Investing in Care for Jobs Generation and Gender Equality: A Policy Simulation for Jordan
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This paper explores the economic returns to increased public expenditures on expansion of early childhood education and care (ECEC) services in Jordan in terms of generation of new jobs and labor earnings, and the distributional impact on employment and income by gender, education, age, marital and labor market status and household income. We assess the coverage gap in ECEC services in Jordan by comprehensive target enrolment rates for children age 0-5 years old and estimate the required increase in public expenditures to eliminate this gap. We then estimate the number of jobs to be generated as a result of increased public spending of this required magnitude on an ECEC expansion, both directly in the ECEC services sector and indirectly in other sectors from which ECEC purchases inputs using input-output analysis. We compare the results to the alternative scenario where expenditures of similar magnitude are directed to physical infrastructure and the construction sector instead. Finally, using a microsimulation model, we allocate the new jobs under the alternative spending scenarios to the various unemployed and labor market inactive individuals observed in household data, based on their employment propensities determined by observed characteristics such as gender, age, education, marital status and household income. The simulation estimates the earnings of the new job recipients, the change in their household income and the consequent impact on income distribution.

Our findings indicate that the ECEC coverage gap is close to 800 thousand children under age 6 with policy targets set at 50 percent for children under 3 and 100 percent for children 3-5 years old. The amount of spending required to eliminate this gap under a scenario of decent work conditions and high service quality in the childcare sector stands at 4.36 percent of GDP. Allocating public spending on ECEC services expansion promises to generate almost four times more jobs (218 thousand direct and indirect jobs) and three times more wage earnings (81 million JOD) than if the same magnitude of spending were directed at construction projects (59 thousand jobs and 27 million wage earnings). It also creates more jobs for women; 59 percent of the jobs generated through ECEC spending go to women vs. only 5 percent of the jobs generated through construction. ECEC spending also exhibits better outcomes of improving income equality by gender and socioeconomic status than construction spending. Monthly mean earnings improve by 18, 11 and 27 percent for employed women with no schooling, basic schooling and post-secondary education respectively.

I. Introduction

According to ILO labor statistics, Jordan's employment rate (for the 15+ population) ranks at the very bottom amongst 189 countries at 32.8 percent as of 2020. This is almost 8 p.p. below the MENA average (40.4%) and 22 p.p. below the world average (54.9%). A major factor at play is its record low female employment rate at 11.1 percent which is almost 5 p.p. below the already low MENA average (15.8%) and with a substantial gap from the world average (44.8%). There is also a substantial gap between the Jordanian male employment rate (54.1%) and the MENA average (67.3%) and the world average (70.4%). Hence both male and female employment rates are very low by global standards, yet more so for women's employment rate. This is indicative of significant labor under-utilization and gender discrimination. Jordan's employment rates have declined in 2020 under the pandemic similar to the MENA region and globally.

Limited access to care services, particularly childcare, is a major impediment in women's access to jobs in Jordan as in many other places (UN Women Jordan 2020). The enrollment rate of children in nurseries and preschools is low, at 16 and 68 percent for ages 4 and 5. Access to services for children under age 3 is negligible such that there are no official statistics for this age group. The constraints on women's labor supply combine with weak labor demand and a slack labor market to further enhance women's conventional responsibility for unpaid work (NSPS 2019).

Both the Jordanian National Employment Strategy (NES) 2011-2020 and the National Social Protection Strategy (NSPS) 2019-2025 identify job creation along with the narrowing of currently large gender gaps in employment and income, as priority policy objectives. The NSPS is based on three pillars: access to jobs for families to be economically self-sufficient through the labor market; access to services in education (including early childhood education and care), health care, and social services; and targeted social assistance to poor households to maintain a basic level of consumption (NSPS 2019). The restrictions posed by the nexus of women's limited access to services and jobs have an implication for the third pillar: In the absence of jobs and services, the only strategy that remains for enhancing women's welfare is social transfers.

This paper aims to explore the feasibility of an alternative policy strategy for job creation and women's empowerment in Jordan: Investing in care services, which promises to simultaneously generate employment opportunities for all, while improving women's access to jobs and services. A series of research studies emerging since the 2010s approach the issue of care services expansion and its implications for women's employment in the context of allocation of fiscal spending.[1] They compare the economic returns to public investments in the social care infrastructure versus in physical infrastructure in terms of the magnitude of new employment generation, narrowing of the gender gaps in employment, generation of new labor earnings, and poverty alleviation. To this end, they undertake an assessment of care coverage gaps in a different sub-sectors of care services (namely early childhood education and care, primary and secondary education, health and long-term care services), estimate the magnitude of the costs (required

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[1] See for example Antonopoulos et.al. 2010 on the U.S.; Ilkkaracan et.al. 2015 and Kim et.al. 2019 on Turkey, de Henau et.al. 2016 and 2017 on select developed and developing economies respectively, Ilkkaracan and Kim 2019 on 45 high- and middle-income countries, Zacharias et.al. 2019 on Ghana and Tanzania; see also Ilkkaracan 2021, A Guide to Investing in the Care Economy, UN Women – ILO for a comprehensive list of these studies.

expenditures) to eliminate these coverage gaps and estimate the afore-mentioned economic returns to increased public expenditures on care services expansion in comparison to returns to expenditures of equal magnitude on other sectors such as physical infrastructure and construction (UN Women-ILO 2021).

The findings of these studies converge on two points:

1. Public spending on expansion of care services produces a substantially higher jobs generation effect than spending on other sectors such as the construction and physical infrastructure which is a common target of public investments and fiscal stimulus packages. This outcome derives from the labor intensity and higher employment multiplier of the care services sector. Hence an expansion of care services does not only benefit workers with care responsibilities by alleviating the constraints on their labor supply, but it also facilitates the reduction of unemployment and increase of labor force participation by contributing to the creation of labor demand and earnings for both women and men.
2. The labor demand emerging from care spending favors women workers, given the gender composition of employment in the care services sector, hence also contributing to a narrowing of the gender employment and earnings gap, unlike for example spending on construction (an extremely male-dominated sector in most countries) which further widens the gender gaps.

This study on the expansion of institutional childcare services in Jordan is inspired by these earlier studies. It approaches the issue of expansion of childcare services and its implications for improving women's employment in Jordan from a macroeconomic perspective, situating its analysis within the context of public expenditures and fiscal policy in Jordan. To this end, we first assess the care coverage gap in early childhood education and care (ECEC) services in Jordan and estimate the required increase in public expenditures to eliminate this gap. We then estimate the economic returns to increased public spending on an ECEC expansion in terms of jobs generation, both directly in the ECEC services sector and indirectly in other sectors from which ECEC purchases inputs. We compare the number of jobs generated through ECEC spending to the number of jobs likely to be generated if expenditures of similar magnitude were to have been directed to physical infrastructure and construction instead. Finally, using a microsimulation model, we allocate the new jobs generated through increased public spending on alternative sectors (under the two scenarios of ECEC expansion vs. a construction boom) to the various unemployed and labor market inactive individuals observed in household data, based on their employment propensities and hence show how the jobs are likely to be distributed by observed characteristics such as gender, age, education, marital status, household income, and labor market status. The simulation estimates the earnings of the new job recipients, the change in their household income, and the consequent impact on poverty alleviation.

The Jordanian context provides an appropriate background for the undertaking of the policy simulation as described above. Women's employment (labor force participation) rate in Jordan is one of the lowest globally. Various analyses point to the lack of access to care services and the consequent restrictions on women's labor supply as one of the contributing factors. In addition, high unemployment, the limited capacity of economic growth to generate jobs, and hence lack of access to decent jobs and demand for women's labor is another significant impediment to improving female employment levels. In line with these assessments the Jordanian five-year reform matrix identifies growth and jobs as the main objective, and improving women's economic opportunities through childcare as one of the reform pillars. Yet the

framework for action is limited to improving the regulatory framework for licensing of childcare centers rather than public investments (MoP 2019).

The recent context of the Covid-19 pandemic has further exacerbated these bottlenecks. A study by UN Women (2020) using Jordanian time-use data from a private survey finds that the increased demand for care within the household under the pandemic conditions has most likely triggered a significant time-squeeze for women in employment by further augmenting their unpaid workload. In addition, for women employed in the health and education sectors, which compromises 56.1 percent of female employment in Jordan, the study estimates their paid workload to have increased due to higher demand for health care under the pandemic conditions plus the transformations in modalities of service provisioning in the education sector. The dual increase in paid and unpaid workloads of women may further weaken their attachment to the labor market (UN Women 2020).

The economic crisis triggered by the pandemic has also increased pressures on labor demand. Comparing the 2nd quarter of to the annual averages for 2019, the unemployment rate increased by 3.8 percentage points (from 16.8 to 20.4 percent) and the employment rate decreased by 2.2 percentage points (from an already low level of 32.6 to 30.4 percent in 2019). The increase in men's unemployment rate is 3.4 p.p. (from 15.5 to 18.9 percent) and the decrease in men's employment rate is -3.2 p.p. (from 51.7 to 48.5 percent). Women's unemployment rates are substantially higher than men's, but they experience a slightly lower unemployment increase during the pandemic (3.2 p.p. increase from 24.2 to 27.4 percent). Comparing women's employment rate in the 2nd quarter of 2021 to the 2019 average, it remains stable at 10.2 percent.[2]

The policy of allocating increased resources to ECCE services promises to address these problems both on the supply and the demand sides, by alleviating the constraints on women's time and labor supply, and by creating ample labor demand for both women and men workers.

The rest of this paper is structured as follows: Section II explains the methodology and data. Sections III presents the findings of the assessment of the care coverage gap in ECCE services and the associated costs (required spending for ECCE expansion). Section IV presents the estimates on direct, indirect (and induced) employment creation through increased spending on the ECEC services sector versus the construction sector. Section V presents the findings of the microsimulation on the distribution of new jobs by gender, age, education, marital and labor market status and household income, the consequent wage earnings, change in household income, and impact on poverty. Section VI concludes with a summary of the findings and their policy implications.

II. Data and Methodology

There are multiple sources of data used at different stages of the analysis. For assessing the care coverage gap, we use the population and ECEC enrolment statistics disaggregated by age from the Jordanian Department of Statistics (DoS). For the costing of the care coverage gap, we used two sources of data. A comprehensive field survey of childcare centers in Jordan was conducted by the World Bank in 2020 with

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[2] UN Women (2020) predicts a relatively less employment decline for women due to their higher representation in sectors such as health and education relatively less affected by the pandemic shut down measures.

the objective of assessing the capacity of ECEC centers, the conditions of supply, and the quality of services. The World Bank Nurseries Survey (WBNS) survey covered nurseries operational under the Ministry of Social Development in three categories: public school nurseries (located in public primary schools), private nurseries, and institutional (workplace-based) nurseries. Private nurseries constitute the most developed and largest group. The survey had the participation of 188 private nurseries out of a total of 510 registered with the MoSD as of January 2021.[3] This is the data that was utilized in our assessment of childcare costs and expenditure structure of ECEC centers. The survey comprises five sub-sections: Service provider's background; accessibility and enrollment of children; pricing and costing information of the centers; the number and the categories of the employed staff in the centers; and lastly the daily routine and activities in the centers. The survey included also several questions to capture the impact of the Covid-19 on the supply of childcare services. Each childcare center was interviewed two times by the childcare provider representative.

Another important source was a number of childcare costing exercises undertaken by the women's organization Sadaqa. The Sadaqa costing scenarios were initially developed in 2016-2017 (Shomali 2016; Qudah 2017), with recent updates in 2020-2021 (personal communication and consultations with Sadaqa). These scenarios profile the cost structure of a typical nursery at different operational scales (ranging from 26 to 78 children capacity per center) and in different regions (Amman, Irbid, Aqaba).

Once the ECEC services coverage gap and the necessary expenditures to eliminate the gap are assessed, we move on to an estimation of the likely returns to such an increase in expenditures through demand-side channels. A primary demand-side outcome of increasing public expenditures on a particular sector is employment creation through an increase in labor demand. The total impact on employment creation as a consequence of the initial investment (increase in expenditures on a particular sector such as ECEC services) is composed of three effects: The direct effect corresponds to the jobs that are immediately created in the sector where the investment is made. The indirect effect captures the employment generated as a result of the increase of all the inputs that are produced and sold to the target sector as intermediate inputs. For example, if there is an investment in the accommodation and food services sector, there will be an increase in the use of agriculture inputs, which will then lead to an increase in the use of electricity and so on. The indirect effect on jobs adds all of the jobs that are created in other sectors of the economy (other than the sector which the increased public spending targets) as a consequence of these chained effects. Finally, the induced effect estimates the impact that the increase in wage incomes will have on employment. It entails all the jobs that are created due to an increase in production that accommodates the expansion of household spending following the increase in household income.

Estimation of direct employment creation in the ECEC sector is straightforward, it is undertaken on the basis of the care coverage gaps (number of new children to be enrolled) and child-to-staff ratios. The ratios come from Jordanian legislation for the caregivers, and for other staff, we formulate suggested ratios on the basis of currently observed ratios obtained from the WBNS and consultations with Sadaqa.

Estimation of employment creation through indirect and induced effects in the ECEC sector is undertaken through input-output analysis using the most recent input-output (IO) data available for Jordan from 2016.

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[3] There were also 58 public school nurseries and 15 institutional nurseries participating in the survey.

The input-output matrix provides a detailed description of the economy, with all of its intersectoral transactions, which enables the estimation of the impact of one unit increase in the output of a particular sector on the output of other sectors. In order to assess the implications for sectoral employment, we use employment multipliers which are calculated on the basis of sectoral output in the IO data and corresponding sectoral employment data from the household labor force surveys (called the Employment and Unemployment Survey EUS by Jordanian DoS).   Since the sectoral breakdown of employment is not available for 2016 in absolute numbers (and the percentage distribution yields inconsistencies due to rounding up errors), we used employment data from the 2017 EUS disaggregated by gender and by economic activity to estimate the employment multipliers in the 2016 IO table and assess the total impact of investing in care on employment. Appendix I entails a detailed description of the data and the application of the IO methodology.

One caveat here is that the ECEC sector does not exist as a stand-alone sector in most IO Tables, including Jordan's IO data. Activities of nurseries and kindergartens are usually merged under the education sector and/or health and social services. Trying to estimate the impact of an increase in ECEC expenditures on the output and employment of other sectors by making an injection into the education and/or health and social services sectors results in what is called an aggregation bias (see Ilkkaracan, Kim, and Kaya 2015, Appendix II for a detailed discussion). One way of avoiding such an aggregation bias and making a more accurate estimation on the basis of the cost structure unique to the ECEC sector (or any other sub-sector that does not stand alone in the IO table) is to build a so-called 'synthetic sector'. This enables the integration of the ECEC sector into the IO Table as a stand-alone sector.

