THE IMPACT OF INVESTING IN SOCIAL CARE ON EMPLOYMENT GENERATION, TIME-AND INCOME-POVERTY AND GENDER GAPS: A MACRO-MICRO POLICY SIMULATION FOR TURKEY

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THE CARE WORK AND THE ECONOMY (CWE-GAM) PROJECT

The Care Work and the Economy (CWE-GAM) Project strives to reduce gender gaps in economic outcomes and enhance gender equality by illuminating and properly valuing the broader economic and social contributions of caregivers and integrating care in macroeconomic policymaking toolkits. We work to provide policymakers, scholars, researchers and advocacy groups with gender-aware data, empirical evidence, and analytical tools needed to promote creative, gender-sensitive macroeconomic and social policy solutions. In this era of demographic shifts and economic change, innovative policy solutions to chronic public underinvestment in care provisioning and infrastructures and the constraints that care work places on women's life and employment choices are needed more than ever. Sustainable development requires gender-sensitive policy tools that integrate emerging understandings of care work and its connection with labor supply, and economic and welfare outcomes.

Find out more about the project at www.careworkeconomy.org.

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1. INTRODUCTION

Feminist economists have long recognized recognition, reduction, and redistribution of unpaid care work (the so-called 3R strategy) as a primary policy intervention towards the closing of the gender economic gaps.[1] Investing in a social care infrastructure is an important component of the 3R strategy. Universal access to quality care services enables the reduction of the unpaid work burden through its redistribution from the domestic sphere to the public sphere. Public investment and expenditure, however, is a question of fiscal policy that is in the realm of macroeconomists and policy-makers who are often gender blind and adopt the mainstream bias of fiscal restraint. As such proposals for increasing social care expenditures are likely to and do meet resistance on the basis of limited fiscal space and fiscal priorities. Even in cases of fiscal expansion or stimulus spending, the conventional target is physical infrastructure and the construction sector.

A series of applied fiscal policy simulations by the Levy Economics Institute in collaboration with country-based partners question the sectoral allocation of public expenditures by comparing the relative economic outcomes of different types of fiscal spending. Using a macro-micro simulation model, these studies typically compare the potential effects of increasing fiscal expenditures on social care versus physical infrastructure, in terms of employment generation, poverty reduction as well as gender equality. Country-specific policy simulations for South Africa, Turkey and the U.S.A.[2] show that spending on the social care sector (given its higher labor intensity) creates substantially more jobs than the spending of similar magnitude on physical infrastructure. The higher employment intensity translates into a generation of higher wage earnings for more households and hence with stronger poverty reduction outcomes. At the same time, the composition of new labor demand is pro-women such that social care spending results in an upward convergence in the gender employment gap as well as the gender earnings gap, while physical infrastructure is likely to further widen those gaps.[3]

Inspired by this first wave of papers, the second wave of policy simulations have been undertaken for a number of other countries, focusing only on the impacts on aggregate employment and the gender composition of labor demand, but without the accompanying microsimulation analysis of income distribution and poverty reduction effects as the Levy

[1] The 3R framework was originally proposed by Diane Elson at a UNDP Expert Group Meeting in 2008 (Elson 2008) and adopted as one of the agreed conclusions of the 58th Commission on the Status of Women (CSW) in 2014.
[2] See Antonopoulos and Kim (2008) for S. Africa: Ilkkaracan, Kim, and Kaya (2015) and Kim, Ilkkaracan and Kaya (2019) for Turkey; Antonopoulos, Kim, Masterson, and Zacharias (2010) for the U.S.A.
[3] While the relative impact of two lines of sectoral spending on the gender employment gap is similar across the different country studies, the impact of the earnings gap (as well as gender jobs segregation) depends on the specific industry-occupation-gender composition of new employment generation specific to each labor market (see Kim and Ilkkaracan 2018).

studies do (see, for example, De Henau, et.al. 2016 and 2017 for five developed and seven developing economies; Ilkkaracan and Kim 2018 for 45 high- and middle-income countries and Ilkkaracan and Kim 2019 for Kyrgyzstan).

These studies introduce a new dimension to the hitherto existing gender economics literature on the effects of social care expansion, which focus predominantly on the labor *supply-side* effects, i.e. alleviation of time constraints on women's labor.[4] The Levy studies, instead, focus on the labor *demand-side* impact of public spending on social care, i.e. employment generation, which facilitates women's labor market activation also by creating new demand for their labor. They also emphasize the multiple economic and social returns to investing in care beyond gender equality; namely macroeconomic growth and employment enhancing effects, the income distributional outcomes not only by gender but also by household income.

Yet these studies fail to explore an important outcome of investing in social care from a gender perspective, namely gendered patterns of time allocation. While investing in social care creates jobs and enhances access to employment and earnings for some women and men, it also increases the requirements on their time through higher hours of employment. Simultaneously access to services alleviates the household production responsibilities of those with care-dependent household members. The net welfare impact for different groups of women and men taking both time-and income-effects into consideration is an empirical question. The current study belongs to a recent third wave of policy simulations, which entail an analysis of employment generation and growth effects via a structuralist SAM (social accounting matrix)-based macroeconomic model, and a microsimulation analysis of the distribution of new jobs and earnings and their attendant impact on time and consumption poverty using the Levy Institute Measure of Time and Income Poverty (LIMTIP) (Zacharias, et.al. 2019).

The LIMTIP accounts for access to income and commodity consumption and, unlike conventional measures, also for access to time and consumption of household produced goods and services through unpaid work.[5] LIMTIP studies use combined datasets of time-use and income whereby it becomes possible to look at the interactions of labor market characteristics, earnings, paid versus unpaid work time, and assess households as 'income poor', 'time-poor' or both.

[4] Another line of literature that explores the economic returns to investing in social care from a labor supply perspective focuses on access to early childhood care and education, and the impact on decreasing inequalities by socioeconomic status (Heckman, et.al. 2012; 2013); enhanced human capital and productivity (Onaran and Oyvat 2018).

[5] The LIMTIP is similar to the approach first suggested by Vickery (1977). The crucial difference between the two approaches lies in the treatment of time deficits. Vickery recognized time deficits solely at the household-level while in the LIMTIP approach they are defined at the individual-level and household-level (Zacharias 2011). Recognizing time deficits only at the household-level implicitly assumes that if there are members of the household with time surpluses, they automatically contribute to reducing the time deficits of other members.

Country-specific applications of LIMTIP, which include Argentina, Chile, Mexico, Ghana, Tanzania, South Korea, and Turkey, typically reveal three important findings:[6] First, women are prone to higher time-poverty than men, in particular as they participate in the labor market and increase their hours of paid work. Second, the LIMTIP poverty rate (i.e. the official poverty rate adjusted for time deficits) is higher than the official poverty rate, revealing some 'hidden' poverty on the basis of time constraints and deficits in household production. Third, LIMTIP studies reveal that access to jobs is not necessarily sufficient to alleviate poverty. Under a policy simulation whereby all the eligible employable people in income-poor households (predominantly female homemakers) are assigned a job in line with their observed characteristics, many households can move above the official poverty threshold but many continue to remain below the LIMTIP poverty threshold and we see an increase in time deficits, especially among the women who receive employment in the simulation.

Hence the impact of a policy intervention centered on employment is substantially more modest in terms of addressing deprivation when evaluated against the LIMTIP measure versus the official poverty measure. In other words, while giving (officially) 'poor' people jobs can enhance cash income and household consumption on the positive side, it also has a detrimental welfare effect through further constraints on their time and ability for household production. The net welfare effect is a trade-off between these two types of outcomes. This finding provides quantitative evidence for an important critique long-raised by feminist economists (e.g. Elson 1995: 179) that policymakers falsely assume women's time is infinite when designing interventions that increase demands on women's paid and unpaid labor inputs (e.g. structural adjustment packages). When the concept of 'poverty' is redefined to encompass scarcity of time to meet household production responsibilities as well as of income, it becomes easier to differentiate between interventions that truly enhance wellbeing. Two common policy implications of LIMTIP studies are the need to improve labor market conditions (wages and work hours) as well as public provisioning of social services.

The current study belongs to the aforementioned third wave of policy simulations, which entail a macro analysis of employment generation and growth effects of public expenditures on childcare along with a microsimulation analysis of the effects on time and income poverty. We contribute by extending and refining this approach from the context of sub-Saharan Africa to Turkey, an upper-middle-income country. Turkey is an obvious choice given that both types of preliminary policy simulations have been undertaken as mentioned above (Ilkkaracan, Kim and Kaya 2015 and Kim, Ilkkaracan, Kaya 2019 on economic returns to investing in social care, from here on IKK 2015 and KIK 2019; and Zacharias, Masterson and Memiş 2014 on LIMTIP).

[6] See Zacharias, Antonopoulos, and Masterson (2012) for Latin America; Zacharias, Masterson, and Memiş (2014) for Turkey; Zacharias, Kim, and Masterson (2014) for S. Korea; and, Zacharias et.al. (2018) for Ghana and Tanzania.

2. METHODOLOGY AND DATA

Our analytical framework for the analysis of the impact of increased fiscal spending on social care expansion in Turkey entails the following: We focus on the early childhood education and care (ECEC) sector following the original study by IKK 2015. We undertake a macroeconomic estimation of the number of jobs generated through increased fiscal spending. We then explore the distributional effects using a synthetically matched dataset from the Turkish time-use survey (TUS) 2015 and the Survey on Income and Living Conditions (SILC) 2015. We assess the gendered changes in wellbeing in terms of access to new employment and earnings, as well as access to newly available services, and the consequent changes in women's and men's allocation of paid and unpaid work time. We explore the impact on poverty using the measures of time-poverty, income-poverty, and joint time- and income-poverty. The methodology and data used in the various analytical steps are explained below and summarized in Table 1.

Estimation of macro employment generation outcomes

Our first step was to determine the magnitude of the fiscal allocation by the government to ECEC service expansion. This is based on a priori assessment of the deficit in ECEC services (supply versus demand/need for services) and the cost of the necessary expenditures to close the deficit. We use the ECEC deficit assessment and costing in the original study by IKK 2015 (further refined in KIK 2019), which takes into consideration both the quality of employment and services (explained under Section III).

In the next step, the necessary fiscal expansion is integrated into the input-output model to estimate the number of direct and indirect jobs to be generated through additional public spending. We supplement the latest input-output table for the year 2012 available from the Turkish Statistical Agency[7] with a synthetic sector that represents the provisioning of ECEC services. This is necessary because the official input-output table does not include a separate ECEC sector, which prevents us from estimating the impact of expanding this sector with a reasonable degree of accuracy. We constructed the synthetic ECEC sector from the data that we collected in a field survey of childcare centers as explained in IKK 2015 (see Appendix A). Combining employment data from the Household Labor Force Survey (HLFS) with the augmented input-output table, it is possible to derive the employment multipliers for each industry (as well as the occupational distribution of industry employment) and estimate the changes in employment triggered through the change in the output of a specific industry.

