kainuu	-0.0619	(0.0825)	-0.1297	(0.0698)
Lappi	-0.0272	(0.0739)	-0.0487	(0.0555)
Level of education				
Elementary school	-0.5208	(0.0907)	-0.5176	(0.0991)
Secondary education	-0.6012	(0.0522)	-0.6909	(0.0468)
First stage of tertiary education	-0.4047	(0.0554)	-0.5529	(0.0475)
Second stage of tertiary education	-0.3521	(0.0536)	-0.5191	(0.0474)
Master's or equivalent level	-0.1140	(0.0536)	-0.2311	(0.0474)
Field of education				
Generic programmes and qualifications	0.2100	(0.0783)	0.3704	(0.0894)
Education	-0.0608	(0.0978)	0.1687	(0.0902)
Arts and Humanities	-0.0487	(0.0832)	0.1854	(0.0895)

Social Sciences, Business and Administration	0.1293	(0.0775)	0.2978	(0.0877)
Natural Sciences	0.0318	(0.0833)	0.2440	(0.0939)
Technology, Communications and Transport	0.1738	(0.076)	0.2921	(0.0886)
Natural Sciences	0.0022	(0.0822)	0.1786	(0.0919)
Technology, Communications and Transport	0.0993	(0.0813)	0.3023	(0.0876)
Natural Resources and the Environment	0.1286	(0.0777)	0.1852	(0.088)
Loans				
No mortgage or other loans	-0.1259	(0.0105)	-0.0947	(0.0094)
Number of children				
No children under 3 years	-0.0356	(0.0187)	-0.0100	(0.0194)
No children between 3 and 7 years	-0.0742	(0.0164)	0.0249	(0.0153)
No children between 7 and 18 years	-0.0373	(0.0138)	0.0000	(0.0116)
Length of the unemployment spell				
0 months	0.2352	(0.0598)	0.0002	(0.0809)
1 - 4 months	0.0764	(0.0631)	0.0123	(0.0864)
5 - 8 months	0.0358	(0.0738)	-0.1194	(0.1077)
Age	0.0344	(0.0042)	0.0257	(0.0038)
Age^2	-0.0003	(0)	-0.0002	(0)
Log of other incomes	0.0064	(0.0017)	0.0029	(0.0021)

Notes: Explained variable in every regression is log of employment income.

APPENDIX B: CHARACTERISTICS

Characterizations of the unemployed and the employed individuals in the sample are presented in the table 10. In Figure 2 are illustrated the differences between the observed wages of employed individuals and estimated wages of unemployed individuals.