In our analysis, we use such an approach to building the ECEC services sector into the Jordanian IO Table 2016 using the expenditures structure of ECEC sectors obtained from the WBNS. The IO Table is built from the use table and the supply table which shows the use of commodities and services by industries and the final use and the production of commodities and services by industries respectively. The use and supply tables allow us to estimate the import, tax, retail, and transportation margins of all the commodities produced, as necessary inputs into the building of a synthetic sector. Details of the synthetic sector method are also presented in Appendix I. Consequently, we are able to estimate the number of jobs to be created in sectors other than ECEC from which the sector purchases its inputs (such as food and non-durable consumer items manufacturing, transport, financial services, etc.). This will enable an estimate of the total employment creation impact.

We use the IO analysis also to estimate employment creation through increased spending on the construction sector as a comparison. Public investment in physical infrastructure and construction projects is a major item of public expenditures. Particularly in fiscal stimulus packages, spending on construction projects constitutes a common sectoral choice. Using such a comparative framework, we compare the relative outcomes of alternative choices of public spending in terms of jobs and earnings generation and the consequent implications for policy objectives of gender equality.

In the final stage, we use microsimulation modeling to distribute the new jobs created in the ECEC or the construction sectors to the various individuals who are not in employment but available for paid work. To this end, we use the Jordanian Labor Market Panel Survey JLMPS for 2016 conducted by the Economics

Research Forum. This was the best accessible micro data set that we could obtain for our purposes.[4] It has good information about the labor market situation in Jordan in 2016, but it has some limitations. While it reports labor income, its capture of other income sources is limited.

Using the JLMPS 2016, we identify our potential pool of employable individuals observed in the microdata. These potential job recipients are those that are not currently working for pay in Jordan, are not retired or in school, and are not physically disabled.[5] Then we estimate their likelihood of employment in the various occupation-industry cells, using the results of a probit regression on the currently employed individuals. The new jobs created in the different sectors (as identified by the IO analysis) are matched to the potential job recipients based on their estimated employment propensity, which in turn is derived from their demographic and household characteristics. Finally, we also estimate the likely earnings and the consequent change in household income of the job recipients to identify the income distributional effects of different scenarios of public spending. The details of the microsimulation method and the JLMPS 2016 dataset are discussed in appendix II.

III. Assessment of Coverage Gaps in Childcare Services and the Cost of Eliminating the Coverage Gaps

In order to assess the coverage gaps in ECEC services and the costing of required expenditures to eliminate the gaps, we follow the criteria set by ILO and UN Women (2020) and ILO (2018).[6] These entail policy targets such as universal coverage for children aged 3 to 5 (or to the mandatory school age) and a 50 percent enrolment rate for the younger children aged 0-2, child-to-staff ratios, and work conditions in the ECEC sector (jobs with social security coverage and decent wages) as preconditions for high-quality services and decent employment.

- **Assessment of Care Coverage Gaps in ECEC**

The care deficit in ECEC services is assessed in terms of enrollment of children aged 0-5 including non-Jordanians, in nurseries and kindergartens. Table 1 shows current enrollment in nurseries, KG 1 and KG 2 versus desired enrollment by each age group to meet the policy targets mentioned above; namely 50 percent of children under 3, and universal coverage for children 3-5 (under the mandatory school age of 6 years old). The difference constitutes the care coverage gap. Accordingly, 346,921 children aged 0-2; 445.690 children aged 3-5, a total of 792,611 children need to enroll in ECEC centers for Jordan to meet the policy targets. This corresponds to 59.5% of the total child population under age 6 as of 2020.

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[4] The ideal dataset to use for the microsimulation would have been the Household Income and Expenditures Survey (HIES) 2017-2018 buy the Department of Statistics, however, the microdata is not accessible to researchers.

[5] The individuals who are identified as employed but with zero earnings are included in the potential employable pool.

[6] These enrollment targets are suggested by ILO (2018) on Care Work and Care Jobs for the Future of Work, based on an interpretation of sustainable development goals (SDGs) on education, gender equality, employment and inclusive growth; and they are further adopted by UN Women and ILO (2020). While they may seem ambitious, given the starting levels of enrollment in Jordan, they should be read as medium-run targets.

Table 1: Coverage Gap in ECEC Services in Jordan, 2020

	a. Population	b. No enrolled[*]	c. Current enrollment rate[*]	d. Target enrollment rate	e. No to be enrolled under target (a x d)	f. Coverage gap (e-b)
Age 0	237,934					
Age 1	239,450	*n.a.*	*n.a.*	50%	363,893	363,893
Age 2	250,402					
Sub-total	727,786					
Age 3	252,336	416	0.2%		252,336	251,920
Age 4	183,046	29,615	16.2%	100%	183,046	154,018
Age 5	170,031	115,574	68.0%		170,031	55,034
Nurseries only		*(31,090)*				
Sub-total	605,413	288,321	29.2%		605,413	460,972
Total	*1,333,199*	*176,695*			*969,306*	*792,611*

Source: Population and KG enrollment figures from Department of Statistics, Nursery enrollment from ???. [*] Number enrolled and current enrollment rate disaggregated for ages 3, 4, and 5 entail official DoS statistics for KG1 and KG2. Nursery enrollment covers ages 0-5 but a breakdown by age group is not available.

- **Costing of Care Coverage Gaps**

The estimation of the total cost of closing the childcare services coverage gap depends on a range of references for per child operational costs of ECEC centers as presented in Table 3. At a minimum, it can be estimated using the childcare subsidy offered by the Social Security Cooperation (SSC) to employed parents for six months as part of a recent pilot initiative, which is 60 JD/month for the lowest wage income earners. On an annual basis, this amounted to 571 million JD for the gap of 792,611 children, corresponding to 1.8% of Jordanian GDP for 2020 (Table 3, column b.i).

Another set of references came from the World Bank Survey of nurseries in terms of their average fees and costs. One of the important caveats here was that the survey was conducted under pandemic conditions, under-utilizing their capacity, and hence with altered and more fragile financial conditions. We took advantage of a question in the survey inquiring with the centers about the share of costs recovered by revenues. The centers which reported that their revenues covered at least 60 percent or more of their costs constituted around 32.4% of the total sample (61 observations out of a total of 181), entailing centers generally with higher enrollment levels. Based on the WBS, the average fees for nurseries is 84 JD/month for the entire sample, and 87 JD/month for centers that report to cover at least 60 percent of their costs through revenues. The total annual cost on the basis of fees was 798 to 827 million JD, approximately 2.5 to 2.6 percent of GDP (Table 3, column b.ii).

On the basis of the WBS, the monthly expenditures (cost) of an ECEC center per child is 179 JD/month for the entire sample, and 120 JD/month for centers that report to cover at least 60 percent of their costs through revenues. This amounted to 1.7 billion JD annually at 5.4% of GDP and 1.1 billion JD annually at 3.6% of GDP (Table 3, column b.iii). The higher cost on the basis of the full sample entails the caveat that at the time of the conduct of the survey (at the end of 2020), many centers operated under full capacity due to the

pandemic, hence leading to an overestimation bias, particularly in fixed costs such as rent per child or management costs per child. Moreover, both the cost and fee estimates prevailing from the survey reflect the current employment conditions (formal vs. informal, part-time vs. full-time) and wage levels in the ECEC sector which are relatively poor, with informal employment and low wages.

In order to arrive at a costing that reflects a more accurate per child cost under conditions of close to full-capacity utilization plus improved working conditions for the employees in the ECEC sector as well as improved service quality, we used a method based on a disaggregation of the costs by different components (Table 3, column c): Per child labor costs, per child rent costs and per child other operational costs (other than wages and rent, such as utilities, cleaning, stationary, other intermediate goods, etc.). The per-child labor costs were driven on the basis of an expansion scenario entailing an estimate of child-to-caregiver ratios as prescribed in the Jordanian legislation and child-to-other staff ratios based on Sadaqa (2021). This is further explained in the next section on direct employment creation in the ECEC sector.

The improved wage levels were determined on the basis of prevailing wage levels by occupation in official DoS statistics for 2020 and the legal minimum wage on the one hand, and on the other hand, consultations with a number of stakeholders including Sadaqa, SSC, and the UN Women Jordan Country Office. Accordingly, we assumed the following wage rates in our ECEC services expansion scenario: 700 JD/month for managers, 420 JD/month for caregivers (an average for teachers and teacher assistants, slightly lower than the average wage for professionals), 260 JD/month (the legal minimum wage) for service workers, plus social security contributions (14.25%) on the basis of full-time, year-round employment. These wage rates reflect an improvement over current wage levels in the ECEC sector, where no official data is available but consultations with stakeholders indicated that sectoral employment in ECEC services is characterized by low wages, informal and part-time employment and overall the sector suffers from a lack of decent jobs. Yet they are still lower than the average occupational wages in official statistics, which range for the private and public sectors respectively between 292 to 400 JD/month for elementary workers, 524 to 639 JD/month for associate professionals, 702 to 659 JD per month for professionals, 1388 to 1619 JD/month for legislators, senior officials and managers. Even on the basis of such limited wage improvement (but including year around formal employment), the per-child wage cost of 102.6 JD/month ended up constituting 70.8 percent of total operational expenditures (Table 3, column c.i).

The per child rent cost was derived from a costing exercise by Sadaqa (2021) but we further assumed that around one-fifth of the centers (20% of children) would be accommodated in new ECEC centers established rent-free in available public buildings (Table 2, column c.ii). While the Sadaqa assessment of rent for centers was based on particular pilot governorates, it should be noted that there is a wide variation of rent costs across the various governorates. Other operational costs (other than rent and wages) are based on WBS, for a sample of centers that have at least 10 children enrolled at the time of the survey (Table 2, column c.iii). The total per child cost on the basis of these assumptions amounted to 144.9 JD/month per child. (Table 3, column c.iv). Converting this to annual costs per child and multiplying with the total number of children (column a), our estimate of total costs required to close the care coverage gap stood at 1.4 billion JD corresponding to 4.36 percent of GDP (Table 2, column c.iv). While this is a substantial amount, it reflects a close to ideal expansion scenario with improved employment conditions as well as high service quality with well-staffed small-scale ECEC centers. The actual implementation could be spread over time with the children in lower-income households prioritized, towards the long-run target of universal coverage.

Table 2: Costing of Coverage Gap in ECEC Services in Jordan, 2020 prices

	a. No of children to be enrolled	b. Monthly cost per child: based on current conditions[*] (JD)			c. Monthly cost per child: based on improved conditions[**] (JD)			
		i. SSC subsidy	ii. Fees (WBS)	iii. Costs (WBS)	i. Wage costs	ii. Rental costs	iii. Other operational costs	iv.Sum (i + ii + iii)
	792,611	60	84 -87	120 -179	102.6	15.2	27.2	144.9
Total cost (a times b.i, b.ii, b.iii or c.iv, 12 months for annual costs) (JD)		*571 million*	*799-827 million*	*1.141-1.703 million*				*1378 million*
Share of GDP		*1.8%*	*2.5-2.6%*	*3.6–5.4%*				*4.36%*

Notes: [*] SSC Social Security Corporation; WBS World Bank Childcare Centers Survey 2020; [**] Improved conditions entail higher than current wages and formal employment for ECEC workers as described in this section; rental costs come from Sadaqa (2021) plus the assumption that 80 percent of the ECEC centers will be accommodated rent-free in available public space; other operational costs reflect average operational costs other than wage and rent payments from WBS for centers with at least 10 children enrolled.

IV. Employment Generation Outcomes

- **Direct Employment Creation**

The expansion of ECEC services as per the defined enrollment targets in part 1 has the potential to create a substantial amount of new employment directly in the ECEC sector and indirectly in the other related sectors from which ECEC centers purchase inputs.

Our estimate of direct employment creation derives directly from the target enrolment rates and the number of new children to be enrolled in ECEC sectors as discussed in part 1, the child-to-staff ratios which in turn depend on legislative ratios for caregivers, and the average scale of ECEC centers. We made the following assumptions:
- The average size of nurseries is assumed to be small at 30 children per center, expected to reflect positively upon service quality;

- The child per teacher (caregiver) ratios were based on legislative ratios, which are as follows: age 0-1, 6 children per caregiver, age 1-2, 8 children per caregiver, age 3-5, 10 children per caregiver;[7]
- The management/administrative staff ratio was taken as 1 per center (30 children per management/admin staff), which is higher than the WB survey (18.4 children per management/administrative staff) following the Sadaqa scenario;
- The service staff ratio was taken as 2 per center (15 children per service staff), which is lower than the WB survey (20.5 children per service staff) again following the Sadaqa scenario;

Table 3 shows the new ECEC jobs to be created in these different categories. Accordingly, we estimate that there will be 92,660 new caregivers (teacher and teacher assistant) jobs, 26,420 manager/administrative jobs and 52,481 service staff jobs to be created in the ECEC sector. Adding up we find a total direct employment creation of 172 thousand new ECEC jobs. This corresponds to 12.8% of Jordanian employment and 9.8 percent of total employment including non-Jordanians as of 2020.

Table 3: Direct Employment Creation in the ECEC Sector

	Child-to-staff ratio	Total Staff
Care givers (teachers and teacher assistants)	Per caregiver, 6 children aged 0-1; 8 children aged 1-2, 10 children aged 3-5	92,660
Managers	30 children per manager	26,420
Service Staff	15 children per service worker	52,841
Total Employment		**171,921**

Source: Authors' Calculation based on Jordanian Input-Output Table

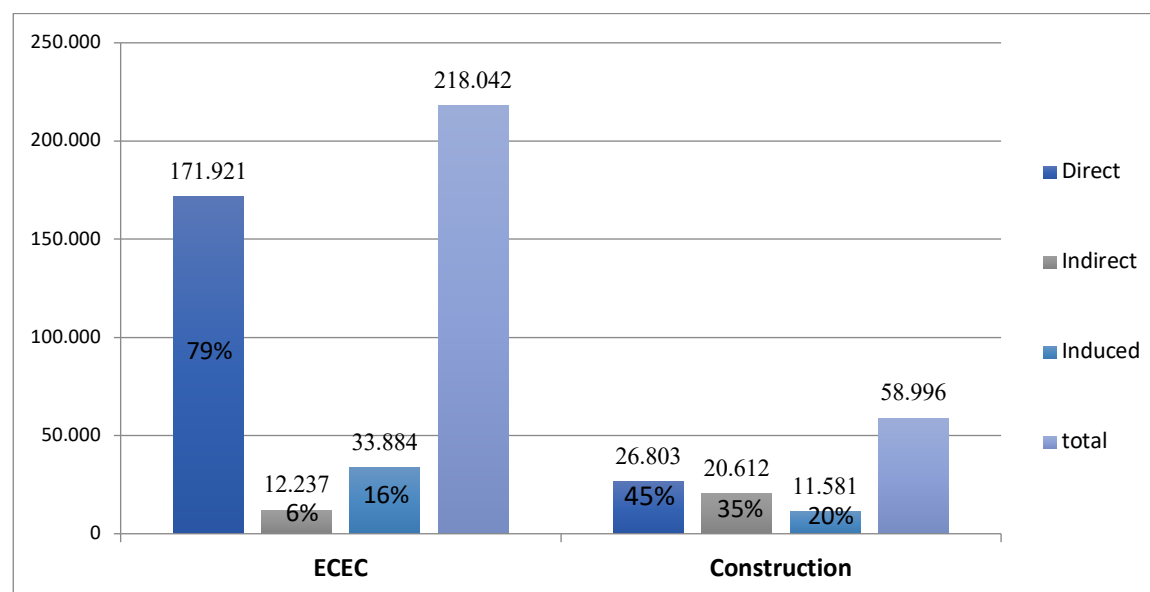- **Indirect and Induced Employment Creation**

The results of the input-output analysis show that increased spending on the ECEC sector has the potential to create a substantial number of new jobs in sectors other than ECEC as well (Figure 7). An increase in public spending on ECEC expansion equivalent to 4.36 percent of GDP is estimated to generate 46 thousand new jobs in other sectors, with 12 thousand jobs resulting from backward linkages (indirect employment) and almost 34 thousand jobs r from increased household spending (induced employment). Total employment creation along with the direct employment created in the ECEC sector (171,921) is 218 thousand jobs. This means the allocation of increased expenditures on the expansion of ECEC services has the potential to expand total employment by as much as 15 percent compared to its observed level in 2016.

