# Selected Research and Policy Analysis Notes

Bank of Israel
Research
Department

Jerusalem, January 2021

This publication replaces the "Recent Economic Developments" series.
This publication will also be published semiannually, and will include research analyses on
various economic issues.

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# THE CORONAVIRUS CRISIS AND THE LABOR MARKET IN ISRAEL[1]

- Analyzing data from the Labor Force Survey, carried out by the Central Bureau of Statistics (CBS), we show that only about 84 percent of employees who worked in the business sector prior to the crisis were working in July 2020 (in contrast to about 91 percent during the same period in 2019).

- The number of actual workhours per employee in July 2020 was similar to its level in July 2019, and total workhours were lower by about 5 percent (and by more than 6 percent in the business sector) due to the decline in the number of employees.

- The number of actual weekly workhours of employees in the business sector who worked prior to the crisis in a part-time job grew on average by 2–4 hours, while among those who worked prior to the crisis in a fulltime job the number of workhours remained almost unchanged. This finding, together with the larger decline in the number of part-time jobs, is consistent with the phenomenon of filling the places of those who were laid off by their colleagues who were not.

- In about 20 percent of the households in which there were two employed members prior to the crisis, at least one was out of work (as opposed to about 12 percent in the corresponding period in 2019).

- After the lifting of the first lockdown in late April, about 30 percent of the unemployed according to the accepted definition, those temporarily absent due to the crisis and discouraged workers (hereinafter, the non-employed) remained in that situation at least until July, and among the young and educated this rate was significantly higher. The proportion of employees that worked in the business sector in April and lost their jobs by July stood at about 6 percent, which is similar to the rate in 2019; however, among the ultra-Orthodox and individuals with less than a year of seniority in their job, the rate was higher than in 2019.

- During June–July, the transition of employees in the business sector, and individuals who were temporarily absent due the crisis (most of them on unpaid leave), to the status of unemployed or discouraged worker accelerated. In July, the return to work slowed among those who had been non-employed in April.

- The proportion of employees who had worked in the business sector prior to the crisis and were non-employed in July 2020 was higher than during the same period in 2019 among the young and workers after retirement age, the ultra-Orthodox, residents of the South and Jerusalem districts and Judea and Samaria, the uneducated, individuals who are unable to work from home, individuals with low seniority in their job and low-earning individuals. However, estimations indicate that there were no statistically significant differences in the risk of becoming non-employed in 2020 relative to 2019 according to personal characteristics (after controlling for those characteristics and industry of employment before the crisis), apart from residents of the North and Haifa districts whose risk was lower than among residents of the Dan region by about 30 percent.

- Salaries (and the unemployment benefit) of families in which at least one earner was employed prior to the crisis and was looking for work in July declined on average (and according to a calculation) by about 20 percent.

## a. Introduction

The coronavirus pandemic had an adverse effect on the labor market in Israel. This was the result of the decline in demand for labor due to the social distancing restrictions imposed, the drop in domestic aggregate demand (due to the contraction of household income and concern among consumers of being exposed to the virus) and the weakened demand for exports. The elevated level of uncertainty, including the lack of employment security, and the negative impact on household wealth exacerbated the already serious situation in the labor market, such that individuals reduced their consumption even further. Overall, the sharp decline in business activity led many businesses to reduce their number of employees and the wages they pay.

A large number of recent studies in many countries indicate that the negative impact of the crisis on businesses and employment was not uniform (Brodeur et al., 2020; International Labor Organization, 2020a and 2020b; OECD, 2020). Due to the social distancing restrictions, there was a greater decline in employment in industries where workers are in close contact with each other and with customers, particularly in closed spaces with a concentration of people, and also in industries and businesses where only a small percentage of the workers can work from home. The reduction in employment was more common in businesses with flexible employment arrangements or whose workers have low productivity and industries that needed to increase efficiency even before the crisis. Prime examples of industries worldwide that suffered more than others from the decline in employment include: hospitality and food; art, entertainment and leisure; personal services; retail trade; and passenger transport.

With respect to the personal characteristics of workers around the world who lost their jobs, particularly prominent are the young, the uneducated and unskilled, workers in temporary or part-time jobs, employees working in the informal economy and foreign workers. Those groups' incomes are in any case low, and in the past they were the last to find work during an economic recovery. In many countries, the proportion of women whose employment was ended was higher than that of men, which can be attributed to a number of factors: their relative concentration in service industries, which were particularly affected by the crisis; the fact that many are employed in part-time or temporary jobs; and the closing of the schools. Furthermore, the traditional division of labor in the household led many women to stay at home to care for their children. At the same time, in Israel as well as abroad there is a high rate of women in healthcare and education services, which were overburdened during the crisis (caring for coronavirus patients and reinforcing the epidemiological system; the transition to remote learning; etc.) but they at least enjoyed job security. Another group that has been particularly negatively affected by the crisis are the self-employed, since their businesses tend to be concentrated in industries that were vulnerable to the effects of the crisis (and in some countries, they did not enjoy government support as employees did).

It is worthwhile at this point to present a brief overview of the events in the labor market in Israel from the onset of the coronavirus crisis until July[2], which will be followed by an in-depth analysis of the data from the Labor Force Survey. National Insurance Institute (NII) data indicate that from the start of the crisis until mid-August approximately one million new requests for unemployment benefits were submitted. From the end of the first lockdown, in the second half of April, until mid-August, more than 460,000 of

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[2]  For further details, see Aviram-Nitzan and Keidar (2020), Achdut (forthcoming), the National Insurance Institute (2020), the Ministry of Finance (2020a and 2020b) and the Israeli Employment Service (2020).

the applicants returned to work and about 510,000 applicants (including long-time unemployed)—who account for about 12 percent of the workforce—remained unemployed. The number of recipients of the unemployment benefit was about 420,000 in July (compared to about 78,000 in February). According to a real-time survey of businesses carried out by the Central Bureau of Statistics (CBS), the proportion of their workers who were employed prior to the crisis and were not working in mid-August stood at about 18 percent of the workforce (and in parallel about 5 percent were new hires). According to the real-time survey in mid-June, about 10 percent of employers in the business sector had reduced the salaries they pay, usually by up to 10 percent. Further evidence of the dismal situation in the labor market is the drop in the job vacancy rate in the business sector: in July, it stood at more than 2 percent of total jobs, which is about two-fifths of the rate prior to the crisis. Various sources of information indicate that In Israel, as in other countries, the main victims of the COVID-19 crisis in the labor market—in terms of lost employment and decline in labor income—are employees in the various service industries (particularly hospitality and food, culture and retail commerce), the young (and those of retirement age), the uneducated and the low-skilled and the self-employed.

In response to the economic crisis, the government adopted a large number of measures in the labor market, primarily a loosening of conditions specified in the Unemployment Insurance Law. These included (a) a shortening of the qualifying period from 12 to 6 working months during the 18 months that preceded registration at the Employment Service, as well as payment of the unemployment benefit to individuals on unpaid leave without any obligation to use up accumulated vacation time and a shortening of the minimal unpaid leave period required to qualify for the unemployment benefit from 30 to 14 days; (b) a lengthening of the period for receipt of the unemployment benefit to beyond the maximal period specified in the law; (c) the level of the unemployment benefit: cancelation of the tapering off of the amount according to the duration of unemployment, payment of the full unemployment benefit to individuals under the age of 28 who are caring for children, to the repeat unemployed and to individuals in vocational training courses and payment of an acclimatization grant to those aged 67+ as a substitute for the unemployment benefit. In addition, there was no offset of various allowances (including the guaranteed income supplement) against the unemployment benefit. These exemptions from the Unemployment Insurance Law will remain valid until the end of June 2021, unless the "monthly rate of non-employment during the COVID-19 period" drops to under 7.5 percent by the end of May 2021.[3] The payment of the unemployment benefit for the month of July totaled about NIS 2 billion, as compared to NIS 0.3 billion per month prior to the crisis. Furthermore, assistance was provided to businesses, including reimbursement of fixed costs and state-guaranteed loans. Employers also received a grant for rehiring workers who had been laid off or had been placed on unpaid leave during the period April–October. Finally, the self-employed whose incomes have declined will receive a subsistence grant up until June 2021, which is essentially a substitute for the unemployment benefit.

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[3]  According to the Economic Assistance Program (The Novel Coronavirus) Law, (temporary order), 5780-2020, the unemployment benefit will decline by 10 percent starting from the month following the decline of the rate to below 10 percent and the payment of the unemployment benefit will be terminated one month after the drop in the rate to below 7.5 percent. The aforementioned applies to those who have exhausted the regular period of eligibility for the unemployment benefit. "The monthly rate of non-employment during the COVID-19 period" was defined in the law as the rate of unemployment and workers placed on unpaid leave due to circumstances connected to the coronavirus ("COVID-19 absence") and is calculated by the CBS based on the Labor Force Survey. In July, the rate stood at 10.3 percent and in August at 9.8 percent (CBS, 2020a and 2020b). Nonetheless, on September 21, 2020, the government announced its intention to extend eligibility for the full unemployment benefit despite the aforementioned drop in the rate in August to below 10 percent.

This document provides an in-depth analysis of the labor market data in Israel during the coronavirus crisis based on the Labor Force Surveys carried out by the Central Bureau of Statistics (CBS). A clear advantage of this survey—particularly during the crisis, which is characterized by ups and downs in the severity of the social distancing restrictions and therefore also in the situation in the labor market—is the ability to track the same respondents over time and to highlight the changes in their employment situation. This is in contrast to the common practice in analyses of this type to present the employment situation of individuals at a given point in time, while over time they only examine aggregate changes. The goal of the current analysis is therefore to examine the changes in the workforce characteristics of the survey respondents from the period prior to the crisis until July, with emphasis on employees working in the business sector prior to the crisis, and from the lifting of the first lockdown in April until July. The analysis is carried out according to the respondents' demographic–socioeconomic characteristics and industry of employment. In addition, changes in workhours are examined and an estimate is made of the reduction in household income among employees who were working prior to the crisis and were jobseekers in July.

We chose to focus on individuals employed in the business sector prior to the coronavirus crisis since the lion's share of employees in the public sector did not lose their jobs during the crisis (even though many of them were placed on paid leave from mid-March to early May) and due to the difficulty in identifying the employment and economic situation of the self-employed whose businesses were shut down or were only partially open. The research population includes respondents above the accepted age for completing compulsory military service.[4] For these reasons, the data to be presented below differ from those appearing in official publications, which include individuals aged 15 or over (including employees in the public sector and the self-employed).

## b. The dataset, the definition of workforce characteristics and the research period

The analysis is based, first and foremost, on the CBS Labor Force Survey, which is the main data source for what is occurring in the labor market. The surveys for the period January 2018 through July 2020 were merged with two additional sources of information: jobseekers who reported to the Israeli Employment Service (IES) from March 2020 onward for which the date and reason for reporting to the IES, among other things, are known, as is the date of their (self-reported) return to work; and files of employed and self-employed individuals from the Israel Tax Authority for 2018 (the last year for which data is available), which contain information on labor income for the employed and the self-employed and the number of months of work for the employees.[5]

The Labor Force Survey respondents are surveyed for a period of 8 months: four consecutive months (panels 1–4) following by a break of 8 months and 4 additional consecutive months (panels 5–8). The time structure of the survey makes it possible, as mentioned, to track the workforce characteristics of the

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[4] Jewish non-ultra-Orthodox men (and the Druze) aged 22 or over, Jewish non-ultra-Orthodox women aged 21 or over and ultra-Orthodox men and women and non-Jews (apart from Druze men) aged 18 or over. The reasons for omitting younger ages from the research population are that the decline in the employment of youth is not at the focus of this analysis and that soldiers in their compulsory military service are defined in the Labor Force Survey as employed and remained so during the course of the crisis (although it may be that some of them were employed outside the army and were indeed exposed to the effects of the crisis).

[5] We wish to thank Danny Pfefferman, the National Statistician and the director of the CBS, for his willingness to provide us with data in the CBS Research Room and the following workers at the CBS: Mark Feldman, Yifat Klopstock, Rebecca Krieger and Merav Pasternak, for their assistance in preparing the data. In addition, our thanks to Ofir Pinto from the Israeli Employment Service for proving data on jobseekers.

respondents over a fixed period of time. Each month, a new panel, which includes over 1,000 households, enters the sample, such that for every month of the survey there are 8 panels, which encompass over 9,000 households (and about 20,000 individuals aged 15 or above).[6]

For the purposes of the analysis, the respondents were classified into five groups (which relate to the week prior to the date of the survey, i.e., the "determining week": (1) employees who were working (i.e., were not temporarily absent from their jobs) (hereafter: actual employees); (2) employees who were temporarily absent from their jobs for reasons not related to the coronavirus crisis (vacation / illness[7] / reserve duty, etc.) (hereafter: non-COVID-19 absentees); (3) temporary absentees from their job for reasons that are to a large extent connected to the crisis (reduction in workhours, closing of the business, etc.; in March–April of 2020, the possibility of answering "because of Corona" as a response was added to the Labor Force Survey questionnaire) (hereafter: "COVID-19 absentees[8]); (4) unemployed; (5) not in the workforce (non-participants), including discouraged workers according to the broad definition.[9] The broad definition of unemployment will therefore include those who belong to one of the following groups: the unemployed and COVID-19 absentees and discouraged workers according to the broad definition. These combined will be referred as non-employed in what follows.[10]

The periods being studied were determined according to milestones in the social distancing restrictions during the course of the coronavirus pandemic in Israel, which are closely related to developments in the labor market: at the beginning of March, nonresidents were no longer allowed into Israel and gatherings were limited, and starting from mid-March a general lockdown was imposed (essential workers were exempt); in mid-April, activity was gradually restored in places of work according to the "purple badge"; and at the beginning of May, public sector workers returned to work and the education system and various

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[6] The Labor Force Survey does not include the population in fixed samples: residents of institutions and senior citizens homes and the Bedouin living outside of permanent settlements in the South of the country. These groups constitute less than 3 percent of the population aged 15 or over. The data presented here differ from those appearing in the CBS publications for three reasons: (1) a focus on the research population, as defined above, in contrast to all individuals aged 15 or over in the CBS publications; (2) a different definition of workforce characteristics (to be described below); and (3) the Labor Force Survey does not, as mentioned, include the fixed samples. Furthermore, no seasonal adjustment, which is currently problematic, was carried out, and instead the data for the coronavirus period were compared to the parallel period in 2019.
The Labor Force Survey also includes temporary residents who are in Israel for more than a year continuously and therefore they also include (legal and illegal) foreign workers who live in regular housing, but not the Palestinians (not including permanent residents of East Jerusalem) who work in Israel. The latter accounted for about 4 percent of labor input in the business sector in 2019, most of it in the construction industry. During the crisis, the number of Palestinians working in Israel in construction declined significantly (Bank of Israel, 2020b).

[7] The CBS classifies those in quarantine as sick. According to the Ministry of Health data, in July the average daily number of individuals in quarantine (who are not infected with COVID-19) was about 44,000 (https://data.gov.il/dataset/covid-19). The number of active patients was about 23,000 (https://www.worldometers.info/coronavirus/country/israel/). Data have not been published with respect to the quarantined and the positive individuals by age and therefore the number of them that belong to the research population cannot be determined.

[8] In Israel, as in many other countries, total temporary absentees from their jobs are those who did not work for the entire week for various reasons, most of which have been listed above, and fulfill one of the following conditions: a) absent for up to 4 weeks (or on maternity leave) from their place of work; b) a longer absence which is (1) paid, including the unemployment benefit, or they are self-employed; or (2) unpaid although they believe that they will be able to return to their job.

[9] The official definition of a discouraged worker includes non-participants in the workforce who are interested and available to work, and who have looked for a job during the past year but not during the past month, for the following reasons: their belief that there are no jobs in their profession or in their area of residence that are suited to them with respect to salary, workhours or interest; or a lack of experience or necessary training, language difficulties and inappropriate age. The more extensive definition of a discouraged worker during the coronavirus crisis is likely to include as well those who did not look for a job during the past month "due to coronavirus".

[10] In addition to the unemployed and coronavirus absentees (who together enter the calculation of "rate of monthly unemployment during the coronavirus period"), the CBS also includes the following in the broad definition of non-employment (see CBS, 2020a and 2020b): those who are no longer working because they were fired or because their place of work was closed starting from March 2020 and they did not actively search for a job during the month prior to the survey. In July, the rate of respondents included in these three groups was 11.9 percent of the total number of respondents (about 11.2 percent in August), which represents about 500,000 people (and about 470,000 in August).

service industries gradually reopened. Later on, a second wave of infection began (after the end of the surveyed period a second general lockdown was imposed during the High Holidays). It is worth mentioning that according to the Stringency Index,[11] the social distancing measures adopted by Israel during the first wave were indeed stringent with respect to both their scope and their duration.

The analysis will therefore focus on tracking the changes in workforce characteristics during the two relevant periods: (1) before and during the crisis: employees in the business sector during the period July–October 2019 (panels 1–4) who were also surveyed in July 2020 (panels 5–8); (2) at the time of the exit from the first lockdown: those surveyed in April 2020 (panel 1 or 5) during the period following the lifting of the general lockdown (April 19th) who were also surveyed in July (panel 4 or 8).

### c. Results of the analysis of the Labor Force Survey

### 1. Workforce characteristics in January–July 2020

Figure 1 presents the workforce characteristics of respondents who were above the age at which compulsory military service is generally completed (including employees in the public and business sectors and the self-employed) for the period January to July 2020 and in comparison to the corresponding period in 2019.[12] The employment rates in both years were similar during January–February (Figure 1a); in contrast, during March–April 2020, with the imposing of the first general lockdown, the employment rate contracted, but following that increased to about 56 percent in July (in contrast to about 59 percent in 2019). At the same time, starting from March 2020, as a result of the large number of workers who were placed on unpaid leave, the rate of coronavirus absenteeism shot up and only some of the absentees returned to work during the course of the year, so that in July they accounted for more than 5 percent of the workforce (Figure 1b). The non-employment rate grew from 3.2 percent in February to 4.8 percent in July and the rate of non-participation in the workforce rose from 32.5 percent to 33.3 percent (Figure 1c), about one-third of which was due to discouraged workers. Overall, the non-employment rate in the age group of the research population jumped from about 4.5 percent in February to about 11.0 percent in July (Figure 1d) and their number soared from about 170,000 to about 410,000. The number of actual workhours per employee fell only during the lockdown and subsequently it was slightly higher than in 2019 (Figure 1e); however, due to the decline in number of employed, their labor input (total workhours) decreased. In July, it was lower by about 5 percent than in 2019 (Figure 1f) and in the business sector by more than 6 percent. The rate of new employees in the workplace within total employees—which is an indication of the pace of worker hiring—declined significantly in March–April 2020, but subsequently approached the rate that prevailed in 2019 (Figure 1g).

### 2. Tracking the changes in workforce status, workhours and labor income of the same respondents

Table 1 indicates that only about 84 percent of employees in the business sector prior to the crisis were still employed in July (in contrast to 91 percent during the same period in 2019), and about 6 percent became COVID-19 absentees; the rest joined the non-employed groups (about 4 percent) and the discouraged

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[11] See: https://covidtracker.bsg.ox.ac.uk/.

[12] A similar analysis, based on the British Labor Force Survey, appears in Wadsworth (2020). The Passover holiday occurs in April in both 2019 and 2020 and most of the Ramadan period was in May in both years.

workers (about 7 percent), rates that are somewhat higher than in 2019. As expected, the proportion of those who were non-employed prior to the crisis and then found work was less than that in 2019.

Support for the above findings can be found in the dynamics of the shifts in workforce status in consecutive months (Figure 2): During March-April, many employees in the business sector became COVID-19 absentees while a minority became unemployed (Part a); later in the year that shift of employees to a status of COVID-19 absentee was halted but the thin stream of employees to a status of unemployed continued and increased in strength; some of the coronavirus absentees returned to work in May and June due to the loosening of restrictions on social distancing but in July the flow slowed and during the entire period of the crisis the flow of coronavirus absentees who became unemployed or discouraged workers grew (Part b); the persistence of the crisis in the labor market also caused some of the unemployed to give up on their job search (Part c).

The shifts in workforce status between the first half of April—immediately following the exit from the first general lockdown—and July show an improvement in the situation of the labor market, despite its continued weakness (Table 2): about 94 percent of employees in the business sector during the second half of April were still working in July, a rate similar to that in 2019, although it should be remembered that only about 66 percent of employees in the business sector in February were employed also in the second half of April (in contrast to about 96 percent in 2019); only about 76 percent of the COVID-19 absentees in April 2020 had returned to work by July. Overall, the proportion of employees in the business sector that were employed in July was, as already mentioned, significantly lower than prior to the crisis.

Figure 3 focuses on employees in the business sector immediately after the exit from the general lockdown in April and the non-employed at that same point in time and examines the persistence of their situation until July according to personal characteristics, relative to the same period in 2019. Close to 6 percent of the employees in the business sector in April had lost their jobs by July, which is similar to the rate in 2019. Among the ultra-Orthodox, residents of the South district and workers with less than a year of seniority in their place of work, the rates were higher than in 2019; in contrast, they were relatively lower among the age 50 to retirement age group and among residents of the Jerusalem district and Judea and Samaria. Among the non-employed in April 2020, 30 percent remained in that situation until June and the rate remained basically unchanged in July.[13] The rates were much higher among the young up to the age of 29 and among individuals with a higher education; many of the service industries—which employ many uneducated workers—recovered following the first wave of infection and rehired some of them.