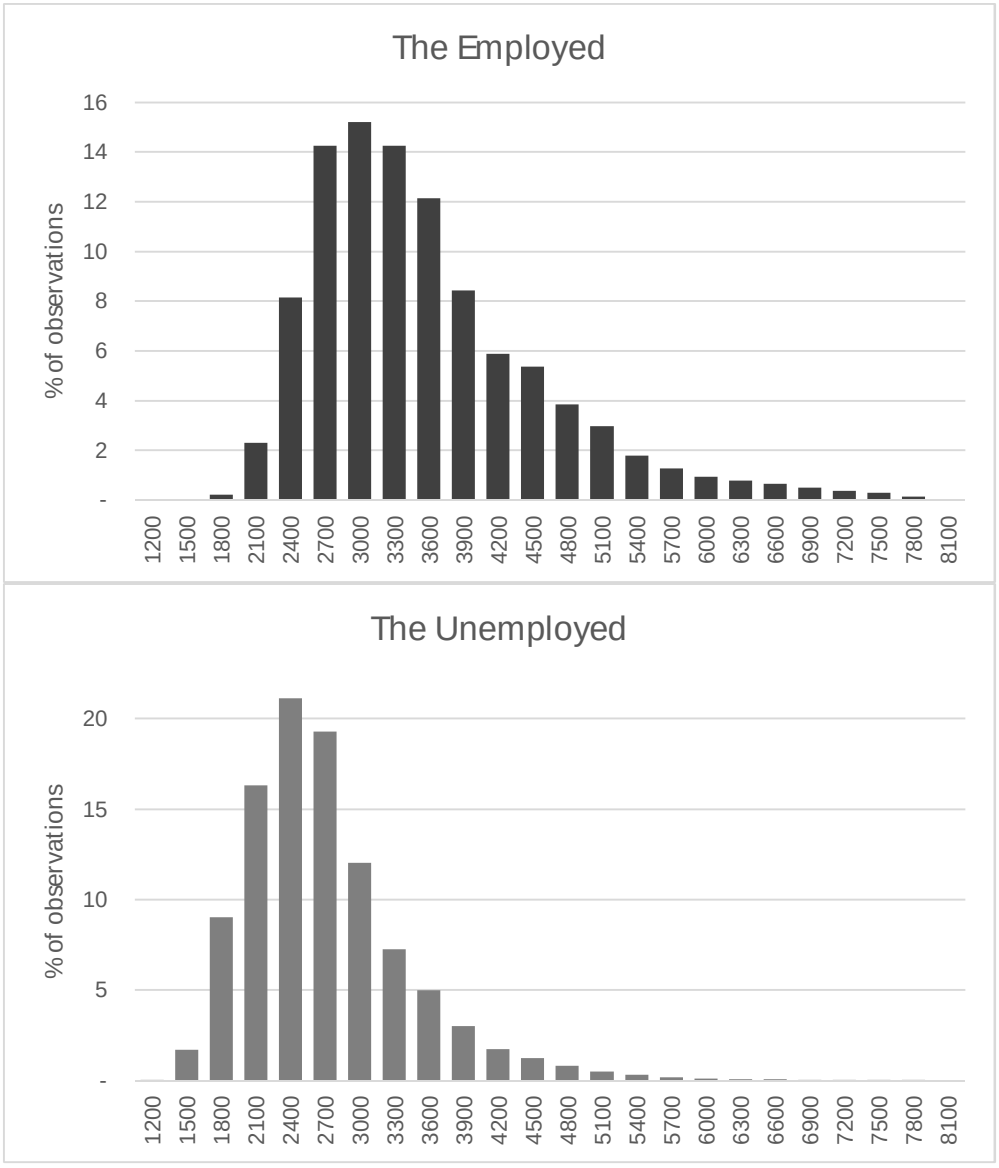
Table 10 Characteristics of employed and unemployed individuals

Variable	%-shares of unemployed	%-shares of employed
Level of Education:		
Pre-primary, primary education or education unknown	22.1 %	10.8 %
Secondary education	47.8 %	42.8 %

First stage of tertiary education (not leading directly to an advanced research qualification)	7.2 %	14.5 %
Second stage of tertiary education (leading to an advanced research qualification)	12.9 %	15.7 %
Master's or equivalent level	9.5 %	14.8 %
Doctoral or equivalent level	0.6 %	1.3 %
Fields of Education:		
Generic programmes and qualifications	4.7 %	4.3 %
Education	1.9 %	3.1 %
Arts and Humanities	5.1 %	3.9 %
Social Sciences, Business and Administration	14.4 %	19.7 %
Natural Sciences	1.9 %	2.5 %
Technology, Commnications and Transport	26.1 %	27.8 %
Natural Sciences	2.8 %	2.2 %
Technology, Communications and Transport	10.2 %	15.4 %
Natural Resources and the Environment	10.2 %	10.1 %
Primary education, pre-primary education, other education or education unknown,	22.7 %	10.9 %
Age groups:		
25 – 29	15.5 %	9.2 %
30 – 34	18.2 %	12.0 %
35 – 39	14.7 %	13.5 %
40 – 44	10.4 %	13.7 %
45 – 49	10.1 %	15.9 %
50 – 54	10.5 %	16.0 %
55 – 59	10.4 %	13.9 %
60 +	10.2 %	5.7 %
Length of Unemployment Spell		
0 months	27.0 %	92.7 %
1 – 4 months	26.4 %	5.9 %
5 – 8 months	18.1 %	1.2 %
9+ months	28.4 %	0.2 %
Household type		
Singles	26.8 %	21.8 %
Childless couples	24.2 %	35.4 %
Single parents	6.1 %	3.9 %