The direct employment effects entail the change in employment of the ECEC services sector, which receives the output stimulus. The indirect employment effects entail changes in employment of the other industries, which are affected through backward linkages. In

[7] IKK 2015 had used an earlier version based on the TurkStat 2002 IOT and updated by the World Input-Output Database (WIOD) for the year 2011.

addition, there are also induced employment effects as a result of the increase in household final demand. We combine indirect and induced effects as total indirect employment effects in this study.

Microsimulation of distributional outcomes of new employment and income

The distributional effects are analyzed through a microsimulation model using a statistically matched dataset from the Turkish time-use survey (TUS) 2015 and the Survey on Income and Living Conditions (SILC) 2015 (for a technical discussion of the method used in our statistical matching, see Kum and Masterson 2010). SILC is the survey used for the official measurement of income and poverty. We assign the weekly hours spent on household production to each individual younger than 70 years old (age 15 – 69 years) in the SILC via our statistical matching procedure (see Appendix B).

Using the SILC, we first identify a pool of employable individuals, i.e. people who are either unemployed (actively seeking a job) or labor market inactive but employable (prime working age and in good health). Typically, and particularly in Turkey where female labor force participation is very low, women constitute the majority in this pool of employable people. A statistical matching procedure is used to allocate the newly generated jobs to the non-employed but employable adults observed in the dataset (Zacharias et al. 2019, Appendix C, provides a discussion of the technique and applications to Ghana and Tanzania). The matching is based on an assessment of their employment probabilities and propensity for being employed into a particular industry and occupation (determined by personal and household characteristics). The jobs are matched to the most likely individuals by personal characteristics, including gender, age, and education level, as well as household characteristics, including income level, household size and structure, and age of household members. The final step is to estimate the earnings and hours of employment of each newly employed individual based on their individual characteristics and the assigned industry and occupation.

Access to new ECEC services and estimating impact on unpaid work time

The next step of the analysis is the allocation of access to the newly created ECEC places to small children on the basis of two criteria. The small children living in households where a previously non-employed parent is now employed in one of the new jobs generated through increased social spending on care services are given priority in enrolment. The remaining new childcare places are allocated on the basis of household income; those with lower income are granted priority in enrolment. It is worth emphasizing that the criteria for allocating enrollment do not mean that we believe in conditional access. In fact, we believe that the appropriate goal is universal access. Our choice of the criteria is guided by the primary objective of this paper: namely, to identify the gendered impact of simultaneous access to new jobs plus access to care services in terms of not only earned income but also household production time.

To estimate the impact of access to ECEC services on the time spent on household production by adults in the new ECEC service recipient households, the TUS data is used to estimate a regression model for the determinants of the time spent on household production. The model is estimated separately for women, men, girls, and boys. Our main independent variable of interest is the ECEC enrolment of small children (a variable that is covered in TUS).[8] The model includes control variables reflecting the demographic characteristics of the household and its members as well as the employment status of household members. We derive the elasticity of unpaid work time with respect to access to childcare services based on the coefficient on the ECEC enrolment variable.

We then use this impact of access to childcare services on household production time derived from TUS to predict the extent of the reduction in the household production time in the matched dataset of the households with small children who acquired new access to ECEC enrolment post-policy intervention.

2.1 IMPACT OF NEW EMPLOYMENT ON UNPAID WORK TIME[9]

Job creation can alter the time spent on household production. For those who are newly employed, there is an obvious increase in the time that they spend on employment and, concomitantly, a reduction in the potential time available for household production compared to the situation in which they did not have a job. The transition to employment can also have an impact on the bargaining power that the individual has over the division of household production responsibilities. Further, the additional income from new employment can go toward the purchase of market substitutes (e.g. ready-to-eat meals) which in turn can reduce the time spent on household production. Taken together, these considerations suggest that it is necessary to model the potential changes in the time spent on household production by the job recipients and members of their household.

We use a hot-decking method to model the likely changes in time spent on household production (Masterson 2018). Specifically, once the newly created jobs are assigned to individuals, we create a recipient pool that consists of all those for whom time use information is available in a household that contains at least one job recipient. The donor pool consists of everyone in the survey. We split the recipient pool into subgroups defined by sex, age category, and educational attainment. For each member of the subgroup, we find a donor who is most similar in a statistical sense. Iterating through the assignment process yields the time spent on household production by all members of the households

[8] The TUS 2015 data for Turkey contains a childcare help variable that lists the use of different kinds of services, namely enrolment in childcare centers, informal paid services (domestic workers), or unpaid help (by extended family members and friends). Given the limited number of observations for each category, we categorized all types of help into one 'access to care support' variable; but distinguished between full-time versus part-time help.

[9] This section heavily draws upon Zacharias et al. 2019.

with job recipients. This allows us to compute the total time spent on household production by all members of the household. Once that is ascertained, we can determine the share of each household member in that total. The final step consists of using the resulting shares to allocate the threshold hours of household production among the members of the household.

2.2 TOTAL IMPACT ON TIME-POVERTY, OFFICIAL POVERTY, AND LIMTIP[10]

The final stage of the analysis entails an assessment of the combined impact of new employment and access to ECEC services on-time deficits and poverty as defined by three measures: official poverty defined on the basis of income alone versus time-poverty and a combined time- and income poverty measure, namely LIMTIP. The conceptual framework for LIMTIP has been discussed in detail in a series of theoretical and applied papers that were cited before.

We start with an equation for the potential time available to a person for employment after setting aside the minimum time necessary for personal maintenance and meeting the responsibilities for household production from the total number of hours in a week:

$$A_{ij} = 168 - M - \alpha_{ij} R_j \quad (1)$$

$\mathbf{Aij}$ is the time available to person $\mathbf{i}$ in household $\mathbf{j}$. The time necessary for personal maintenance (sleep, eating, and drinking, etc.), denoted by $\mathbf{M}$, is assumed to be uniform across individuals.[11] The time required for the fulfillment of household production responsibilities are specified at the level of the household ($\mathbf{R_j}$) because they are assumed to represent the collective needs of the members of the household; in principle, the identity of the household member should not matter for the task to be performed although it can matter for the efficacy.[12] The household-level requirements or thresholds of household production are defined as the level of household production that is required for a household with income or consumption expenditures around the official poverty line to reproduce itself. The individual share of household production responsibilities fulfilled by a person (α_{ij}) can be different across persons, particularly by gender, as manifest in women's higher unpaid work burden.

[10] The empirical methods used to estimate the time thresholds are described in Appendix C.

[11] As in the previous LIMTIP studies, we estimated M as the sum of three components: the average weekly hours spent on sleep, hygiene, eating, washing dressing and other unspecified personal activities by individuals between 15 and 69 years of age; average weekly hours of non-substitutable household production; and average weekly hours of necessary leisure. We estimated the first component from the TUS. The second and third components were assumed to be, respectively, 7 and 7 hours per week.

[12] We estimated R_j by using a nonlinear regression model as in Zacharias et al. (2019). The regression model aims to account for the economies of scale due to household size and differences in the time spent on household production due to differences in household composition.

A potential time deficit (X_{ij}) that a person can experience is defined as the situation when the hours at the job (L_{ij}) plus the "normal" commuting time (T_{ij})[13] exceeds the time available to them:

$$X_{ij} = \min\left(0, A_{ij} - L_{ij} - T_{ij}\right) < 0 \quad (2)$$

Our interest in time deficits is both at the individual level (for assessment of gender gaps), as well as at the household level. In the LIMTIP framework a household's ability to attain a minimum standard of living is determined both by consumption of market- and household-produced goods and services. Since that minimum standard of living is generally defined at the level of the household, we need a household-level measure of time deficits. We obtain that by adding up the time deficits of individuals in the household and we indicate that sum as X_j. We consider a household to be time-poor if $X_j < 0$, thus allowing for the possibility that a time-poor household may have individuals with no time deficits.

It is reasonable to suppose that the household with a time deficit is failing to attain a minimum standard of living if it does not have the resources to replace the shortfalls in household production. Official poverty lines implicitly assume that all households either have sufficient time to satisfy their needs of household production or enough resources to meet them via the purchase of market substitutes. We modify the official poverty line by adding the monetized value of the time deficits of the household to its poverty line to lay bare this implicit assumption:

$$P_j^M = P_j^O - pX_j, \quad (3)$$

where P_j^M is the modified poverty line, P_j^O the official poverty line, and p the unit replacement cost of household production.[14] Because the modified poverty threshold can only be higher than the official threshold, households that have income below the official threshold will be considered poor by either yardstick. The category of "hidden poor" consists of individuals in households with income (Y_j) that is equal to or greater than the official poverty line but lower than the modified poverty threshold:

$$P_j^O \le Y_j < P_j^M \quad (4)$$

The expanded category of individuals in poor households encompass the hidden poor in addition to those households under the official poverty line, i.e.,

$$Y_j < \max\left(P_j^o, P_j^M\right) \quad (5)$$

The total impact of the proposed policy intervention (expansion of ECEC services) on time deficits and LIMTIP is generated through multiple channels. Increased access to ECEC

[13] Our estimates of "normal" commuting time were constructed from the TUS. We calculated the average weekly hours spent on travel to work by individuals differentiated by full-time vs. part-time work status and geographical areas as 12 regional categories (NUTS 1), occupation, household income, educational level, and age categories.

[14] We approximated the unit replacement cost by the average hourly wage of SILC 2015, of domestic workers (5.19 TL).

services would potentially reduce the time spent on household production by lowering the thresholds of household production and increase the time available (R_j A_{ij}, respectively, in equation 1 above). This, in turn, may lead to a reduction in the incidence of time poverty and, thereby in the impoverishing effects of time deficits.

On the other hand, employment generation through increased ECEC spending would increase income and hence consumption possibilities; increase hours of employment, and hence decrease the time available (A_{ij} in equation 1 above) for the job recipients. This is also likely to trigger changes in the time spent on household production by the job recipients and members of their households as we described above. The net impact on time-deficits of job recipients and the members of their households cannot be predicted a priori because it would depend on how the allocation of time between employment and household production changes.

Consequently, the total impact of the expansion on LIMTIP cannot be ascertained a priori because it depends on the weight of the unambiguously beneficial direct impact and the ambiguous indirect impact of job creation. Our modeling effort aims to answer this question. Our hypothesis is that even though job creation would lead to time deficits for some of the newly employed and their household members, given that new employment takes place along with increased access to social care services, its overall impact will be to generate sufficient gains in household income so as to lead to a fall in consumption poverty. Time poverty is likely to decrease (increase) if we do (not) expect the direct impact of ECEC expansion on beneficiary households to outweigh the time deficits generated via job creation. In our view, this is an open research question. We pay particular attention in our analysis to the effects on the newly employed women living in households with small children who are newly enrolled in ECEC services to identify the net effect.