The gross rates of non-employment in July among employees in the business sector prior to the crisis—according to gender, age group, population group, family composition, level of education, ability to work from home (based on occupation[14]), seniority in one's place of work and salary—are presented in Figure 4. The high rates relative to those in the same period in 2019 among the young (and individuals without children) and workers after retirement age, the ultra-Orthodox, residents of the South and Jerusalem districts and Judea and Samaria, the relatively uneducated, individuals who are unable to work from home, individuals with less than a year of seniority in their jobs and low-wage earning individuals (in 2018) can also be seen in Figure 9.

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[13] According to the NII, about one-half of those eligible for the unemployment benefit due to the coronavirus crisis returned to work by mid-August and about three-quarters of the rest did not work for 19 weeks or more.

[14] Thanks go to Gilad Shalom for preparing this indicator.

In addition to the raw data on rates of non-employment just presented, we used a Logit specification to estimate the probability of someone who was employed in the business sector prior to the coronavirus crisis of being non-employed in July 2020 and one year prior to that. The estimation is therefore a difference-in-differences type of analysis, which creates two separate groups of employees from parallel periods. The independent variables include similar characteristics to those listed above and interactions between them and a dummy for 2020, the industry of employment before the crisis (or a year earlier), the month in which the respondent was surveyed prior to the crisis (or a year earlier) and also a dummy for 2020. Figure 5 presents the odds ratio for being non-employed relative to the base group, which is defined at the bottom of the graph, for 2020 (the columns) and 2019 (the circles). The odds ratio for the ultra-Orthodox was 1.30 in 2020, which means that their likelihood of being non-employed in July was higher by 30 percent than for non-ultra-Orthodox Jews (when their other characteristics are controlled for); in 2019 the likelihood of the ultra-Orthodox was about 5 percent higher than that of non-ultra-Orthodox Jews in that year and therefore their likelihood of being non-employed grew in 2020 by about 24 percent. However, the gap in the odds ratio between 2020 and 2019 is not statistically significant (perhaps due to the small number of ultra-Orthodox respondents). Furthermore, no statistically significantly differences were found between the likelihood of being non-employed in 2020 and the likelihood in 2019 according to gender and age group, Arabs versus non-ultra-Orthodox Jews, family status, part-time job versus full-time job, and district of residence. Exceptions are residents of the North and Haifa districts: their odds in 2020 relative to 2019 were lower by about 30 percent than residents of the Dan region. The lack of difference according to personal characteristics in the likelihood of being non-employed (given the industry of employment) is likely an indication that employers did not discriminate between workers when deciding whose employment to end.

The crisis in the labor market had a severe effect in several industries, as expressed in the contraction of number of employees in the business sector, which was sometimes accompanied by some drop in the number of actual workhours and therefore also a decline in labor input during the months of March and April, a phenomenon that diminished in May and June primarily. The industries that were most affected (see Figure 6) include art; entertainment and leisure; hospitality and food services; passenger transport; and retail trade (excluding food); in contrast, the high tech industries have been only slightly affected, if at all.

Figure 7 presents the change in the number of actual workhours per employee in the business sector in June 2020[15], in contrast to June 2019 for that same employee, compared to the parallel change a year earlier (in which other employees were surveyed). It can be hypothesized that the crisis in the labor market likely leads to two opposing phenomena: (a) a reduction in the number of employees' actual workhours due to the contraction in business activity and in businesses' opening hours; (b) an increase in employees' number of workhours because employers chose to let some workers go and their colleagues filled the gap. Figure 7 shows that the number of actual weekly workhours of employees who were working prior to the crisis in a part-time job and who continued to work during the crisis grew by an average of 2–4 hours, while it remained almost unchanged among those who worked prior to the crisis in a fulltime job. This finding is consistent with hypothesis (b) above, since the drop in the number of employees in the business sector who were employed in a part-time job[16]—many of which are temporary workers who are more common

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[15] The estimation was carried out for June because in July 2020 the timing of holidays was different than in 2019.

[16] Part-time/full-time is self-reported. The usual definition of a part-time position is less than 35 workhours per week; however, the goal here is to examine the differences in the trend of employment between those who work in full-time/part-time jobs in normal times, even if there was a change in their number of workhours due to the coronavirus crisis.

in the service industries that were more affected by the crisis—was more pronounced than the drop among fulltime employees.

The results of estimating the change in the number of actual weekly workhours between the period prior to the crisis and June 2020 (and in comparison to the same period in 2019), which is similar in format to the previous estimation, indicate that in 2020, relative to 2019, there were no differential changes according to personal characteristics in the number of actual weekly workhours. Exceptions are the uneducated and residents of the South district (relative to residents of the Dan region) who increased their number of workhours in 2020 by 2–3 hours relative to 2019. (Those in part-time jobs added an hour, although the addition is not statistically significant.) Neither were there any differences in the change in number of actual weekly workhours of employees between the various industries, which is similar to the raw data presented in Figure 6; in contrast, the number of actual weekly workhours per employee grew by about 4 hours in medium-technology manufacturing and in the retail food industry—an industry that flourished during the crisis—relative to low technology manufacturing.
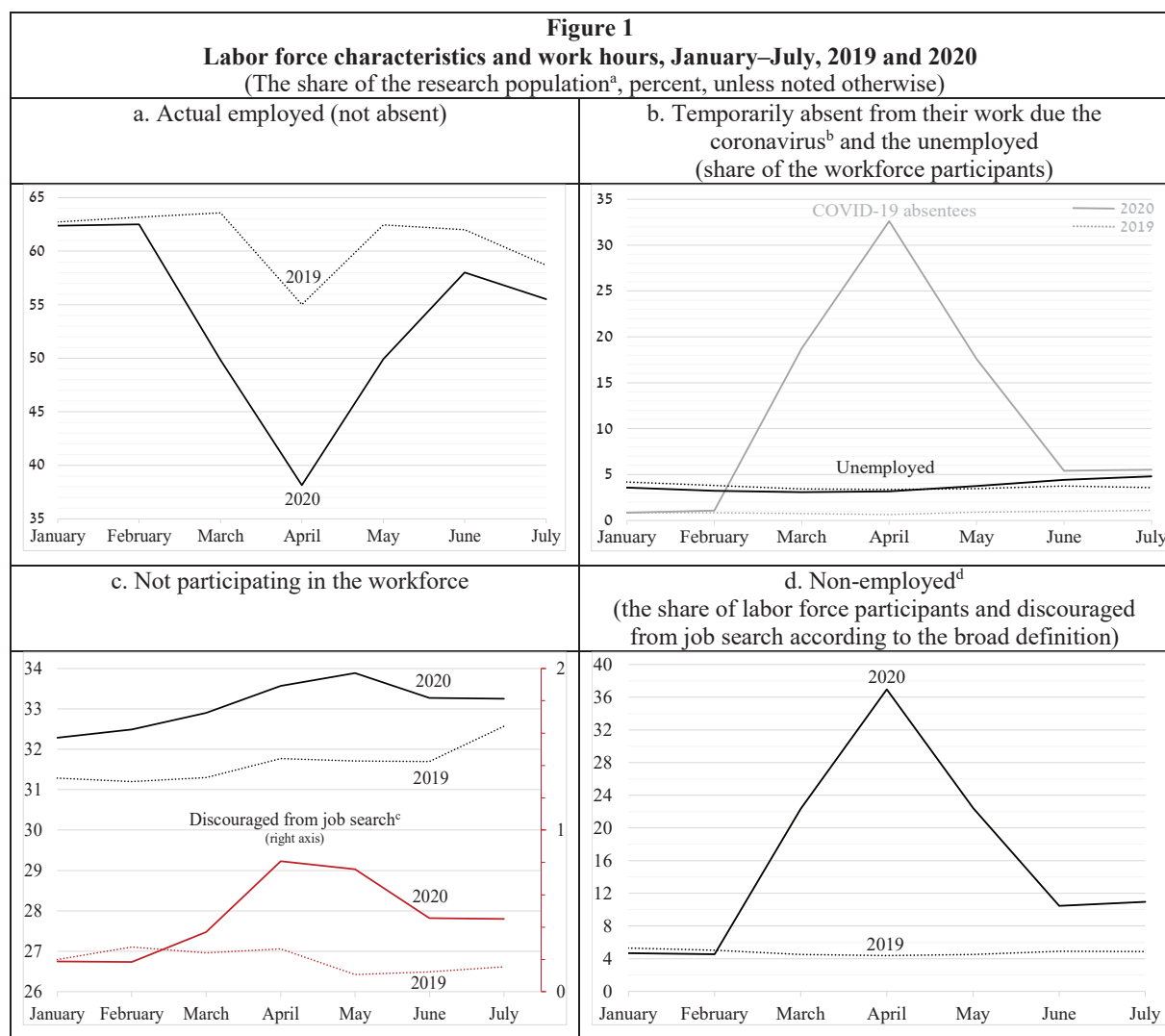
### 3. Calculation of the decline in labor income for households who lost earners

In this section, we calculate the decline in labor income (and the unemployment benefit) among households which prior to the coronavirus crisis included at least one employee (in the business/public sector) who lost his or her income during the crisis (see also Bank of Israel 2020a). Figure 8 presents the breakdown of number of adult employees in a household in July relative to their numbers prior to the crisis. In about 17 percent of households that had two employees (in the public/business sector) prior to the crisis, one employee lost his or her income (as opposed to about 11 percent of households a year earlier), and in about 2 percent of those households both employees lost their income (as opposed to less than 1 percent a year earlier); in about 13 percent of the households that had two adults and one employee, the employee became non-employed (as opposed to about 11 percent a year earlier). In more than 15 percent of households with one employed adult, the adult's employment was halted (compared to about 11 percent the previous year). The decline in the number of employees in households that included at least one adult employed in the business sector prior to the crisis was larger by, in general, 2–3 percentage points (not presented), since employment in the public sector was almost unaffected.

Figure 9 presents the distribution of wages per month in 2018 for employees prior to the crisis who were jobseekers (registered with the IES) in July 2020.[17] The graph shows that the income of jobseekers was much lower than for employees in general. Thus, for example, about 46 percent of jobseekers earned up to the minimum wage in 2018 (close to NIS 5,300 per month) in contrast to 30 percent of all employees. The graph also shows the unemployment benefit specified by law (the green lines whose values appear on the right-hand scale). The replacement rate between the unemployment benefit and wages prior to the unemployment period (the wage prior to unemployment is depicted by the grey diagonal) declines with wage level: thus, for example, among the 28+ age group of minimum wage earners the replacement rate is about 80 percent while it is only about 60 percent among the younger age group; in contrast, those who earn more than NIS 25,000 per month receive an unemployment benefit that is limited to about 10,500 per month. Since the income of jobseekers is relatively low during the coronavirus crisis and their replacement rate is relatively high, the adverse impact on their absolute income is in most cases limited.
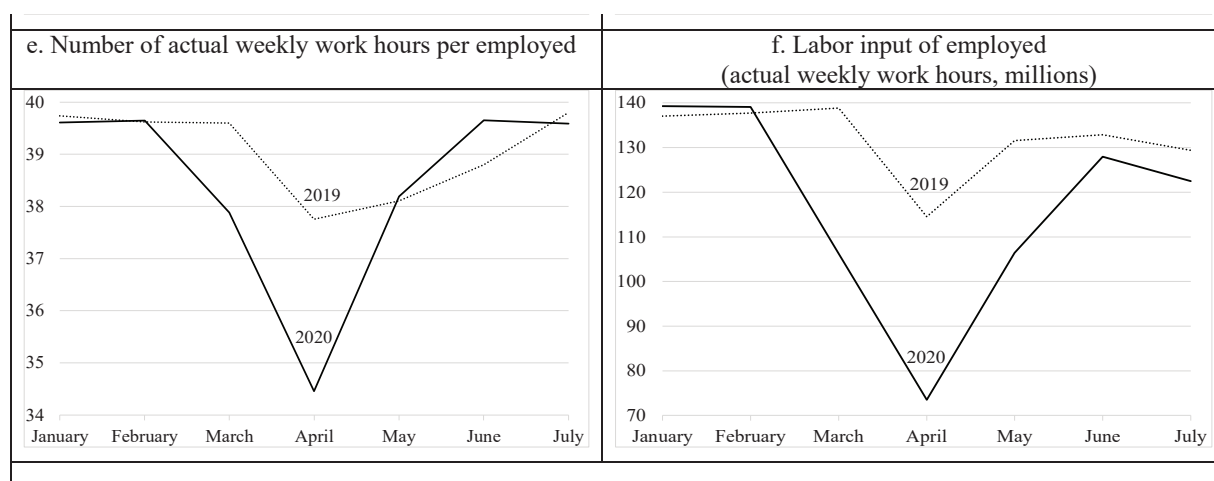
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[17] Some of the jobseekers had not informed the Employment Service by July that they had returned to work.

We calculated the drop in labor income (and the unemployment benefit) for households that had at least one adult employee prior to the crisis and at least one of the adult members of the household was a jobseeker in July 2020. The calculation took into account the unemployment benefit on the assumption that the jobseeker was eligible for it.[18] Figure 10 shows that the income of these households dropped by an average of 20 percent. While about three-quarters of the households whose monthly income was less than NIS 5,000 lost up to 20 percent, more than one-quarter of the households whose income was greater than NIS 20,000 lost more than 30 percent. A similar picture is obtained from an analysis of the drop in income among households of employees where at least one worked in the business sector prior to the crisis.

**Figure 1**
**Labor force characteristics and work hours, January–July, 2019 and 2020**
(The share of the research population[a], percent, unless noted otherwise)

a. Actual employed (not absent)

b. Temporarily absent from their work due the coronavirus[b] and the unemployed
(share of the workforce participants)

c. Not participating in the workforce

d. Non-employed[d]
(the share of labor force participants and discouraged from job search according to the broad definition)
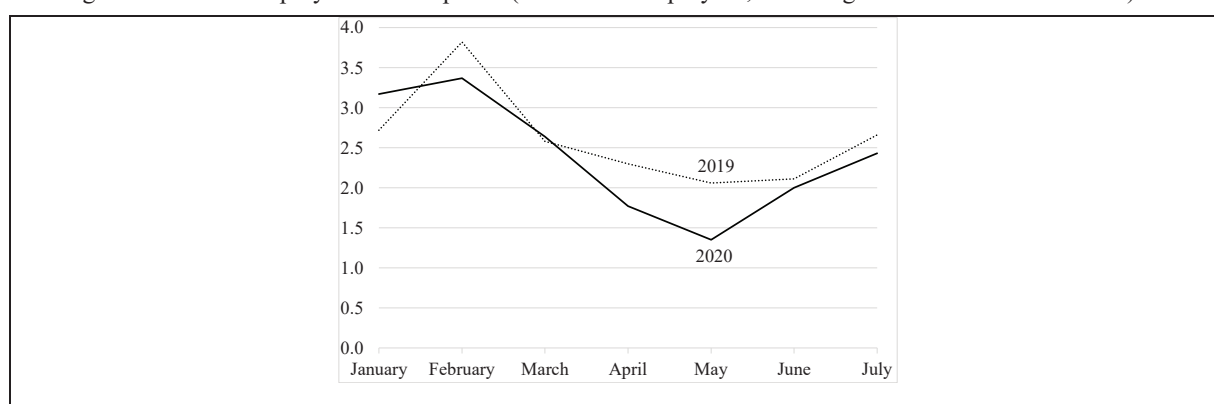


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[18] According to the National Insurance Institute (2020), about 92 percent of the applications for the unemployment benefit were approved by the end of June.

| e. Number of actual weekly work hours per employed | f. Labor input of employed (actual weekly work hours, millions) |
|---|---|



g. Share of new employees in workplace[e] (out of total employees, including non-COVID-19 absentees)



SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.

a Surveyed people above the general age for ending mandatory military service (including employees in both the public and business sectors and self-employed).

[b] COVID-19 absentees: Temporarily absent from their work due to a reduction in the scope of work, suspended operations of the business, and the reason "other" (in March–April 2020, also for the reason "because of the coronavirus").

[c] Discouraged from job search under the broad definition (which means it includes those who ceased looking for work "because of the coronavirus").

[d] Unemployed, COVID-19 absentees, and those who have given up looking for work under the broad definition.

[e] The share of new employees (actually employed and non-COVID-19 absentees) in the workplace (began to work there in the survey month or in the previous month) out of total employees in the workforce (including non-COVID-19 absentees). The data regarding the month of starting to work are missing for some of the employees and are not final.

**Table 1**
**Transition matrix between labor force statuses: July 2020 compared to before the coronavirus crisis[a], and compared to the corresponding periods of the previous year**
(distribution by row, in percent)

| Labor force status before the crisis (2019)/ Corresponding period in the previous year (2018) | | Labor force status in July (July 2020 compared with before the crisis – 2019 rows and the corresponding periods 1 year earlier – 2018 rows) | | | | |
|---|---|---|---|---|---|---|
| | | Employed (and non-COVID-19 absentees) | COVID-19 absentees | Unemployed | Not participating | Total |
| **Employed** (includes absentees)[b] | 2019 | 83.6 | 5.7 | 3.8 | 6.9 | 100 |
| | 2018 | 91.1 | 0.7 | 2.0 | 6.2 | 100 |
| **Unemployed** | 2019 | 53.8 | 4.5 | 19.1 | 22.6 | 100 |
| | 2018 | 60.7 | 19.5 | | 19.8 | 100 |
| **Not participating** | 2019 | 35.4 | 3.9 | 5.0 | 55.7 | 100 |
| | 2018 | 35.1 | 6.5 | | 58.4 | 100 |

SOURCE: Based on Labor Force Surveys of the Central Bureau of Statistics.
[a] Surveyed in panel 4 in months July–August and in panels 5–8 in July 2020, and the same in the previous year.
[b] Employees in the private sector.

**Table 2**
**Transition matrix between labor force statuses: July compared to the second half of April[a],**
**2020 and 2019** (distribution by row, in percent)

| Labor force status in April | | Labor force status in July | | | | |
|---|---|---|---|---|---|---|
| | | Employed (and non-COVID-19 absentees) | COVID-19 absentees | Unemployed | Not participating | Total |
| **Employed** (includes non-COVID-19 absentees)[b] | 2020 | 94.3 | 2.9 | | 2.8 | 100 |
| | 2019 | 94.2 | 2.0 | | 3.8 | 100 |
| **COVID-19 absentees**[b] | 2020 | 75.6 | 17.1 | | 7.3 | 100 |
| | 2019 | | | | | 100 |
| **unemployed** | 2020 | 49.0 | 51.0 | | 0.0 | 100 |
| | 2019 | 78.5 | - | | - | 100 |
| **Not participating** | 2020 | 22.8 | 12.1 | 9.1 | 56.0 | 100 |
| | 2019 | 22.9 | - | - | 68.7 | 100 |

SOURCE: Based on Labor Force Surveys of the Central Bureau of Statistics.
The sign "-" indicates a small number of surveyed people in the cell. In such cases, the values detailed in the row do not sum to 100 percent.
Cells with a value of less than 3 percent have limited reliability and thus the distribution of the unemployed as well.
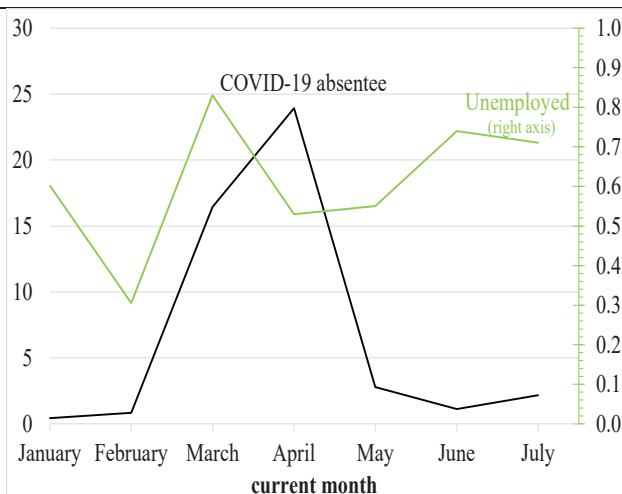[a] People surveyed in panels 1 or 5 in April. The "determining week" in the survey begins on April 19 and onward, when the general lockdown was cancelled. Note that in the first part of the month only a few people were surveyed, because of the general lockdown and the Passover holiday.
[b] Employees in the private sector.