Two adults and 1+ child	36.9 %	34.1 %
Others	6.1 %	4.7 %

Figure 2 Wage rates for employed (above) and unemployed (below) individuals



APPENDIX C: LOW PWR

In the table 11 is presented the unconditional probabilities of ending up low participation wage rate when becoming employed. The unconditional probability is calculated using equation (3).

Table 11 Unconditional probability of getting near minimum wage (under 2 000 euros/month) when becoming employed

Variable	Unconditional probability
Level of education:	
Pre-primary, primary education or education unknown	13.8 %
Secondary education	9.2 %
first stage of tertiary education (not leading directly to an advanced research qualification)	0.3 %
second stage of tertiary education (leading to an advanced research qualification)	0.4 %
Fields of Education:	
Generic programmes and qualifications	0.8 %
Education	1.2 %
Arts and Humanities	13.8 %
Social Sciences, Business and Administration	2.6 %
Natural Sciences	4.1 %
Technology, Commnications and Transport	1.2 %
Natural Sciences	11.2 %
Technology, Communications and Transport	5.3 %
Natural Resources and the Environment	19.2 %
Primary education, pre-primary education, other education or education unknown,	14.0 %
Age groups:	
25 – 29	23.6 %
30 – 34	11.6 %
35 – 39	5.8 %
40 – 44	3.5 %
45 – 49	2.1 %
50 – 54	1.5 %
55 – 59	1.1 %

60 +	0.7 %
Length of Unemployment Spell	
0 months	6.6 %
1 – 4 months	22.3 %
5 – 8 months	59.0 %
9+ months	30.7 %
Household type	
Singles	4.6 %
Childless couples	3.4 %
Single parents	34.6 %
Two adults and 1+ child	8.5 %
Others	4.6 %

Appendix D: PTRs of those receiving child home care allowance

Table 12 Participation tax rates of those receiving child home care allowance by family type, education level, number of children, income quintiles and benefit type.

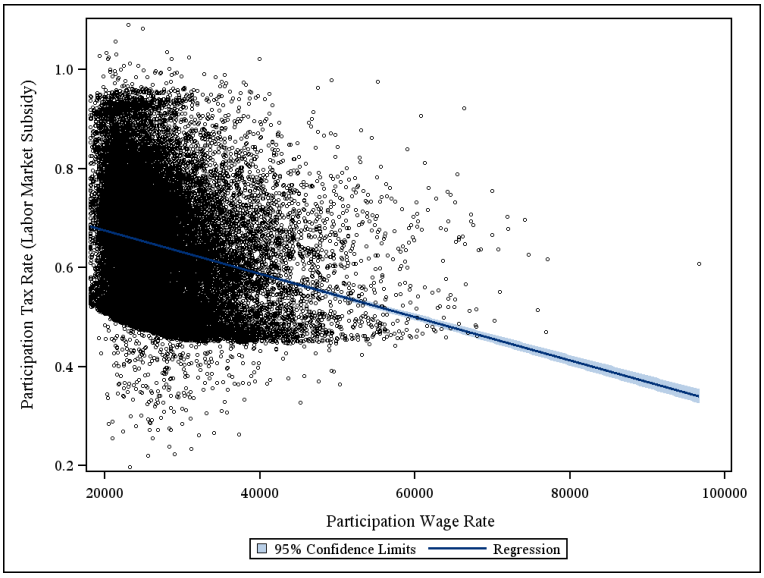
	Child Home Care Allowance				
Category	**Family type**				
	Childless singles*	Childless couples*	Lone parents	Couple parents	Others
Mean value	52.4	45.5 %	69.9	53.6	60.4
Share	0 %	0 %	8 %	84 %	8 %
Category	**Number of Children**				
	0	1	2	3	≥4
Mean value	62.7*	50.3	55.9	58.5	60.4
Share	6 %	30 %	39 %	19 %	6 %
Category	**Age**				
	<30	30-39	40-49	50-59	≥60
Mean value	57.2	54.8	55.5	54.4	69.2
Share	24 %	66 %	10 %	0 %	0 %
Category	**Education**				
	Pre-primary education	Upper secondary level	Lower-degree level tertiary		Higher-degree level tertiary
Mean value	67.5	57.9	54.0		51.6
Share	20 %	34 %	34 %		27 %
Category	**Income Quantile**				
	1	2	3	4	5
Mean value	66.9	57.0	52.0	49.3	48.8
Share	20 %	26 %	24 %	19 %	11 %
	Child Home Care Allowance (Total)				
Mean value	55.4				
Share	18 %				