Using input-output analysis, we are also able to estimate in a comparative framework, job creation if the same magnitude of spending were to be directed instead of ECEC services to the construction sector, for example on physical infrastructure or construction projects. The total job creation through increased spending on the construction sector is estimated at almost 59 thousand jobs, which is about one-third of the employment creation through ECEC spending. Of this close to half (26,803) is direct employment in the sector itself, while approximately 22 thousand jobs are created through indirect effects and 12 thousand

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[7] In the WBS, the child-to-caregiver ratio based on total enrollment and total employment of caregivers in nurseries is 4.3. We assume this to be a low ratio due to decreased enrollment under the pandemic.

jobs are created through induced effects (Figure 1). This means the allocation of increased expenditures on the construction sector, has the potential to increase total employment by only 4 percent compared to its observed level in 2016.

Figure 1 - Employment creation direct, indirect, and induced: ECEC vs. Construction

Source: Authors' Calculation based on Jordanian Input-Output Table 2012.

Table 4 shows the sectoral distribution of new jobs. In terms of indirect and induced effects, both types of public spending trigger the largest job creation in the manufacturing, wholesale and retail trade, and transportation sectors.

Table 4: The distribution of new jobs by sector: ECEC vs. Construction

	ECEC	CONSTRUCTION
	Total	Total
ECEC (Synthetic Sector)	171,921	0
Agriculture, forestry and fishing	768	644
Mining and quarrying	163	244
Manufacturing	5,059	7,980
Electricity, gas, steam, and air conditioning supply	1,276	281
Water supply, sewerage, waste management and remediation activities	322	99
Construction	3,138	30,064
Wholesale and retail trade; repair of motor vehicles and motorcycles	12,192	7,651
Transportation and storage	3,762	3,551

Accommodation and food service activities	979	408
Information and communication	1,079	546
Financial and insurance activities	1,421	794
Real estate activities	395	165
Professional, scientific and technical activities	1,983	1,597
Administrative and support service activities	2,784	566
Public Administration and Defense, Compulsory Social Security	1,356	1,171
Education	5,288	1,832
Human health and social work activities	1,655	548
Arts, entertainment and recreation	51	4
Other service activities	2,162	751
Activities of extraterritorial organizations and bodies	100	36
Activities of households as employers	187	64
Total	**218,041**	**58,996**

Source: Authors' Calculation based on Jordanian Input-Output Table

V. Distributional Impact of Jobs and Income Generation

The results of the input-output analysis presented in Section IV are at a macro level: They represent estimates of the total number of jobs to be generated in response to an increase in sectoral spending through direct, indirect, and induced effects. The next step, as described in the methodology discussion above, is to estimate the distributional impact of the employment increase obtained from the Input-Output model scenarios. To this end, we employ a microsimulation model using the Jordan Labor Market Survey for 2016 (see Appendix II). The microsimulation serves to answer the following questions: Who among non-employed workers may get the new jobs? i.e. the distribution of new job recipients by gender, marital status, presence of children in the household, age, and education level. What will be the likely earnings of the new job recipients? How will these affect earnings by gender?

Looking first and foremost, at the distribution of new job recipients by gender, we find that 59 percent of the jobs created through ECEC spending (129 thousand jobs) are likely to employ women and the remaining 41 percent (89 thousand) go to men (Figure 2). This seems a rather gender-balanced distribution, favoring women with a relatively small margin. Table 5 shows the sectoral distribution of the jobs created by the sector. Approximately half (44 percent) of the male jobs created through increased ECEC spending derive from indirect or induced effects while the rest is direct job creation in the ECEC sector.

In the case of construction spending, the gender distribution of new employment is very imbalanced: Women's share of new employment is only 5 percent. Despite men having the lion's share of new employment created by construction spending, however, we observe that construction spending still underperforms in terms of the absolute number of male jobs created. Increased ECEC spending is estimated

to result in approximately 89 thousand new employment opportunities for men as opposed to 54 thousand through construction spending of the same magnitude.

This result is due to both the ECEC sector having a larger employment multiplier as well as demonstrating an improved gender balance as the sector expands. If the gender distribution of new employment creation were to be estimated in a static manner on the basis of the current gender distribution of jobs in each sector, women would get 82 percent of total jobs generated through increased ECEC spending. The higher female share would have been driven by the observation that in the current ECEC sector which has a small size, only 2 percent of employment is constituted by men. However, our model shows that the types of employment created by the expansion may not be met solely by women that are not employed. There are indeed men too that fit the profile of the jobs (e.g. in terms of educational attainment) generated in the ECEC sector. Our results show that men may make up 29 percent of the employment in the ECEC sector(see Table 5) as a result of moving towards the policy target of universal access to services.

Figure 2 - Employment creation by gender: ECEC vs. Construction
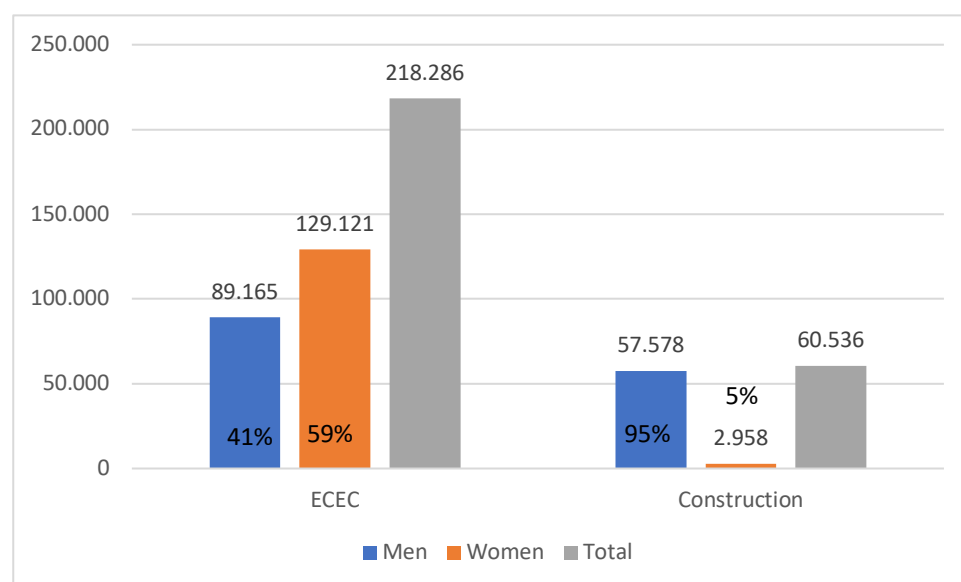
Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Table 5: Distribution of new jobs by gender, direct vs. indirect and induced employment

	ECEC			CONSTRUCTION		
	Men	**Women**	**Total**	**Men**	**Women**	**Total**
ECEC (Direct Employment)	49,702	120731	171,921	---	---	---
Construction (Direct Employment)	---	---	---	29,083	---	30,064
Indirect and induced employment	39,763	8,405	46,120	29,089	2,960	28,932
Total	**89,465**	**129,136**	**218,041**	**58,172**	**2,960**	**58,996**

Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Figure 3 shows the change in gender distribution of total employment under the two scenarios as compared to the baseline (current) status. According to the gender distribution of employment observed in the JLMPS 2016, women's share in total employment in Jordan stands at 14.8 percent. Under the ECEC scenario, this improves by 5.4 percentage points to 20.2 percent. Under the construction scenario, by contrast, there is a slight decline in women's share in total employment to 14.4 percent.

Figure 3: Change in distribution of total employment by gender
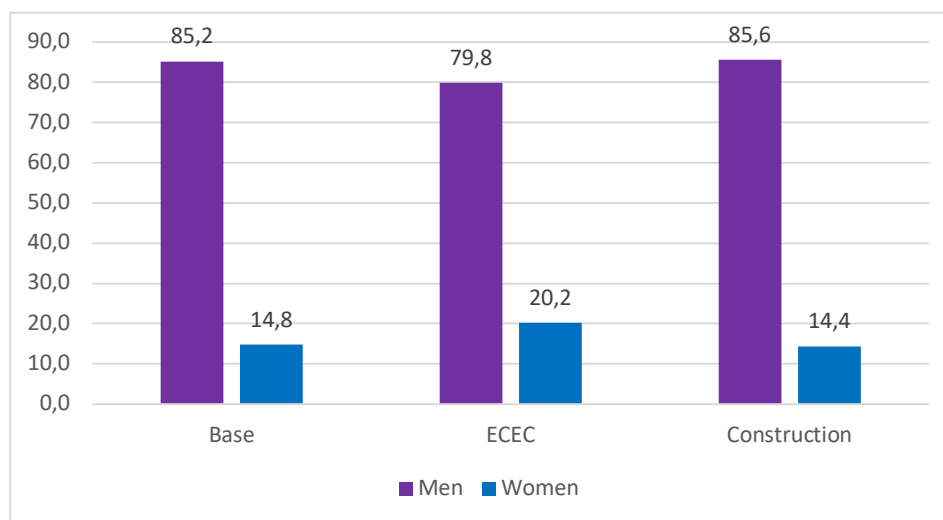
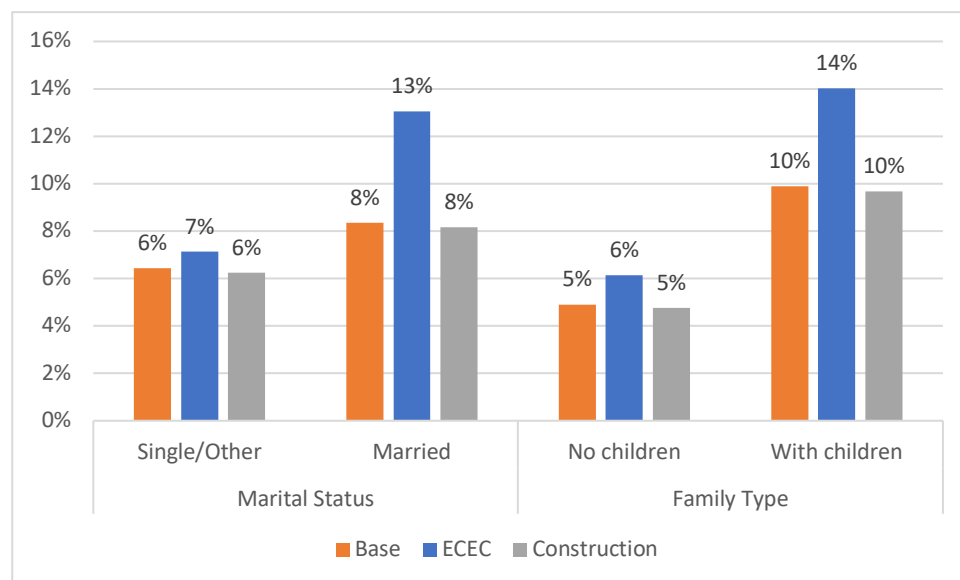*Source: Authors' calculation based on a microsimulation model using the JLMS for 2016*

Figures 4 through 6 show the changes in the distribution of total employment not only by gender but also by other demographic variables such as marital status, presence of children in the household, age and educational attainment under the two simulation scenarios of increased sectoral spending against the baseline. We should note, however, the difference between the change in the share of a particular group in total employment versus the change in the absolute number of employed in that group. While the share of a particular group in total employment may decline under the ECEC or construction scenarios, this need not reflect a decrease in their level of employment. On the contrary, under both scenarios the employment increases for most groups, albeit to a much larger extent under ECEC than in construction. The level of employment by gender and various demographic characteristics under the two simulation scenarios against the baseline are presented in Table 7. The interpretation of changing shares of different groups in total employment (Figures 4 to 6) should be viewed in light of the changes in the level of employment (Table 6).

Married women's share in total employment is improved from 8 to 13 percent (103 thousand jobs), and the share of women living in households with small children improves from 10 to 14 percent (96 thousand jobs) under the ECEC scenario (Figure 4 and Table 6). The increase in the shares of single women and women living in households with no children is relatively smaller from 6 to 7 percent (27 thousand jobs) and 5 to 6 percent (33 thousand jobs) respectively. Note that these results are purely due to ECEC spending creating

employment demand for women. It would be expected that there would be additional positive labor supply-side effects through increasing access to childcare services and the consequent alleviation of time restrictions on women's labor supply. Under the construction scenario, we do not observe a change in women's share in total employment in any of the categories.

Figure 4: Change in women's share of total employment by marital status and presence of small children in the household

Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Looking at the changes in the distribution of total employment by gender and age (Figure 5), we observe that under the ECEC scenario, the primary gains are for women of prime working age. For the 25-34 age group, women's share increases from 6 to 9 percent, and for the 35-54 age group it increases from 7 to 9 percent. Under the construction scenario, women's share in total employment remains the same for all the age groups, despite a small rise in the number of employed in all groups (Table 6). There is a small decrease in men's share for most age groups under the ECEC scenario as compared to the baseline, despite a relatively large rise in the number of employed. By contrast under the construction scenario, men's share in total employment increases for the youngest and oldest age groups (less than 25 and 55 and older). For middle-age groups, men's share in total employment remains the same (25 to 34 age group) or declines by one percentage point (35 to 54 age group). It should also be noted that a dimension of distributional effects is by Jordanian versus non-Jordanian workers. The gains from employment expansion in construction is likely to benefit non-Jordanian men who constitute the majority of workers in this sector, but for most part informally employed without social security coverage.