**Figure 2**
**The probability of transitions in labor force statuses between consecutive months[a], January to July 2020**
(share of those switching from the previous month to the current month, percent)

| a. From an employee (including non-COVID absentee) in the business sector in the previous month to a COVID-19 absentee or to unemployed in the current month | b. From a COVID-19 absent employee in the business sector in the previous month to an employee or to a unemployed/discouraged from job search[b] in the current month |
|---|---|
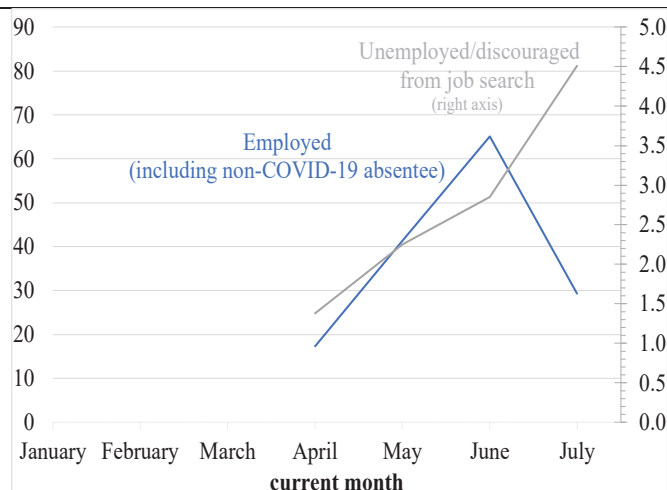


c. From unemployed in the previous month to discouraged from job search[b] in the current month
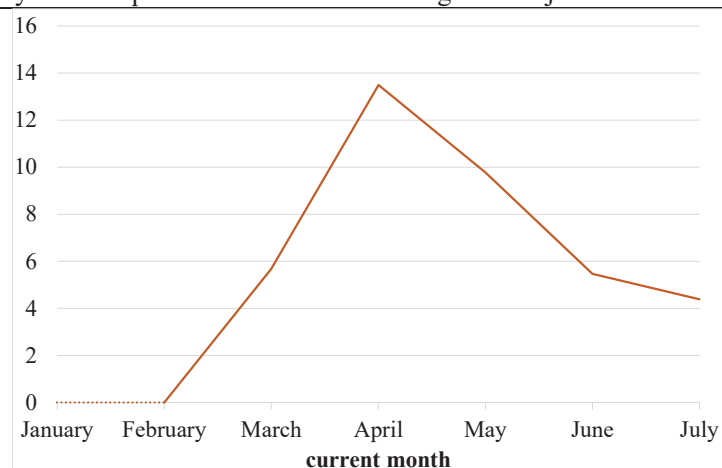


SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.
[a] Surveyed people in panels 1–3 and 5–7 in the previous month.
[b] Discouraged from job search in the broad definition (includes those who stop searching for work "because of COVID-19").

**Figure 3**
**Share of non-employed[a] and employees[b] in the second half of April 2020[c] who remained in their status until July, and the share in the corresponding period in 2019, by personal characteristics** (percent)

**Employees[b] in the Business Sector**



a. Total

b. By Personal Characteristics

**Non-employed[d]**



a. Total

b. By Personal Characteristics
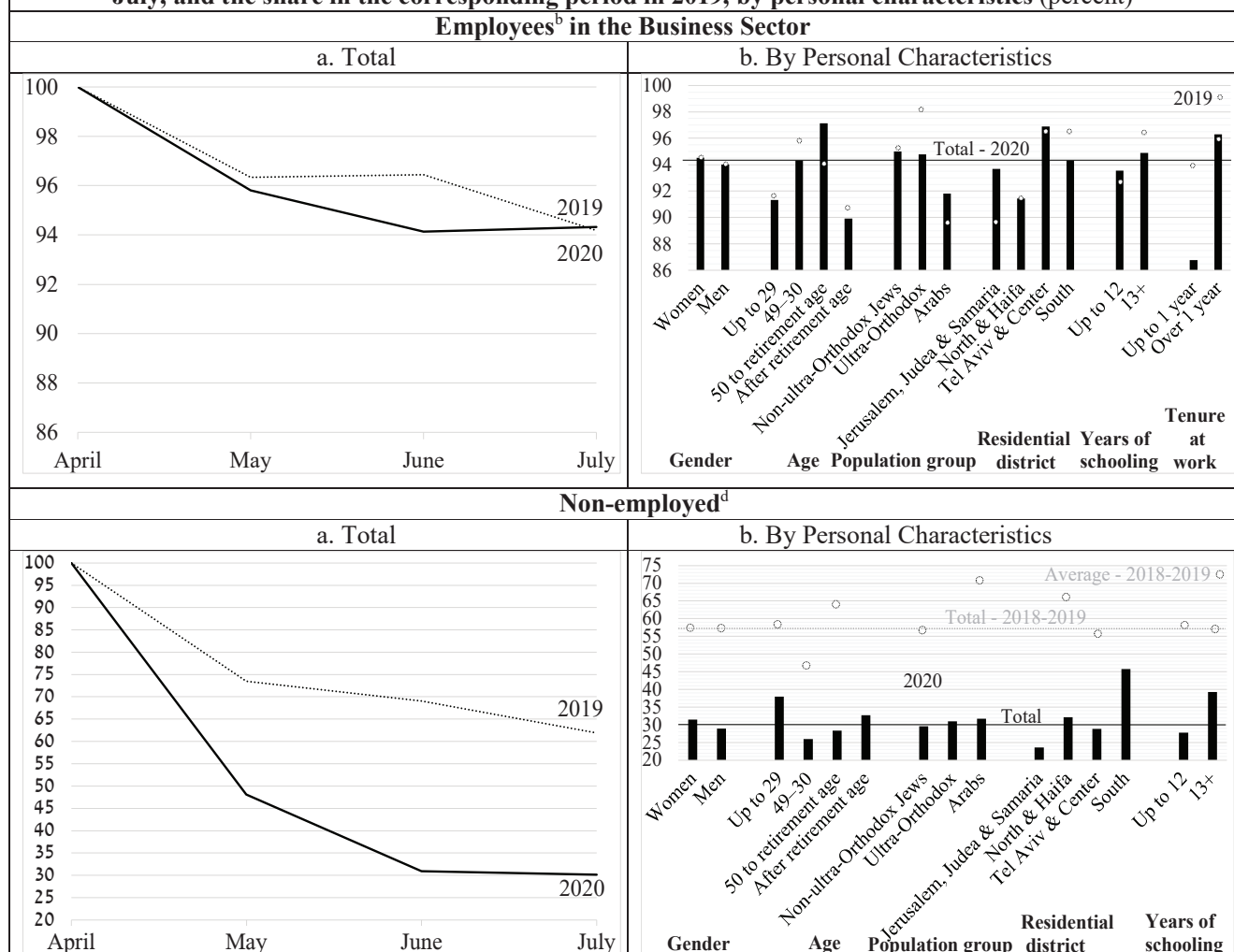
SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.
Data for 2020 for the South district have limited reliability, particularly regarding non-employed. Data for 2018–19 are not displayed for non-employed when the number of respondents is small.
[a] Unemployed, COVID-19 absentees, and those discouraged from job search under the broad definition.
[b] Including non-COVID-19 absentees.
[c] Surveyed people in panels 1 or 5. The "determining week" in the survey begins on April 19, 2020 and onward, when the general lockdown was cancelled. In the first part of April only a few people were surveyed due to the lockdown and the Passover holiday.
[d] The share of non-employed who remained non-employed or became non-participants (as opposed to those discouraged from job search under the broad definition, who are included in the non-employed group.)

**Figure 4**
**Share of non-employed[a] in July 2020 out of employees[b] in the business sector before the COVID-19 crisis[c],**
**and the share in the corresponding period in the previous year,**
**by socioeconomic-demographic characteristics[d] (percent)**



SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics and the Israel Tax Authority.

All the differences in the share of non-employed in 2020 compared with 2019 are statistically significant at the 1 percent level.

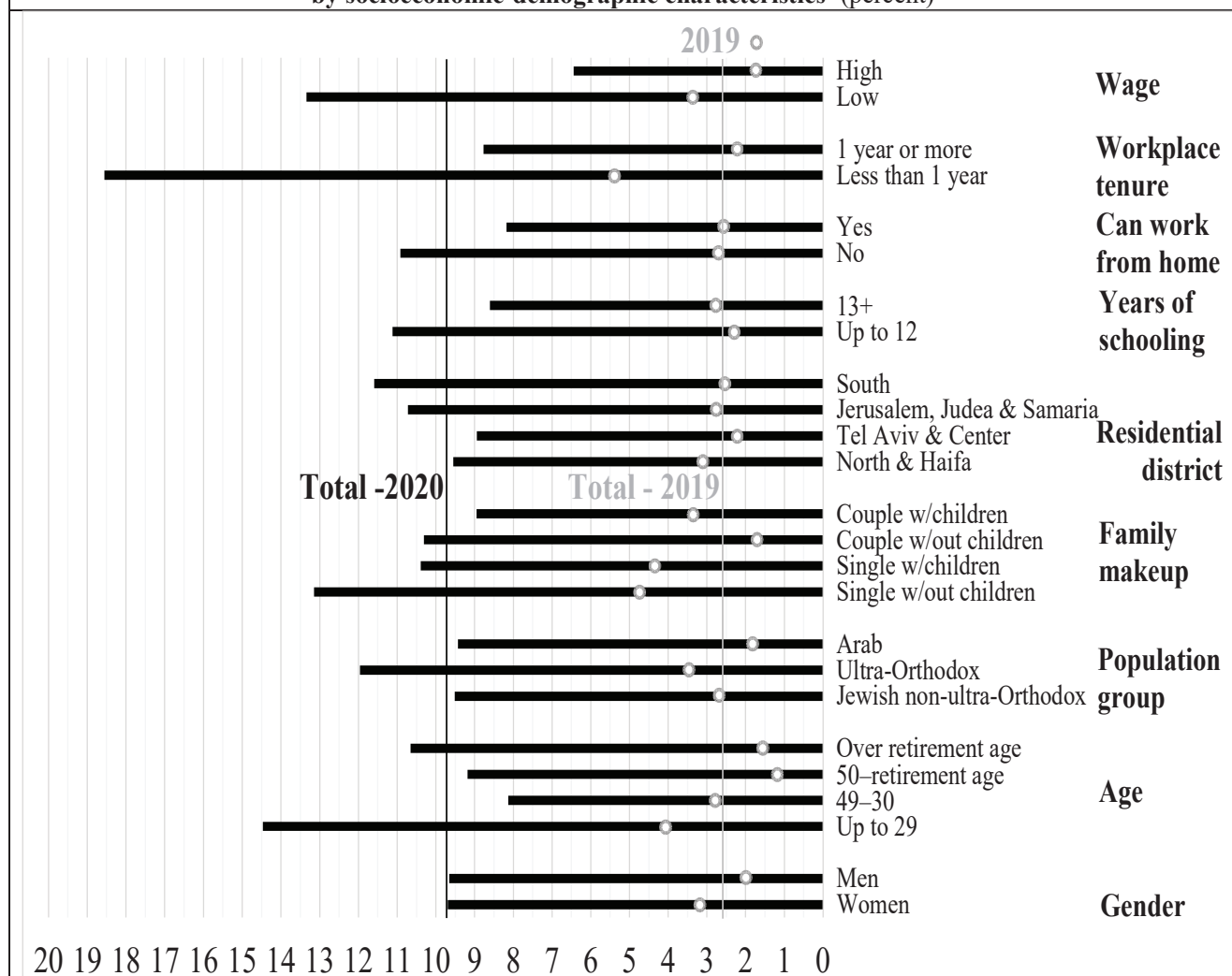[a] Unemployed, COVID-19 absentees, and those discouraged from job search under the broad definition.

[b] Including absentees.

[c] Surveyed people in Panel 4 in July–October 2019 (or 2018) as well as in panels 5–8 in July 2020 (or 2019).

[d] Workplace tenure: Calculated tenure at workplace in February 2020 (or 2019) in accordance with actual tenure before the coronavirus crisis (or in the corresponding period of the previous year), assuming that the surveyed person persisted at the same workplace until February. Can work from home: Based on adjusting the classification by Dingel and Neiman (2020) of occupations that allow work from home to Israel.

Wage: Gross annual income from employee labor in 2018 (low—below median, high—above median). The calculation was conducted only among those who earned a salary in 2018. Retirement age 62 for women, 67 for men.

**Figure 5**
**Probability of employees[a] in the business sector before the COVID-19 crisis[b] to be non-employed[c] in July 2020, and in the corresponding period in the previous year[d]** (odds ratio compared with the comparison group; the blue column marks a statistically significant difference in the odds between the two periods)
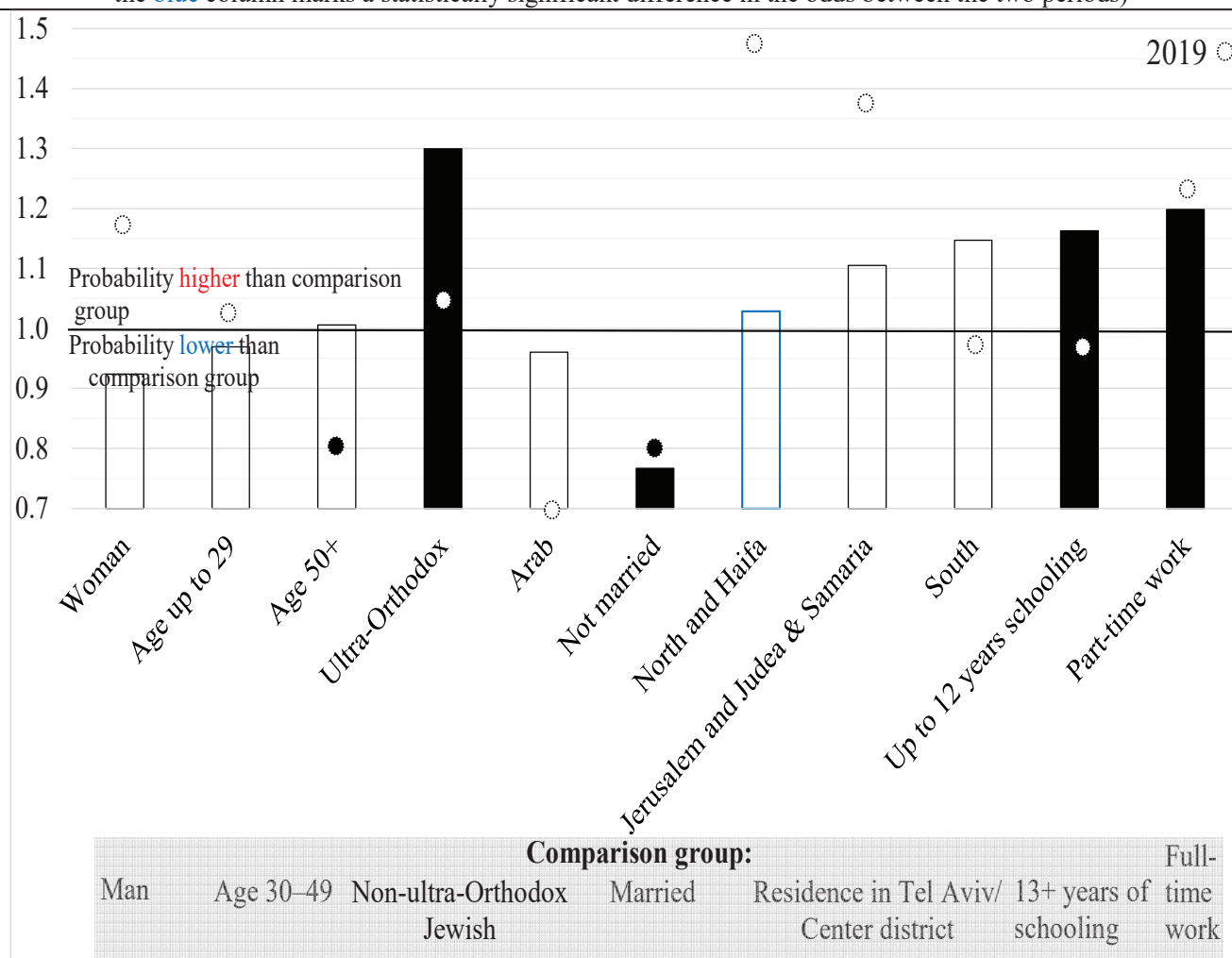


SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.
[a] Includes absentees.
[b] Surveyed people in Panel 4 in Labor Force Surveys in July–October 2019 (or 2018) as well as in panels 5–8 in July 2020 (or 2019). The estimations include only surveyed people up to retirement age (62 for women and 67 for men).
[c] Unemployed, COVID-19 absentees, and those discouraged from job search under the broad definition.
[d] The figure presents the odds ratio derived from a Logit estimation for the probability of being non-employed in July 2020 (or 2019) as dependent on the independent variables that are listed in the figure and the interaction between them and a dummy variable for 2020, the industry (at a 2-digit specification), the month in which the respondent answered the survey before the crisis (or during the corresponding period in 2018) and a dummy variable for 2020. Empty columns or circles denote estimates that are not statistically significant (at a 10 percent level).

**Figure 6**

**Change in number of employees, actual work hours per employed and total work hours (labor input), in selected industries in the business sector[a]**

(January to July 2020, compared with the corresponding month the previous year, percent)
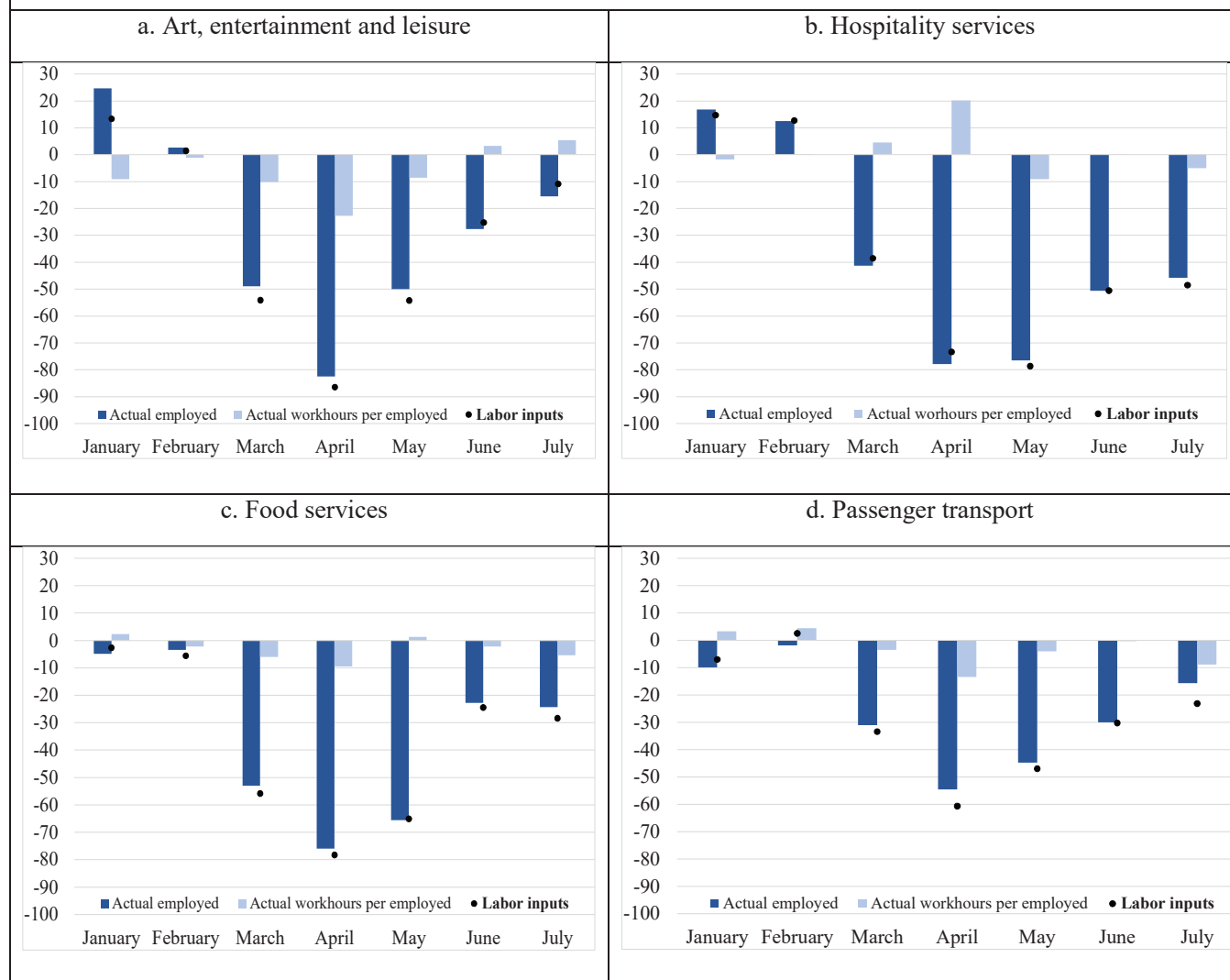
### a. Art, entertainment and leisure



### b. Hospitality services



### c. Food services



### d. Passenger transport

e. Retail trade (excl. food)

f. High technology
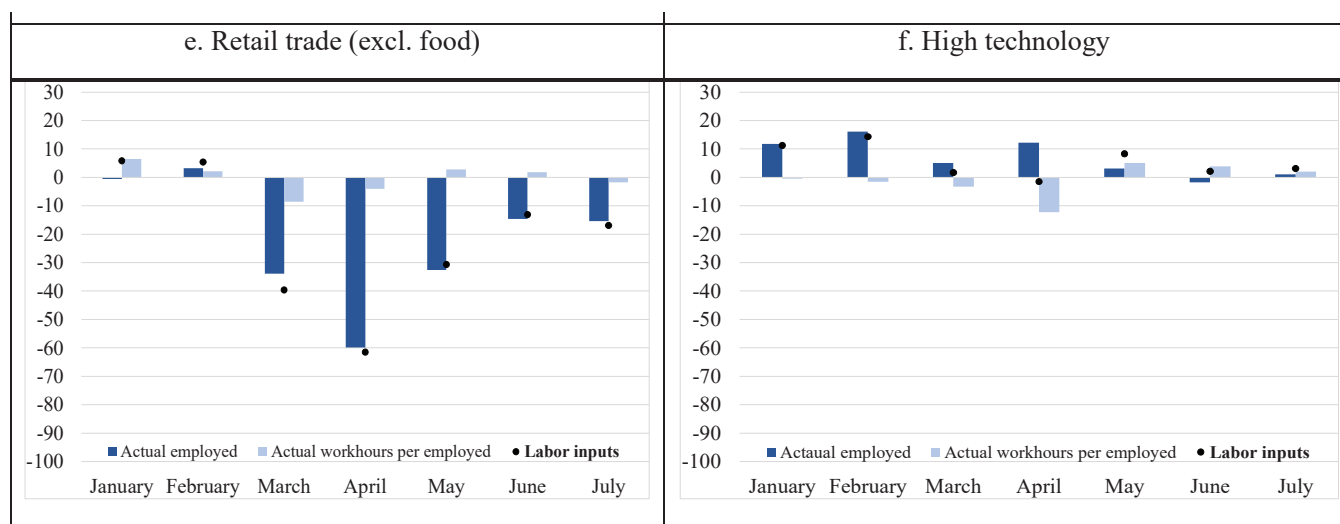
SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.