Table 1 – Steps of Analysis and Data

Steps of Analysis	Method and Data	Comparison to earlier policy simulations on Turkey
1. Care deficit assessment and costing	Deficit assessment against policy target of OECD average ECEC enrolment rates; based on Population Surveys and Ministry of Education ECEC enrolment rates by age group; own calculations for enrolment of those in age 0-2 group;	Deficit assessment same as in IKK 2015; costing the same as in KIK 2019 (adjusted from IKK 2015 for decent work)

	Field Survey of Childcare Centers	
2. Employment generation	Macro IO analysis; IOT 2012 by TurkStat; HLFS 2015; Field Survey of Childcare Centers for ECEC cost structure and synthetic sector	IOT 2011 by WIOD based on IO 2002 by TurkStat in IKK 2015
3. Distribution of new employment and earnings (by gender, HH income, previous labor market status, etc.)	Microsimulation and econometric estimation with TUS 2015+SILC 2015 matched data	SILC 2011 in IKK 2015
4. Access to new ECEC services and impact on unpaid work time of adults in households with small children	Microsimulation and econometric estimation with TUS 2015+SILC 2015 matched data	Not done in previous studies; adopting methodology used in Zacharias, et.al. 2019
5. Impact of new employment on the intra-household distribution of unpaid work time in households of newly employed	Microsimulation and econometric estimation with TUS 2015+SILC 2015 matched data	Not done in previous studies; adopting methodology used in Zacharias, et.al. 2019
5. Total impact of new employment and new ECEC services on LIMTCP and official poverty	Microsimulation with TUS 2015+SILC 2015 matched data	Not done in previous studies; adopting methodology used in Zacharias, et.al. 2019

3. IMPACT OF JOB CREATION AND INCOME GENERATION BY GENDER: CHANGES IN EMPLOYMENT AND EARNING GAP

We follow IKK 2015 in assessing the ECEC deficit against a policy target of OECD average enrolment rate for preschool children by age group. Based on official population and enrolment data for 2014-2015, we estimate that for Turkey to reach the OECD average ECEC enrolment rates for children under age 6, it needs to enroll 3.27 million additional

children in childcare centers and preschools.[15] For costing (the increase in expenditures necessary to close the care deficit in ECEC), IKK 2015 uses the average cost per child derived from their field survey of childcare centers and preschools. KIK 2019 revises the original estimate upward to reflect decent work conditions with all direct employment in the ECEC sector covered under social security and decent wages. This yields a cost estimate for the hypothetical ECEC expansion at 31.95 billion TRY (in 2014 prices, approximately 1.8 percent of GDP).[16]

The policy scenario on ECEC expansion is defined on the basis of decent work conditions for employees and high service quality through lower student-to-staff ratios as foreseen in national legislation. To that end, IKK 2015 applies the legislative ratios to the number of new childcare places to derive the direct employment impact of increased spending. This yields an estimate of 611,385 employees including teachers, assistant teachers, managerial, administrative, and other support staff employed in the ECEC sector (see Appendix A for further details). The employment intensity of the ECEC sector determines the size of the direct employment creation.

In order to estimate indirect job creation in other related sectors through backward linkages and increased household final consumption (induced effects), 31.95 billion TRY (14.6 billion USD in 2014) is injected in the synthetic ECEC sector in the input-output model based on 2012 data. The indirect (plus induced) employment multiplier is 29.5 per million USD injection. As a result, the injection of 31.95 billion TRY generates 431,340 indirect jobs.[17] In total, including direct job creation in the care sector (611,385 jobs), increased ECEC spending generates 1.042 million new jobs in total. The estimates indicate that the majority (58.6%) of the new jobs are concentrated in ECEC services. The occupational and sectoral breakdown of jobs by gender are provided in Appendix A.

Using a microsimulation model, the newly generated jobs are assigned to potential employable adults in the matched (SILC-TUS) dataset. The pool of those that are potentially employable (Table 2), almost 18 million workers, consists of the unemployed (currently not employed at a paid job and actively seeking a job), homemakers (currently not employed at a paid job but engaged in full-time homemaking) and adult students (above 20 years old).

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[15] The 2014-2015 average enrolment rates by age group for the OECD versus Turkey are as follows: 33% vs. 0.2% for 0-2 years old; 70% vs. 9.1% for age 3; 84% vs. 32.4% for age 4; and 94% vs. 51.4% for age 5. See Ilkkaracan, Kim and Kaya 2015 for population and student numbers for each age group and assessment of the need for new ECEC places.

[16] While it is a sizable amount of spending, what the ECEC expansion policy scenario suggests is not necessarily an immediate and one-time allocation of resources. The expansion can take place over the medium-run targeting the most disadvantaged children and households first, eventually achieving universal access for all.

[17] The employment multipliers and number of jobs are based on input-output analysis using the TurkStat 2012 input-output table. IKK 2015 had used World Input-Output Database (WIOD) IO table for Turkey based on the Turkstat 2002 IO table updated by WIOD to 2011. Accordingly, the IKK 2015 used an employment multiplier of 23.1 generating 337,289 indirect jobs. The number of direct jobs is the same as IKK 2015 (611,386 direct jobs).

Given women's low labor force participation rate in Turkey (about 30%), it is not surprising that the majority of the employable pool consists of women (14.7 million) and most of them (13.1 million) are homemakers. By contrast, of the total male employable pool of 3 million, the majority (1.94 million) is in the unemployed status (versus 659 thousand unemployed women). About one-third of the women in the employable pool (almost 5 million) live in households with small children (under 6 years old); and 4 million are mothers of small children. Hence, this group can benefit from the twin outcomes of the policy intervention: as potential recipients of new jobs as well as of expanded ECEC services.

Table 2 - Jobs Simulation: Potential Employable Pool and Job Recipients by Gender

	Total	Women (%)	Men
Total Sample (all in SILC)	65,360,770	32,916,727 (50.4)	32,444,043
Potential pool of employable people	17,703,114	14,677,722 (82.9)	3,025,392
unemployed	*2,599,746*	*659,313*	*1,940,433*
homemakers	*13,101,911*	*13,100,000*	*1,911*
(adult) students	*2,001,457*	*918,409*	*1,083,048*
Those with small children - potential beneficiaries of ECEC services *Of which: mothers of young children age < 6*	5,672.354	4,984,289 (87.9) *3,955,469*	688,065
Job recipients *Of which: mothers of young children age < 6*	1,019,240	601,619 (57.7) *227,481*	441,016
unemployed	*399,410*	*111,190*	*288,220*
homemakers	*424,830*	*424,362*	*468*
(adult) students	*218,485*	*66,067*	*152,418*

Figures 1 to 4 show the results of the microsimulation whereby a total of 1.043 million jobs are assigned to various workers drawn from the pool of employable and ranked by their employment probabilities as determined by observed characteristics of the individuals and the types of jobs available. More than half the new jobs (601,619; 57% of total new jobs available) employ women; the rest (441,106) employ men (Figure 1).[18] Given the gender composition of employment in the child care sector, women are beneficiaries of direct job creation; 76% of women are employed in the new jobs created directly in the ECEC sector; and 24% benefit from indirect job creation in other sectors. By contrast, men benefit relatively more from indirect job creation with 62% employed in new jobs in sectors other than ECEC.

In terms of previous labor market status (Figure 2), the main beneficiaries of the new jobs are women who were previously engaged in full-time homemaking; 424 thousand female homemakers are hired into new jobs. Of these, about half (227,481) are mothers of young children and in addition to becoming employed into new jobs, they also receive access to full-time ECEC services for their children by the design of our policy simulation. Unemployed men are the second-largest beneficiary group by previous labor market status; 228,220 unemployed male workers are hired into new jobs generated through increased ECEC spending (and 111,190 unemployed female workers). Finally, approximately 218, 485 adult students become job recipients, with about three quarters consisting of male students.

Distribution of jobs by education level (Figure 3) shows that about 60% of the new jobs hire college-educated workers. This is particularly the case for women, where half a million out of the total 601,619 jobs hiring women, go to college graduates. This is an outcome of our policy design, whereby in deriving the direct job creation in the ECEC sector, we abided by the skills requirements and child-to-staff ratios as defined by the national legislation on the establishment of childcare centers. In the case of men, who are mostly hired into indirect jobs in other sectors, the distribution by education level follows a reverse trend: Almost half (199,726) of the new jobs which hire men to go to workers with less than high school education.

[18] IKK (2015) reported 73% of the jobs going to women; the female share of new jobs is lower here due to the inclusion of induced effects in this paper's estimation (i.e. jobs created through forward linkages of increased household expenditures). The gender distribution of the indirect jobs reflects the overall gender distribution of the labor market in Turkey, with about two-thirds of indirect jobs employing men. IKK (2015) did not include induced effects, because the study focused on a comparison of social care spending and construction spending; with the induced effects being similar.