Figure 5: Change in the distribution of total employment by gender and age group
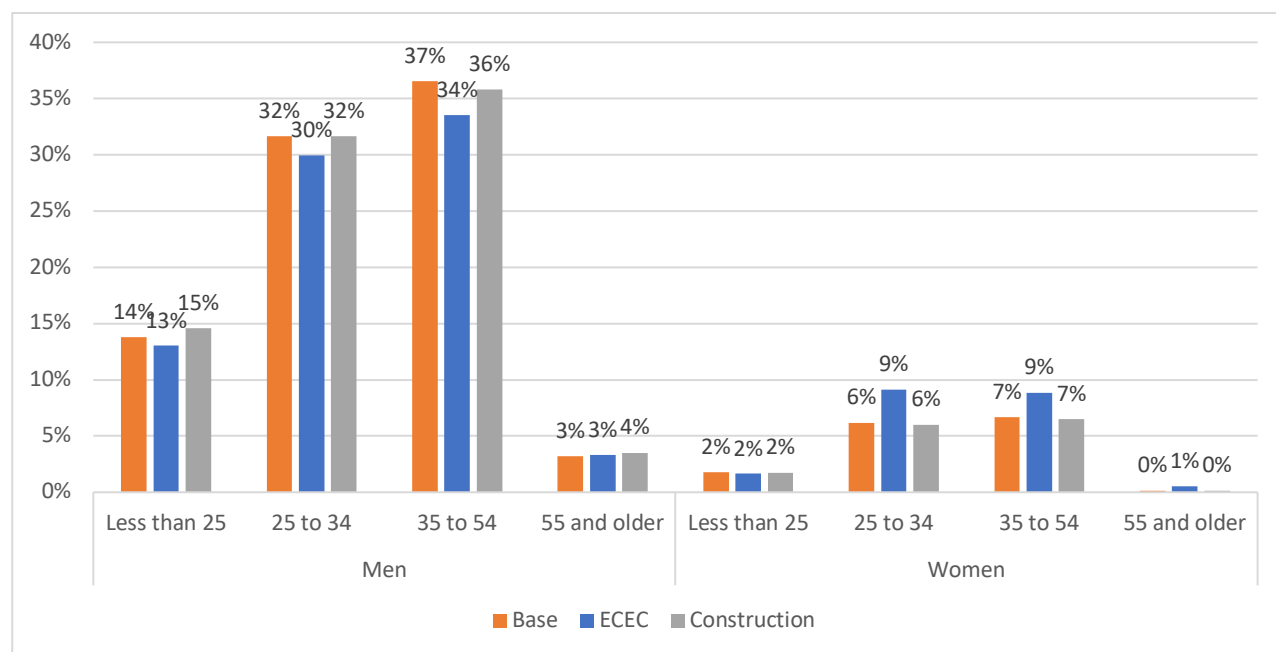
Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

As for changes in the distribution of employment by gender and education level (Figure 6), the largest relative gains under the ECEC scenario, are for women with post-secondary education (from 3 to 5 percent) corresponding to 43 thousand job recipients in this category (Table 6). This is followed by a one percentage point increase in the share of illiterate women (from 0.3 to 0.5 percent, 10 thousand jobs), secondary education (from 2 to 3 percent, 14 thousand jobs), and university education (from 8 to 9 percent, 37 thousand jobs). Under the ECEC scenario, there is a small decline (one percentage point) in men's share for all education groups, except for post-secondary graduate men, whose share remains the same at 7 percent. The construction scenario exerts little impact on the distribution of employment by education level, except for a small increase in the share of men in the "read&write" group, and a small decrease in the share of women with post-secondary education.
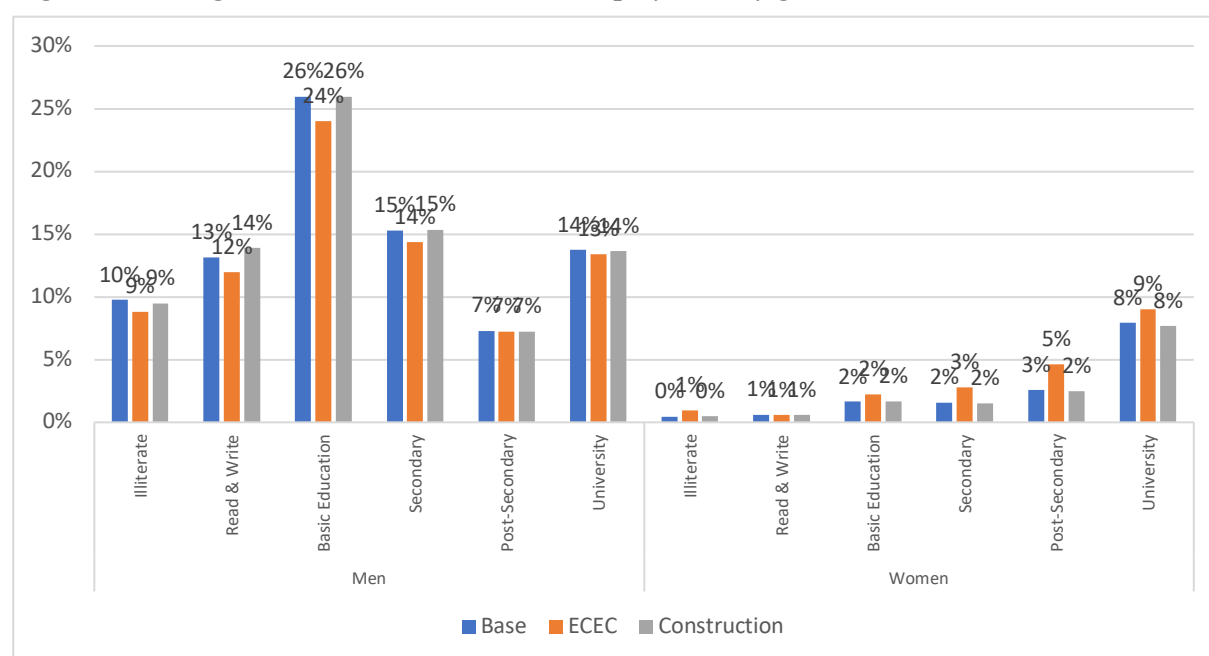
Figure 6: Change in the distribution of total employment by gender and education level

Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Table 6: Change in number of employed by gender and demographic characteristics

	Men			Women		
	Base	**ECEC**	**Construction**	**Base**	**ECEC**	**Construction**
Educational attainment						
Illiterate	154,007	158,648	155,504	7,270	16,979	7,859
Read & Write	207,944	215,497	228,045	9,597	10,508	9,597
Basic Education	410,191	431,177	425,922	26,052	40,123	27,493
Secondary	241,628	258,479	251,713	24,828	49,764	25,002
Post-Secondary	115,256	129,963	118,618	40,571	83,433	40,678
University	216,869	241,296	223,670	125,157	161,789	125,804
Age Groups						
Less than 25	217,680	234,110	239,483	27,995	29,875	28,605
25 to 34	500,078	538,381	518,866	97,420	164,216	98,491
35 to 54	577,371	603,016	587,646	105,648	158,862	106,846
55 and older	50,766	59,552	57,478	2,412	9,644	2,491
Marital Status						
Single/Other	420,865	462,886	448,805	101,666	128,225	102,389
Married	925,030	972,173	954,668	131,809	234,371	134,044
Family Type						
No children	496,758	527,252	513,968	77,464	110,484	77,934
With children	849,137	907,808	889,505	156,011	252,112	158,499
Total	**1,345,895**	**1,435,059**	**1,403,473**	**233,475**	**362,596**	**236,433**

Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Figure 7 shows the distribution of new employment by labor market status in the baseline i.e,. the labor market status of the job recipients prior to being assigned a new job. For the purposes of our simulation, we considered as potential job recipients those that are not currently working for pay, are not retired or in school, and are not physically disabled. We also included those that were employed but did not report any wages in the pool of potential recipients. In Figure 7, we divide the pool into three groups. The unemployed consists of those actively seeking a job and ready to start employment if offered a job. Not being in the labor force entails individuals who are not employed and not seeking a job but without a disability. The majority of the women in this category are full-time homemakers. For men, the reason for being out of the labor force entails various categories, such as discouraged workers (those willing to work at a job but not seeking employment because they believe there are no opportunities in the labor market), students, or retired. The increase in ECEC spending facilitates the entry of 102 thousand women previously not in the labor force (presumably homemakers) into the labor market and yields wage employment for 27 thousand unemployed women. For men, the numbers of new job recipients in these respective categories are 46 thousand and 26 thousand. It is striking that increased allocation to ECEC spending creates more jobs for unemployed men than in the case of construction, where 13 thousand of unemployed men transition into paid jobs.

Figure 7: Distribution of new jobs by gender and prior labor market status
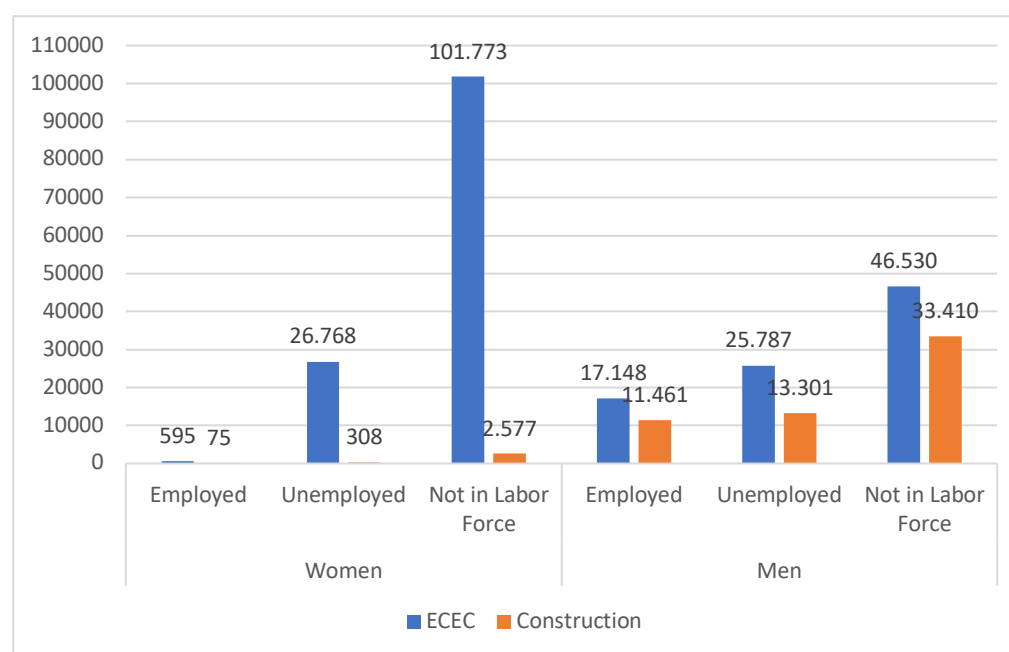
Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Turning to the impact on earnings, Figure 8 shows the percent change in the mean monthly earnings of employed women and men for each education level under the two simulation scenarios as compared to the baseline. The mean earnings of employed women and men show almost no change from the baseline under both the construction and ECEC scenarios. Under ECEC there is a slight improvement in average earnings

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of women workers vs. a decline for men workers. In the case of construction, men benefit from a slight improvement in earnings, and there is no change for women workers. The shift in overall mean female pay under ECEC seems to especially benefit women workers with post-secondary education with a 27 percent increase in average earnings (Figure 8) and their share in total employment went up from 3 to 5% (Figure 6). The increases in mean pay for illiterate women workers and those with basic education are also quite large at 21 and 9 percent respectively (Figure 8), but their share in total employment is quite small in size to have a big effect on median pay for women as a whole; only 1 percent for illiterate women and 2 percent for women with basic education under the ECEC scenario (Figure 6).

Figure8: The change in monthly mean earnings by gender and education: ECEC vs. Construction (against the Baseline)
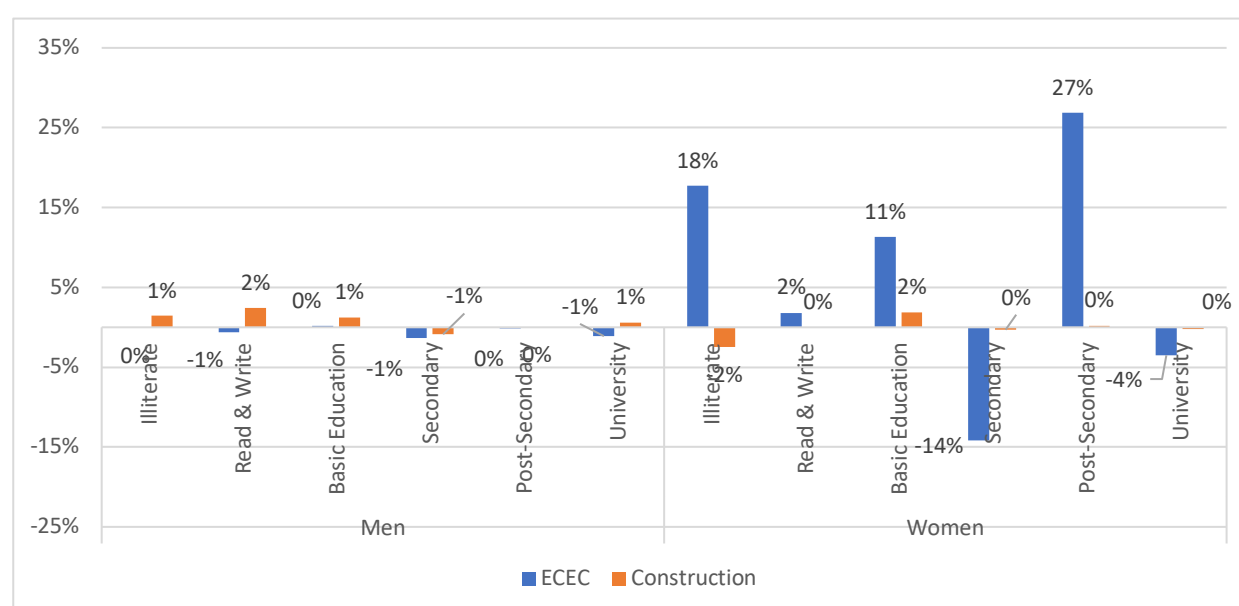
Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

Figure 9 shows the gender earnings gap under the ECEC and construction scenarios as compared to the baseline by education level on the basis of mean earnings. The gender earnings gap improves for most education groups under the ECEC scenario. The gender earnings gap narrows from 88 to 103 percent for illiterate workers; from 74 to 76 percent for workers with the ability to read and write; from 68 to 75 percent for those with basic education; from 83 to 106 percent for post-secondary graduates. For secondary and university graduates, there is a worsening of the gender earnings gap from 95 to 83 percent and 82 to 80 percent respectively. Overall there is a slight improvement in the gender earnings gap from 99 to 100 percent on the basis of mean earnings (from 101 to 106 percent on the basis of median earnings). Under the construction scenario, by contrast, we observe a slight improvement in the gender earnings gap only for the secondary and post-secondary graduates from 95 to 96 percent and 83 to 84 percent respectively. For the other education groups, the earnings gap either worsens (illiterate, read&write) or remains the same (basic education and university). Overall, the gender earnings gap worsens from 99 to 98 percent on the basis of

mean earnings under the construction scenario (remains the same at 101 percent on the basis of median earnings).