The above does not refer to following the same respondents (panel).

[a] Following are details on the classification into industries (in parentheses are the industry code), in the order they appear in the figure: Art, entertainment and leisure: Art, entertainment and leisure (90–93) and art productions (59); Hospitality services (55); Food services: Food and drink services (56); Passenger transport: Passenger transport via inter-city trains (4911), other overland transport of passengers (4921, 4924–4929), air transport of passengers (511); Retail trade (excluding food): Retail sales (excluding motorized vehicles and motorcycles) (47) except for retail sales in general trade stores that specialize in food, drink, and tobacco products (4711); High technology: Production of pharmaceuticals (21), manufacture of computers, electronic and optical equipment (26), production of aerial vehicles (303), computer planning, consulting in computer issues, and other related services (62), data processing, storage, and related services, and Internet gateway pages (631), and scientific and development research (73).

**Figure 7**

**Change in the number of business-sector employees' actual work hours: June 2020 compared with June 2019 and the same for 1 year previous**[a] (hours)
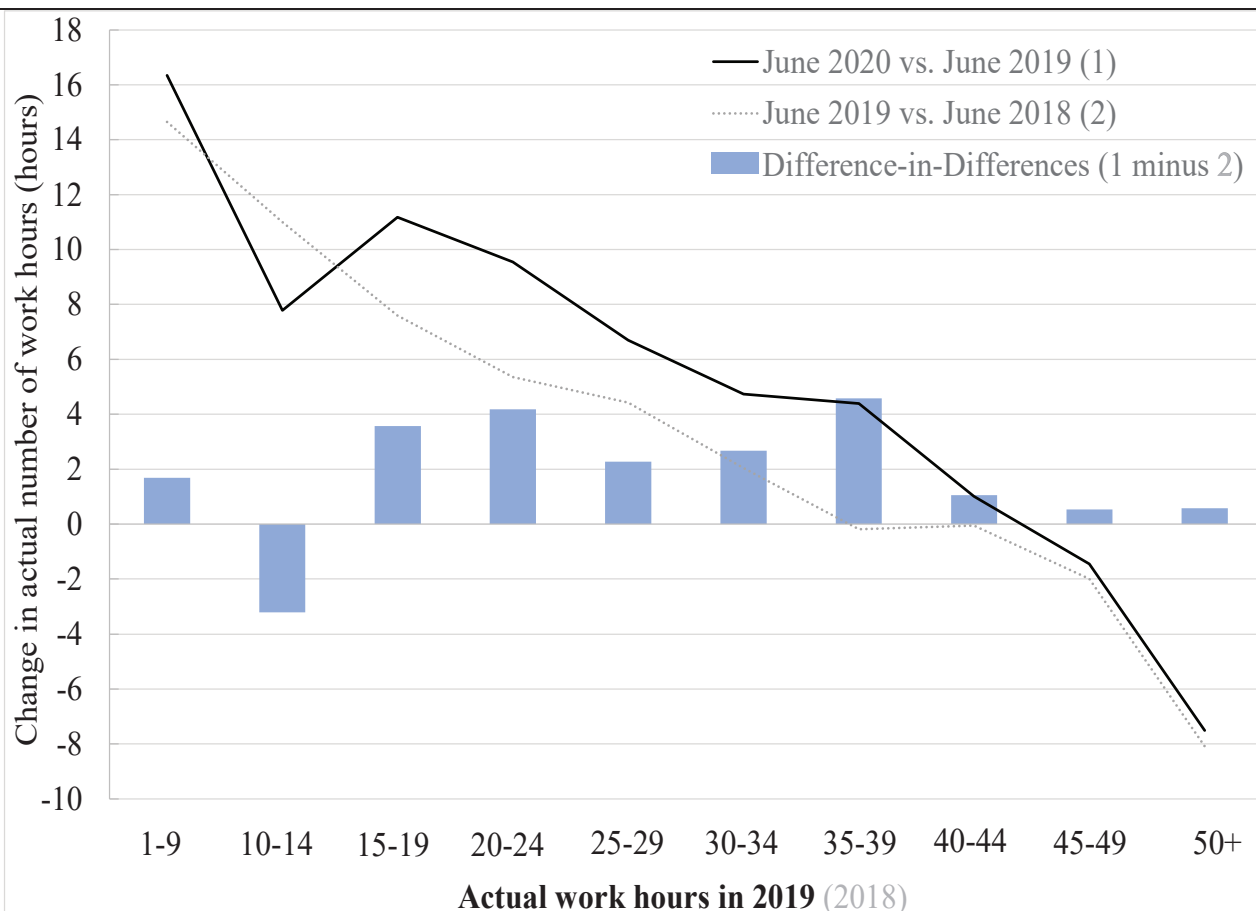


SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.

[a] Surveyed people in Panels 1–4 in June 2019 (or 2018) as well as in panels 5–8 in June 2020 (or 2019). The calculation was carried out for June because in July 2020 the vacation patterns were apparently different from the previous year (for example, only on part of the days of the week, an estimation that is backed up by the percentage of non-COVID-19 absentees being lower this year).

**Figure 8**
**Distribution of number of employees per household[a] in July 2020 by their number before the COVID-19 crisis[b], and the distribution in the corresponding period 1 year earlier** (percent)



SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics.

[a] The number of employed adults per household (surveyed person and his/her spouse). The calculation included only households in which there was at least 1 surveyed employee (including temporarily absent from work) before the crisis (in the corresponding period 1 year earlier). In July, an employee includes non-COVID-19 absentee. Households in which there were more than 2 adults and/or self-employed person before the crisis/in the corresponding period 1 year earlier were not included in household calculations, nor were those whose family status before the crisis/in the corresponding period 1 year earlier was different than that in July.

[b] Surveyed people in Panel 4 in July–October 2019 (or 2018) as well as in panels 5–8 in July 2020 (or 2019).

**Figure 9**
**Distribution of gross wage of employees and job seekers in July 2020[a], and the amount of calculated unemployment benefits[b] (per month)**
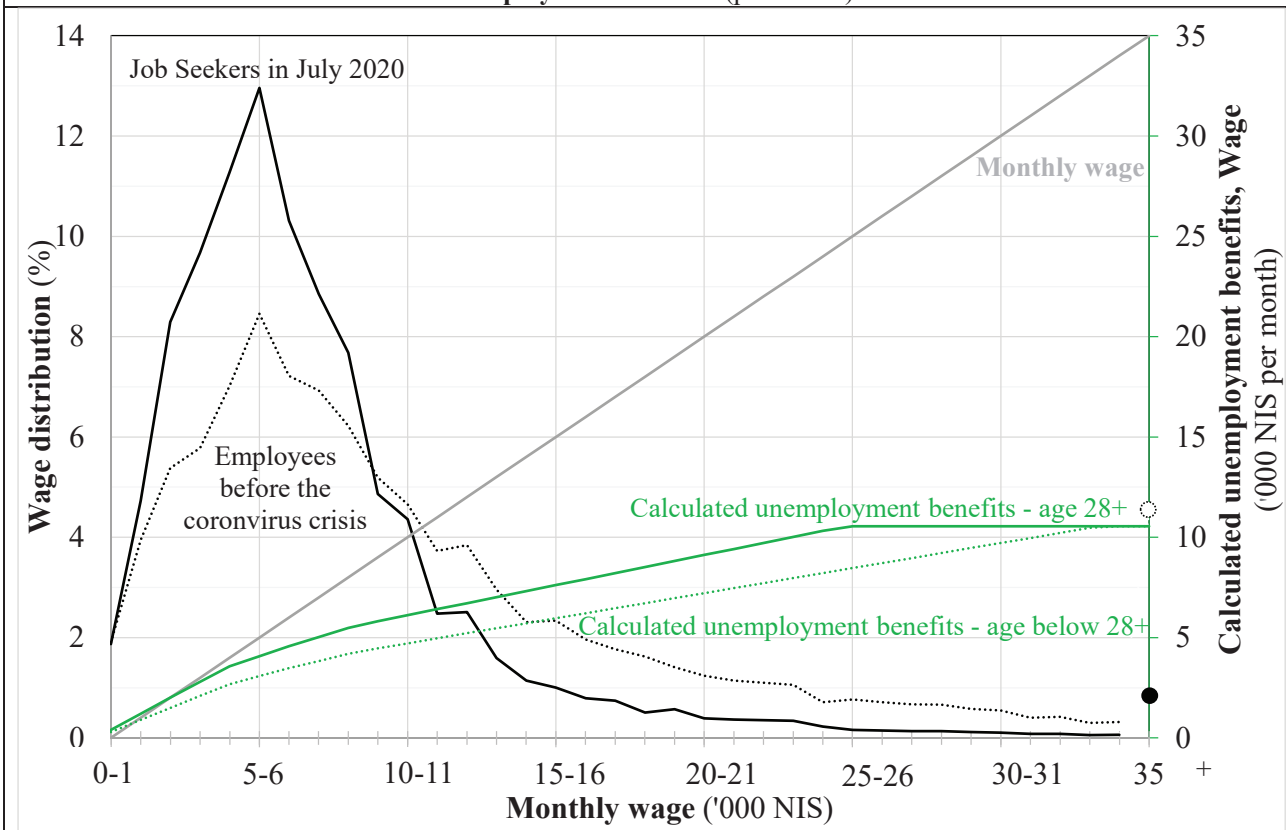


SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics, the Israeli Employment Service, and the Israel Tax Authority.

[a] Surveyed people who were employees in October 2019 through February 2020. Of which: New jobseekers in March 2020 and onward who by the end of July had not reported that they had returned to work.
Gross annual wage in 2018 (the last year for which data are available) divided by the number of months of work.

[b] Calculation of the amount of unemployment benefit assuming that the job seeker is eligible for it. Youth up to age 28—without children. Beginning from August 1, 2020, youth up to age 28 with children are eligible for unemployment benefits like people aged 28 and older.

**Figure 10**
**Estimation of the decline in gross income from wages (including unemployment benefits) of employee households before the coronavirus crisis[a], in which at least 1 of them was a job seeker in July 2020[b,c]**
(distribution within each wage group of households before the crisis, percent)



SOURCE: Based on the Labor Force Surveys of the Central Bureau of Statistics, the Israeli Employment Service, and the Israel Tax Authority.
[a] Households with at least 1 employed person (including temporarily absent from work) in July–October 2019. The calculation does not include households in which there were more than 2 adults and/or a self-employed person during the period.
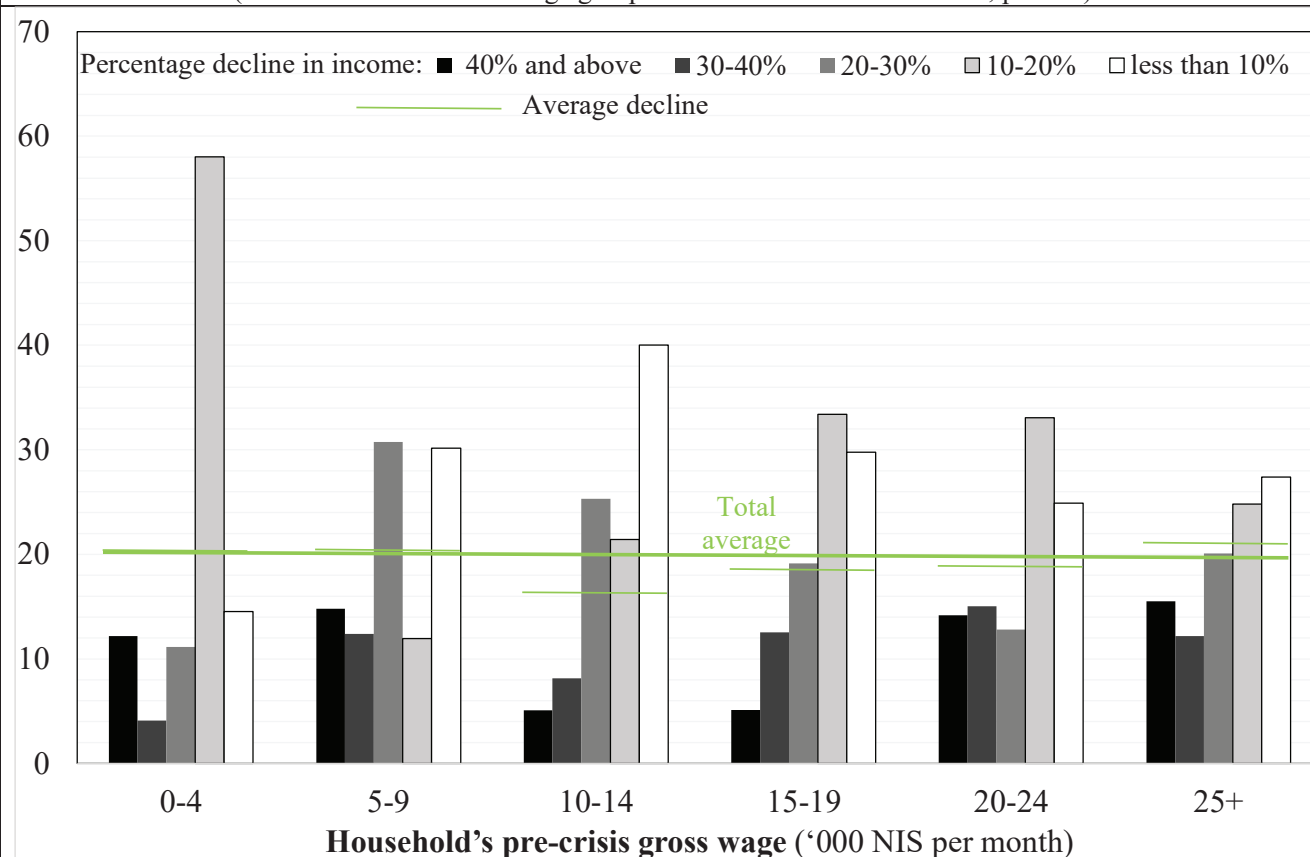[b] New job seekers from March 2020 and onward that as of the end of July had not reported to the Israeli Employment Service that they had returned to work.
[c] Following is the manner of calculating the household's gross monthly income: the household's wage before the COVID-19 crisis—the average gross monthly wage of the surveyed person and his/her spouse in 2018 and provided that they were employed (or absent) before the crisis. Households of job seekers in July 2020—the calculated unemployment benefits of the job seekers provided that they were employed (or absent) before the crisis, and the average gross wage per month of work in 2018 of the job seeker's spouse provided that they were employed (or absent) before the crisis, or zero in a case in which both were job seekers; the calculation was only carried out among households in which the working (or absent) adult before the crisis received a wage in 2018. In calculating the household's income, the income support allowance was not taken into account. (In February 2020 there were approximately 71,000 recipients of the allowance and in July there were 83,000.)

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# PROFILE OF THE RESIDENTIAL LPG MARKET IN ISRAEL[1]

- The residential liquid petroleum gas (LPG) market in Israel is divided into consumers who are supplied in storage tanks (where gas is streamed to a storage tank), and consumers who are supplied with cylinders. The gas companies are divided into large veteran companies that dominate the market, and smaller new gas companies. Price differences between the large and small companies are especially large (approximately 40 percent) for consumers with storage tanks, which are commonly used by multifamily buildings. Price differences for gas in cylinders are small, around only 7 percent.
- The small price difference for gas in cylinders reflects the fact that the large companies charge much lower prices for gas in cylinders compared to gas in storage tanks. The small gas companies sell gas in both types of delivery modes (channels) at similar prices.
- The differences in price differentials between the large and small companies for gas in cylinders and in storage tanks are explained by switching barriers, which are higher for customers with storage tanks, compared to customers who consume gas in cylinders.

## Introduction

Residential gas (LPG) in Israel is distributed via two main delivery modes (channels): gas in cylinders, mainly delivered to private homes, and gas in bulk, mainly streamed directly to storage tanks in multifamily buildings. In delivery by cylinder, the companies replace an empty cylinder with a full one. Stored gas is streamed into a permanent tank located near the consumers' building. The market has 4 veteran companies with large market shares and several relatively new companies with small market shares. In Israel, the price of residential gas is not regulated and in theory the conditions are those of a free market, yet customers with storage tanks face high costs of switching from one supplier to another. Customers who consume gas in cylinders face lower switching costs.

A study we conducted using a unique Ministry of Energy database on LPG prices by locality, supplier, and delivery mode (storage tank or cylinder) found that average prices for LPG in storage tanks are much higher compared to LPG in cylinders, and that the veteran companies charge higher prices than do the new companies. This difference is large for LPG in storage tanks, and is small for LPG in cylinders.

| Table 1 | | | | | |
| --- | --- | --- | --- | --- | --- |
| Average price1 of 1 cubic meter LPG (simple mean of all localities where at least two gas companies operate), by delivery mode, in NIS | | | | | |
| Storage tanks[2] | | | Cylinders | | |
| Large/veteran companies | Small/new companies | Price differential | Large/veteran companies | Small/new companies | Price differential |
| 37.0 | 26.1 | 41% | 27.2 | 25.4 | 7% |
| [1] 2018:Q4 [2] Includes fixed storage tank maintenance costs. | | | | | |

The goal of this study is to identify the factors underlying the price differences between the veteran and new gas companies, the higher prices for LPG in storage tanks compared to LPG in cylinders, and the excessive price differences between the veteran and new companies for LPG in storage tanks. The study was based on an analysis of empirical data on the features of localities and insights from a formal model of the LPG market. Identification of the potential factors underlying these price differences supports recommendations of policy instruments to reduce consumer prices, especially for LPG gas consumers in storage tanks, without detracting from service quality.

## a. Profile of the industry, data and descriptive statistics

### a1. Profile of the industry

Several companies operate in the residential gas (LPG) market, which can be divided into the following groups (Milard, 2014): Four large or veteran companies and approximately 22 small or new companies, based on 2018:Q1 data.[2] In 2016, the four largest companies in the residential market controlled approximately 85 percent of the market.[3]

The average cost of LPG (refinery gate price[4]) plus excise tax and VAT, between 2018:Q2 to end 2019:Q1, was approximately NIS 6.3 per cubic meter (2.352 kg). In contrast, the average residential consumer price of LPG in storage tanks ranged from NIS 25.6 to NIS 35.9, for new and veteran companies, respectively, and from NIS 25.9 and NIS 27.8 for LPG in 12-kg cylinders,[5] for new and veteran companies, respectively. Based on the Consumer Price Index, LPG expenditures accounted for approximately NIS 1.8 billion per year or 0.35 percent of total household expenditure.[6]

Government policy:[7] Until 1989, entry into the market and gas prices were both regulated. In that period, the market was controlled by three companies. In 1989, Dor Gas entered the market but had a limited impact on the competition due to its small size and the fact that it operated primarily in the institutional market. In 1995, regulation of residential gas prices was removed, and in 2008, the government approved a reform to increase competition in the LPG market. Today, prices are unregulated and no significant regulatory entry barriers exist. The Gas Economy Law (Promoting Competition in LPG for Residential Use) 2008, under the 2008 Arrangements Law, regulates the operations of and relations between the large and the small companies. The Gas (Safety and Licensing) Law, 5749-1989 regulates safety of use of LPG. The regulator (the Ministry of Energy) supervises the gas suppliers and investigates safety incidents in this sector.

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[2]  Companies that supply gas in 12-kg cylinders or in bulk to residential consumers.

[3]  The Antitrust Authority, Final report – Supply of LPG to Households through a Central Gas System, Jerusalem, January 23, 2017 (25 Tevet, 5777). In addition, the four largest companies were responsible for 88 percent of all removals of LPG from the refineries and from imports for the residential and institutional sectors in 2014, according to Milard (2014), and for 80 percent of the removals in 2020, according to a personal communication with Nahum Yehoshua, Chief Economist of the Fuel Administration of the Ministry of Energy (September 29, 2020), excluding removals designated for the Palestinian Authority.