Figure 1: Job creation by gender and direct vs. indirect jobs

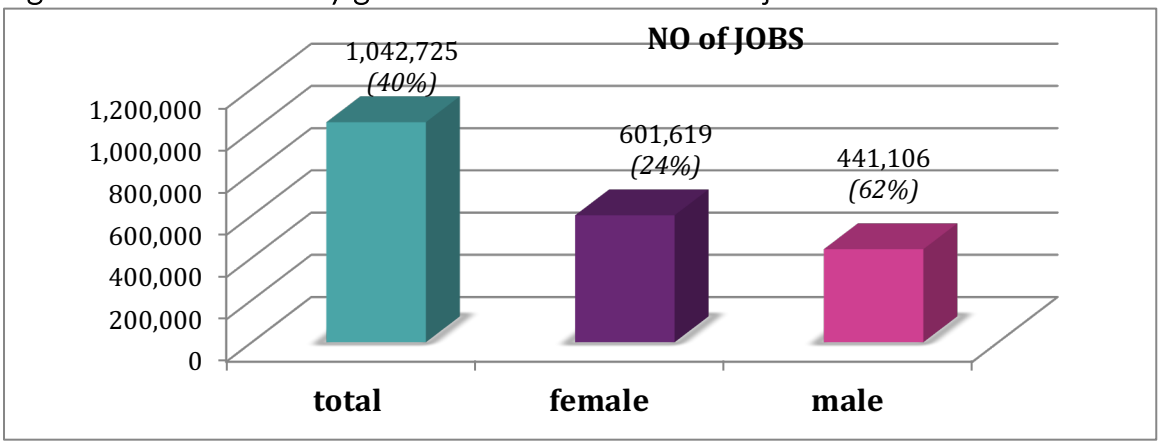


Figure 2: Distribution of new jobs by previous labor market status and gender

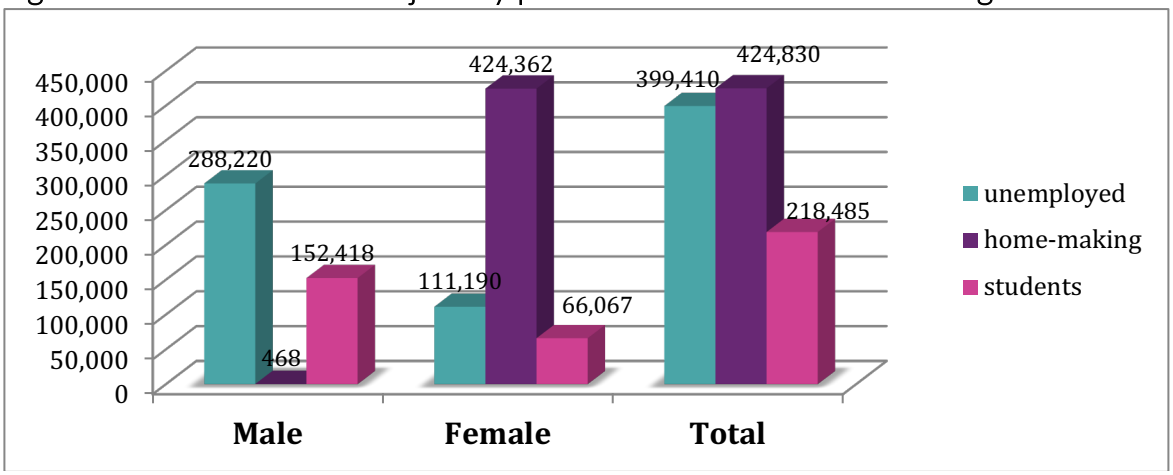


Figure 3: Distribution of new jobs by gender and education (in 1000's)

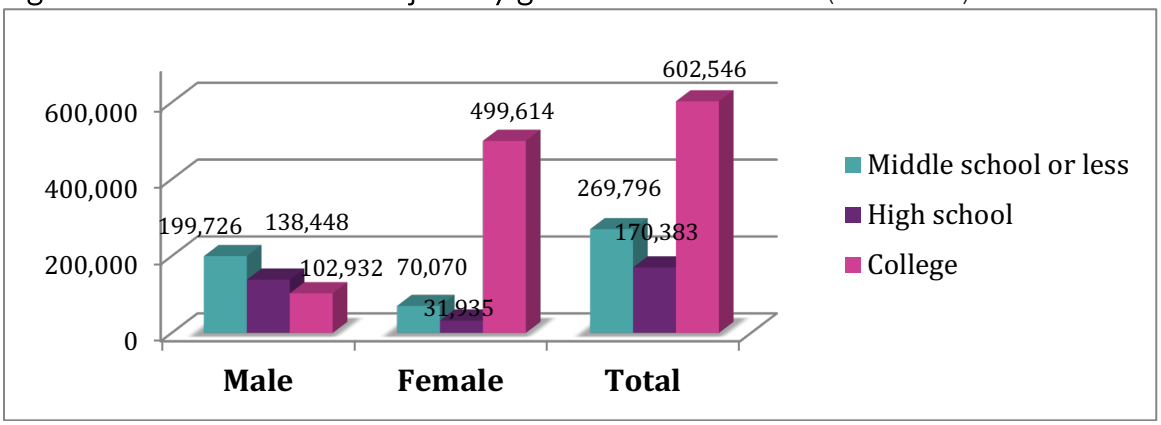
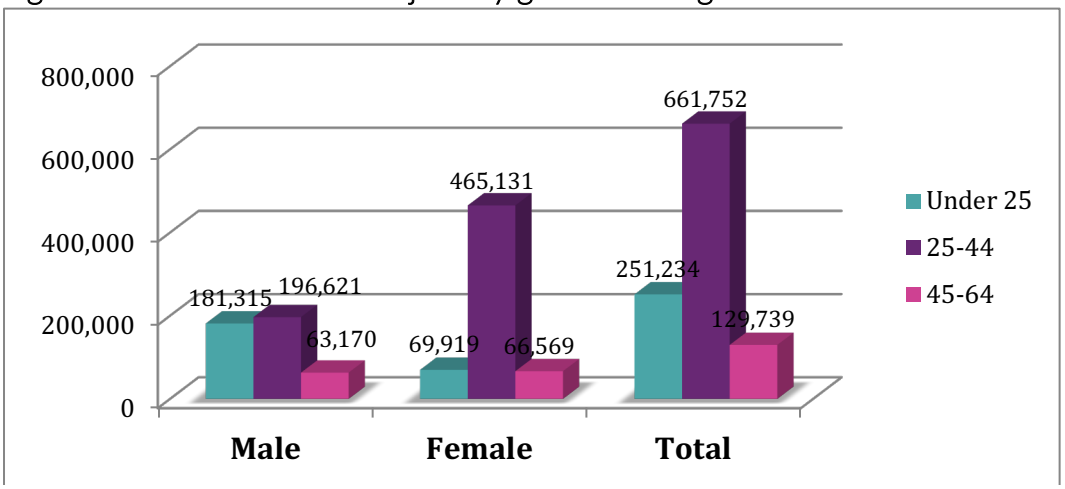


Figure 4: Distribution of new jobs by gender and age



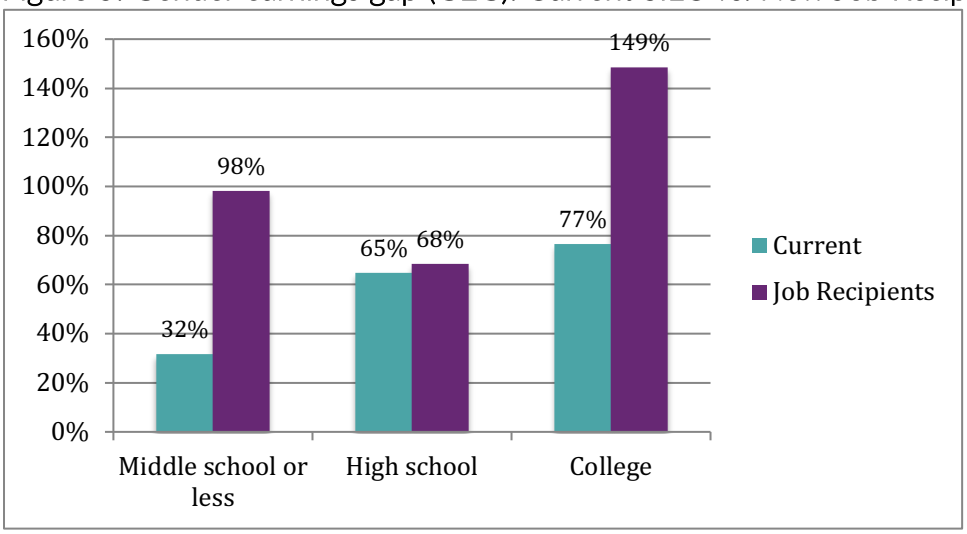
As for the distribution of the new jobs by age groups (Figure 4), majority of the women hired (465,131 women workers) are in the prime working-age category of 25-44 years; and the rest divided equally into the younger age group of 21-25 years old (69,919 women) and the older age group of 45-64 years old (66,569 women). In the case of job recipient men, the younger workers under 25 (181,315 men) and the prime working-age group (196,621 men) benefit equally.

The new earnings generated through job creation narrow the gender earnings gap (Figure 5). The current gender earnings gap (female earnings as a share of male earnings) observed in SILC 2015 is substantial, at 32% for workers with the lowest level of education, 65% for workers with high school education, and narrows down to only 77% for workers with a college education. The gender wage gap observed for women and men hired into the newly created jobs is almost at parity (98%); in the case of workers with the lowest level of education; for high school graduates the new job recipients' wage gap at 68% is similar to that observed in SILC and in the case of job recipients with a college education, the gap is to women's advantage at 149%. An important factor deriving this outcome is that in estimating the magnitude of the public spending to close the care deficit, we abide by decent work criteria for the ECEC sector jobs in terms of wage levels and formal employment as explained above. Since the majority of the jobs into which women are hired into are jobs created directly in the ECEC sector, the gender wage gap narrows down substantially and even turns to women's advantage.

As for the impact of new income generation by income quintiles (Figure 6), the largest effect is observed for households in the bottom income quintiles. The median (mean) income of the households in the lowest quintile is enhanced by 53% (86%); for those in the second-lowest quintile, their median (mean) income is enhanced by 21% (35%). The increase in

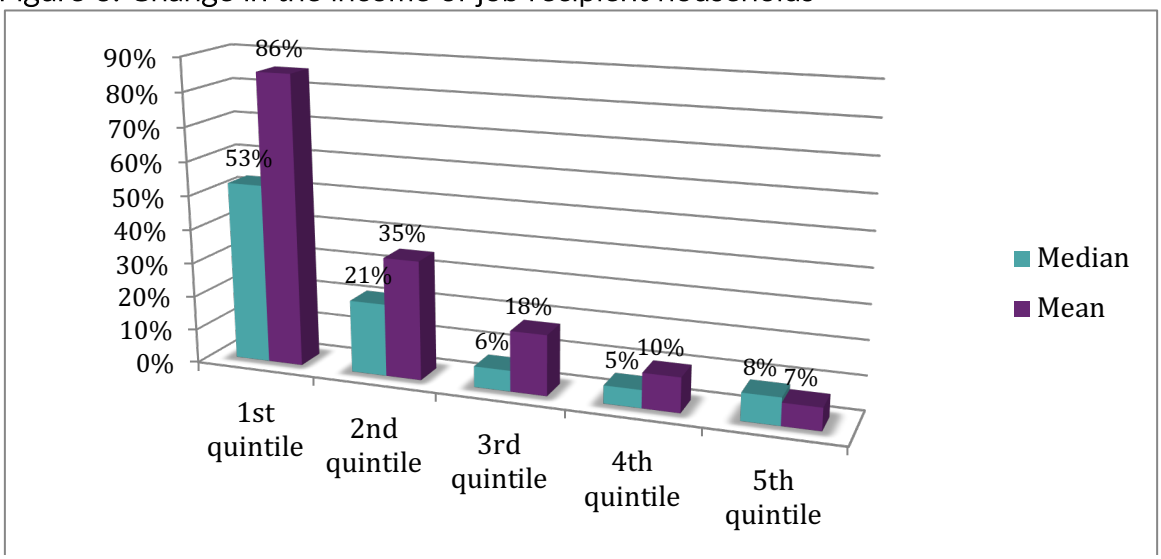
household income of the middle to higher income quintiles are lower, ranging from 6 to 8% for median income (7 to 18% for mean income).