* Child home care allowance paid to individuals with no children represents either change of status within the year or inaccuracy of the data

Notes: Shares indicate population share of those who received child home care allowance. In the last column share is calculated from all unemployed individuals.

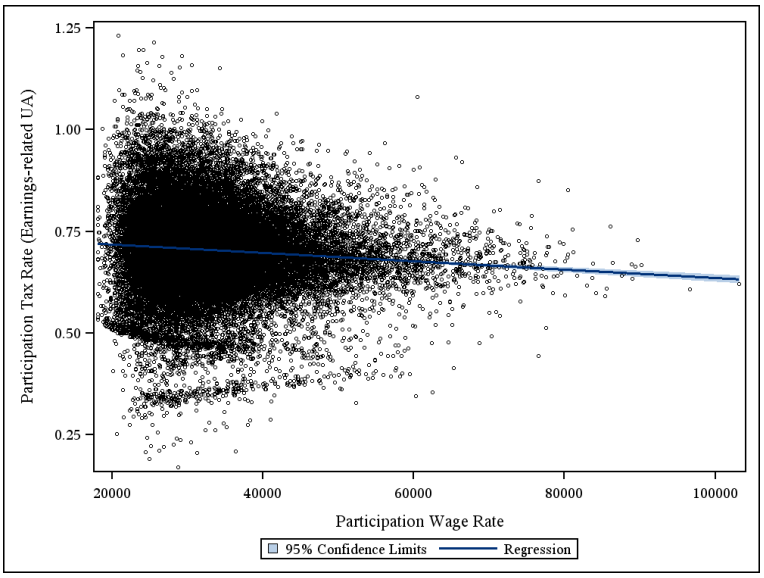
Appendix E: PTRs as a function of PWR by benefit type

Figure 3 Participation tax rate as a function of participation wage rate, labor market subsidy



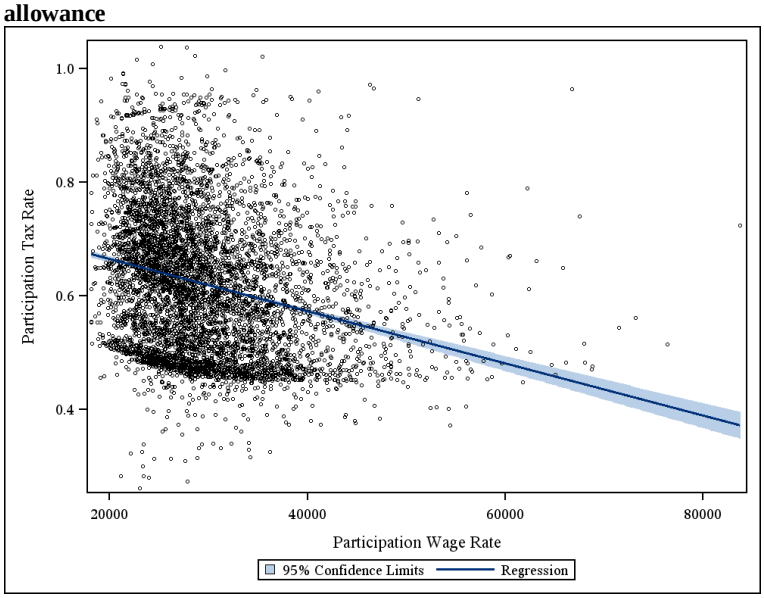
Note: one plotted point is a cell of three observations