[4]  According to import price at the refinery gate.

[5]  For additional information on the calculations, see notes to Table 4.

[6]  The calculation is based on average monthly household expenses for consumption in the amount of NIS 16,267 (Household Income and Expense Survey 2017), residential gas expenses (which account for 0.0355 in the Consumer Price Index, revised in 2019), and the number of households (approximately 2.587). A year has 12 months and therefore residential consumers' annual LPG expenses total NIS 1.79 billion.

[7]  The chronological presentation of regulatory changes in this sector is brief. For additional information, see Milard (2014) and the Antitrust Authority (2017).

In 2011, the Committee for Economic and Social Change[8] studied the LPG distribution segment and found that residential consumers unjustifiably pay almost twice as much as institutional customers: These price differences are not explained by differences in the marketing or delivery costs in these segments. The Committee's findings indicate that market failures are caused by two main barriers: the cost of switching from one supplier to another for LPG in storage tanks, and the ad hoc discounts that the veteran companies give to consumers in order to deter the small companies. The Committee estimated that households' excess cost as a result of these market failures is approximately NIS 150 million a year. In 2015, the Ministry of Energy first published a database of LPG prices (see additional information in section A2 – Database). In the following years, the information appearing on consumers' gas bills was made more accessible,[9] the terms for multifamily residents' decision to switch companies were relaxed, and several issues related to the financial reconciliation between outgoing and incoming gas companies were resolved.[10,11]

| Table 2 Profile of Residential Use of LPG, by Delivery Mode | | |
|---|---|---|
| | **Storage tanks** | **12-kg cylinders** |
| Consumer type | Typically multifamily building | Typically private home |
| Gas bill | Includes a fixed fee and payment for gas | Payment for gas only |
| Switching suppliers | Complicated: Written consent of at least one-half of the building residents, or a decision by a tenants' meeting on the basis of a majority[1] of the tenants attending the meeting. Outgoing supplier's ability to engage in price discrimination between residents undermines efforts to switch. At the same time, one resident may be strongly committed to the issue and will take action on behalf of all residents. Storage tanks are the property of the gas company. In the event of a switch, the incoming gas company must purchase the storage tank or replace it and replace the gas meters. | Simple: Cylinders are on loan from the gas company (in exchange for a deposit). A customer who switches to another gas company, returns the cylinders to the outgoing company and receives a refund for their deposit, or gives the cylinders to the incoming gas company and the companies reconcile their accounts (including the customer's deposit). |
| Price discrimination | Current company may engage in price discrimination, even between the residents of the same building. | Price discrimination is permitted |
| Information | A database of prices by locality gives consumers information on the companies that operate in each locality and the average price they charge, by delivery mode (for additional information, see below). | |
| [1] For additional information on the rules for a resolution to switch to a new gas supplier in a multifamily building, see https://www.nevo.co.il/law_html/Law01/286_075.htm. | | |

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[8]  Based on State Comptroller's Annual Report 68A, 2017. The Trachtenberg Committee (the Committee for Economic and Social Change) was established in July 2011 in response to the social protest, and submitted its recommendations to the government on August 10, 2011.

[9]  Information on tax invoices is used to identify addresses of additional gas consumers connected to the same central gas system, and facilitates a transition from one supplier to another.

[10]  Various amendments to the Land (Substitution of a Gas Supplier That Supplies Gas via a Central Gas System) Law, 5761-1991.

[11]  The steps to improve competition noted herein are related to the switching barriers that affect storage tank LPG consumers. For additional action on barriers to entry and expansion of small gas suppliers (limited manufacturing capacity and storage capacity), see Antitrust Authority (2017).

This comparison highlights the switching barriers that exist when customers switch from one company to another, especially customers with storage tanks.[12] The Ministry of Energy also found the following indications of a lack of competition in this market: an absence of switching, a large range of prices despite the homogeneity of the product, concentrated market and highly stable market shares, and high profitability for companies.[13]

Several potential factors explain the price differences between the new and veteran gas companies, and the excess price differences between the new and veteran gas companies charged to customers with storage tanks: switching costs for customers in storage tanks are higher than switching costs for customers with cylinders, due to the requirements of building residents' consent and replacement of equipment; the state of competition—the number and composition of companies and the features of their competition in each locality—which may vary across delivery mode; differences in quality (quality of service and reputation) between outgoing and incoming companies; and differences in cost.

The high switching costs for customers with storage tanks stem from the following factors, among others: the need for a collective decision by all building residents in order to switch suppliers, where such consent must be obtained pursuant to mandatory legal rules. In contrast, customers with cylinders make decisions independently. The switching costs for customers with storage tanks are also higher than the switching costs for customers with cylinders because a portion of the equipment installed in the building is unique and cannot be used by other companies. In contrast, in the case of cylinders, most of the equipment is movable, and the gas companies conduct a reconciliation process among themselves, which reduces switching costs.

## a2. Database

The Ministry of Energy database contains data on average residential gas prices by locality, supplier, and delivery mode (storage tanks and 12-kg cylinders). The database was designed to promote competition through consumer price transparency, similar to the database of retail prices in Israel and many price databases in use around the world, such as the database of transport gasoline prices used in several European countries. The database of LPG prices in Israel allows consumers not only to compare prices but also to identify the companies that operate in their locality.

The database contains 3-month moving averages for each month. Based on data from 2018:Q2 to 2019:Q1, LPG in storage tanks is available in 113 localities,[14] and LPG in 12-kg-cylinders is available in 195 localities (see Note 1 to Table 3).

## a3. Statistical data

There is no restriction that prevents small or large gas companies from operating in all localities, in any delivery mode. Table 3 indicates that small companies have a stronger presence in the stored LPG segment than in the cylinder LPG segment. In other words, in the storage tanks segment, small gas companies operate in the majority of localities in which at least two gas companies operate; This is the case in 87 out

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[12] Small (new) companies also have capacity limits. This study does not address these barriers.

[13] The Ministry of Infrastructure and Energy, Fuel and Gas Administration, "The LPG economy, background, competition failures, proposed tools, 2014.

[14] Cities and local councils.

of 103 localities. In the cylinder segment, the presence of small companies is more limited: They operate in only 97 of the 163 localities in which at least two gas companies supply LPG in cylinders, due to the relatively limited presence of small companies in general, and specifically in Arab localities (for additional information see Table 7).

| | Table 3 | | | | |
|---|---|---|---|---|---|
| | Characteristics of the mix of companies in localities by delivery mode[1] | | | | |
| Delivery mode | Mix of gas companies | No. of localities | Average population (in thousands) | Household size | Socio-economic cluster |
| Storage tank | Localities in which both large and small gas companies operate | 87 | 91.3 | 3.4 | 5.9 |
| | Localities in which only large gas companies operate | 16 | 17.9 | 3.2 | 5.6 |
| Cylinder | Localities in which both large and small gas companies operate | 97 | 76.0 | 3.4 | 6.1 |
| | Localities in which only large gas companies operate | 66 | 16.8 | 3.7 | 4.3 |
| 1 Localities in which at least two gas companies operate. LPG in storage tanks is also delivered in an additional 10 localities in which only one gas company operates. LPG by cylinder is delivered in an additional 16 localities in which only one gas company operates. Sixteen localities were eliminated due to problematic data concerning the gas companies operating in them. | | | | | |

Table 4 examines the average prices and price differences between large/veteran companies and small/new gas companies, in both delivery modes, by locality type, and the mix of gas companies. For each locality, we calculated the average price and standard deviation, and used them to calculate the average across all localities. The prices of the veteran companies are higher than the prices of the new companies; The standard deviation is larger with respect to LPG in storage tanks compared to LPG in cylinders. The same outcomes were also obtained in more homogeneous locality groups such as cities, local councils, and Jewish towns, and in localities in which the conditions of competition were similar.[15]

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[15] For LPG in storage tanks, the average price charged by large companies in localities where no small companies operate is significantly higher than the price charged by large companies in localities were small companies operate alongside them. See Table 6 for additional information.

| | **Table 4** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Weighted average price[1] of LPG per cubic meter, by delivery mode, company size, and locality type[2], 2018:Q4 (standard deviation of prices in parentheses)[3] | | | | | | | |
| | Weighted price of 1 cubic meter LPG – storage tanks[4] (in NIS) | | | | Weighted price of 1 cubic meter LPG – cylinders[5] (in NIS) | | | |
| Locality | No. of localities | New gas companies | Veteran gas companies | Difference (%) | No. of localities | New gas companies | Veteran gas companies | Difference (%) |
| All localities | 103 | 26.1 | 37.0 | 41 | 164 | 25.4 | 27.2 | 7 |
| | | (6.0) | | | | (2.2) | | |
| Cities | 66 | 26.7 | 37.2 | 40 | 71 | 25.8 | 28.8 | 12 |
| | | (6.0) | | | | (2.4) | | |
| Local councils | 37 | 24.9 | 36.5 | 46 | 93 | 24.9 | 26.0 | 5 |
| | | (5.9) | | | | (2.4) | | (2.1) |
| Jewish localities only | 102 | 26.1 | 36.9 | 41 | 106 | 26.1 | 29.6 | 13 |
| | | (6.0) | | | | (2.7) | | (2.7) |
| All localities in which small and large gas companies operate[6] | 87 | 26.1 | 36.2 | 39 | 97 | 25.5 | 28.9 | 13 |
| | | (6.0) | | | | (2.6) | | |

[1] When calculating averages, all localities were given equal weight. Weighted average by population size generated similar results.

[2] Localities in which at least two companies operate, including cities and local councils, but excluding regional councils.

[3] Standard deviations were calculated per locality and delivery mode, and then the average of all localities by delivery mode was calculated. Standard deviation calculations included all the localities, including

[4] In storage tanks, price includes fixed fees per 1 cubic meter LPGs. Fixed fees are based on average LPG consumption of 3.824 cubic meters per two months, and weighted by household size, because we assumed that gas consumption is a direct function of household size (also see footnote 23).

[5] There are no fixed fees for cylinders. We calculated the price of 1 cubic meter based on 12-kg cylinders. One cubic meter of LPG weighs 2.352 kg.

[6] In a small number of localities, only large gas companies operate.

In Table 5, we examine the differences between new and veteran companies in localities with different socioeconomic profiles. We find that prices are lower in localities with larger households, perhaps because these families have larger current LPG expenses and therefore presumably make more of an effort to obtain a lower price. We find this trend in ultra-Orthodox localities where LPG prices in storage tanks are especially low.[16] Although we have no evidence to support this, ultra-Orthodox localities may have a stronger tendency toward involvement in community consumer activities, which helps lower prices. However, even excluding the ultra-Orthodox localities from all localities with large household size, the prices in this group remain much lower than in other locality groups, although prices are not as low as in ultra-Orthodox localities. A division by socio-economic cluster, excluding ultra-Orthodox localities, highlights that price differences in most socio-economic clusters are similar.

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[16] Information on the price of cylinder LPG in these localities is scare and therefore not presented herein.

**Table 5**

Weighted average price of LPG per cubic meter, by delivery mode[1], company size, and locality profile, 2018:Q4
(standard deviation of prices in parentheses)

| | Weighted price of 1 cubic meter LPG (in NIS) | | | | | |
|---|---|---|---|---|---|---|
| | Storage tanks | | | Cylinders | | |
| Locality profile | New gas companies | Veteran gas companies | Difference (%) | New gas companies | Veteran gas companies | Difference (%) |
| Localities with above-average household size | 24.5 | 34.2 | 40 | 24.8 | 26.2 | 6 |
| | (5.4) | | | (2.1) | | |
| Localities with below-average household size[2] | 28.4 | 40.4 | 42 | 26.5 | 29.4 | 11 |
| | (6.7) | | | (2.4) | | |
| Ultra-Orthodox localities[3] | 20.1 | 26.4 | 31 | | | |
| | (3.9) | | | | | |
| Low socioeconomic cluster (1-3)[4] | 27.7 | 37.8 | 36 | 23.3 | 24.3 | 4 |
| | (6.1) | | | (1.7) | | |
| Intermediate socioeconomic cluster (4-7) | 26.9 | 39.4 | 46 | 25.9 | 28 | 8 |
| | (6.7) | | | (2.3) | | |
| High socio-economic cluster (8-10) | 26.4 | 36.3 | 38 | 26.5 | 30.7 | 16 |
| | (5.6) | | | (2.9) | | |

[1] For definitions of terms, see Table 4.

[2] The differences between the prices paid by larger-than-average households and the prices paid by smaller-than-average households are statistically significant at a level of 1 percent, both for storage tanks and cylinders.

[3] The localities that were included are: Elad, Efrat, Beit El, Beitar Ilite, Bnei Brak, Givat Zeev, Modiin Ilite, Emanuel, Zefat, Kedumim, Kiryat Arba, Kiryat Yearim, and Rechasim.

[4] Not including ultra-Orthodox localities.

Table 6 presents price differences for LPG in storage tanks charged by large companies, between localities where only large gas companies operate and localities where both large and small gas companies operate. We find that in the first group of localities, prices are approximately 17 percent higher than in the second group. In contrast, the price differences of large companies between those two locality groups for LPG delivered in cylinders are negligible. Similar results are observed in homogeneous localities, specifically in Jewish localities (see note 2 to Table 6).

**Table 6**

Average prices of LPG in localities where only large gas companies operate and in localities where both large and small gas companies operate (standard deviation of prices in parentheses)

Weighted price of large companies LPG per cubic meter

(in NIS)

| Storage tanks | | | Cylinders | | |
|---|---|---|---|---|---|
| Localities where only large gas companies operate[1] | Localities where both large and small gas companies operate | Difference | Localities where only large gas companies operate[2] | Localities where both large and small gas companies operate[2] | Difference |
| 40.9 | 35.1 | 17% | 24.8[2] | 26.0[2] | -5% |
| (6.0) | (5.9) | | (1.6) | (2.2) | |

[1] To maintain homogeneity of the localities, we included only localities where 2–4 gas companies operated. We compared the localities in which only large companies operated to localities with a similar number of operating companies that included at least one small company. If we eliminate ultra-Orthodox localities from the calculation of average LPG prices in storage tanks, and localities in which competition exists between suppliers of storage tanks and gas in cylinders, very few localities remain. The average price in localities with only large companies then increases to NIS 42.8, and the average in localities where both large and small companies operate has little meaning, due to the small number of localities.

[2] The average prices charged by large companies that supply gas in cylinders in localities where only large gas companies operate are based on a relatively large number of Arab localities, while the average prices charged by large companies that supply gas in cylinders in localities where both large and small gas companies operate are based on a relatively small number of Arab localities. When all Arab localities were excluded, the difference was not affected: The average price charged by large companies in localities with only large companies is NIS 28.2, and in localities with both large and small companies is NIS 29.5. In the study period, only one Arab locality had consumers of LPG in storage tanks.

**Table 7**

Mean price in cylinder and characteristics of the mix of gas companies in Arab and Jewish localities

| | | Price[1] | Average no. of gas companies per locality | Population (in thousands) | Population in low-rise construction (in thousands) | Socio-economic cluster | Household size | No. of localities |
|---|---|---|---|---|---|---|---|---|
| Arab localities | Small gas companies | 22.2 (1.3)[2] | 3.1 | 24.2 | 20.2 | 2.9 | 4.6 | 17 |
| | Large gas companies | 22.9 (1.4) | 2.6 | 15.7 | 14.2 | 3.0 | 4.3 | 57 |
| | | | | | | | | |
| Jewish localities | Small gas companies | 26.1 (2.9) | 6.0 | 69.0 | 8.2 | 6.2 | 3.4 | 81 |
| | Large gas companies | 29.6 (2.7) | 5.4 | 57.8 | 7.2 | 6.1 | 3.3 | 106 |

[1] In all localities where at least two gas companies operate, we calculated the mean prices of small companies (if any) and of large companies. In calculating the means, the same weight was attributed to all localities.

[2] Standard deviations were calculated as follows: First the standard deviation was calculated per locality, and then the average standard deviation was calculated across all localities in each category. Therefore, For example, the standard deviation for price of small companies in Arab localities (1.3) is the average of the standard deviations of all 17 Arab localities in this group.

Table 7 indicates that in Arab localities, the average prices are lower and price differences are much smaller, compared to Jewish localities. The average number of companies that operate in each locality is smaller in Arab localities, and few new companies operate in these localities.

In Arab localities, similarly to ultra-Orthodox localities, families are larger and gas expenses are greater, and therefore it is reasonable to assume that consumers will invest greater efforts to obtain lower prices. Arab localities are typically classified in lower socioeconomic clusters, and they may also have a tendency toward collective consumer activism. These consumer features promote competition and low prices. Despite the large potential customer base for consumers who use gas cylinders (households in low-rise construction), a relatively small number of gas companies operate in each Arab locality, which is not surprising in view of the lower profitability in these localities.

## b. Analytical model of switching costs to explain the findings

Empirical literature on consumer switching costs has focused on identifying evidence of such costs in various sectors, including mobiles phones and bank accounts (Shy, 2002), and local gas (Giulietti et al., 2005, which was based on a consumer survey). The topic of the current study is the residential LPG market. Beckert and Siciliani (2017, 2019) developed a model of policy effects under switching costs. The current study focuses on policy effects in the residential LPG market in Israel.

Theoretical literature on switching costs is extensive, and its roots can be traced to work by Klemperer (1987), who developed a two-period model. Works by Chen (1997), Beckert and Siciliani (2017, 2019), Shaffer and Zhang (2000), Biglaiser et al. (2016) and Bouckaert et al. (2012) are the most similar to the current study, as like the current study, they assume heterogeneous and continuous switching costs.

For the sake of simplicity, we model the state of competition in a locality to include two companies that simultaneously announce their prices, and aim to maximize their profits.[17] The LPG market is a mature market where all market share is already occupied by the existing companies,[18] in contrast to a market for a new product, such as Internet connectivity, where all the companies are new in the market and compete to gain a share of the market. In a mature market with significant switching costs, consumers are "locked in" by the companies currently operating in the market, and these can charge higher prices as a result. If a new company enters this market, it will be forced to lower its price to persuade the consumers to switch, and to compensate them for their switching costs.[19] If only two companies operate in such a market and they control similar market shares, both companies have little incentive to increase their market share by lowering their price.

The predictions of our model are consistent with the findings of local price differences between large (veteran) gas companies and small (new) gas companies, as a function of delivery mode (gas in storage tanks—in which switching costs are high, or gas in cylinders). The high cost of switching for consumers who consume LPG in storage tanks allows the veteran companies to charge higher prices without losing a significant market share: Most consumers will pay a higher price rather than switch. High switching costs also force new companies to reduce their prices to attract consumers. Consequently, average prices and price differences between veteran and new companies are expected to be higher in the storage tanks segment, which is consistent with the data (see, for example, Table 4). This finding was obtained despite

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[17] The Bertrand equilibrium.

[18] Obviously this is a simplistic description of the situation and disregards the emergence of new consumers in the locality.

[19] According to the literature, the period in which a company attempts to attract consumers through low prices is known as "invest," while the period in which it benefits from consumers' switching costs due to high prices is known as "harvest."

the fact that the cost of LPG in storage tanks is presumably lower than the cost of cylinder-based service, because a storage tank contains a large volume of LPG and the filling cost per unit of gas is presumably smaller.

Switching costs may also be a function of residents' socioeconomic status. For example, household size per locality is an indication of the average monthly volume of gas consumed per household,[20] and large households will cover their switching costs more quickly than small households, and therefore the former will make a greater effort to switch despite switching costs, compared to the latter. The findings presented in Table 5 on the low prices in localities with large households (even after excluding ultra-Orthodox localities) are consistent with the predictions of our analytical model.

Another market feature that dissuades consumers with storage tanks from switching is that price discrimination is permitted: Companies may offer specific consumers with storage tanks prices that are lower than the prices paid by other consumers with storage tanks for the same service. In such event, residents who wish to switch may discover that the supplier granted a discount to other residents in the same building, which undermines their efforts to switch.

## c. Summary and policy recommendations

This study examined LPG prices as a function of locality, gas company size, and delivery mode (storage tanks or cylinder) in the final quarter of 2018, and was made possible by the availability of a unique database on residential LPG prices by company and locality. The study found that for both delivery modes—storage tanks and cylinders—the veteran gas companies in the residential LPG market charge higher prices than the new gas companies, and the price differences between large and small companies for LPG in storage tanks are greater than for LPG in cylinder. Findings also show that LPG prices in storage tanks are significantly higher in localities where new gas companies do not operate, compared to localities in which new gas companies operate alongside veteran companies. These findings are in line with the predictions of an analytical model in which high switching costs (for consumers of LPG in storage tanks) allow the veteran companies to charge higher prices. Switching cost effects are also a function of the socioeconomic status of the locality. For example, large households are able to more quickly recover switching costs compared to small households, and ultra-Orthodox and Arab localities are characterized by a tendency toward community action, which leads to lower prices.