Figure 5: Gender earnings gap (GEG): Current SILC vs. New Job Recipients



Note: GEG = Women's average earnings/ Men's average earnings

Figure 6: Change in the income of job recipient households



The relatively higher impact of new job creation on the earnings enhancement of households in the lower-income quintiles observed in Figure 6, would be expected to trigger poverty reduction outcomes. However, when poverty is defined not only in terms of access to income but also in terms of access to time for household production (as discussed above in the methodology section), a comprehensive assessment of poverty impact requires also

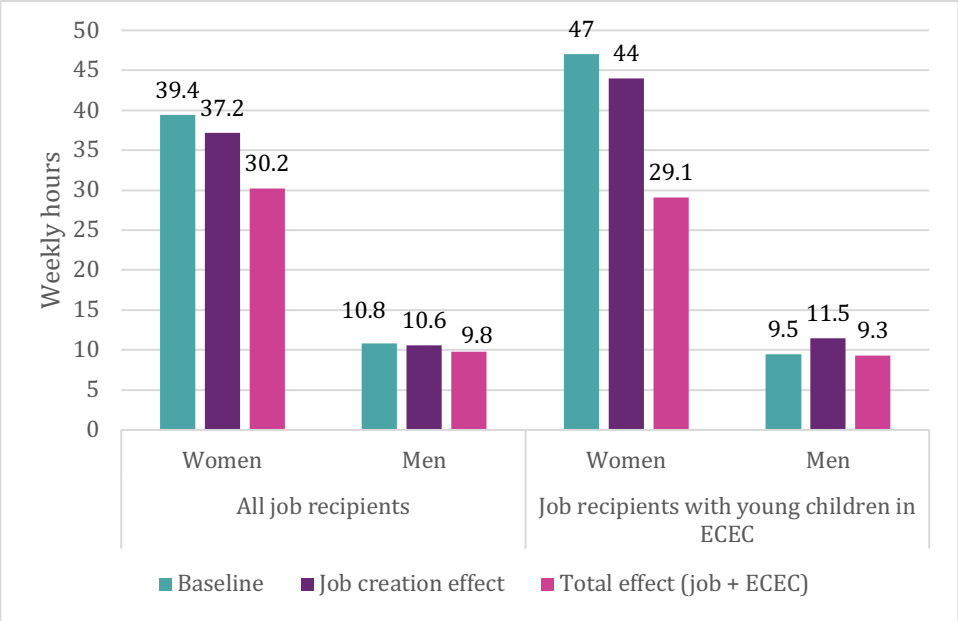
looking at the effects of job creation on time allocation. The households of the newly employed enjoy increased income but at the same time experience less available time for household production. Since job creation in our policy scenario is realized through increased spending on childcare services, the newly employed with small children will also have access to childcare, decreasing the requirements on their unpaid household production time.

4. IMPACT OF JOB CREATION ON TIME AND INCOME POVERTY

We now turn to examine the potentially contradictory effects of job creation on the time and income poverty of job recipients, with a special focus on recipients that are mothers of young children. As we discussed previously, the contradictory effects derive from the fact that taking on a job often tends to push some women into time poverty because the additional demand on their time is not offset by a one-to-one reduction in the time that they have to devote to their household production responsibilities. The expansion of ECEC services can provide some relief on this front because such expansion entails a reduction in the time required for household production. Our microsimulation model aims to provide some quantitative evidence on these effects.

The estimated impact of the policy interventions on the required hours of household production of the job recipients are displayed in Figure 6. As indicated in equation (1), the hours of household production that the individual is required to spend depend on the household-level thresholds of household production (R_j) and the individual's share in the total time spent by all household members in their household on household production activities (α_{ij}). In our modeling exercise, we assumed that job creation in itself does not have any impact on the household-level thresholds. On the other hand, we assume that the expansion of ECEC services has a direct impact on households with ECEC-eligible children; specifically, it reduces the thresholds (R_j) that they face. With regard to the individual's share (α_{ij}), we assume that both job creation and ECEC expansion can potentially affect the intrahousehold distribution of household production responsibilities. "Job creation effect" shows the simulated required hours of household production after accounting for the individual's new employment status. The simulated hours after accounting for both the new employment status and expansion of ECEC services are labeled "Total effect (job + ECEC)." Finally, the pre-intervention (i.e. actual) values are labeled "Baseline."

Figure 7 Required hours of household production by job recipients by sex and type of family (average weekly hours)



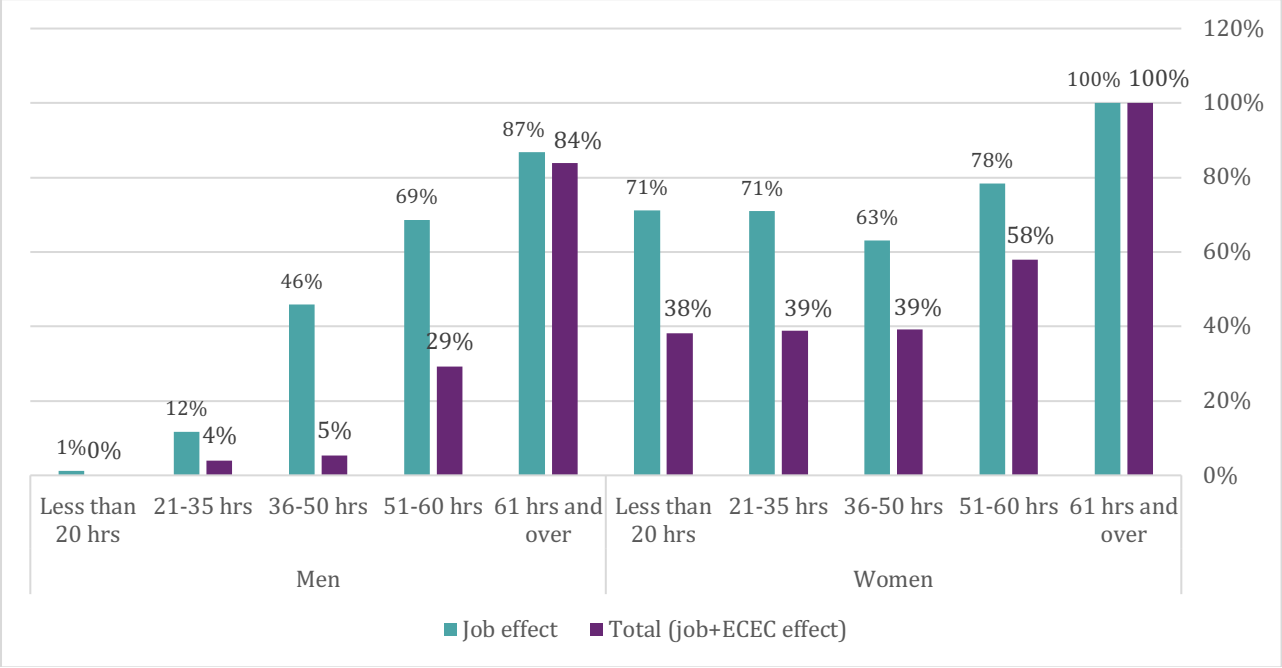
Our estimates indicate that policy intervention has a pronounced gendered effect. The average weekly household production hours spent by men hardly budge compared to the decline observed for women job recipients, especially in households with young children that got enrolled as a result of the ECEC expansion. By contrast, the average weekly household production of women hours fell by 23% (from 39 to 30 hours) for all female job recipients, and by 38% (from 47 to 29 hours) for female job recipients in households with young children enrolled in the newly available ECEC facilities. As may be recalled, 92 percent of women in the latter group of households are mothers of young children. It is remarkable that the bulk of the reduction in the required hours may be attributed to the expansion of ECEC services. Job creation in itself may be unable to make a serious dent on the demands placed on women by household production responsibilities. The implication is that the effect from the expansion of social provisioning of care outweighs the change in the intrahousehold disparity of earnings ("the opportunity cost of time" in the mainstream approach). A further indication of the relative roles of the two factors can be gauged by considering the roles played by, respectively, the change in thresholds (R_j) and change in the individual share (α_{ij}) in accounting for the decline in the required hours. Our estimates for women in households with ECEC beneficiaries showed that while the average individual share declined rather modestly (from 58 to 55 percent), the decline in the average thresholds was much more marked (from 82 to 58 weekly hours per household).

The other aspect of time allocation addressed in our simulation exercise relates to the hours of employment associated with the new jobs received by men and women. We estimate that the average weekly hours of the newly employed men and women were 25 and 21 hours respectively. Compared to the disparity in the post-intervention required hours of

household production, the gender disparity in the hours of employment is rather low among the job recipients: The average weekly required hours of household production was more than three times that of men while the average weekly hours of employment was only about 16% lower than that of men.

The narrow gender disparity in the time spent on employment compared to the required time for household production suggests that newly employed women are far more likely than men to incur time deficits (Figure 8). Since the reduction in the required hours of household production is largely driven by changes in the thresholds of household production through access to child care services, we focus here on job recipients in families with children enrolled in the newly available ECEC facilities. The overall time poverty rate of newly employed women is 41 percent compared to only 3 percent for men. We find that the ECEC expansion brings about a remarkable reduction in the incidence of time poverty among all those who are employed for less than 60 hours per week, especially for women. For part-time employed women working less than 20 hours per week, the time poverty rate decreases from 71% to 38%; for women employed 21-35 hours from 71% to 39%, 36-50 hours from 63% to 39% and for 51-60 hours from 78% to 58%.

Figure 8 Time poverty rates of employed[19] in households with young children enrolled in new ECEC



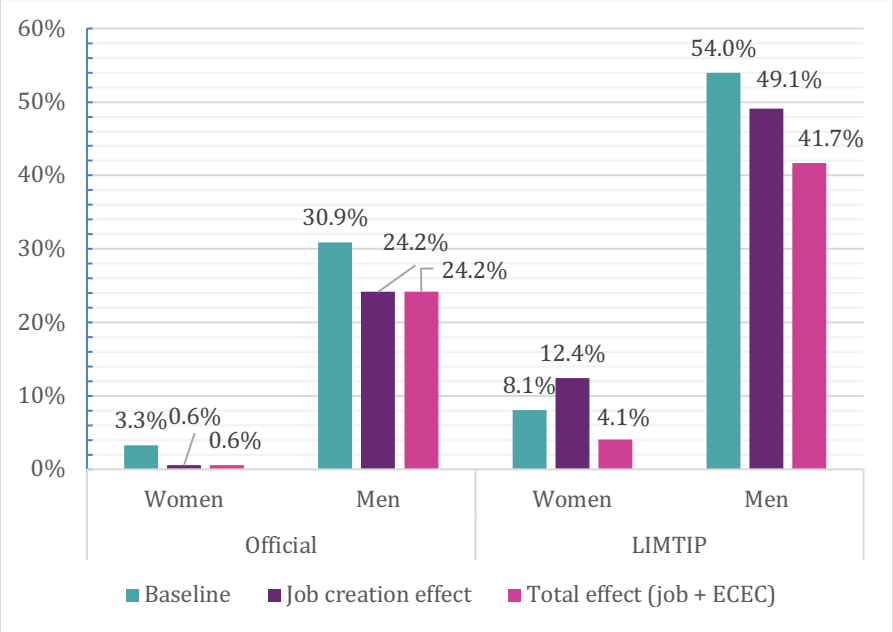
The official (income) poverty measure adopted by the Turkish Statistical Institute, as in other countries, ignores the impoverishing effects of time deficits. According to this yardstick,

[19] Individuals who are already employed under pre-policy conditions as well as the newly employed who receive new jobs.