Figure 4 Participation tax rate as a function of participation wage rate, earnings-related UA



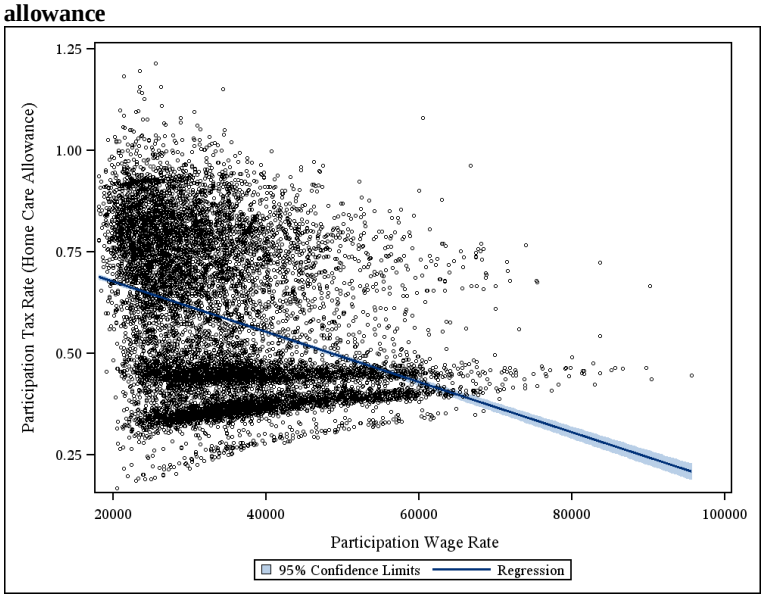
Note: one plotted point is a cell of three observations

Figure 5 Participation tax rate as a function of participation wage rate, basic unemployment allowance



Note: one plotted point is a cell of three observations

Figure 6 Participation tax rate as a function of participation wage rate, child home care allowance



Note: one plotted point is a cell of three observations

Appendix F: Robustness check with the Fields' method

Robustness check for the subgroup decomposition is done with the method presented in Fields (2003). It was first developed to 'explain' income inequality but Brewer et al. (2013) has used it to explain the variations of the participation tax rate.

First the participation tax rate is estimated:

$$PTR_i = \sum_{c=0}^{N} \beta_c X_{ci} + \epsilon_i$$

Where PTR_i is the individual's participation tax rate, X's are individuals'/households' characteristics influencing participation tax rate and ϵ_i is the error term. In the next step, the fitted values obtained are used to form the *relative characteristic inequality weight*:

$$s_c(PTR) = \frac{cov(\hat{\beta}_c X_c, PTR)}{\sigma^2(PTR)}$$

and it can be similarly formed for the residual. Also, these shares are applicable to virtually any inequality measure. Only with inequality measures that do not use all the observations in a given distribution these shares cannot be used. Benefit of this method compared to subgroup decomposition is that all the variables are included simultaneously and the share we cannot explain is also calculated.

All the variables are included in the regression as indicator variables. Then the shares of the indicator variables belonging to the particular subgroup are summed together to form the total share explained by that group.[19]

The results for this decomposition are presented in table 12

Table 13 Relative contributions of each characteristic to variation of PTRs

Variable	Relative contribution (%)
Residual	56.75 %
Type of the unemployment benefit	30.80 %
Household type	5.91 %
Level of education	2.36 %

[19] The above calculations can be done by using ineqrbd Stata package made by Fiorio and Jenkins (2008).

Length of the unemployment spell	2.23 %
Number of children	1.70 %
Field of education	0.30 %
Region	0.03 %
Age	0.00 %
Gender	-0.06 %

Note: Positive (negative) values indicate that on average the characteristics have positive (negative) contribution to variation.

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