Findings point to a considerable difference between the LPG prices charged by the large gas companies for LPG in storage tanks (a segment in which switching barriers are apparently higher due to the need for cooperation among building residents and the consent of the majority of residents for a switch) and the prices charged for LPG in cylinders (a delivery mode that allows consumers to act independently, and in which switching is a relatively simple act). Consequently, a policy change to reduce switching costs may reduce the excess costs of consumer of LPG in storage tanks. An important element in such policy is increased consumer access to information on prices and the identity of the companies that operate in

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[20] According to an analysis of the Central Bureau of Statistics 2017 Household Income and Expenditure Survey, for 52 major localities, the mean gas bill in ultra-Orthodox localities (Beitar Elite, Bnei Brak, and Zefat) is 29 percent higher than in non-ultra-Orthodox localities. This finding, together with the low LPG prices in these localities, indicates that the gas consumption of households in ultra-Orthodox localities is much higher than in non-ultra-Orthodox localities.

their locality, which is made possible by the Ministry of Energy database[21] that is based on the periodic reporting requirements of gas companies regarding gas prices in each locality. Furthermore, switching costs may additionally be lowered by relaxing the conditions for switching in multifamily buildings. For example, a new policy may relax the requirement to obtain the consent of a majority of the building residents to switch, or may limit gas companies' ability to engage in price discrimination between similar consumers. It is also possible to enhance the process of reconciliation between the incoming and outgoing gas companies with respect to the building storage tank.

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[21] This is a prevalent global trend. In Israel, the retail price database promotes transparency.

# THE SCHOOL VACATION STRUCTURE IN ISRAEL AND ITS RAMIFICATIONS ON THE LABOR MARKET[1]

- A survey conducted among parents of preschool and lower grade school children shows that the structure of school vacations in Israel might have an adverse impact on labor productivity: More than 15 percent of respondents reported that they or their spouses took their children with them to work on those days, and between 5 and 11 percent of respondents or their spouses were absent from work without taking vacation days. In addition, about half of the respondents said that school vacations have a detrimental impact on their work.

- According to the survey, about half of the parents support greater synchronization between school vacations and workdays (through cancelling schooling on Fridays, while turning vacation days into regular school days). Fifteen percent of respondents were opposed to the idea. Support for the program is lower among teachers and parents who work on Fridays.

- Responses to the survey show that implementation of the synchronization program could have a positive impact on labor productivity: 31 percent of respondents believe that it would have a beneficial effect on them at work while just 8 percent believe that it would have a detrimental effect on them.

- Seventy-seven percent of those supporting the program said they would continue to support it even if work from home is allowed during school vacation days, and just 2 percent of supporters would oppose it under such circumstances. The two main reasons given for continuing to support the program were that it is difficult to work from home when the children are on vacation, and that they would like the children to have an educational framework on those days.

- About one-third of parents responded that they would send their young children to the proposed noncompulsory Friday care programs ("Friday care"), at their own expense. However, it is plausible to conclude that up to about half of all parents at the relevant ages may send their children to Friday care programs.

## 1. Background

During school and preschool vacation days on which work places continue to operate normally, working parents are forced to find care arrangements for their young children. These arrangements may entail parents taking time off work or disrupting their workday, thus adversely affecting their labor supply and labor productivity. Another option to resolve the problem of these vacation days involves payment for alternative care frameworks, which increases the financial burden on the parents. The vacation issue has become more acute with the growing labor force participation rates in recent years.

In Israel, the number of vacation days in the school system that are regular work days in the rest of the economy is high by international comparison, even though the number of school days in Israel is not low.[2] At the same time, and as opposed to other countries, the education system in Israel operates six days a week. Consequently, there is a significant lack of synchronization between the vacation days of parents

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[1] Authors: Kobi Braude and Yossi Margoninsky. We wish to thank Maya Haran Rosen and Guy Segal for their constructive comments and Dima Vasilyev for his considerable assistance with the data processing.

[2] Yossi Margoninsky and Guy Segal, *Characteristics of School Vacations in Israel—Costs to the Economy and Policy Alternatives*, November 2019, at https://www.boi.org.il/he/Research/DocLib1/pp-201911h.pdf (in Hebrew).

and their children. This problem is compounded by the relatively low number of annual vacation days to which Israeli workers are entitled, compared with other advanced economies. In the past few years, the government has run two programs to overcome the problem, partially at least—one in the first part of the long summer vacation and the other in the midterm vacations centered around the Jewish festivals. Margoninsky and Segal (2019) estimated that the cost to the economy of running these programs is roughly balanced by the benefit they provide (loss of GDP avoided due to them); but these programs only provide a partial solution to the problem of lack of vacation synchronization.

According to Margoninsky and Segal (2019), the problem could be better solved by increasing the synchronization between the parents' vacations and those of schoolchildren by cancelling school on Friday and shortening vacations during the course of the school year as well as shortening the summer vacation. This would reduce by more than half the discrepancy in vacation days and according to the estimate would increase GDP by at least two billion shekels a year.[3] In addition to increasing the synchronization, Margoninsky and Segal propose introducing noncompulsory Friday enrichment programs, at the parents' expense, for preschoolers and lower-grade schoolchildren ("Friday care"), which would help households in which both parents, or families with a single parent, work on Fridays.

This paper presents the findings of a survey that examined the ways in which parents currently cope with the various school system vacations, the extent to which mechanisms introduced by the government have helped them, and the way in which parents perceive the impact of the present situation on their functioning in the work place. The survey also examined the parents' positions regarding the synchronization program and the proposed Friday care.

Using the results of the survey, we can assess the ramifications of the present situation on the labor market and the benefit that the program is expected to bring in this context, as perceived by the parents and reflected in their conduct. The results show that there is extensive support for the synchronization and Friday care programs, the implementation of which would increase productivity in the economy without any additional budgetary cost. The proposal could be included as part of a broader move to increase labor productivity in the economy – one of the main long-term challenges facing the Israeli economy.

## 2. The survey

For the purpose of this paper, a designated Internet based survey was conducted in August 2020 among a nationwide sample of 1,200 parents to children aged 4–12,[4] where the target population for this survey was parents who, in 2019, had at least one child aged 3–11. The subject of care for children below the age of 3 requires a separate discussion.[5] The minimum age at which parents are willing to leave a child alone at home, unsupervised, may vary from one household to another. At present, the government runs two programs for children up to age 9—midterm vacation school (centered around the Jewish festivals)

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[3]  According to the calculation prepared by Margoninsky and Segal (2019) for 2019. The calculation relates to gross salary and is one billion shekels, which in terms of GDP is two billion shekels when taking into account the cost of labor in its entirety and the return on equity.

[4]  After adjustment for respondents who noted that they have no custody for their children, the number of observations is 1,158.

[5]  Programs for the supervision and care of children up to age 3 also operate on many of the days on which there is no school. They raise questions about the resulting financial burden, but this is a somewhat separate issue from the synchronization discussed here, which centers on the effect on working parents and not on the financial burden.

offered to children aged 3-9, and summer vacation school offered to children aged 6-9. Since some of the parents may believe that the minimum age should be higher, the survey examined the parents' attitude to this subject up to age 11.[6] The findings described below refer exclusively to the 1,016 respondents in the Jewish population.[7]

The first part of the survey addressed characteristics of the parents' work and the arrangements they make with regard to care for their young children (age 3-11) during preschool and school vacations. It is emphasized that the respondents were asked to comment on the previous school year (2019) in their replies—in other words, the year preceding the onset of the COVID-19 crisis, in which there were no disruptions in the labor market and school system due to the pandemic. The second part of the survey addressed the parents' positions on the proposed program and its repercussions, to the extent that it is implemented once the pandemic is over.

| Table 1 Descriptive statistics: Study survey vs. CBS Household Expenditure Survey (2018) (Every group as a percentage of total observations in the sample) | | |
|---|---|---|
| | **Study survey[a]** | **Household Expenditure survey[b]** |
| Women | 56.2 | 52.3[c] |
| Ultra-Orthodox[d] | 15.5 | 20.2 |
| Jerusalem district | 10.1 | 12.1 |
| North district | 8.7 | 9.7 |
| South district | 11.3 | 14.0 |
| Age 25–34 | 25.5 | 15.1 |
| Age 35-49 | 69.1 | 69.2 |
| Age 50-59 | 5.2 | 13.3 |
| Employed | 96.7 | 84.3 |
| Spouse employed | 92.0 | 86.0 |
| Both spouses not working | 0.3 | 3.8 |
| Both spouses employed | 89.0 | 74.0 |
| Has a spouse[e] | 93.3 | 88.8 |
| Holds a Bachelors degree or higher | 56.5 | 42.4 |

a. Jewish sector. Household with at least 1 child ages 3–11

b. Jews and others. Household with children ages 5–14.

c. Percent of women out of total heads of households and their spouses.

d. Self-defined by respondent.

e. The study survey: Raises his children with a spouse (though the spouse may not live in the same house). Household Expenditures Survey: There is a spouse in the household. Because of the differences in definitions (that can derive from, for example, divorce arrangements) the difference in the share of the groups in the 2 surveys does not necessarily indicate lack of representation in the survey of parents.

[6]  Margoninsky and Segal (2019) note that the vacation school program was designed initially to cover 5-11 year olds.

[7]  Sampling error in the survey: 3.1 percent. A review of the raw data for the survey showed that the sample does not properly represent the Arab sector. Use of the survey data for this sector might therefore distort the results and affect their reliability.

To examine the extent to which the survey sample is representative of the target population, Table 1 presents a comparison of the share of different groups in the survey sample with their share in the Central Bureau of Statistics 2018 Household Expenditure Survey. The data in the Central Bureau of Statistics (CBS) survey refer to households in the Jewish sector with children aged 5-14, so that, to the extent possible, they are comparable with the population in the present survey.

The table indicates that in the present survey, respondents with higher education are significantly over-represented, women have a slightly higher representation than in the CBS survey, and the geographical distribution is similar, while the ultra-Orthodox account for a lower share than in the CBS survey. (In both surveys, respondents were characterized as ultra-Orthodox by self-definition.) The employment rates of ultra-Orthodox parents are similar to those of the non-ultra-Orthodox and substantially higher than in the CBS survey. It is therefore possible that the survey does not accurately reflect the ultra-Orthodox population in its entirety and its opinions on the issues discussed here. The average age of participants in the present study is lower than in the CBS survey, although this might be more to do with the fact that the present survey relates to households with younger children than in the benchmark groups in the CBS survey, rather than indicating a problem of representation.[8] Due to differences in the definition of household income in the two surveys, it is impossible to compare the distribution of income between them.

Employment rates among participants (and their spouses) in the present survey are substantially higher than in the CBS survey. Thus, for example, only 3 percent of respondents reported that they did not work at all in 2019. The survey therefore does not sufficiently represent population groups that do not participate in the labor market. Nonetheless, it should be noted that both the problem of vacation synchronization discussed here and the proposed program primarily concern working parents.[9] In this sense, the survey does in fact focus on the relevant population.

The opinions of parents in households in which one or both spouses lost their place of work or were placed on unpaid leave as a result of the COVID-19 pandemic regarding school vacations and support for the program, were no different from those who retained their jobs (Tables 4 and A-2).[10] This result substantially reduces—but does not rule out—the concern that the shocks in the labor market in the wake of COVID-19 make it difficult to project the findings of the present survey on the parents' opinions once the pandemic is over. Nonetheless, some differences were found with respect to the intention to use Friday care, as will be detailed below.

## 3. Parental conduct and opinions on the present situation

The lack of vacation synchronization is a problem on those days on which the education system is on vacation while the rest of the economy works normally. For this purpose, we identified three separate groups of vacation days: individual vacation days on various dates spread throughout the school year (Lag Ba'omer and the days following Jewish festivals ["Isru Chag"]); the two long midterm vacations during

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[8]  In the CBS survey, children are grouped by age groups make it impossible to compare identical ages in the two surveys.

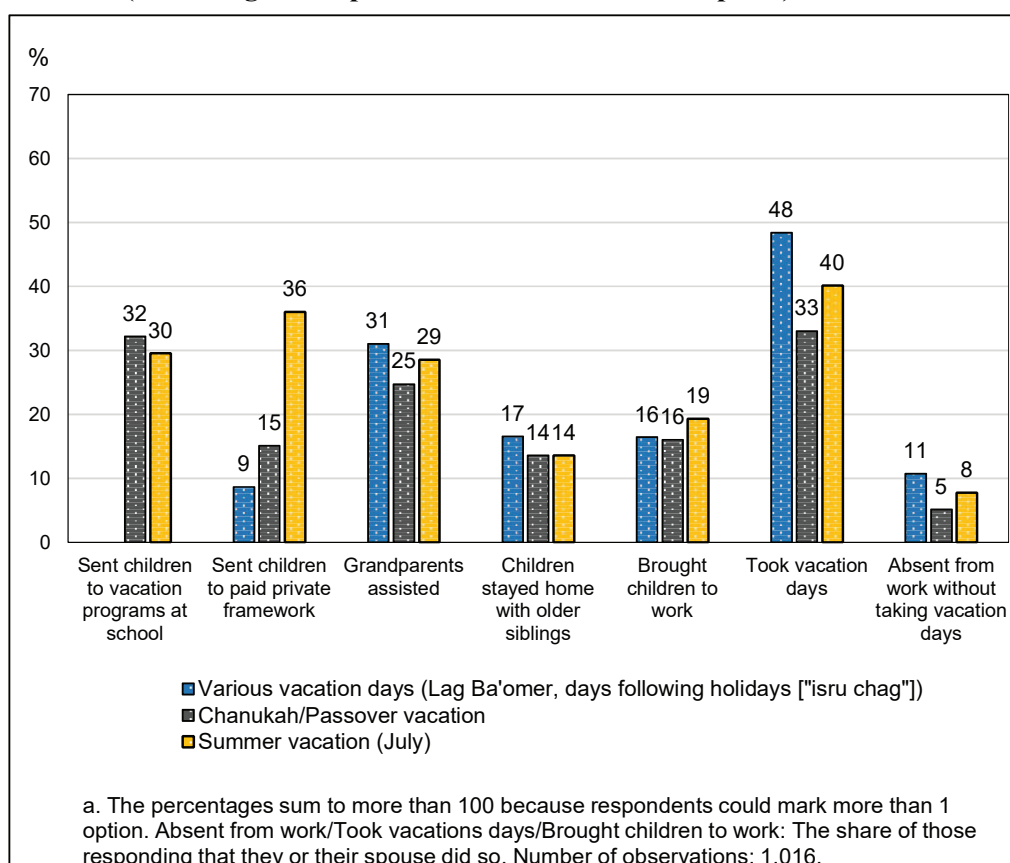[9]  Although it is possible that some parents do not work due to the problem of findings solutions for their children during vacation periods.

[10]  Seventeen percent of respondents reported that they lost their place of work or were placed on unpaid leave as a result of the pandemic. Fourteen percent reported that their spouse had been affected and 4 percent reported that both spouses were affected.

the year (Chanukah and the first week of vacation before Passover); and the summer vacation in July.[11] In 2019, which was covered in the survey, the government ran partial solutions in two of these vacation day groups: midterm vacation school for children aged 3-9 for five days during the Chanukah break and five days in the first part of the Passover vacation, and the summer vacation school for the first 15 work days of July for children aged 6-9. However, no solution was offered for the individual vacation days during the year.

The survey shows that parents make use of a broad range of solutions to care for their young children on vacation days in the school system when the rest of the economy works normally (Figure 1), sometimes combining them. In doing so, the effect of these vacations on the labor market is notable: many parents take time off work (vacation days or other forms of absence), at least on some of the vacation days, and 16–19 percent of the respondents (or their spouses) took at least one of their children with them to work on some of the days at least. The highest rate of absence from work was on the individual vacation days (Lag BaOmer and the days following Jewish festivals): no government programs were run on these days

**Figure 1**
**Supervision Arrangements for Young Children (Ages 3-9) during Vacations in 2019 (Percentage of respondents who marked each option)[a]**



a. The percentages sum to more than 100 because respondents could mark more than 1 option. Absent from work/Took vacations days/Brought children to work: The share of those responding that they or their spouse did so. Number of observations: 1,016.

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[11] In August and on the intermediate ("Chol Hamoed") days of Passover and Sukkot many parents in any case take their own annual vacation. The summer vacation school programs and most of the private day camps do not operate in August.

and the use of paid care offered by private programs was extremely limited.[12] On vacation days in which the government ran programs (midterm vacation school and summer vacation school), about 30 percent of parents took advantage of them,[13] and the percentage of parents who reported that they or their spouse took time off work on some of those days at least was lower, but still significant: 38–48 percent.

Table 2 indicates that absence from work in the summer vacation (July) is more widespread in the non-ultra-Orthodox Jewish sector than among the ultra-Orthodox. This is mainly explained by the higher participation rate in the labor market in the non-ultra-Orthodox sector, which is also reflected in the lower share of non-ultra-Orthodox who responded that they or their spouse did not work, so that in any case they stayed with the children.[14] The difference in the rate of absence from work cannot be attributed to the differences in help received from family. To the contrary, the share of families assisted by grandparents among working ultra-Orthodox families is significantly lower, and there is no difference in the percentage who leave young children with their older siblings.[15]

The data in Figure 1 and Table 2 depict the way in which households cope with the vacations. It therefore presents the share of individuals who responded that they or their spouse took time off work or took their children with them to work, as well as the arrangements at household level that are not associated with either spouse (utilizing private frameworks, help from a grandparent or older siblings, etc.). However, this does not provide information about how the childcare burden is shared by the couple.

According to the survey, there are no major and consistent differences—recurring in each of the three vacation groups—between men and women in the rates of absence from work on vacation days or in taking children to work (other than the difference between ultra-Orthodox men and women on the individual vacation days). In addition to the similarity of these rates, a similar share of non-ultra-Orthodox men and women noted that the current state of vacation days is detrimental to their work, and their support for the proposed program was also similar. However, the similarity of these rates does not necessarily prove that caring for the children is shared equally since it is possible that women took more time off work (the survey did not include quantitative questions about absence from work or the extent of the detrimental effect). Table A-1 in the Appendix presents the replies given by men and women separately.

The findings concerning time taken off work without taking vacation days and parents taking their children to work are consistent with the argument that the present structure of school holidays has a detrimental effect on GDP and productivity. Furthermore, a much greater share of parents noted that they took vacation on these days. This might reflect further negative impact to the labor supply and labor productivity, since at least in some cases parents take vacation to coincide with school vacation days rather than at the most

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[12] Help from grandparents, leaving young children at home with older siblings and working from home were slightly more commonplace on the individual vacation days than during other vacations.

[13] This percentage refers to households and not to children. According to Margoninsky and Segal (2019), the participation rate for children in vacation school programs was 57 percent. One household might send several children to such programs.

[14] This finding is consistent with the analysis of Margoninsky and Segal (2019) regarding the low contribution to GDP of running vacation day programs among the ultra-Orthodox, given the small percentage of ultra-Orthodox homes in which both parents work. Another possible explanation, which was not examined in the survey, for the higher rate of absence from work in July among the non-ultra-Orthodox, is that family vacations in this period are more common in this sector.

[15] The CBS Social Survey (2019) also shows that the share of families who receive help from their parents or from their spouse in looking after children among the ultra-Orthodox is lower than among the non-ultra-Orthodox, even though the difference in smaller than in Table 2. The CBS survey refers to help in general, not necessarily to childcare in the holidays.

| | Jewish, non-ultra-Orthodox | Ultra-Orthodox |
|---|---|---|
| **Table 2** | | |
| Care arrangements for young children used by the parents in July | | |
| (Percent of respondents that noted the arrangement)[a] | | |
| Summer vacation school | 30 | 28 |
| Vacation or other absence from work[b] | 50 | 38 |
| Brought children to work[b] | 19 | 20 |
| Worked from home | 7 | 16 |
| Grandparents assisted | 31 | 17 |
| Private framework, for pay | 36 | 34 |
| Children remained home with older siblings | 14 | 13 |
| Not working—at home in any case[b] | 9 | 20 |
| Number of observations | 859 | 157 |

[a] Percentages total more than 100 because the respondent could mark more than one option.

[b] The respondent or the respondent's spouse.

beneficial time for their own performance in the work place. However, the survey does not facilitate quantifying the scale of the damage to the labor supply and labor productivity.[16] Additionally, about 10 percent of the respondents noted that they worked from home on at least some of the school vacation days, although we have no way of knowing whether this hurt productivity. Productivity might be further adversely impacted if some parents choose a work place that makes it easier for them to cope with the vacation structure at the expense of finding employment commensurate with their skills; however, this topic was not examined in the present survey.

Additional direct evidence of the effect that school vacation days have on performance in the labor market is the finding that 52 percent of respondents noted that their children's vacation days have a detrimental effect on their own work, while 45 percent noted a detrimental effect on the spouse's work.[17] An econometric analysis (Table 3) shows that there are no significant differences between the different groups in the share of those reporting a detrimental effect: the rates are similar for men and women, ultra-Orthodox and non-ultra-Orthodox,[18] salaried employees and the self-employed, parents with and without academic degrees and parents with high and low incomes, and single parents.[19] The strong similarity in the share of women and men who mentioned a detrimental effect is consistent with the finding mentioned above concerning similar

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[16] Such an assessment appears in Margoninsky and Segal (2019).

[17] In response to the following question: How do preschool and school vacation days affect you at work (e.g., in terms of efficiency and performance, the chances of success and promotion, etc.)? Detrimental effect, No effect, Beneficial effect, Don't know / unsure. Only 4 percent mentioned a beneficial effect, 36 percent said that there was no effect.