16.4% of the beneficiaries of our policy intervention (people living in households that receive new jobs as well as access to new ECEC services) were income-poor.[20] Following the policy intervention, due to additional earnings through increased spending on ECEC services, the official income poverty rate of these households reduces by a substantial 5.8 percentage points to 10.61%.

However, there is a marked difference between job recipient women and men in terms of their baseline income poverty status. As we noted above, job creation among women is mostly in the care sector and the majority of the women job recipients have relatively high educational attainment (Figure 3) as required by the quality of care to be provided in the new ECEC services. In contrast, the bulk of new employment for men was in indirect jobs created in other sectors, where the work conditions replicated observed labor market patterns. Hence the majority of male job recipients were unemployed men with lower education (Figures 2 and 3). Accordingly, a much smaller proportion of women are from income-poor households than men in the baseline, irrespective of whether we use the official or the LIMTIP poverty lines (Figure 9).

Figure 9 Official and LIMTIP rates of income poverty among job in households with young children enrolled in new ECEC



The gender bias of the blind spot in the official measurement of poverty with respect to time deficits is quite evident in the measured impact of the policy intervention on women's income poverty. According to the official measure, we would conclude that income poverty

[20] In comparison, the overall poverty rate for individuals in Turkey in 2015 is 14.7%.

was almost eliminated among women; in contrast, the LIMTIP income poverty rate actually increases (from 8.1 to 12.4%) without accounting for the effects of the ECEC on household production requirements. For men, unlike women, the change is in the same direction, i.e., the income poverty rate declines by either measure. Taking into account the new ECEC services received by children and their impacts on household production requirements results in a reduction in the income poverty of women—a reduction that is large enough to more than offset the rise due to the job creation effect alone. For men, the similar reckoning reinforces the reduction due to the job creation effect alone. All said the policy intervention reduces the LIMTIP income poverty rate from 8.1 to 4.1% and from 54 to 42% for women and men, respectively, in beneficiary households.

5. CONCLUSIONS

The framework for analysis used in this paper aims at exploring the gender-disaggregated impact of increasing public expenditures on social care services on employment and earnings simultaneously with the allocation of time to household production. The impacts on employment and earnings are through new job creation directly in the care sectors and indirectly in other related sectors through backward and forward linkages. The gendered nature of new job creation and earnings generation lies in the sex composition of employment in the social care services sectors. The impact on household production time is conditioned by women's and men's time allocation patterns between paid versus unpaid work, and the differential impact of access to new jobs and social care services on these gendered patterns. We explore how simultaneous access to care services as well as new job opportunities transform the gender gaps in employment, earnings, time allocation, time poverty, and income poverty. Our combined dataset which brings time-use information into an income and employment data set enables us to undertake a more comprehensive assessment of the impact on poverty by different measures; the conventional measure of income poverty, as well as a comprehensive measure of income poverty that takes account of not only earned income but household production and access to time as well.

Using Turkey as the background for the policy simulation based on matched SILC and TUS 2015 data, we explored the multiple economic outcomes of investment in childcare services (childcare centers and preschools for children under age 6) towards a policy target of Turkey achieving OECD average early childhood education and care (ECEC) enrolment rates. We find that an investment of approximately 1.8% of GDP is necessary to reach the policy target while also observing standards for high service quality and decent employment conditions in the care sector. An increase in spending of this magnitude has the potential to generate 1.042 million new jobs, with about 60% in the care sector, and 40% in other related sectors. Given the gender composition of employment in the ECEC sector, women receive 57% of the new jobs. Approximately 424 thousand women move from the previous position of full-time homemaking to working at a paid job in the labor market. Approximately

200 thousand unemployed men and 70 thousand unemployed women become recipients of the new jobs created through increases in social care spending.

A striking finding of this study is with respect to the impact of job creation and access to ECEC services on gendered patterns of time-allocation. We find that women's unpaid work time is reduced only slightly through employment into a new job through a reallocation of some of the household work to men; hence overall, they experience a large rise in time-poverty through entry into the labor market. With access to care services, however, there is a sharp reduction in their required household production time and a parallel decrease in time-poverty. This is testimony to the fact that the opportunity cost of women's entry into the labor market is not determined by access to jobs and associated wages alone, but also (and even more) by the costs of substitutes to household production.

As a result of new employment and earnings, there is a substantial reduction in poverty evaluated on the basis of the income poverty measure alone for both women and men. Nevertheless, by the more comprehensive LIMTIP measure, we found that new employment and earnings alone (without accounting for the new services), still decreases poverty for men but at a much more modest rate than official poverty; while the impact on women is reversed as they become subject to a higher LIMTIP rate. When the simultaneous impact of access to ECEC services and the associated positive time-related effects are accounted for, however, women's income poverty rate is reduced by almost one-third (from 12.4% to 4.1%), while men's income poverty decreases further but by a small share (4.1%).

These findings show that increased spending on the social care service sector does not only have the potential to facilitate gender-equitable inclusive growth through its demand-side effects, but it does so with further reinforcing outcomes on the labor supply side. Jobs generation is substantial given the labor-intensity of the sector, and the composition of new labor demand slightly favors women, helping to narrow the gender employment and earnings gaps. In addition, simultaneous access to ECEC services helps to relieve constraints on women's labor supply to some extent; reducing the time bind of entering into paid employment; alleviating time- and LIMTIP poverty of women.

Nevertheless, despite the two-pronged policy intervention, employed women's time-poverty risk continues to stand at higher levels than men's; access to ECEC services facilitates a notable reduction of the gender gap therein but stops short of eliminating it. Hence policy interventions for gender parity need to go beyond giving access to jobs and services, to entail more comprehensive interventions, such as labor market regulation for work-life balance with equal gender incentives and better working conditions. Future applied modeling work may attempt at integrating the likely impact of such policy interventions on reduction and redistribution of household production time and narrowing of the gender gaps therein.

6. APPENDIX A

A-1 Distribution of new jobs by gender, occupation, and sector

The majority (59.8%) of the new jobs are concentrated in the education and care sectors (Table A.1.1); with 58.6% of the jobs created directly in the ECEC services sector. The employment intensity of the ECEC sector determines the size of the direct employment creation. Legislation on nurseries and day-care centers dictates the student-to-teacher ratio to be 10-to-1 for children 0 to 2 years old and 20-to-1 for children 3 to 5 years old; it also mandates one teacher's aide per teacher (MFSP 1996).[21] We follow the legal guidelines of the Ministry of Education and calculate the number of teachers and aides in relation to the allowable number of additional children to be enrolled through the ECEC expansion. Based on the field survey of IKK (2015), we set the composition of teaching and non-teaching staff at an ECEC center in our simulations as follows: 36.6 percent of total staff is for teachers and another 36.6 percent for teachers' aides (15.3 teachers and 15.3 teachers' aides per US$1 million); 16 percent for non-teaching non-managerial staff such as cooks, janitors and others (6.7 workers per US$1 million); and the remaining 10.8 percent is split equally between managers and clerks (3.7 workers each per US$1 million).[22]

Table A.1.1: Distribution of Jobs by Sector and Gender (in thousands)

	Women	Men	Total
Agriculture	6.391	118.855	125.246
Manufacturing & Mining	28.411	42.249	70.660
Construction	0	10.790	10.790
Service	60.742	94.349	155.091
FIRE	46.743	1.867	48.610
Government & Health	3.395	5.392	8.787
Education & Care	455.937	167.604	623.541
Total	*601.619*	*441.106*	*1,042.725*

As for the distribution of jobs by occupation (Table A.1.2), for women, more than half (51%) of the new jobs are in high-skilled professionals, a result was driven by the regulatory requirements for direct care staff (teachers) employed at childcare sectors. The second-

[21] According to the preschool survey, the student-to-teacher ratio in private schools at full capacity is estimated to be 12.7 at the mean and 9.9 at the median. The student-to-aide ratio in the same schools is estimated to be 28.2 at the mean and 21.7 at the median.

[22] In the field survey data, the number of nonteaching staff with a full capacity of 80 students or more is in the range of five to seven, and we take the lower bound from the data for our analysis. The composition of nonteaching, administrative staff in a school of 100 students is: one manager, one clerk or an assistant manager, and three non-teaching, non-administrative workers for cooking, cleaning, and security services. In total, 163,695 nonteaching staff jobs are generated in our ECEC simulations.

largest occupational category for new job recipient women is service workers (33%), entailing service staff at childcare centers, and service employees in indirect jobs. For men, who are the recipients of mostly indirect jobs (created through backward linkages and induced effects), most of the jobs are created in the occupational categories of production workers (39%) and service workers (33%).

Table A.1.2.: Distribution of Jobs by Occupation and Gender

	Women	Men	Total
High-skilled professionals	306.849	7.784	314.633
Low-skilled professionals	17.054	7.454	24.508
Service workers	199.414	145.906	345.320
Production workers	13.245	172.435	185.680
Elementary workers	65.057	107.527	172.584
Total	*601.619*	*441.106*	*1.042.725*

The microsimulation technique applied is described in Zacharias et al. (2019, pp 164-168).

A-2 Assignment of new household production hours after assignment of new jobs

Following Zacharias et.al. (2019), we assigned new household care, procurement, and core household production hours for all the members of the job recipient household. We used the hot-decking method as described in the study aforementioned. The figures below present the quality check results after the assignment.