Figure 9: The gender earnings gap by education group: Baseline vs. ECEC vs. Construction scenarios (women's earnings as share of men's earnings)
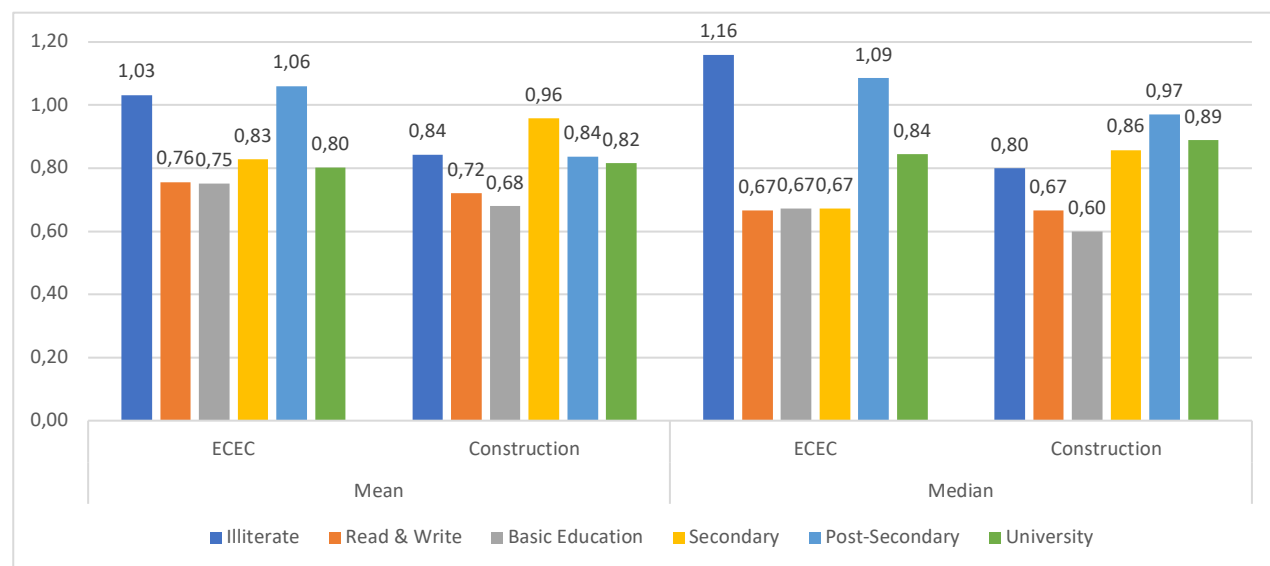
Source: Authors' calculation based on a microsimulation model using the JLMS for 2016

We should note that the impact of the two public spending scenarios on the gender earnings gap alone is a conservative interpretation of the overall positive impact on women's income. The gender gaps shown in Figure 8, represent the mean earnings for those in employment under the baseline versus the two simulation scenarios. Yet as the previous discussion has shown increased ECEC spending has created new earnings for 129,121 women by providing them with new jobs. As such the overall income gains for women as a whole are more substantial than the gender earnings analysis indicates. The total income creation under ECEC for a total of 218,286 new job recipients is approximately 81.1 million JD per month (average earnings under ECEC at 371 JD/month). Of this new income creation, 59.8 percent accrues to women (average earnings under ECEC is 375 JD/month for women vs. 365 JD/month for men). On the other hand, the total income creation under construction for a total of 60,536 new job recipients is 27.0 million JD per month (average earnings under construction at 442 JD/month). Of this, a meager 3.1 percent accrues to women (average earnings under construction at 280 JD/month for women vs. 450 JD/month for men). Hence the increase in public spending of a given magnitude generates a substantially higher amount of labor earnings under ECEC both for women and men while narrowing the gender income gap by a substantial amount.

Table 7: Earnings generation by gender: ECEC vs. Construction

	ECEC	Construction

Average earnings (JD/month)		371	442
women		375	280
men		365	450
Total earnings JD/month		81.1 million	27.0 million
women		48.5 million	0.8 million
men		32.6 million	26.2 million
women's share in total		59.8%	3.1%
women's earnings as a share of men's earnings		148.8%	3.2%

VI. Conclusions

Job creation remains a crucial challenge for the Jordanian economy, with its overall employment rate, and in particular the female employment rate well below the world average. The background assessment in this report has underlined a declining trend in both the male and female employment rates, along with very high levels of youth unemployment. The situation is exacerbated by the influx of refugees since the 2010s as well as the recent context of the economic crisis under the Covid-19 pandemic. Jordan's National Employment Strategy (NES) 2011-2020 states that creating jobs of adequate quantity and quality is a top priority for Jordan (MoP 2010, p.1). While the importance of expanding ECEC services is acknowledged in the NES, its role is foreseen exclusively on the labor supply side through two causal mechanisms: improving human capital and labor productivity by investing in early education, and alleviating the constraints on female labor supply.

This study aimed to explore the labor demand side outcomes of investing in ECEC services in terms of job creation. Following an assessment of the deficit in ECEC services and the costs of eliminating this deficit, we estimated the magnitude of the new job creation in response to increased public expenditures on this sector: i.e. the number of new jobs to be created directly in the ECEC sector and indirectly in the other related sectors through backward linkages and induced effects. The simulation also estimated the distributional outcomes of jobs creation in terms of the characteristics of the potential job recipients and the magnitude of their labor earnings. These employment and income returns to increased public expenditures on a hypothetical expansion of ECEC services were evaluated in a comparative framework, with reference to those that would be expected if a similar magnitude of public expenditures were to be allocated instead to physical infrastructure and construction sector.

It was estimated that achieving a long-run policy objective of universal access to quality ECEC services by all children aged 3-5 and at least 50 percent of children aged 0-2 (including non-Jordanians), requires the enrollment of close to 793 thousand additional children in childcare centers. If such an expansion takes place on the condition of high-quality services and decent jobs in the ECEC sector, the cost is estimated at 1.39 billion JD (2020 prices), equivalent of 4.36 percent of GDP. While this is a substantial amount, an

expansion plan can be implemented over the medium-run prioritizing the disadvantaged households and regions. In addition, the substantial jobs and income creation will enhance its feasibility through increased tax revenues in the short-run, and increased labor force participation and productivity over the longer run.

The simulation findings show that increased expenditures (both provisioning of public services and/or public-private partnerships) of this magnitude towards the objective of improving children's access to ECEC services, has the potential to create 218 thousand new jobs (21.2 percent in sectors other than ECEC); almost 60 percent of the new jobs would employ women. If the same amount of public expenditures is allocated to the construction sector instead, employment creation is limited to 60.5 thousand new jobs; only 5 percent of the jobs would employ women. Under the ECEC expansion scenario, women's share in total employment improves to 20.2 percent as compared to a baseline of 14.8 percent, while under the construction boom scenario, it deteriorates further to 14.4 percent. While in relative terms, job creation through ECEC spending favors women as job recipients, in terms of absolute numbers, it has the potential to create more employment opportunities for men (89 thousand male jobs) than construction pending (57.6 thousand male jobs). Hence a sectoral allocation of public spending towards ECEC services, does not only have the potential to create almost four times more jobs than allocation of spending to the construction sector, but also does so in a gender balanced manner, narrowing the gender gaps in employment.

Exploring jobs distribution in more detail, we find that job creation through ECEC spending tends to favor married women (improving their share in total employment from 8 to 13 percent) and women living in households with small children (improving their share in total employment from 10 to 14 percent). More than 100 thousand women previously excluded from the labor market due to engagement in home-making enter employment, in addition to 27 thousand unemployed women and 26 thousand unemployed men.

The estimation of labor earnings of new job recipients shows that jobs created under the ECEC expansion scenario improve the mean monthly earnings of women with post-secondary education by 27 percent, of those with no schooling and basic education by 18 and 11 percent respectively. The overall gender earnings gap narrows down under the ECEC expansion scenario while it further deteriorates under the construction spending scenario. The substantially higher number of jobs created via ECEC spending has the potential to generate labor earnings at 81.1 million JD per month with almost 60 percent accruing to women job recipients. The labor earnings generated via construction spending of similar magnitude, is estimated at 27 million JD per month, where women's share is at a meagre 3.2 percent.

The Government Economic Priorities Program 2021-2023 identifies three priority sectors towards the objectives of unlocking the potential for increased growth and employment; namely, tourism, information technologies and agriculture. The findings of this study seek to point attention towards another sector with a high potential for decent jobs generating growth: early childhood education care services. Given the labor-intensive nature of ECEC services, the sector entertains a very high employment multiplier such that a given magnitude of public funds has the potential to create substantially higher number of jobs and generate labor earnings than most other sectors. While beyond the scope of this study, it should be noted that increased allocation of public spending towards an ECEC expansion creates further multiplier effects by meeting other important policy objectives: Namely, narrowing of gender gaps in time-use and consequently in access to employment and income not only through creating jobs for women but also relieving their time constraints; narrowing of socioeconomic gaps amongst households through improving disadvantaged

children's access to quality ECEC services; promoting dual earner households with lower risks of poverty; and enhancing human capital and productivity over the long-run through support to children's development in the early stages.

References

Antonopoulos, R., and K. Kim. 2008. *Impact of Employment Guarantee Programmes on Gender Equality and Pro-poor Economic Development*. Policy Brief: Case Study on South Africa. Annandale-on-Hudson, N.Y.: Levy Economics Institute of Bard College. January.

Antonopoulos, R., K. Kim, T. Masterson, and A. Zacharias. 2010. *Why President Obama Should Care About "Care": An Effective and Equitable Investment Strategy for Job Creation.* Public Policy Brief No. 108. Annandale-on-Hudson, N.Y.: Levy Economics Institute of Bard College. February.

Assaad, R. and C. Salemi. 2018. *The Structure of Employment and Job Creation in Jordan 2010-2016.* Economics Research Forum Working Paper no. 1259, Cairo: Economics Research Forum.

De Henau, J., S. Himmelweit and D. Perrons (2017) *Investing in the Care Economy: Simulating Employment Effects by Gender in Countries in Emerging Economies*. Women's Budget Group Report to the International Trade Union Confederation, Brussels, January.

De Henau, J., S. Himmelweit, Z. Lapniewska and D. Perrons (2016). *Investing in the Care Economy: A Gender Analysis of Employment Stimulus in Seven OECD countries*. Women's Budget Group Report to the International Trade Union Confederation, Brussels, March.

Ilkkaracan, I. 2021. A Guide to Investing in the Care Economy: Assessing Care Coverage Gaps, Costs and Returns, New York and Geneva: UN Women and ILO.

Ilkkaracan, I. 2018. *Promoting Women's Empowerment: Recognizing and Investing in the Care Economy*, UN Women Issue Paper, New York: UN Women Economic Policy Unit, 2018.

Ilkkaracan, I. and K. Kim. 2019. *The Employment Generation Impact of Meeting SDG Targets in Early Childhood Care, Education, Health and Long- Term Care in 45 Countries*. Geneva: ILO Geneva, Gender, Equality and Diversity Branch.

Ilkkaracan, I. and K. Kim. 2019. *Investing in Early Childhood Education and Care in the Kyrgyz Republic: An Assessment of Care Deficits, Costs, and Impact on Employment, Gender Equality, and Fiscal Returns*. New York, Paris, and Helsinki: UN Women, Organisation for Economic Co-operation and Development (OECD); National Institute for Health and Welfare (Finland).

Ilkkaracan, I., K. Kim and T. Kaya. 2015. *The Impact of Investments in Social Care Services on Employment, Gender Equality and Poverty: The Case of Turkey*, Istanbul Technical University and the Levy Economics Institute, September 2015, Istanbul and New York.

International Labor Organization (ILO) (2020) World Employment and Social Outlook. Geneva: ILO

International Monetary Fund (IMF). Covid-19 Policy Responses. https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#J, accessed 30 November 2021.

Karak Castle and Friedrich Ebert Stiftung (FES). 2018. *Legal Review of Flexible Work Regulation of 2017*. Amman: Karak Castle and FES.

Kim, K., I. Ilkkaracan, I and T. Kaya. 2019. "Investing in Social Care Infrastructure and Employment Generation: A Distributional Analysis of the Care Economy in Turkey", Journal of Policy Modelling, forthcoming.

Kum, H., & Masterson, T. N. 2010. "Statistical Matching Using Propensity Scores: Theory and Application to the Analysis of the Distribution of Income and Wealth". Journal of Economic and Social Measurement, 35(3), 177–196. https://doi.org/10.3233/JEM-2010-0332

Ministry of Education MoE, *Education System in Jordan*. https://moe.gov.jo/index.php?q=en/node/19404, accessed 1 November 2021.

Ministry of Planning and International Cooperation MoP. 2021. National Economic Priorities Program 2021-2023, Amman, Jordan. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://mop.gov.jo/EBV4.0/Root_Storage/EN/EB_HomePage/final_english_13-9.pdf

_____. 2019. Five-year Reform Matrix *2019-2024*, Amman, Jordan. MoP https://mop.gov.jo/EN/List/Reform_secertariat?View=1088

_____. 2010. *Jordan's National Employment Strategy 2011-2020*, Amman, Jordan.

National Social Protection Strategy of Jordan 2019-2025 (NSPS).

Qudah, Lara. 2017. *Cost Analysis of Setting-up Chain of Daycares in Jordan*. Research Report. Amman: Sadaqa.

Shomali, Yakoub. 2016. *The Value of Daycare Services in the Workplace*. Research Report. Amman: Sadaqa.

Shukri, M., J. DeStefano and K. Merseth. 2018. *Kindergarten in Jordan: Data for Decision-*

Making. CIES 2018 Mexico City.

State University Education Encylopedia https://education.stateuniversity.com/pages/750/Jordan-EDUCATIONAL-SYSTEM-OVERVIEW.html#ixzz6yJzL3NHo

United Nations Development Programme (UNDP). Covid-19 Gender Response Tracker. https://data.undp.org/gendertracker/ accessed 17 November 2021.

UNICEF Jordan. 2020. *Country Report on Out-of-School Children*. Amman: UNICEF Country Office in Jordan.

UN Women. 2021. UN Women Strategic Plan 2022-2025. New York: UN Women.

UN Women Jordan. 2020. *Implications of the Covid-19 Pandemic for Women's Economic Empowerment and Policy Interventions: Contextualizing to the Case of Jordan*. Amman: UN Women Jordan Country Office.

UN Women Jordan. 2019. *Fiscal Policy, Taxation and Gender Equality in Jordan*. Amman: UN Women Jordan Country Office.