[18] As mentioned, the employment rate among the ultra-Orthodox in our survey was markedly higher than in the CBS survey. This might partially explain the fact the present survey found few differences between the ultra-Orthodox and non-ultra-Orthodox. Regarding the low share of households in the ultra-Orthodox sector in which both parents work and the implications regarding the effect of school vacations on them, see also Margoninsky and Segal (2019).

[19] The income variable was examined but is not reported in the table. The correlation between it and the education variable interferes with the estimation when they are included together. The income effect is also insignificant when estimated in a regression without education.

patterns for time taken off work and taking children to work (and it is also consistent with the attitude to the proposed program – see below). As expected, the share of those who mentioned the detrimental effect is significantly lower among respondents whose partners did not work and among those respondents, or their spouses, who are teachers. The results are also valid in the econometric estimation that takes into account that the respondents were able to rank the degree of detrimental effect (Table A-3).

An integrated assessment of all these findings shows that the decisive factor with respect to the effect on labor productivity is whether the children's vacation days fall on the parents' work days. If at least one parent does not work on that day (because s/he not employed at all or is a teacher), then, as expected, the detrimental effect is relatively small. In contrast, if this is a work day for the parent (and the parent is forced to take time off work or take the children to work), then the salary level or type of position could affect, as we know, in contradictory ways, the cost of absence from work, for example due to the opposing income and substitution effects.

The table also shows that the adverse effect on labor is more severe among parents to children aged 3–6. This might reflect greater difficulty in finding alternatives to parents staying at home during school vacations (older siblings, taking children to work), a higher cost of paid childcare at these ages, etc.

## 4. Parents' positions regarding the vacation synchronization program and Friday care

The program presented by Margoninsky and Segal (2019) proposes improving synchronization between school vacations and regular workdays in the economy by cancelling school on Fridays and at the same time making 29 existing vacation days in the school calendar into regular school days. These include the days following Jewish holidays, Lag BaOmer, Chanukah, the first week of vacation before Passover, and three weeks of the summer vacation. The two components will cancel each other out so that the number of hours of schooling remains unchanged.

The program also proposes introducing a Friday non-compulsory enrichment program—"Friday care", for preschoolers and lower-grade children, the cost of which would be similar to the cost of the present after-school programs. This description of the main points of the program was presented to the survey participants and they were asked several questions about it.

About half the parents expressed support for the program, similar to the percentage of parents who reported that their children's vacation days adversely affect them at work. Only 15 percent of respondents were opposed to the program, and very few believed that it would have a detrimental effect on them.[20] About 30 percent believed that the program would be beneficial and 20 percent thought that it would help them increase their work hours or days. One-third of respondents were indifferent to the program and 40 percent responded that it would not affect their work (Figure 2).

An econometric analysis shows that several characteristics of individual respondents (gender, whether or not they are ultra-Orthodox, a single parent, salaried employee versus self-employed) do not significantly affect the share of those supporting the program and the share who believe that it will be beneficial to

[20] Of those who opposed the program, two thirds said that it was important for the children to continue to study on Fridays, a similar share said that cancelling school on Fridays would negatively impact their leisure time, and a quarter opposed shortening the summer vacation. More than one reason could be given.

**Figure 2**
**Stances Regarding the Vacation Synchronization Program and Friday Care**
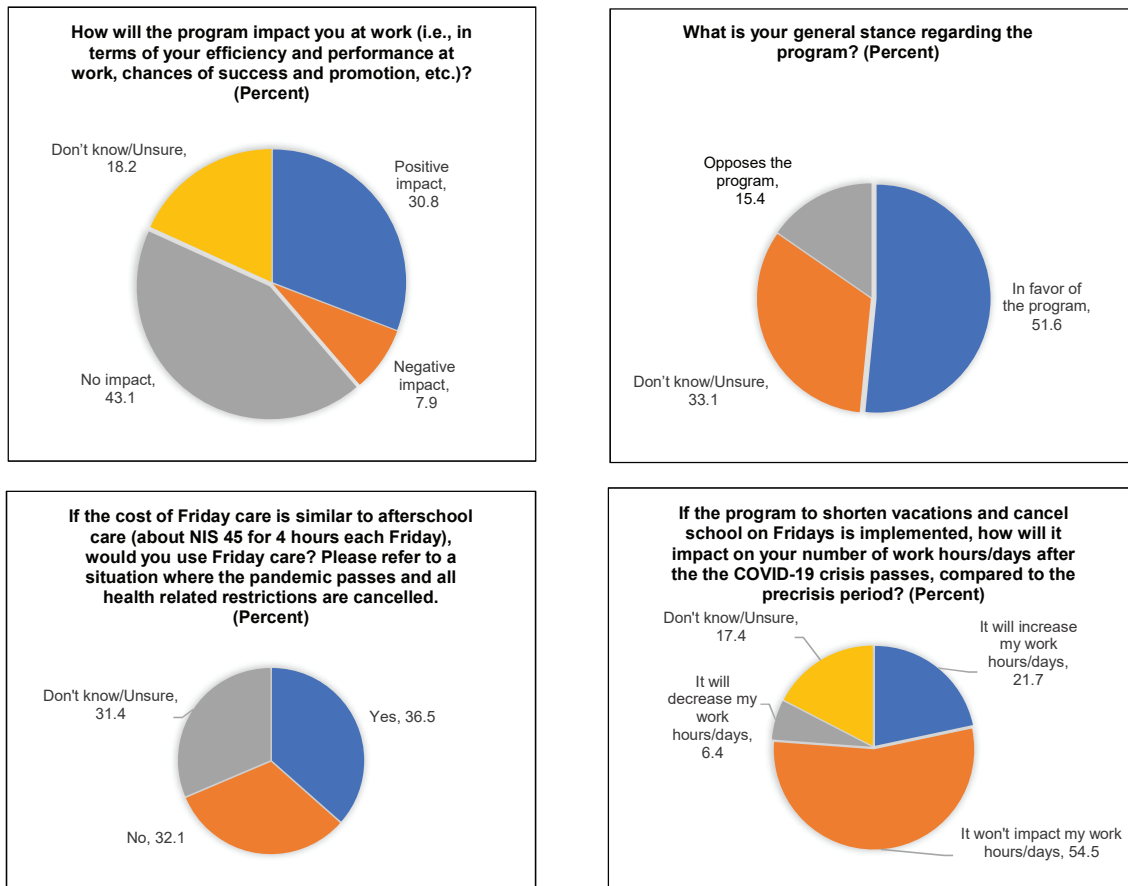


Number of observations: 1,016.

their work, as these characteristics did not affect the probability that the individual would mention that the school vacations have a detrimental effect on their work. In contrast, higher education increases support for the program and the share of respondents who believe that it will be beneficial for them, although it did not affect the share of respondents who noted that the vacations have a detrimental effect on them.[21] Nor did spouse being unemployed affect support for the program, although this factor did reduce the share of respondents who noted that the school vacations adversely affect them. Support for the program is not higher among parents of children aged 3–6, even though a greater share of these parents noted that the school vacation days have a detrimental effect on their work and that they intend to send their children to the Friday care programs (below).

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[21]  Higher income does not significantly affect support for the program, even when estimated in a regression that does not include education. The inclusion of both variables together in the regression negatively affects the significance of the effect of education in some of the questions, but not the issue of overall support for the program. An estimation that takes into account the ranking of the answers regarding the effect of the program (Table A-3) produces results similar to those obtained in the binary estimation (Table 3).

**Table 3**

Effect of the characteristics of individuals and their spouse on their opinions

| | The vacations have a detrimental effect on work[a] | In favor of the plan[b] | The plan will have a positive effect at work[c] | Will use Friday care[d] |
|---|---|---|---|---|
| Woman | -0.025 | -0.096 | 0.082 | -0.025 |
| | (0.087) | (0.086) | (0.092) | (0.089) |
| Ultra-Orthodox | -0.063 | -0.164 | 0.154 | 0.086 |
| | (0.128) | (0.126) | (0.135) | (0.129) |
| Spouse doesn't work | -0.585*** | -0.078 | -0.300 | -0.267 |
| | (0.214) | (0.199) | (0.218) | (0.215) |
| Works on Fridays | 0.074 | -0.305** | -0.133 | 0.130 |
| | (0.122) | (0.120) | (0.131) | (0.124) |
| Spouse works on Fridays | 0.040 | -0.179* | 0.003 | 0.028 |
| | (0.108) | (0.107) | (0.111) | (0.111) |
| Both spouses work on Fridays | 0.025 | 0.396** | 0.008 | -0.054 |
| | (0.195) | (0.191) | (0.212) | (0.197) |
| Teacher | -0.706*** | -0.388** | -0.850*** | -0.254 |
| | (0.160) | (0.155) | (0.194) | (0.163) |
| Spouse is a teacher | -0.635*** | -0.417*** | -0.806*** | -0.189 |
| | (0.157) | (0.156) | (0.191) | (0.167) |
| Age | -0.007 | -0.023*** | -0.026*** | -0.012 |
| | (0.009) | (0.009) | (0.009) | (0.009) |
| Academic degree | 0.046 | 0.216** | 0.236** | 0.196** |
| | (0.087) | (0.086) | (0.092) | (0.089) |
| Children aged 3–6 | 0.292*** | -0.102 | 0.062 | 0.348*** |
| | (0.111) | (0.109) | (0.124) | (0.118) |
| There are older siblings (age 13 and older) | -0.135 | 0.011 | -0.153 | -0.289*** |
| | (0.108) | (0.107) | (0.119) | (0.111) |
| Number of observations | 1,016 | 1,016 | 1,016 | 1,016 |

Standard deviations in parentheses.

*Significant at 10 percent level; **Significant at 5 percent level; ***Significant at 1 percent level.

Probit regressions. Similar results were obtained with Logit regressions.

[a] How do vacation days in preschools and in schools impact you at work (i.e., in terms of your efficiency and performance at work, the chances of success and promotion, etc.)? Positive impact, Negative impact, No impact, Don't know/Unsure

[b] What is your general view of the program? For, Don't know/Unsure, Against.

[c] How will the program impact you at work (i.e., in terms of your efficiency and performance at work, the chances of success and promotion, etc.)? Positive impact, Negative impact, No impact, Don't know/Unsure

[d] If the cost of Friday care is similar to afterschool care (about NIS 45 for 4 hours every Friday), will you use Friday care? (Please refer to a situation in which the pandemic ends, and all health related limitations are cancelled); Yes, No, Don't know/Unsure.

Given that the program proposes cancelling schooling on Fridays, it could have a detrimental effect on parents who work on those days, particularly if both parents (as well as single parents) work on Fridays. In about 11 percent of the households that participated in the survey, both parents (or the single parent) work at least one Friday a month.[22] As expected, support for the program is lower among parents or their spouses who work on Fridays, but surprisingly when both spouses work on Fridays this in itself increases support for the program. Nevertheless, even among parents who work on Fridays, the share of support for the program far exceeds the share of those opposing it (Figure 3).

**Figure 3**
**Distribution of Stances Regarding the Program, by Characteristics of the Individual and Spouse (Percent of respondents in each group that responded that they are in favor, they oppose, or they don't know/are unsure about the program)**
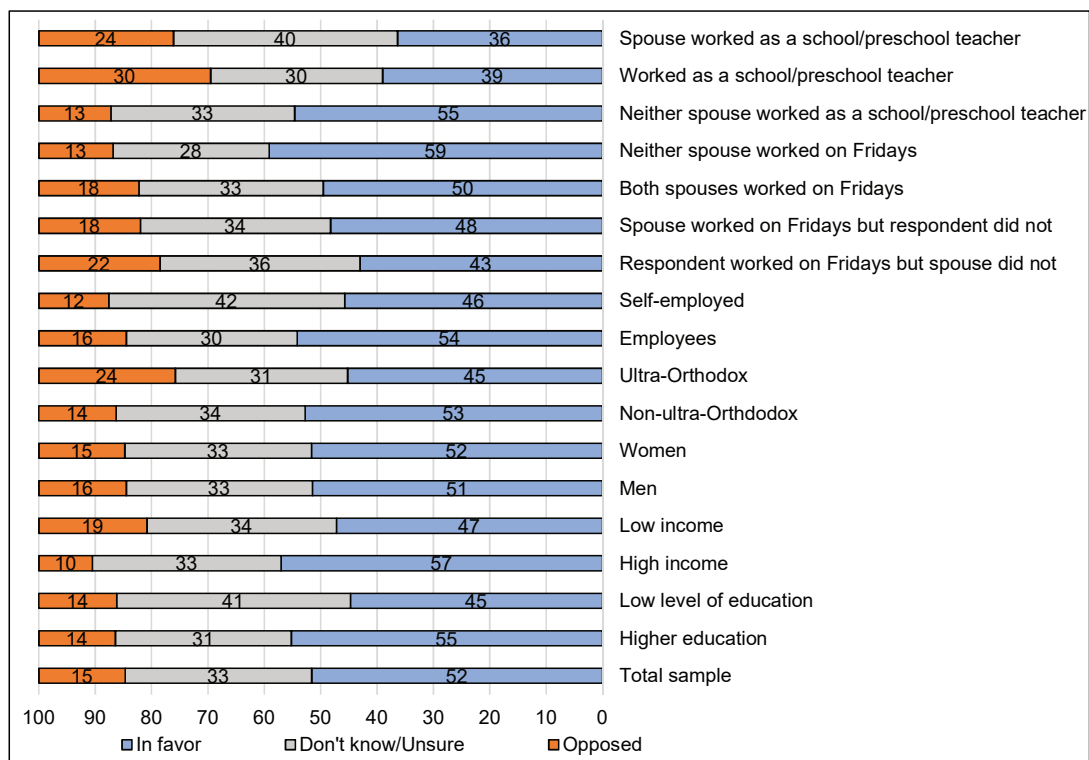


Number of observations: 1,016.
Formulation of question: What is your general stance regarding the program? In favor, Don't know/Unsure, or Opposed.

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[22] Margoninsky and Segal (2019) assumed that in 8 percent of households both parents work every Friday (after adjustment for teachers). According to the survey, in about one quarter of households at least one parent works at least once a month on Friday.

Support for the program is significantly lower among parents or their spouses who work in the education system (school or kindergarten teachers); this is also true of the share of such parents who believe that the program will be beneficial to them. The share of those opposing the program among school and kindergarten teachers is much higher than among any other group, and the difference between the share of school and kindergarten teachers who support the program and those who oppose it is smallest (Table 3). Nonetheless, even among school and kindergarten teachers, a higher percentage support the program than oppose it.[23]

Further evidence of considerable opposition to the program among teachers (and to a lesser degree also among parents who work on Fridays) emerges from an estimation of the variables that explain this opposition. Table 4 shows that it is exclusively these variables that have a significant effect (in the expected direction) on the degree of opposition to the program and on the share of respondents who believe that it will have a detrimental effect, whereas support for the program was also influenced by the age and education of the parent.[24]

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[23] Eight percent of respondents worked as teachers or kindergarten teachers, and a similar share reported that their spouse worked in the school system. The small number of cases (8 observations) in which both parents work in the school system does not facilitate a significant analysis of them.

[24] In certain specifications, the variables "ultra-Orthodox" and "works on Friday" also have a significant positive effect (5 percent) on the probability of opposing the program, although the significance is sensitive to changes in the variables included in the estimation.

**Table 4**

Effect of the characteristics of the individual and spouse on the probability of opposing the program

| | Opposes the program | The program will have a detrimental effect | Will not use Friday care |
|---|---|---|---|
| Woman | 0.051 | -0.141 | -0.012 |
| | (0.106) | (0.135) | (0.091) |
| Ultra-Orthodox | 0.275* | 0.070 | -0.530*** |
| | (0.141) | (0.176) | (0.145) |
| Raising children on his or her own | 0.259 | 0.257 | 0.009 |
| | (0.305) | (0.347) | (0.282) |
| Spouse not working | -0.004 | -0.436 | 0.273 |
| | (0.240) | (0.388) | (0.220) |
| Works on Fridays | 0.275* | 0.892*** | -0.222 |
| | (0.141) | (0.163) | (0.135) |
| Spouse works on Fridays | 0.150 | 0.277 | 0.052 |
| | (0.133) | (0.182) | (0.114) |
| Both spouses work on Fridays | -0.307 | -0.335 | 0.148 |
| | (0.229) | (0.263) | (0.212) |
| Teacher | 0.543*** | 0.624*** | 0.234 |
| | (0.168) | (0.189) | (0.168) |
| Spouse is a teacher | 0.344** | 0.085 | 0.149 |
| | (0.173) | (0.231) | (0.163) |
| Age | 0.002 | 0.016 | 0.007 |
| | (0.010) | (0.012) | (0.009) |
| Academic degree | -0.108 | -0.097 | -0.124 |
| | (0.105) | (0.130) | (0.091) |
| Children aged 3–6 | 0.245* | 0.265 | -0.583*** |
| | (0.134) | (0.166) | (0.114) |
| Self-employed | -0.190 | -0.371* | 0.111 |
| | (0.153) | (0.201) | (0.127) |
| There are older siblings (aged 13 and older) | 0.182 | -0.220 | 0.283** |
| | (0.122) | (0.159) | (0.114) |
| Lost their job/placed on unpaid leave due to COVID-19 | -0.010 | -0.063 | 0.349*** |
| | (0.149) | (0.199) | (0.123) |
| Spouse lost their job/placed on unpaid leave due to COVID-19 | 0.077 | -0.049 | 0.142 |
| | (0.162) | (0.218) | (0.144) |
| Both spouses lost their job/placed on unpaid leave due to COVID-19 | -0.094 | -0.165 | -0.689** |
| | (0.337) | (0.432) | (0.305) |
| Number of observations | 1,016 | 1,016 | 1,016 |

Standard deviations in parentheses.

*Significant at 10 percent level; **Significant at 5 percent level; ***Significant at 1 percent level.

Probit regressions. Similar results were obtained with Logit regressions.

For the formulations of the questions, see Table 3.

Giving parents the option of working from home on days when the children are on vacation might, ostensibly, solve the problem of synchronization of the vacations, thus making the proposed program redundant and lessening support for it. The sharp increase in the scale of work from home during the COVID-19 pandemic, together with the severe curtailment of activity in the education system, provided many parents with an opportunity to experience working from home while their children are with them. Respondents who expressed support for the program were therefore asked whether they would continue to support it even if they were allowed to work from home on vacation days in the school system. Seventy-seven percent replied that they would continue to support the program and only 2 percent would oppose it under such circumstances. The two main reasons given for continuing to support the program were the difficulty in working from home when the children are on vacation and that they would like the children to have an educational framework on those days.[25] It follows that expanding the option of working from home is not, at this stage, perceived as a solution to the lack of vacation synchronization. We are unable to determine how the experience of parents working from home during the COVID-19 pandemic alongside their children affected their replies, and it is difficult to estimate how expanding the work from home option once the pandemic is over will in the future affect opinions regarding the program.

As noted, one component of the proposed program is to set up enrichment programs for preschool and lower-grade schoolchildren ("Friday care"). About one third of parents responded that they would use such programs and about one third that they would not (Figure 2). If the remaining third of respondents (who replied that they don't know or are unsure) is distributed along the same lines, then about half of all parents of children at the relevant ages would send their children to Friday care programs. Subsidizing the Friday care programs could further increase demand for them.[26] The fact that the share of those who intend to use the Friday care programs is higher among parents with higher education (and income) (Table 3) could indicate that the cost of the Friday care programs is a significant consideration among parents, or that these parents have a more positive opinion of the expected quality of the care programs in the area in which they live. The presence of older siblings (aged 13 and up) significantly reduces the probability of sending the younger children to Friday care. This is consistent with the approach that the purpose of the Friday care programs is more supervision than enrichment. The finding that the demand for Friday care is higher among the parents of children aged 3–6 (but not among parents to children aged 7–9 compared with children aged 10–11) is also consistent with this approach. Surprisingly, the share of respondents who intend to send their children to Friday care programs among those who work on Fridays (also in families in which both spouses work on Fridays) is the same as among the other parents.

An analysis of the factors affecting the share of respondents who said they will not send their children to Friday care generally provides a mirror image of the analysis regarding the share of parents who intend to utilize the Friday care (Table 4 compared with Table A-2). Nonetheless, there seems to be a marked, significant tendency among respondents who lost their jobs or were placed on unpaid leave as a result of the COVID-19 pandemic not to send their children to Friday care, even though the question emphasized

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[25] About two thirds of the respondents mentioned both reasons. The share who mentioned any other reason was much lower: 3–18 percent.

[26] The survey question noted that the cost of the Friday care programs will be similar to that of the after-school programs—NIS 45 per Friday (four hours).

that it refers to the post-pandemic period.[27] This could be an indication of the uncertainty regarding the chance of finding work after the crisis, and consequently regarding the need for Friday care, or the ability to pay for it. Notably, this variable was not found to have any effect on any other result in the survey.

As mentioned, parents with academic education are over-represented in the survey sample. Given that the share of their support for the program and their demand for Friday care are higher than among the general population, the overall levels of support and demand in the survey could be upwardly biased. A calculation that corrects this over-representation shows that the bias is negligible (up to one percentage point in the rates of support / opposition presented in Figure 2). Nor is the effect of the results of the econometric estimation material.