Figure A-1 Donor and Recipient Pool Composition by Sex and Age

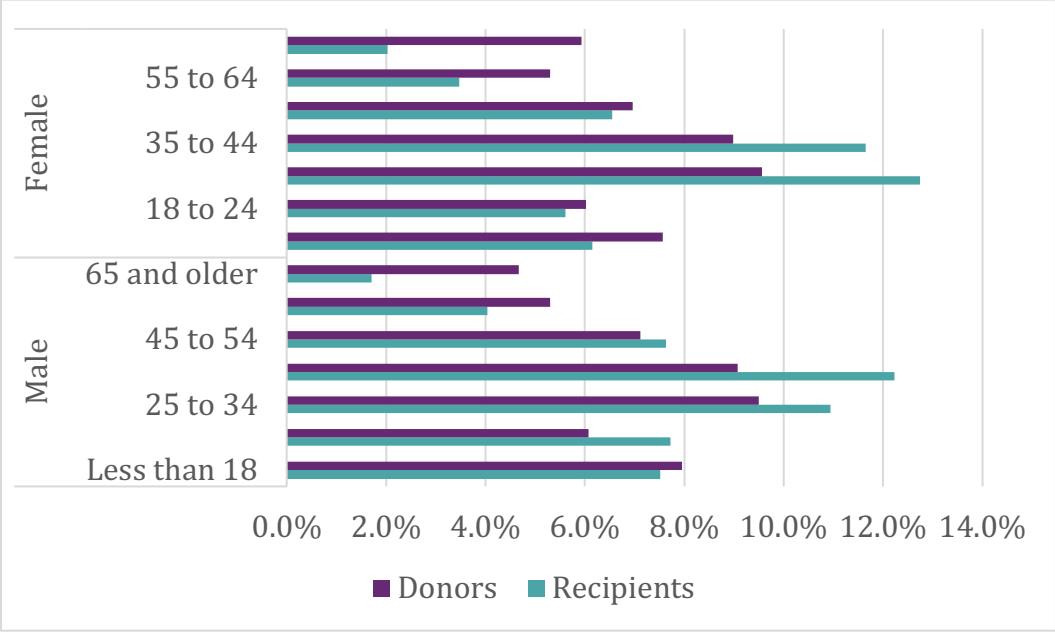


Figure A-2 Donor and Recipient Pool Composition by Sex and Education

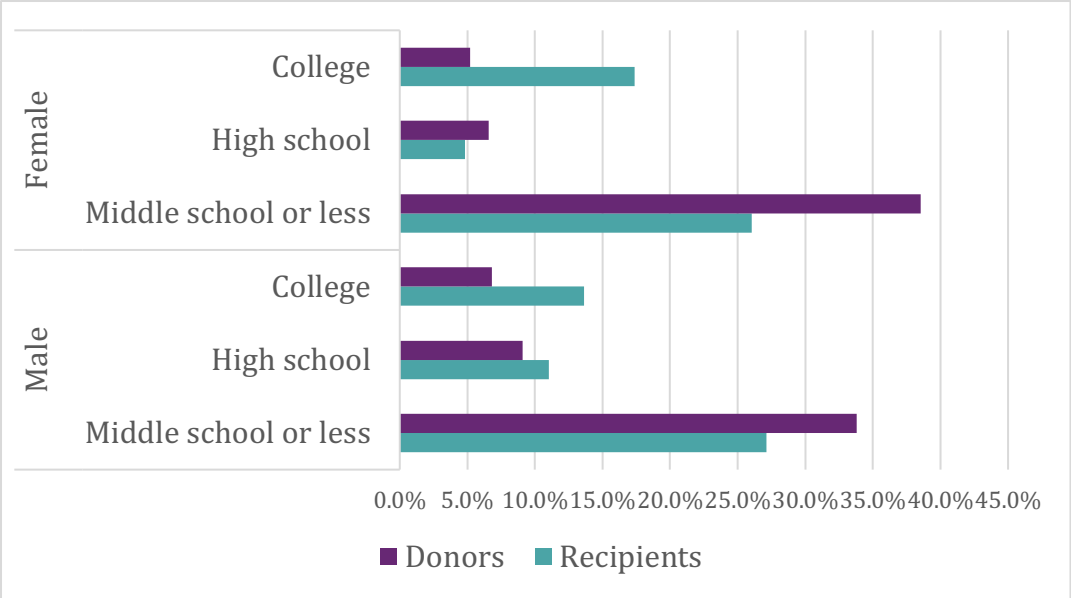


Figure A-3 Ratio of Recipient to Donor Mean and Median HH Production Hours by Sex and Age

Figure A-4 Ratio of Recipient to Donor Mean and Median HH Production Hours by Sex and Education

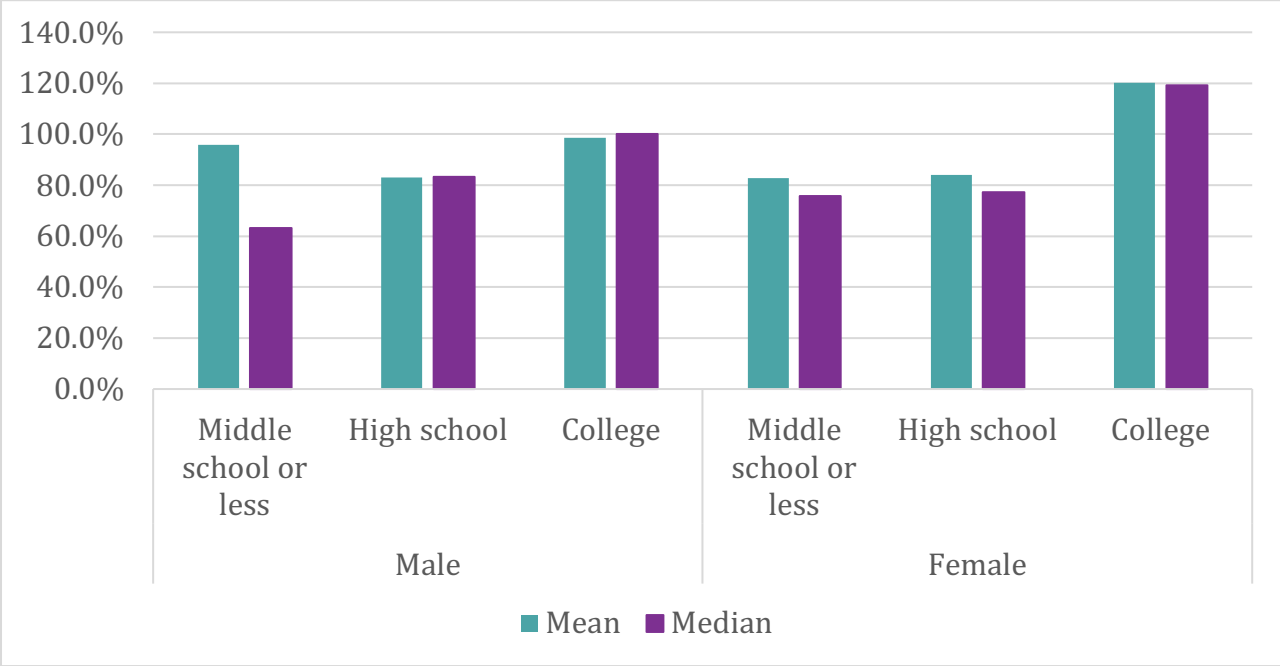


Table A.1.3: - Change in Poverty through Job Creation and Access to ECEC Services (copied onto separate document)

Reference Population	Job Recipient Households			Job Recipient Individuals		Job Recipient Households with kids age 0/5 years and have ECEC Access			Job Recipient Individuals (with kids age 0/5 years and have ECEC Access	
By Sex *(Pop. Size)*	Women *(1,678,341)* (1)	Men *(1,773,920)* (2)	All *(3,452,261)* (3)	Women *(616,407)* (4)	By Sex *(Pop. Size)*	Women *(1,678,341)* (1)	Men *(1,773,920)* (2)	All *(3,452,261)* (3)	Women *(616,407)* (4)	By Sex *(Pop. Size)*
Income poor - baseline	13.87	13.72	13.79	2.98	19.50	16.06	16.83	16.44	3.25	30.89
Income poor - job creation effect	7.69	8.81	8.26	1.05	11.91	9.55	11.65	10.61	0.56	24.15
Income poor - total effect	7.69	8.81	8.26	1.05	11.91	9.55	11.65	10.61	0.56	24.15
Time-poor – baseline	16.26	11.61	13.86	4.59	0,96	16.42	14.79	15.60	7.31	1.33
Time-poor post- job creation effect	41.61	29.90	35.59	58.52	5.85	50.96	35.42	43.17	75.75	5.69
Time-poor - total effect	28.56	11.85	19.97	41.17	4.64	28.67	13.45	21.04	40.48	2.91
LIMTIP poor - baseline	25.63	28.30	26.99	8.26	36.69	27.63	32.07	29.86	8.08	53.98
LIMTIP poor - job creation effect	23.48	26.93	25.25	8.77	32.30	28.81	31.87	30.35	12.42	49.08
LIMTIP poor - total effect	19.88	23.32	21.65	4.22	30.26	20.18	23.99	22.09	4.09	41.71
Hidden poor - baseline	11.75	14.57	13.20	5.28	17.18	11.57	15.25	13.41	4.82	23.09
Hidden poor - job creation effect	15.78	18.11	16.98	7.72	20.38	19.26	20.22	19.74	11.85	24.93
Hidden poor - total effect	12.20	14.50	13.38	3.16	18.34	10.62	12.34	11.48	3.52	17.56

7. APPENDIX B

Synthetic Data Matching Time-Use Survey (TUS) and Survey on Income and Living Conditions (SILC) 2015 Turkey

In order to bring time-use information and household income and employment status together, we applied a statistical matching method using the TUS and SILC datasets. TUS (2014-15) provides time use data of 25,109 individuals ages 10 and above living in 9,073 households. The data was collected by interviews and daily diaries. Household members provide data for specified two days (one for a weekday and one for a weekend day) where they record their daily activities in ten-minute intervals for 24 hours of a day. All days of the week surveyed in equal proportions and postponement of diary days are allowed for a maximum of two weeks. All members of the household keep their diary on the same day. If the respondent does more than one activity simultaneously, one of these activities is determined as the main activity and the data shows the distribution of the time spent on the main activity in 24 hours. Daily activities are classified according to the Eurostat (2000) activity coding list. We use the whole week's information.

SILC (2015) provides income and living conditions data for 22, 763 households with 81,048 individuals (59,840 individuals ages 15 years and over) representative of the whole population in Turkey covering 12 NUTS 1 geographical region. TURKSTAT calculated income poverty rates and other poverty indicators based on the SILC database very year.

The basic framework of standard statistical matching is described in detail in Kum and Masterson (2010). Given TUS and SILC contains a set of common variables (demographic, household composition employment status and et.) for the whole population. Using the distance function of each observation similarity between in each data set, the matching technique enables to find the most similar donor observation for each in the recipient dataset according to the propensity scores calculated. This method is defined as the nearest neighbor match, that requires the weighted population sums equalized between the donor and recipient data sets. For more detailed information on the assumptions and application of the technique please see Kum and Masterson (2010).