UN Women and ILO. 2020. *A Guide to Public Investments in the Care Economy: Policy Support Tool for Estimating Care Deficits, Investment Costs and Economic Returns*. New York: UN Women and Geneva: ILO.

World Bank. https://www.worldbank.org/en/news/press-release/2017/06/19/jordan-embracing-economic-stimulus-and-green-growth-to-reverse-economic-doldrums, accessed 15 November 2021.

World Bank Jordan (WBJ). https://www.worldbank.org/en/news/press-release/2021/06/28/jordan-modest-economic-contraction-but-private-sector-and-equality-suffer, accessed 15 November 2021.

Xihuanet, (http://www.xinhuanet.com/english/2021-03/31/c_139850345.htm)

Zacharias, A., Masterson, T., Rios-Avilla, F., Nikiforos, M., Kim, K., & Khitarishvili, T. 2019. *Macroeconomic and Microeconomic Impacts of Improving Physical and Social Infrastructure: A Macro-Micro Policy Model for Ghana and Tanzania*. Research Project Report. Annandale-on-Hudson, NY: Levy Economics Institute of Bard College.

APPENDIX I: Input-Output Analysis of Jobs Generation under Different Scenarios

The first step to our estimation is to translate the costs reported by care centers surveyed by the World Bank into a cost structure of domestic products at basic prices compatible with the input-output data. To do so, we map each of their reported costs into commodities and services that exist in the input-output table. Next, we exclude the imported content redistribute their transportation and retail margins as well as taxes and subsidies to the corresponding sectors, and assign them to activities following the industry technology assumption[8]. As a result, we have a vector that describes all inputs that are purchased by the ECEC sector from all other sectors of the economy. As can be seen in Table A1, this structure is very different from that of the education sector. Not only the input composition is distinct but the education sector has the participation of profits and higher participation in wages and imports, all of which would lead to an underestimation of the chained effects of an investment in early education if we were to assume that the injection goes into the existing education sector. Our method allows us to more precisely calculate in which sectors jobs are indirectly created as a result of an investment in the ECEC sector. The comparison is presented here to show the advantage of the synthetic sector method when compared to the alternative of simulating impacts on existing input-output sectors.

Table A1.1 Observed composition of inputs of the education sector vs estimated composition of inputs of the synthetic sector as a share of total output.

	Education	ECEC
Agriculture, forestry and fishing	0.02%	0.15%
Mining and quarrying	0.02%	0.05%
Manufacturing	2.70%	2.51%
Electricity, gas, steam, and air conditioning supply	1.07%	4.65%
Water supply, sewerage, waste management, and remediation activities	0.46%	1.38%
Construction	1.15%	9.24%
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.43%	0.60%
Transportation and storage	1.59%	1.48%
Accommodation and food service activities	0.15%	0.12%
Information and communication	0.77%	0.09%
Financial and insurance activities	0.83%	1.54%
Real estate activities	1.56%	0.03%
Professional, scientific and technical activities	0.41%	0.12%
Administrative and support service activities	0.46%	3.44%
Public Administration and Defense, Compulsory Social Security	0.00%	0.00%
Education	0.60%	0.00%

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[8] For details see Miller and Blair (2009) page 193.

Human health and social work activities	0.19%	0.20%
Arts, entertainment and recreation	0.08%	0.06%
Other service activities	0.04%	0.07%
Activities of households as employers	0.00%	0.15%
Activities of extraterritorial organizations and bodies	0.05%	0.08%
Imports	3.36%	2.83%
Taxes on Products	0.52%	0.44%
Subsidies on Products	0.00%	0.00%
Total Use	16.49%	29.23%
Gross value added	83.51%	70.77%
Subsidies on production	0.00%	0.00%
Taxes on production	0.45%	0.00%
Compensation of employees	73.48%	70.77%
Gross operating surplus / mixed income	9.58%	0.00%
Total output	**100%**	**100%**

The resulting vector is ready to be inserted into the input-output matrix. This needs to be done by respecting the symmetry of the table, that is the total output of each sector needs to be the same from the perspective of expenditure (column sum) and consumption (row sum). Ilkkaracan, Kim, and Kaya (2015) propose a method that circumvents the need to calculate how much other industries use the output of the ECEC sector as an input in their production. We follow them and assume that the use of and supply of ECEC equal each other in each industry. For example, the value of electricity used by ECEC as inputs is assumed to be equal to the value of early childhood education services used by the electricity sector as inputs. Ilkkaracan, Kim, and Kaya (2015) normalize the values of inputs purchased by the synthetic sector to a very small total output, which allows for the technical coefficients to be intact. At the same time, the values that need to be assigned to the row, to maintain the balance of table, are miniscule. This method allows us to calculate the backward linkages, direct and indirect effects and induced effects but it does not allow for the calculation of forward linkages, which are not necessary for our purposes.

Next, we follow standard input-output methods to calculate type I and type II output multipliers. Type I multipliers are calculated by taking the Leontief inverse of the technical coefficients matrix, and it allows us to calculate the direct and indirect effects. Type II multipliers are calculated by closing the model with respect to the households, i.e. making households endogenous[9] to the model, as if they are also a producing sector in the economy. Final demand by families and wages are included in the coefficients table and the Leontief inverse is then calculated over the augmented matrix[10].

The total number of jobs that are created as a result of the investment of an extra Jordanian dinar in a

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[9] See Miller and Blair (2009) page 35.
[10] Type I and type II multipliers are presented in Miller and Blair (2009) chapter 6. It is important to notice that while type I multipliers underestimate the impact of a demand shock in a sector since households are absent, type II multipliers might overestimate since it assumes that labor coefficients and the propensity to consume out of wages are rigid.

specific sector is calculated by performing an element-wise multiplication of the vector of labor coefficients, which reports the ratio of employment to the output of each sector, by the sector's column in the augmented Leontief inverse. The result is a vector that tells us the number of jobs created in each industry directly, indirectly, and through the induced effect. Direct plus indirect jobs created are calculated similarly, but by multiplying each element of the labor coefficients vector by each element of the sector's column of the original Leontief inverse matrix. The number of induced jobs by sector can be computed as a residual, by taking the difference between total employment created by sector and the direct and indirect employment by sector. Similarly, by deducting the magnitude of direct employment created by sector from direct and indirect employment by sector we get the total number of indirect jobs created. By summing across sectors, we obtain the total number of direct, indirect, induced, and the total number of jobs created in the economy as a whole by the expansion of the sector.

For the purpose of comparison, we simulated the direct, indirect, and induced effects in each sector of the economy that the same investment would have in the education sector. The results are presented in Table A2. We use official employment data by sector and by gender to calculate how many jobs are created for men and women. We assume that the share of women in each sector is preserved after the investment. As a consequence, when jobs are created in a female intensive sector, the impact for women is larger than for men. As can be seen, if we simulated the impact of the investment in the education sector instead of using the synthetic sector method we would be underestimating the overall impact while overestimating the number of jobs created for men. Furthermore, the synthetic sector method allows us to more precisely estimate in which sectors the jobs were created, which in turn provides us with better results for the microsimulation.

Table A1.2. Distribution of jobs created by 1.378 billion JD (4.36% of Jordan's 2016 GDP) injection on ECEC vs education sectors

	ECEC			EDUCATION		
	Men	Women	Total	Men	Women	Total
ECEC (Synthetic Sector)	2579	169342	171921	0	0	0
Agriculture, forestry and fishing	705	63	768	644	58	702
Mining and quarrying	157	6	163	132	5	137
Manufacturing	4377	682	5059	3813	594	4407
Electricity, gas, steam, and air conditioning supply	1210	66	1276	610	33	643
Water supply, sewerage, waste management and remediation activities	316	6	322	184	3	187
Construction	3087	51	3138	703	11	714
Wholesale and retail trade; repair of motor vehicles and motorcycles	11259	933	12192	10663	883	11546
Transportation and storage	3654	108	3762	2954	87	3041
Accommodation and food service activities	937	42	979	892	40	932

Information and communication	797	282	1079	892	315	1207
Financial and insurance activities	978	443	1421	825	374	1199
Real estate activities	351	44	395	379	48	427
Professional, scientific and technical activities	1566	417	1983	1771	471	2242
Administrative and support service activities	2276	508	2784	823	183	1006
Public Administration and Defense, Compulsory Social Security	1232	124	1356	1132	114	1246
Education	2190	3098	5288	47299	66890	114189
Human health and social work activities	794	861	1655	784	849	1633
Arts, entertainment and recreation	40	11	51	42	11	53
Other service activities	1762	400	2162	1652	375	2027
Activities of extraterritorial organizations and bodies	64	36	100	49	27	76
Activities of households as employers	110	77	187	110	76	186
Total	**40445**	**177596**	**218041**	**76351**	**71449**	**147800**

*Input-Output simulation of direct, indirect, and induced effects using 2017 employment data

REFERENCES

Ilkkaracan, Ipek, Kijong Kim, and Tolga Kaya. 2015. "The Impact of Public Investment in Social Care Services on Employment, Gender Equality, and Poverty: The Turkish Case." *Research Project Report, Istanbul Technical University Women's Studies Center in Science, Engineering and Technology and the Levy Economics Institute, in partnership with ILO and UNDP Turkey, and the UNDP and UN Women Regional Offices for Europe and Central Asia*.

Miller, Ronald E., and Peter D. Blair. 2009. *Input-Output Analysis: Foundations and Extensions*. Cambridge university press.

APPENDIX II: Simulating the Distribution of Employment Produced by Policy Scenarios

To estimate the distributional impact of the employment changes in the Input-Output model scenarios, we employ a microsimulation model. Our base data set is the Jordan Labor Market Survey for 2016 (JLMPS 2016). It contains records for 33,450 individuals in 7,228 households representing 9,532,053 individuals in 1,941,773 households in Jordan. This is the best data set that we could obtain for our purposes. It has good information about the labor market situation in Jordan in 2016, but it has some limitations. While it does report labor income, its capture of other income sources is limited. Monthly household per capita cash income for Jordan's governorates, as well as urban, rural, and refugee camps measured with the variables available in the JLMPS 2016 is displayed in Table 1 below.

Table A2.1 Monthly Household per Capita Cash Income by Governorate and Location

Governorate	Urban	Rural	Camps	Total
Amman	1804.5	1111.1		1783.3
Balqa	1394.2	1318.7		1381.1
Zarqa	910.4	1051.7	87.7	883.0
Madaba	903.1	1461.9		1014.8
Irbid	1483.7	1419.9		1478.2
Mafraq	1047.8	1024.5	260.4	872.8
Jarash	1548.4	1432.7		1522.3
Ajloun	1642.3	1499.1		1618.2
Karak	1297.6	1370.3		1328.6
Tafileh	1248.3	1212.6		1240.9
Ma'an	1141.6	1175.3		1157.9
Aqaba	1215.5	1182.5		1211.8
Total	1500.6	1258.2	204.6	1454.7

To proceed with the simulation, we first distribute the employment numbers produced in the Input-Output model for each scenario among one-digit occupations. The existing occupational distribution for each industry is used. For the synthetic Early Childhood Education (ECE) sector, we use the four-digit occupational breakdown of the four-digit industry 8510 ("Pre-primary and primary education") to identify workers in the ECE sector. For those occupations in this sector that could be either primary school or pre-school, we divided the workers up by the ratio of the workers in the occupations 2340 ("Primary School and Early Childhood Teachers"), 2342 ("Early Childhood Educators"), and 5311 ("Child Care Workers") to the total number of teachers (two-digit codes 23 and 53) in the four-digit industry (this came out to roughly 2 percent). The results were aggregated up to the one-digit occupational codes. The result of applying these breakdowns for wage workers to the two scenarios is shown in Tables 2 and 3, below.

Table A2.2 Jobs Created in the ECE Scenario by Industry and Occupation

	Managers	Professionals	Technicians and associate professionals	Clerical support workers	Service and sales workers	Skilled agricultural, forestry, and fish	Craft and related trades workers	Plant and machine operators	Elementary occupations	Total
Early childhood education	22053	85420	4861	30874	0	0	1260	12241	15302	172011
A: Agriculture, forestry, and fishing	0	12	1	4	49	638	1	8	55	768
B: Mining and quarrying	0	27	3	26	4	1	17	48	35	161
C: Manufacturing	32	477	319	231	204	0	2653	703	440	5059
D: Electricity, gas, steam and air conditioning	0	329	299	187	0	0	462	0	0	1277
E: Water supply; sewage, waste management	0	26	50	36	37	0	0	101	72	322
F: Construction	0	354	54	34	40	0	2513	63	80	3138
G: Wholesale and retail trade	135	924	660	414	6829	18	2290	172	750	12192
H: Transportation and storage	0	238	240	412	25	0	26	2716	106	3763
I: Accommodation and food service activities	26	57	15	21	692	0	37	32	99	979
J: Information and communication	0	884	118	9	0	0	63	5	0	1079
K: Financial and insurance activities	63	904	121	218	11	0	37	12	54	1420
L: Real estate activities	0	8	103	134	0	0	146	0	3	394
M: Professional, scientific and technical	0	1468	169	163	0	0	172	6	4	1982
N: Administrative and support service activities	0	181	154	184	1888	0	18	67	293	2785

O: Public administration and defense	1	169	56	151	696	3	64	125	90	1355
P: Education	131	4233	86	83	229	8	91	173	254	5288
Q: Human health and social work activities	1	821	417	184	86	2	22	59	62	1654
R: Arts, entertainment, and recreation	0	16	23	0	7	0	1	0	3	50
S: other service activities	0	207	139	1	993	0	232	9	582	2163
T: Activities of households as employers	0	0	0	0	96	0	0	0	4	100
U: Activities of extraterritorial organizations	10	101	8	11	5	0	8	25	21	189
Total	22452	96856	7896	33377	11891	670	10113	16565	18309	218129

Table A2.3 Jobs Created in the Construction Scenario by Industry and Occupation

	Managers	**Professionals**	**Technicians and associate professionals**	**Clerical support workers**	**Service and sales workers**	**Skilled agricultural, forestry, and fish**	**Craft and related trades workers**	**Plant and machine operators**	**Elementary occupations**	**Total**
Early childhood education	0	0	0	0	0	0	0	0	0	0
A: Agriculture, forestry, and fishing	0	10	1	4	41	535	0	7	46	644
B: Mining and quarrying	0	41	4	39	6	2	26	72	53	243
C: Manufacturing	51	752	503	364	322	0	4185	1108	693	7978
D: Electricity, gas, steam and air conditioning	0	72	66	41	0	0	102	0	0	281

E: Water supply; sewage, waste management	0	8	15	11	11	0	0	31	22	98
F: Construction	0	3388	521	322	380	0	24078	605	770	30064
G: Wholesale and retail trade	85	580	414	260	4286	11	1437	108	471	7652
H: Transportation and storage	0	224	227	389	24	0	24	2564	100	3552
I: Accommodation and food service activities	11	24	6	9	288	0	15	13	41	407
J: Information and communication	0	448	59	4	0	0	32	3	0	546
K: Financial and insurance activities	35	505	68	122	6	0	21	7	30	794
L: Real estate activities	0	3	43	56	0	0	61	0	1	164
M: Professional, scientific and technical	0	1183	136	132	0	0	139	5	3	1598
N: Administrative and support service activities	0	37	31	37	384	0	4	14	60	567
O: Public administration and defense	1	146	49	131	601	2	55	108	78	1171
P: Education	45	1466	30	29	79	3	31	60	88	1831
Q: Human health and social work activities	0	272	138	61	28	1	7	20	21	548
R: Arts, entertainment, and recreation	0	1	2	0	1	0	0	0	0	4
S: other service activities	0	72	48	0	345	0	80	3	202	750
T: Activities of households as employers	0	0	0	0	34	0	0	0	2	36
U: Activities of extraterritorial organizations	3	34	3	4	2	0	3	8	7	64
Total	231	9266	2364	2015	6838	554	30300	4736	2688	58992

To assign the jobs we use a hot-decking statistical matching procedure. We will describe the latter below, but first, we will outline the preparation for this matching procedure. We first identify potential job recipients. These potential recipients are those that are not currently working for pay in Jordan, are not retired or in school, and are not physically disabled.[11] Next, we identify donor records within the same data set. We will assign sets of job characteristics (industry, occupation, earnings, and hours) that exist to new job recipients. For each recipient, we rank industries by the likeliness of being employed within them by running a multinomial *probit* model on all of the employed individuals and then using the results to predict the likeliest industries among the recipients. We repeat this procedure for occupations. Finally, we predict the likelihood of being employed using a simple *probit* model.