Table B-1 Statistics for Quality Check - Weekly household production hours

		Donor		Matched Data	
Households with one non-employed adult member		*Mean*	*Median*	*Mean*	*Median*
One adult	No children	165.67	162.17	163.68	159.83
	One child	219.35	226.33	233.45	243.83
	Two children	206.32	236.83	257.21	290.50
	Three or more	177.06	112.00	222.06	179.67
Two adults	No children	153.86	136.50	153.39	131.83
	One child	186.95	119.00	182.05	112.00
	Two children	172.78	88.67	177.13	93.33
	Three or more	155.27	72.33	151.97	71.17
Three adults	No children	116.39	63.00	116.22	63.00
	One child	116.62	56.00	116.06	56.00
	Two children	124.72	58.33	125.81	58.33
	Three or more	136.28	65.33	138.13	66.50
Households with one non-employed adult member					
	One adult	171.02	163.33	171.00	162.17
	Two adults	165.63	105.00	164.62	105.00
	Three or more	122.23	60.67	122.43	60.67
Households with one non-employed adult member and income level is in poverty band					
One adult	No children	164.50	159.83	156.53	156.33
	One child	225.01	236.83	259.69	271.83
	Two children	175.36	123.67	268.25	341.83
	Three or more	177.28	96.83	241.56	229.83
Two adults	No children	155.96	140.00	159.35	145.83
	One child	185.66	115.50	192.75	116.67
	Two children	171.75	87.50	181.04	105.00
	Three or more	153.00	67.67	157.70	72.33
Three adults	No children	125.58	73.50	106.10	54.83
	One child	124.86	60.67	122.30	59.50
	Two children	133.94	70.00	135.87	66.50
	Three or more	132.71	63.00	135.25	57.17
Households with one non-employed adult member and income level is in poverty band					
	One adult	169.20	159.83	171.14	162.17
	Two adults	165.02	99.17	169.07	102.67
	Three or more	129.52	66.50	127.35	59.50

8. APPENDIX C

Estimation of time thresholds and the impact of access to ECEC and new employment on household production time by gender

In order to construct consistent measures of the potential impact of job creation and ECEC services on household production hours, we use the 2014-15 Turkish Time Use Survey data file rather than the synthetic matched data. The total time spent on household production is defined as the sum of (1) time spent on core activities (made up of cooking, cleaning, and other household chores) and (2) procurement (consisting mainly of shopping); (3) time spent on care (made up of caring for children and adults); together with travel time related to core, procurement and care activities added in each category.

The minimum required weekly hours of personal maintenance were estimated as the sum of minimum necessary leisure (assumed to be equal to 10 hours per week), non-substitutable household activities (assumed to be equal to 7 hours per week) and the weekly average computed from the time use survey of the time spent on personal care by individuals aged 18 to 70 years (table C-1). We assume that these thresholds do not change as a result of the policy interventions.

Table C-1. Personal Care Time (Mean hours/day)

Age 18/69	Women	Men
011 Sleep	08:35	08:27
021 Eating (at home, at a restaurant, at work, etc.)	02:00	01:57
031 Washing and dressing	00:46	00:52
039 Other or unspecified personal care	00:14	00:16

Source: TUS (2014-15).

Secondly, as in Zacharias et. al. (2019), we estimate the required threshold household production hours (THR) using a subsample of households as the reference group.

The reference group was defined as households that live with incomes or consumption expenditures within 75% to 150% of the official poverty line and have at least one non-working adult. We estimate, for households in the reference group, a non-linear model that has the following functional form:

$$THP = a_0\left(A_{18-59} + a_1 C_{0-6} + a_2 C_{7-17} + a_3 E_{60p}\right)^b + e$$

In the equation above, A_{18-59} is the number of adults between 18-59 years of age, C_{0-6}, and $C_{7-17}$is the number of children between 0-6 and 7-17 years of age respectively, and E_{60p} is the number of people 60 years or older living in the household. In this framework, a_0 is the scale shift parameter that will indicate the number of hours required by a household with only 1 adult, $a_1$to a_3 represent the relative additional hours of household production with respect to an adult, and b is the parameter for the economies of scale. We assume that the thresholds calculated using the parameters of the estimated equation apply to all households. We estimated the threshold hours both for the baseline case as well as for the policy simulation scenario. However, we apply the latter thresholds only to those households that receive the new ECEC services.

Estimating the Impact of Expansion of Early Childhood Education on Time Allocation

In order to estimate the potential impact of the policy interventions on individuals' time use decisions, we use a tobit model based on TUS (2014-15) database. The estimation method we use provides consistent results for truncated data with a lower censoring limit determined as zero. The model is estimated separately for subgroups of beneficiaries: we ran separate models for girls, boys, women, and men.

We controlled for several demographic and household compositional factors in order to obtain the isolated impact of the policy intervention variable on time allocation. Conditioned on differences in demographic factors as age, education level, and marital status, we estimate time spent on household production including controls for employment status, employment type, households' employment composition, proxies for household bargaining structure (including relative age between husband and wife, and relative education), the household composition including (share of elderly adults, number of small kids, the share of kids by age group and whether they are enrolled in school or not), overall household income, as well as the employment and health status of the mother. The results of the Tobit regressions are reported in Table C-2. Access to full-time ECEC services (5 days/week and 8 hours/day) is negatively related to the hours of household production of individuals, with the exception of boys.

Table C-2 Impact of ECEC Enrollment on Weekly Hours of Household Production

VARIABLES	Women >17 years	Men >17 years	Boys 15-17 years	Girls 15-17 years
Base Ages 15/17				
Ages 25/34	-0.853	-2.324		
	(1.481)	(2.212)		
35/44	-3.008	-1.896		
	(1.870)	(2.308)		
45/54	-16.04***	-2.153		
	(2.738)	(2.776)		
55/64	-21.30***	-3.394		
	(2.748)	(3.036)		
65 and over	-34.00***	-5.962*		
	(3.229)	(3.244)		

Base non- employed				
2 (Full-time employed)	-9.958**	-1.640	-0.405	-107.2***
	(4.629)	(1.308)	(8.732)	(1.584)
3 (Part-time employed)	-5.210	4.988*	-7.264	-22.47***
	(4.186)	(2.565)	(8.727)	(1.072)
If student (=1)	-4.982***	-1.850*	-1.060	-7.576***
	(1.419)	(1.066)	(8.387)	(0.750)
Base primary school				
No school	-0.381	-0.0154	-2.415	6.145***
	(1.250)	(1.442)	(13.68)	(0.802)
Middle school	-0.772	1.844*	-1.613	-3.507***
	(1.250)	(1.056)	(5.119)	(0.783)
High school and over	0.868	3.251***	4.475	-12.93***
	(1.370)	(0.872)	(9.182)	(0.594)
Relative age (Own age relative to husband; base: husband's age is higher)				
2. Equal to husband's age	0.929	10.17		
	(0.922)	(6.314)		
3. Older than husband	2.294	10.38		
	(2.396)	(6.511)		
No head or spouse	1.301	7.825		
	(2.375)	(6.661)		
No head or spouse living in a hh with equal relative age	-7.906*	-7.158		
	(4.234)	(8.260)		
No head or spouse living in a hh wife is older than husband relative age	-9.999***	-11.66		
	(3.556)	(7.209)		
Single adult households	-7.057*	27.80***	-29.64**	-2.959***
	(3.963)	(2.942)	(14.18)	(0.652)
Relative education (Own education relative to husband; base: husband's education is higher)				
2. Equal education	0.0853	1.714**	0.487	0.382
	(1.115)	(0.807)	(4.336)	(0.681)
3.Wife is more educated	0.168	1.891*	0.147	4.445***
	(1.286)	(1.087)	(4.464)	(0.689)
No head or spouse living in a hh with equal education	2.098	1.521		
	(2.410)	(2.121)		
No head or spouse living in a hh where wife is more educated	0.246	-0.892		
	(2.472)	(2.349)		
Log (#adults +1)	-5.349*	-4.148	25.63*	1.164***
	(3.096)	(3.381)	(15.10)	(0.439)
=1 if there is an extended family adult in HH	-0.528	1.929	-3.997	-6.206***
	(2.220)	(1.573)	(4.999)	(0.747)
Share of small children age 0/5 years	0.791	2.680	14.79	-3.981*
	(3.031)	(3.572)	(28.20)	(2.034)
Share of children at school age 6/14 years	2.186	5.024**	-13.30	1.808
	(2.379)	(2.388)	(14.47)	(2.505)
Share of children 10/17 ages not in school	-0.899	-4.465	-1.903	2.874***
	(2.652)	(2.834)	(14.96)	(0.965)

Share of adults ages 70 and over	5.446	1.381	3.715	-11.00***
	(5.008)	(4.267)	(22.23)	(2.078)
Log (1+ adult number)	-9.185	-8.454	-30.10	-5.253***
	(6.625)	(5.673)	(18.93)	(0.690)
Share of employed adult	5.506**	1.451	6.506	-3.517**
	(2.357)	(2.575)	(10.86)	(1.380)
If agricultural worker (=1)	5.675*	5.112***	10.09	18.78***
	(3.369)	(1.557)	(13.92)	(3.878)
If wage worker (=1)	-2.928	2.856**	-14.80	85.44***
	(3.563)	(1.204)	(10.61)	(1.584)
If unpaid family worker (=1)	-4.061	1.728	-9.270	3.973
	(3.775)	(2.531)	(11.68)	(3.564)
Base never married				48.44***
				(1.425)
	20.99***	7.665***		
2. Married	(2.398)	(2.340)		
	16.16***	11.98**		
3. Divorced/widowed	(2.990)	(5.161)		
Base household income group 0 – 1080				
2- 1081 - 1550	-0.685	0.0533	-2.676	12.04***
	(1.113)	(1.114)	(4.813)	(0.787)
3 1551 - 2170	-0.914	-2.460**	-8.244	5.932***
	(1.330)	(1.163)	(6.390)	(0.517)
4 2171 - 3180	-1.039	-0.185	2.889	2.943***
	(1.230)	(1.204)	(7.313)	(0.505)
5 3181 +	0.854	-0.453	-2.470	6.740***
	(1.555)	(1.382)	(7.272)	(0.694)
Number of kids ages 0/5 years	5.079***	1.847	-3.400	5.868***
	(1.194)	(1.332)	(3.223)	(0.492)
Employed without full-time ECEC services	-13.90***	-11.04***		
	(3.661)	(1.557)		
Non-employed with full-time ECEC services	-2.616	1.111	6.599	-2.306***
	(4.794)	(5.179)	(14.52)	(0.699)
Employed with full-time ECEC services	-19.09***	-8.503***		
	(4.144)	(2.061)		
=1 if Mother is employed	2.754	0.835	9.080	3.833***
	(1.794)	(1.371)	(7.067)	(0.766)
=1 if Mother is healthy	-0.110	1.964**	5.958	-3.538***
	(1.035)	(0.845)	(4.224)	(0.766)
Constant	46.28***	6.567	-13.61	24.12***
	(9.643)	(9.883)	(32.36)	(0.863)
Sigma	16.85***	12.30***	17.97***	12.05***
	(0.281)	(0.541)	(2.806)	(0.0144)
Observations	2,660	2,389	149	149
Uncensored Obs.#	2,624	1,887	86	140

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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