We next use a three-stage Heckit procedure to impute wages and hours for each individual. The imputations for the earnings and usual weekly hours of paid work are performed using a three-stage Heckit procedure (Berndt 1996, p. 627), separately for each combination of four age categories,[12] sex, and area of residence. The first stage is a probit estimation of labor force participation:

$$lf_i = \alpha_1 + \beta X + \varepsilon_i$$

The vector of explanatory variables, *X*, comprises the number of children aged less than five and the number of children aged six to seventeen in the household, the individual's education, and the individual's spouse's age, education, and labor force status. The regression is run on the universe of all eligible adults. The Mills ratio is calculated for all individuals using the results of the first stage regression:

$$\lambda = \frac{f\left(\frac{-\widehat{lf}}{\sigma_{\widehat{lf}}}\right)}{\left(1 - F\left(\frac{\widehat{lf}}{\sigma_{\widehat{lf}}}\right)\right)}$$

Where *f* is the normal density function, *F* is the normal distribution function, $\widehat{lf}$ is the estimated probability of labor force participation, and $\sigma_{\widehat{lf}}$ is the standard deviation of $\widehat{lf}$.

The second stage is an OLS estimate of the log of hourly wage:

$$\ln w_i = \alpha_2 + \gamma_2 Z + \theta_2 \lambda + \mu_i$$

This regression is run only on those that are actually employed for pay. The vector of explanatory variables, *Z*, in this stage includes the individual's education, age, industry, occupation, and state, and finally, *λ*, the Mills Ratio calculated in the first stage. Inclusion of the Mills Ratio corrects for the selection bias induced by limiting the regression to those in paid employment. The imputed log of wage is predicted for donors and recipients from the results of the regression, with industry and occupation replaced for the latter by the likeliest industries and occupations predicted in the previous step.

The third stage is a regression of the usual hours of paid work per week:

$$h_i = \alpha_3 + \gamma_3 Z + \omega \ln \widehat{w_i} + \theta_3 \lambda + \eta_i$$

The regression is once again run only on those in paid employment. The vector of explanatory variables, *Z*, in this stage is the same as in the previous stage, with the addition of the number of children aged less than seven, the number of children aged seven to seventeen in the household, and the spouse's labor force status. Finally, the imputed wage predicted in the second stage and the Mills Ratio calculated in the first stage are included. Imputed hours per week are predicted for donors and recipients using the results of the regression, replacing the industry and occupation of the latter with their predicted values as for the wage equation.

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[11] Individuals who are identified as employed but with zero earnings are included in the potential employable pool.
[12] Less than 25 years old, 25 to 34 years old, 35 to 54 years old, and 55 and older.

With the variables generated in the previous steps, as well as other characteristics, we then proceed through the job assignment procedure. For each industry and occupation pair in turn, for those recipients for whom the industry and occupation were the likeliest, we identify a pool of individuals actually employed in that industry and occupation that most resemble each recipient. We randomly draw from this group of donors and assign a duplicate of their job to the recipient. We next check that the sum of the weights of the recipients does not exceed the number of new jobs available. If there are more recipients than jobs, we make the assignment only to those that are the likeliest to be employed (using the results of the probit estimation from the first step), using up all of the available jobs. If there are more jobs than recipients, they are all assigned jobs. The total jobs assigned are then subtracted from the total remaining to be assigned in that cell of the industry-occupation matrix. Those individual records that were assigned jobs are removed from the remaining recipient pool and the process continues. If after going through all the possible assignments for recipients' first most likely industry and occupation there are still jobs remaining, we move on to the second most likely industry and occupation and repeat the above procedure. This process iterates until all jobs have been assigned. We then repeat the assignment procedure with the job matrix from the other scenario. For the ECE scenario, we assign earnings to women based on a flat schedule.[13]

Once we have completed the assignment of all of the jobs, we move on to assess the quality of the simulation. Our options for such an assessment are limited by the fact that we are creating a counterfactual distribution of employment and earnings. Thus, our main quality check will be a comparison of the distributions of earnings and hours of the job recipients in each scenario with those of the donor pool. Before that, we compare the distribution of characteristics used in the matching process between the recipient and donor pools. Note first that the composition of the recipient and donor pools by sex is very different, as must be the case, given the very low labor force participation rate of women in Jordan. In fact, 68 percent of the individuals in the recipient pool are female, while 84 percent of the donors are male. However, because of the way we do the matching, female recipients are only matched with female donors and vice versa. Figure 1, below, shows the distribution of the recipient and donor pools by sex, age, and educational attainment. Note that for both women and men, the donors are more likely to be prime working-age individuals, while recipients are more likely to be under 25 or over 65. Among women, a greater share of recipients is aged 45 to 54 than among the donors. Looking at the distributions by educational attainment, it is clear that more highly educated women are more likely to be working for pay: greater shares of the women in the donor pool have secondary and higher education that in the recipient pool. Among men, the relationship is not as clear-cut. Although greater shares of the male donor pool have secondary or post-secondary education, there is little difference in the shares of donors and recipients with university or post-graduate education and male donors are likelier to be illiterate than recipients.

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[13] The monthly earnings for managers is JD 633, for teachers it is JD 380, and for service staff it is JD 235.

Figure A2.1 Distribution of recipients and donors by sex, age, and education
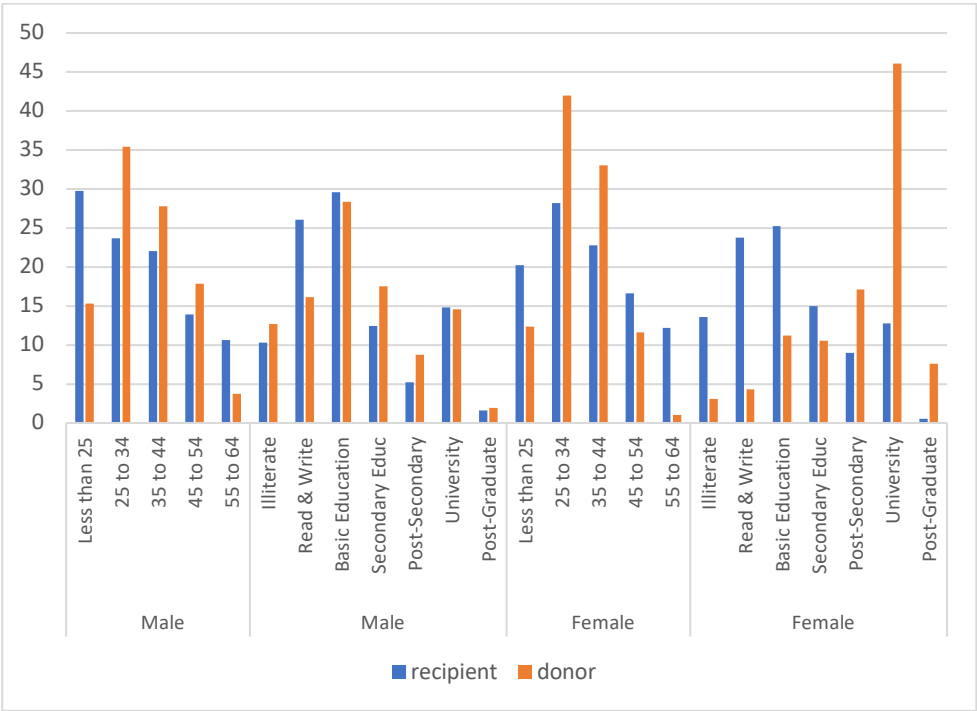
Figure 2, below, gives the distributions of the recipient and donor pools by sex, type of household, and household earnings category. Unsurprisingly, donor records are in households with higher earnings. They are also more likely to be married couple households, rather than single-headed households without children.

Figure A2.2 Distribution of recipients and donors by sex, household type, and household earnings category
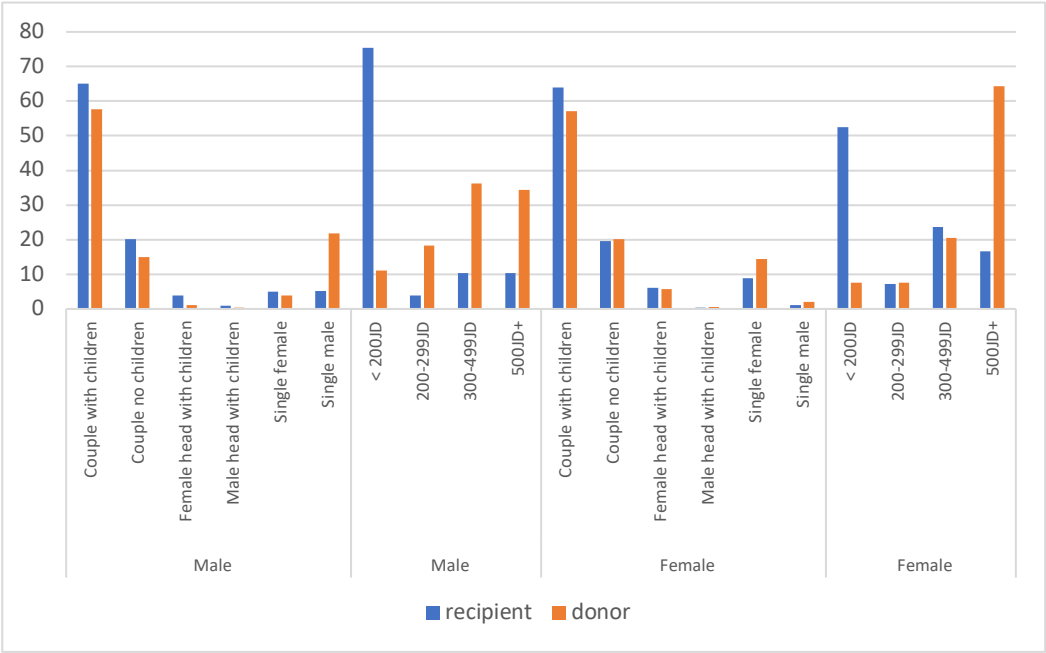
The sexual division of

work in the two assignments is in stark contrast (see Table 4, below). Almost all of the jobs in the construction scenario went to men, while over half of the jobs in the ECE scenario went to women. We next check the rate at which individuals are assigned to their most likely industry and occupation by tabulating the assigned industry with the likeliest industry and then the assigned occupation with the likeliest occupation. These tabulations are shown for both scenarios in Tables 5 through 8, below. The results are influenced by the structure of the jobs created, of course. For the construction employment simulation, 87 percent of job recipients received jobs in their likeliest industries (see the bolded entries in Table 4, below). However, the ECE sector was no recipient's likeliest industry, yet most of the jobs in that scenario were in the ECE sector. Thus, in that simulation, only 15 percent of recipients received jobs in their likeliest industry. Of those that were not assigned jobs in the ECE sector, however, 69 percent were in their likeliest industry. As far as the assignment by occupation is concerned, no recipient's likeliest occupation was manager. In the construction employment simulation, 69 percent of recipients got their likeliest occupation. In the ECE simulation, only 30 percent did. This is in part a reflection of the characteristics of the recipient pool and the existing occupational structure of the labor market in Jordan.

Table A2.4 Jobs assigned by sex and employment scenario

	Male	Female	Total
Construction	58,172	2,960	61,132
ECE	89,465	129,136	218,601

Table A2.5 Assigned Industry by Likeliest Industry of Job Recipients in the Construction Employment Simulation

Construction Scenario	Likeliest Industry												
Assigned Industry	1	2	3	4	6	7	9	13	14	15	16	17	Total
1 A: Agriculture, forestry, and fishing	**165**	0	0	0	0	0	0	0	0	0	0	0	165
2 B: Mining and quarrying	0	**161**	0	0	0	0	0	0	0	0	0	0	161
3 C: Manufacturing	0	0	**6,154**	0	0	0	0	0	0	0	0	0	6,154
4 D: Electricity, gas, steam and air conditioning	0	65	0	**159**	0	0	0	0	0	0	0	0	224
5 E: Water supply; sewage, waste management	0	0	0	0	0	0	0	0	0	0	0	0	0
6 F: Construction	0	0	0	0	**29,083**	0	0	0	0	0	0	0	29,083
7 G: Wholesale and retail trade	0	0	0	0	0	**11,407**	0	0	0	0	0	0	11,407
8 H: Transportation and storage	0	69	0	0	0	3,838	0	0	0	920	0	0	4,827
9 I: Accommodation and food service activities	0	0	0	0	0	0	**287**	0	0	0	0	0	287
10 J: Information and communication	0	0	0	0	0	0	0	0	0	0	571	0	571
11 K: Financial and insurance activities	0	0	0	0	0	0	0	0	0	0	1,213	0	1,213
12 L: Real estate activities	0	0	0	0	0	0	20	0	0	285	0	0	305
13 M: Professional, scientific and technical	0	0	0	0	0	0	0	**2,293**	0	0	0	0	2,293
14 N: Administrative and support service activities	0	0	0	0	0	0	0	0	**242**	0	0	0	242
15 O: Public administration and defense	0	0	0	0	0	0	0	0	0	**1,144**	0	0	1,144
16 P: Education	0	0	0	0	0	0	0	0	0	0	**1,639**	0	1,639
17 Q: Human health and social work activities	0	0	0	0	0	0	0	0	0	0	0	**589**	589
18 R: Arts, entertainment, and recreation	0	0	828	0	0	0	0	0	0	0	0	0	828
19 S: other service activities	0	0	0	0	0	0	0	0	0	0	0	0	0
20 T: Activities of households as employers	0	0	0	0	0	0	0	0	0	0	0	0	0
21 U: Activities of extraterritorial organizations	0	0	0	0	0	0	0	0	0	0	0	0	0
22 Early childhood education	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	165	295	6,982	159	29,083	15,245	307	2,293	242	2,349	3,423	589	61,132

Table A2.6 Assigned Industry by Likeliest Industry of Job Recipients in the Early Childhood Education Employment Simulation

ECE Scenario		Likeliest Industry													
Assigned Industry		1	2	3	4	6	7	9	13	14	15	16	17	20	Total
1	**A: Agriculture, forestry, and fishing**	**588**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**588**
2	**B: Mining and quarrying**	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0
3	**C: Manufacturing**	0	0	**4,214**	0	0	0	0	0	0	0	0	0	0	4,214
4	**D: Electricity, gas, steam and air conditioning**	79	455	0	**159**	0	0	0	0	0	663	474	0	0	1,830
5	**E: Water supply; sewage, waste management**	0	0	0	0	0	0	0	0	0	639	0	0	0	639
6	**F: Construction**	0	0	0	0	**2,969**	0	0	0	0	0	0	0	0	2,969
7	**G: Wholesale and retail trade**	0	0	0	0	0	**10,566**	0	0	0	0	0	0	0	10,566
8	**H: Transportation and storage**	0	69	0	0	0	3,832	0	0	0	845	0	0	0	4,746
9	**I: Accommodation and food service activities**	0	0	0	0	0	0	**1,315**	0	0	0	0	0	0	1,315
10	**J: Information and communication**	0	0	0	0	0	0	0	0	0	382	944	0	0	1,326
11	**K: Financial and insurance activities**	0	0	0	0	0	0	0	0	0	0	2,551	0	0	2,551
12	**L: Real estate activities**	0	0	0	0	0	0	100	0	0	594	0	0	0	694
13	**M: Professional, scientific and technical**	0	0	0	0	0	0	0	**2,618**	0	0	0	0	0	2,618
14	**N: Administrative and support service activities**	0	0	0	0	0	0	0	0	**2,591**	662	0	0	0	3,253
15	**O: Public administration and defense**	0	0	0	0	0	0	0	0	0	**1,444**	0	0	0	1,444
16	**P: Education**	0	0	0	0	0	0	0	0	0	0	**5,161**	0	0	5,161

															Total
17	Q: Human health and social work activities	0	0	0	0	0	0	0	0	0	0	0	**1,362**	0	1,362
18	R: Arts, entertainment, and recreation	0	1	2	3	4	5	6	7	8	9	10	11	12	13
19	S: other service activities	0	0	2,544	0	0	0	0	0	0	0	0	0	0	2,544
20	T: Activities of households as employers	0	0	0	0	0	0	0	0	0	0	0	0	**251**	251
21	U: Activities of extraterritorial organizations	0	0	0	0	0	0	0	0	0	0	97	0	0	97
22	Early childhood education	2,574	175	28,558	0	3,402	8,932	440	0	3,298	34,103	69,038	19,247	666	170,433
	Total	3,241	699	35,316	159	6,371	23,330	1,855	2,618	5,889	39,332	78,265	20,609	917	218,601

*TableA2.7 Assigned Occupation by Likeliest Occupation of Job Recipients in the Construction Employment Simulation*

Construction Scenario	Likeliest Occupation								
Assigned Occupation	2	3	4	5	6	7	8	9	Total
1 Managers	421	0	0	0	0	127	0	0	548
2 Professionals	**5,372**	143	65	1,772	0	1,816	69	190	9,427
3 Technicians and associate professionals	381	**966**	551	0	0	496	75	0	2,469
4 Clerical support workers	994	36	**473**	2,747	0	258	285	0	4,793
5 Service and sales workers	0	0	0	**3,740**	0	0	0	409	4,149
6 Skilled agricultural, forestry and fishing	0	0	0	0	165	0	0	0	165
7 Craft and related trades workers	103	80	0	5,824	0	**27,875**	0	161	34,043
8 Plant and machine operators	118	0	0	1,528	0	575	**871**	0	3,092
9 Elementary occupations	0	0	0	1,129	0	702	0	**615**	2,446
Total	7,389	1,225	1,089	16,740	165	31,849	1,300	1,375	61,132

Table A2.8 Assigned Occupation by Likeliest Occupation of Job Recipients in the Early Childhood Education Employment Simulation

| ECE Scenario	Likeliest Occupation								
Assigned Occupation	2	3	4	5	6	7	8	9	Total
1 Managers	15,996	6,820	0	0	0	0	0	0	22,816
2 Professionals	**50,575**	28,408	218	826	2	0	174	15,382	95,585
3 Technicians and associate professionals	4,348	**1,374**	267	522	0	0	0	1,068	7,579
4 Clerical support workers	21,833	1,407	**714**	3,038	0	2,569	594	5,365	35,520
5 Service and sales workers	110	120	0	**4,208**	0	0	0	2,694	7,132
6 Skilled agricultural, forestry and fishing	0	0	0	0	**551**	0	0	0	551
7 Craft and related trades workers	1,673	0	0	7,188	214	**5,181**	132	357	14,745
8 Plant and machine operators	894	653	0	6,735	0	5,665	**1,744**	0	15,691
9 Elementary occupations	1,779	294	1,899	6,381	2,932	4,106	146	**1,445**	18,982
Total	97,208	39,076	3,098	28,898	3,699	17,521	2,790	26,311	218,601

Turning to the simulated distributions of earnings and hours, we first compare the earnings and hours by sex and age (Figure 3, below). For the most part, the recipients' mean and median earnings are between 50 and 100 percent of that of the donors. For men, the ratios are higher for the construction than in the ECE scenario. For women, the scenarios are more comparable in terms of hours and earnings. For women aged 55 to 64, simulated earnings are significantly higher than typical for this group in the ECE scenario, though less than half for the construction scenario.

Figure A2.3 Ratio of simulated to donor mean and median earnings and hours, by sex and age
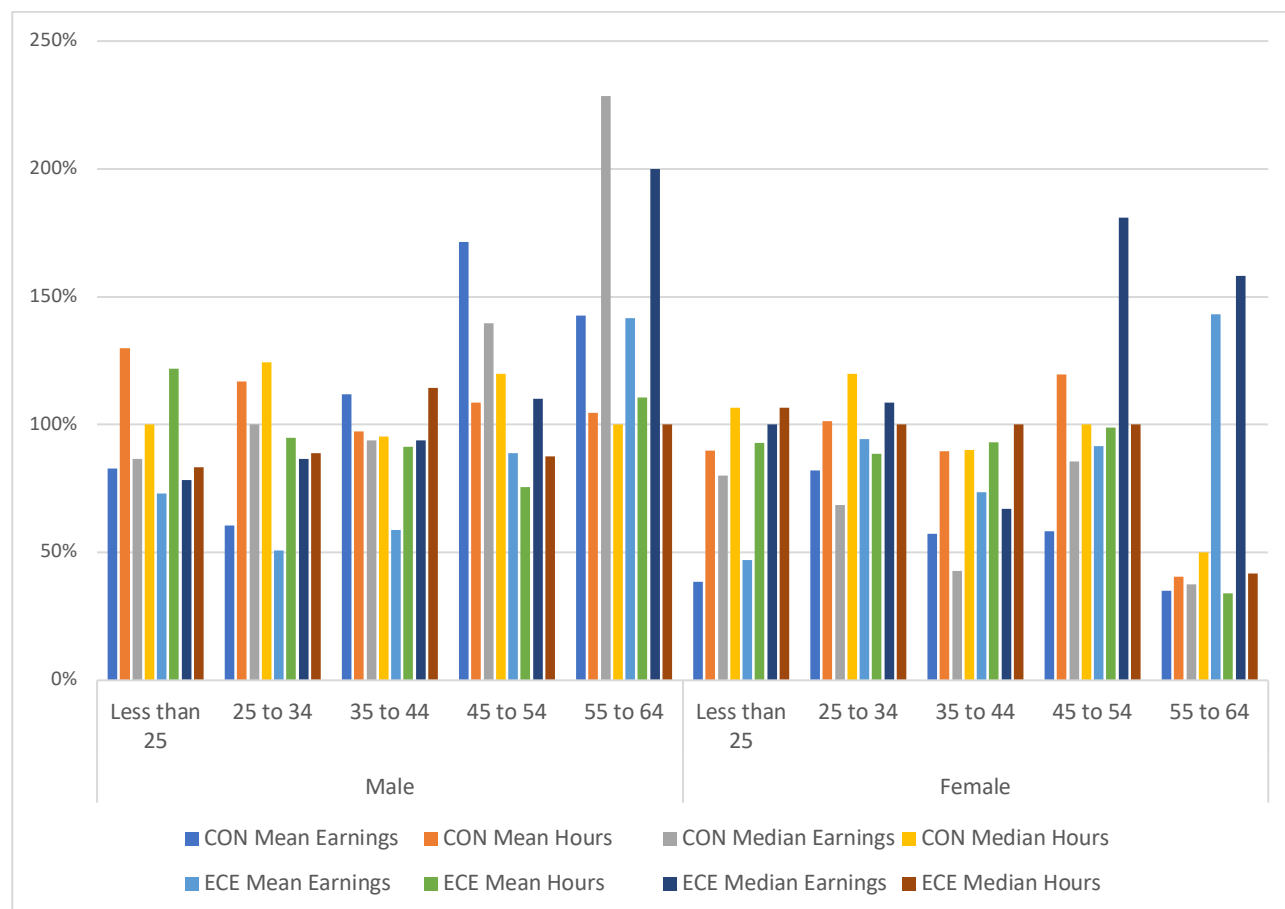
Turning to the distribution of hours and earnings by sex and educational attainment (Figure 4, below), it is first worth noting that in the construction scenario, less than 3,000 of the 62,000 jobs assigned went to women. Half of the latter had attained basic education. For men, the illiterate made up the second smallest segment of job recipients by education (with 1,700 jobs going to illiterate men, only the post-graduates received fewer jobs with 900). The illiterate job recipients did get job assignments that were higher-paying than they might otherwise receive in the Jordanian job market, but the statistics here are for a small number of observations (just 15 records in the JLMPS). Almost all of the jobs in the construction scenario went to men with education levels from reading and writing to secondary education. In the ECE scenario, the job recipients were more likely to have higher education. Among women, the bulk of the jobs went to those with secondary to university educations. Among male job recipients, the gains were more spread out, also including those with basic education. Overall, the recipients received jobs with earnings and hours that were in line with those that their age-sex category currently receives in Jordan.

Figure A2.4 Ratio of Simulated to Donor Mean and Median Earnings and Hours, by Sex and Education
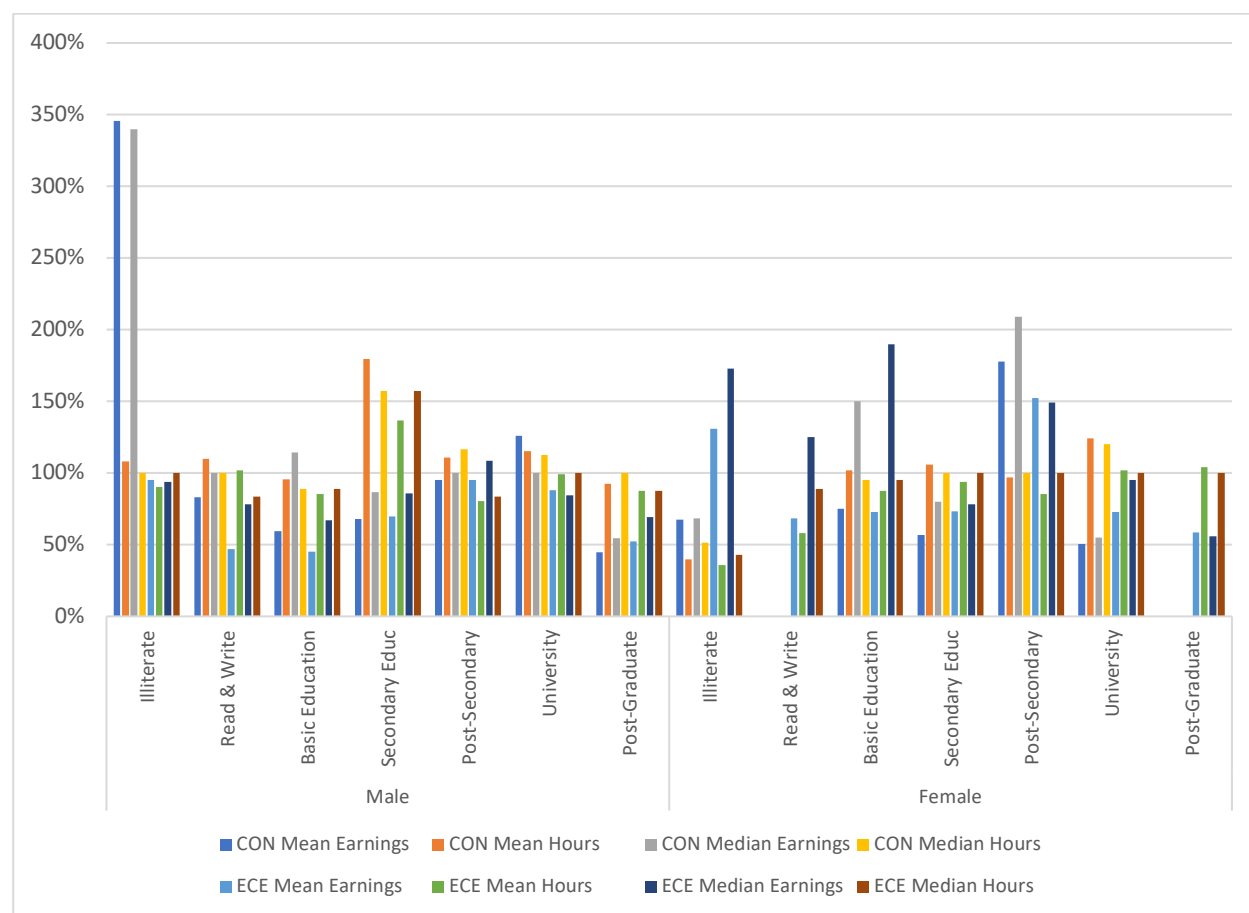
Overall, the simulation appears to be a good one, despite the limitations in the data (relatively small sample size and lack of information about non-labor incomes). The job assignments adequately reflect the job market situation in Jordan in 2016. Earnings and hours are not out of line for the Jordanian labor market.