## 5. Conclusion

A survey of parents of preschool and lower-grade school children in the Jewish population shows that the structure of school vacations in Israel has an adverse effect on parents' work. The survey also found that about half of the parents support a proposal to improve the synchronization between school vacation days and the regular working days in the economy by cancelling schooling on Friday and holding school on days that are currently vacation days in the education system; and that about one-third of the respondents believe that implementation of the proposal will have a beneficial effect on their performance at work. About 15 percent of the parents oppose the program and an even smaller percentage believes that it will adversely affect their work. The survey findings therefore show broad support for the proposal and they are consistent with assessments that implementation of the program will increase the labor productivity of parents as well as GDP. The move on its own would not involve any additional budgetary cost and could be included in reforms to increase labor productivity in the economy.

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[27] In contrast, respondents who stated that they or their spouse were affected by the COVID-19 pandemic are less likely to turn down the Friday care option. This is a surprising result but it should be treated cautiously due to the small number of observations on which it is based: just 4 percent of the respondents reported that both spouses had been affected in this way.

**APPENDIX**

| Table A-1 | | | | |
|---|---|---|---|---|
| Effect of vacations on parents' conduct with respect to the work place, and their stances regarding the synchronization program | | | | |
| (Percent of respondents that took the option or expressed the stance noted, out of total respondents belonging to that group.) | | | | |
| | Jewish, non-ultra-Orthodox | | Ultra-Orthodox | |
| | Men | Women | Men | Women |
| **Took vacation days from work** | | | | |
| Lag Ba'Omer, Day following a holiday ("Isru chag") | 31 | 37 | 2 | 26 |
| Chanukah or Passover | 25 | 18 | 10 | 11 |
| July | 27 | 23 | 18 | 14 |
| **Absent from work without taking vacation days** | | | | |
| Lag Ba'Omer, Day following a holiday ("Isru chag") | 4 | 6 | 8 | 3 |
| Chanukah or Passover | 2 | 3 | 2 | 2 |
| July | 3 | 5 | 3 | 5 |
| **Brought children to work** | | | | |
| Lag Ba'Omer, Day following a holiday ("Isru chag") | 8 | 13 | 9 | 11 |
| Chanukah or Passover | 11 | 11 | 8 | 9 |
| July | 12 | 12 | 18 | 6 |
| | | | | |
| The vacation days have a detrimental effect on me at work | 51 | 54 | 51 | 44 |
| The program will have a positive effect on me at work | 28 | 32 | 26 | 41 |
| In favor of the program | 53 | 53 | 26 | 36 |
| | | | | |
| Number of observations in group | 354 | 505 | 91 | 66 |

**Table A-2**

Effect of characteristics of the individual and spouse on their opinions

| | The vacations have a detrimental effect on work | In favor of the plan | The plan will have a positive effect on work | Will use Friday care |
|---|---|---|---|---|
| Woman | -0.043 | -0.095 | 0.086 | -0.027 |
| | (0.088) | (0.087) | (0.093) | (0.090) |
| Ultra-Orthodox | -0.074 | -0.157 | 0.161 | 0.087 |
| | (0.128) | (0.126) | (0.135) | (0.129) |
| Raising children on his or her own | 0.204 | 0.048 | 0.018 | 0.017 |
| | (0.263) | (0.264) | (0.299) | (0.281) |
| Spouse not working | -0.586*** | -0.083 | -0.301 | -0.281 |
| | (0.212) | (0.199) | (0.219) | (0.216) |
| Works on Fridays | 0.051 | -0.296** | -0.122 | 0.143 |
| | (0.123) | (0.121) | (0.132) | (0.126) |
| Spouse works on Fridays | 0.060 | -0.184* | 0.000 | 0.022 |
| | (0.109) | (0.107) | (0.112) | (0.111) |
| Both spouses work on Fridays | -0.011 | 0.416** | 0.007 | -0.043 |
| | (0.198) | (0.193) | (0.212) | (0.199) |
| Teacher | -0.720*** | -0.384** | -0.858*** | -0.251 |
| | (0.160) | (0.155) | (0.194) | (0.164) |
| Spouse is a teacher | -0.664*** | -0.407*** | -0.801*** | -0.188 |
| | (0.158) | (0.156) | (0.191) | (0.167) |
| Age | -0.009 | -0.022** | -0.025*** | -0.011 |
| | (0.009) | (0.009) | (0.009) | (0.009) |
| Academic degree | 0.065 | 0.211** | 0.239** | 0.179** |
| | (0.087) | (0.087) | (0.093) | (0.089) |
| Children aged 3–6 | 0.319*** | -0.108 | 0.066 | 0.333*** |
| | (0.112) | (0.110) | (0.123) | (0.119) |
| Self-employed | 0.190 | -0.092 | -0.075 | -0.139 |
| | (0.125) | (0.121) | (0.133) | (0.129) |
| There are older siblings (aged 13 and older) | -0.108 | 0.001 | -0.153 | -0.296*** |
| | (0.110) | (0.109) | (0.120) | (0.112) |
| Lost their job/placed on unpaid leave due to COVID-19 | 0.045 | 0.024 | 0.065 | -0.182 |
| | (0.121) | (0.120) | (0.129) | (0.125) |
| Spouse lost their job/placed on unpaid leave due to COVID-19 | -0.080 | 0.007 | 0.075 | -0.108 |
| | (0.138) | (0.139) | (0.145) | (0.140) |
| Both spouses lost their job/placed on unpaid leave due to COVID-19 | 0.465 | -0.235 | -0.097 | -0.018 |
| | (0.288) | (0.273) | (0.303) | (0.282) |
| The constant | 0.251 | 1.094*** | 0.383 | -0.114 |
| | (0.383) | (0.383) | (0.417) | (0.394) |
| Number of observations | 1,016 | 1,016 | 1,016 | 1,016 |

Standard deviations in parentheses.
*Significant at 10 percent level; **Significant at 5 percent level; ***Significant at 1 percent level.
Probit regressions. Similar results were obtained with Logit regressions.
For the formulations of the questions, see Table 3.

**Table A-3**

Effect of characteristics of the individual and spouse on their stances—estimation of ranked responses

| | The vacations have a detrimental effect on work[a] | The program will have a positive impact on work[b] |
|---|---|---|
| Woman | 0.036 | 0.104 |
| | (0.088) | (0.092) |
| Ultra-Orthodox | -0.027 | 0.089 |
| | (0.120) | (0.134) |
| Raising children on his or her own | 0.175 | -0.115 |
| | (0.271) | (0.296) |
| Spouse not working | -0.569*** | -0.020 |
| | (0.187) | (0.175) |
| Works on Fridays | -0.061 | -0.427*** |
| | (0.122) | (0.137) |
| Spouse works on Fridays | -0.010 | -0.062 |
| | (0.108) | (0.109) |
| Both spouses work on Fridays | -0.023 | 0.109 |
| | (0.207) | (0.218) |
| Teacher | -0.706*** | -0.878*** |
| | (0.145) | (0.186) |
| Spouse is a teacher | -0.601*** | -0.503*** |
| | (0.140) | (0.131) |
| Age | -0.011 | -0.022*** |
| | (0.009) | (0.009) |
| Academic degree | 0.043 | 0.189** |
| | (0.087) | (0.087) |
| Children aged 3–6 | 0.334*** | 0.039 |
| | (0.108) | (0.103) |
| Self-employed | 0.110 | 0.085 |
| | (0.136) | (0.117) |
| There are older siblings (aged 13 and older) | -0.084 | -0.039 |
| | (0.107) | (0.100) |
| Lost their job/placed on unpaid leave due to COVID-19 | 0.048 | 0.118 |
| | (0.122) | (0.131) |
| Spouse lost their job/placed on unpaid leave due to COVID-19 | -0.002 | 0.086 |
| | (0.132) | (0.143) |
| Both spouses lost their job/placed on unpaid leave due to COVID-19 | 0.291 | 0.109 |
| | (0.312) | (0.349) |
| Number of observations | 930 | 831 |

Standard deviations in parentheses.

*Significant at 10 percent level; **Significant at 5 percent level; ***Significant at 1 percent level.

Ordered probit regressions. Observations with a response of Don't know/Unsure were deleted. For the formulations of the questions, see Table 3.

a Rating of the responses from high to low: Negative impact/No impact/Positive impact.

b Rating of the responses from high to low: Will have a positive impact/Won't have an impact/Will have a negative impact.

# ESTIMATING INFLATION IN REAL TIME USING BIG DATA: PRICES OF FRUIT AND VEGETABLES[1]

- New data sources, and in particular big data, have recently been used around the world and in Israel to estimate the state of the economy, including inflation, in real time—and have become yet more important during the coronavirus crisis.
- This is a presentation of the first use by the Bank of Israel of a database containing big data for retail prices at supermarket chains, to improve the estimation of price changes for the fruit and vegetables component published by the Central Bureau of Statistics—in real time.
- The fruit and vegetables component, despite having a relatively low weighting in the average consumption basket (2 percent), contributes significantly to errors in forecasting the Consumer Price Index, due to the typically high volatility for this component.
- A preliminary forecast, aided by data from the retail price database, improves the forecast accuracy by 25 percent compared to the current forecasting method.

## 1. Introduction

Use of new data sources, and in particular big data, to forecast economic variables, including official price indices, by central bureaus of statistics, has become commonplace in recent years (Cavallo and Rigobon, 2016). The following is a presentation of the use of data from the Bank of Israel's retail price database, which includes daily price data for food products, including fruit and vegetables ("F&V") in retail chains, to forecast in real time the monthly change in the F&V component of the Consumer Price Index.[2,3] Indeed, the fresh F&V component is a small part of the Consumer Price Index (hereinafter: "CPI") issued by the Central Bureau of Statistics – about 2 percent[4] – but as this component tends to be highly volatile and therefore difficult to forecast – the forecasting error for this component is much higher than for other components. Therefore, the contribution of the error in forecasting F&V prices to error in forecasting the overall CPI is high by comparison to other CPI components, at 0.05 percentage points on average, and up to 0.1–0.25 percentage points in extreme cases. [5]Due to the high volatility of the F&V component, which is mostly due to supply shocks (such as changes in weather), it is customary to focus on the "core CPI", which is the overall CPI excluding the most volatile components, including F&V. Nonetheless, it is important to remember that the Bank of Israel target inflation is in terms of the overall inflation rate, rather than core inflation, and therefore it is very important to forecast in real time all CPI components, including the more volatile ones.

Most of the research in the literature concerning forecasting of official price indices using high frequency big data is focused on online prices rather than prices at physical stores, for two main reasons. First, as opposed to prices at physical stores, these data are mostly highly available and may be collected at high

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[1]    Written by Dor Goldenberg and Yonatan Rosen.

[2]    The Consumer Price Index published by the Central Bureau of Statistics on the 15th day of each month measures price change in the previous month over the month previous to that; this means that data for each month is published 15 days late.

[3]    Chains included in the retail price database account for 40 percent of the total F&V market.

[4]    The F&V section includes another component, with a 1 percent weighting in the overall CPI—frozen, pickled and preserved fruit and vegetables.

[5]    "Contribution of error" is defined as the error in forecasting of the component, multiplied by its weighting in the overall CPI.

frequency, with relative ease and at low cost; Second, presumably these prices are a close approximation of the official price indices, which are typically based on prices at physical stores. However, findings with regard to similarity of prices between physical and online stores are inconclusive. The literature includes evidence whereby online prices behave similarly to traditional prices, and may even predict them well, while being measurable at a higher frequency (Cavallo, 2017; Aparicio and Bertolotto, 2019; Powell et al. 2018). Yet in contrast, there is evidence of unique behavior features of online prices. Thus, for example, it was found that they react to changes in the nominal exchange rate (Gorodnichenko and Talavera, 2017) faster than do prices at stores, and changes in online prices are more uniform across diverse geographic regions (Cavallo, 2018b). In this work, we made direct use of prices posted at physical stores, thereby avoiding the need to estimate such prices using online prices. Moreover, the retail price database (hereinafter: "the Database") includes, along with prices at physical stores, also data about prices at the chains' online websites, which were used. This work is further to recent research conducted by the central bank of Sweden, involving forecasting price changes in the F&V component there, based on prices collected online (Hull et al., 2017). The results of that research indicate some benefit to using online prices in forecasting the F&V component.

The results of this study are closely linked to the series of rapid indicators developed by the Bank of Israel in view of the coronavirus crisis, such as data about credit cards, mobility and electricity consumption, which may provide real-time indication of changes in economic trends.

## 2. Data

This section describes the data underlying the forecast and presents the challenges in analysis of this data.

### a. Forecasted variable: The Central Bureau of Statistics' Fruit and Vegetables Price Index

Each month, the Central Bureau of Statistics samples prices of fresh F&V in accordance with the household consumption basket (which is sampled in the household expenditure survey). Based on these prices, the Central Bureau of Statistics compiles the "F&V Price Index", which is used to calculate the change in the F&V prices section of the overall index.[6] Prices are sampled by survey staff sent by the Central Bureau of Statistics to various market "levels" – greengrocers, retail chains and markets. The index attributes to each fruit and vegetable a weighting to match their weighting in the household expenditure survey. The index also takes into account various aspects of seasonality and varieties.

### b. Variables used in forecast the retail price database

In 2014, the Knesset enacted the "Food Industry Competition Promotion Law" (hereinafter: "the Food Law"), which requires major retail chains to report the prices of all products sold at their branches daily[7]. Due to the significant value of these data and their potential contribution to management of monetary policy and to analysis and understanding of the Israeli economy, the Bank of Israel created a database that regularly stores data published by the chains, to allow for processing and analysis of this data. The

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[6] The Central Bureau of Statistics also publishes separately the prices of select F&V.

[7] The law requires chains to report prices at daily and intra-day level, promotions at daily and intra-day level, and geographic data about their branches. Currently, 24 chains report their prices pursuant to the Law. Later on, this law was also made applicable to pharma chains.

Database includes prices of all products at all branches of retail food chains in Israel, including prices of fresh F&V, allowing data for this cross-section to be viewed in real time. However, forecasting the F&V Index using the Database poses multiple challenges.

(i) The Database does not include all prices used by the Central Bureau of Statistics to measure the F&V component; The Central Bureau of Statistics also observes prices of other market layers – greengrocers and markets – to which the Bank does not have access. Therefore, if developments in these market layers differ from those in the retail chain layer, changes in prices in the Database would not reflect all of the change reflected in the index. For example, if prices in markets increase when retail chains lower their prices, the change in prices in the Database would reflect the lower prices in such chains and would not reflect the higher prices in the markets[8]. However, since there is some competition between the different layers, we may reasonably assume that their actions are correlated. If indeed the different layers are correlated, we can apparently forecast the index based on information for the retail chain layer only, but to do so would require extensive information with historical depth – which brings us to the next challenge.

(ii) The reporting frequency by the Central Bureau of Statistics is monthly, and because the Database only includes data for 4 years, there are only 50 monthly observations where the Bank has data both for the F&V index and for prices of products included in the index[9]. The small number of observations reduces the forecasting capacity of the model and prevents us from estimating a parameter-based statistical model.

(iii) Reliance on the retail price database poses challenges that are not encountered when working with routine data, due to the size of this Database. These challenges, typical of big data, are usually known as the 4 "V"s: Volume, Variety, Velocity, and Veracity:

- Volume: The enormous volume of data (some 10 billion observations) does not allow us to work using standard methods, since these cannot be stored and processed, for example, on a standard PC hard drive, and therefore new solutions are required to store and calculate such a volume of data.
- Variety: Data include dates, numeric fields (such as price) and text fields (such as product description).
- Velocity: Data arrives on daily basis, with some files even arriving on intra-day basis (e.g., once every two hours).
- Veracity: Data arrive in non-uniform format and sometimes require significant preprocessing to be usable. Missing data, switched columns, problem texts—all these make it challenging to use the existing data.

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[8] Retail chains often apply a "loss-leader" approach to pricing their products, i.e., they set a lower price for F&V in high demand (tomato, cucumber) to attract customers, and set a higher price for other F&V. Greengrocers and markets find it more difficult to apply this strategy.

[9] In actual fact, we only use 33 observations, due to the low quality of the Database prior to 2017.

**Figure 1**
**Forecast estimation process**
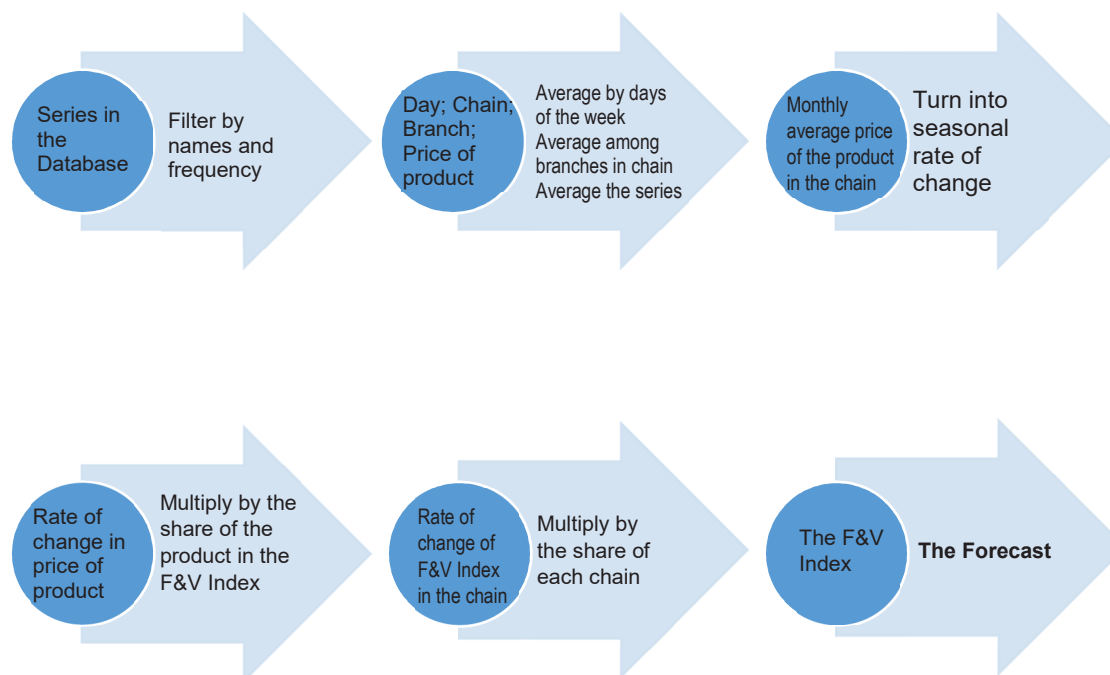


## 3. Creating the forecasting model

The forecasting model we used combines individual prices at branches into a single F&V index[10]. In stage one, we determine which chains we shall use to forecast the index[11]. In actual fact, we created the forecast based on data from two large retail chains—Shufersal and Rami Levi Shivuk HaShikma. Attempts to add other chains did not contribute to, or even impaired the forecast quality[12]. In stage two, we must identify the specific F&V within each chain, i.e., find the relevant catalog numbers that may be used to create a single price series for each chain[13].

In the next stage, daily prices were consolidated into a monthly series for each catalog number, by weighted average of weekdays, where the weekend is assigned a higher weighting than weekdays (in conformity with the sampling frequency applied by the Central Bureau of Statistics). The monthly series of catalog

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[10] Due to difficulty in unifying the various promotion types across different chains, we use the pre-promotion price.

[11] The step of identifying the relevant products for forecasting, namely F&V, is highly laborious and could not be automated for various reasons. We have limited the number of chains to the two large ones.

[12] Adding another chain adds complexity and does not contribute to the forecast accuracy.

[13] Identifying the specific fruit or vegetable is no simple matter. It may be that the same vegetable appears multiple times under different catalog numbers, and sometimes the vegetable name may appear in hundreds of products within a single month. Moreover, we cannot rule out the possibility of the same catalog number used for one product in one month—and for another product in another month. In actual fact, when there are multiple catalog numbers applicable for a product, we averaged prices across all catalog numbers.

numbers were consolidated into a single series for each F&V, by simple average across all chain branches, and averaged across all catalog numbers that match the product description within that chain. After creating a price series for each product in each chain, we calculated the rate of change in price of each fruit and vegetable. To calculate the overall rate of change for a chain, we multiplied the rate of change for each product by their weighting in the index. Finally, the rates of change in the chains are consolidated into the overall rate of change in the index, using a weighting assigned to each chain, based on its market share[14]. To avoid any bias in the index, we controlled for seasonal products – similar to what the Central Bureau of Statistics does. The entire process is described in Figure 1 below. After calculation of the F&V index forecast using the Database, we averaged this with current forecasts at the Bank of Israel[15].

| Table 1 | | | |
|---|---|---|---|
| Performance of the various forecasts | | | |
| **The model** | **RMSE** | **Mean error** | **Median error** |
| The Ministry of Agriculture price model (used currently by the Bank of Israel) | 2.2 | 1.6 | 1.2 |
| Retail prices database | 2.0 | 1.7 | 1.3 |
| Average of the above two (the forecast proposed herein) | 1.5 | 1.2 | 1.1 |



The average forecast for the fruit and vegetable uindex

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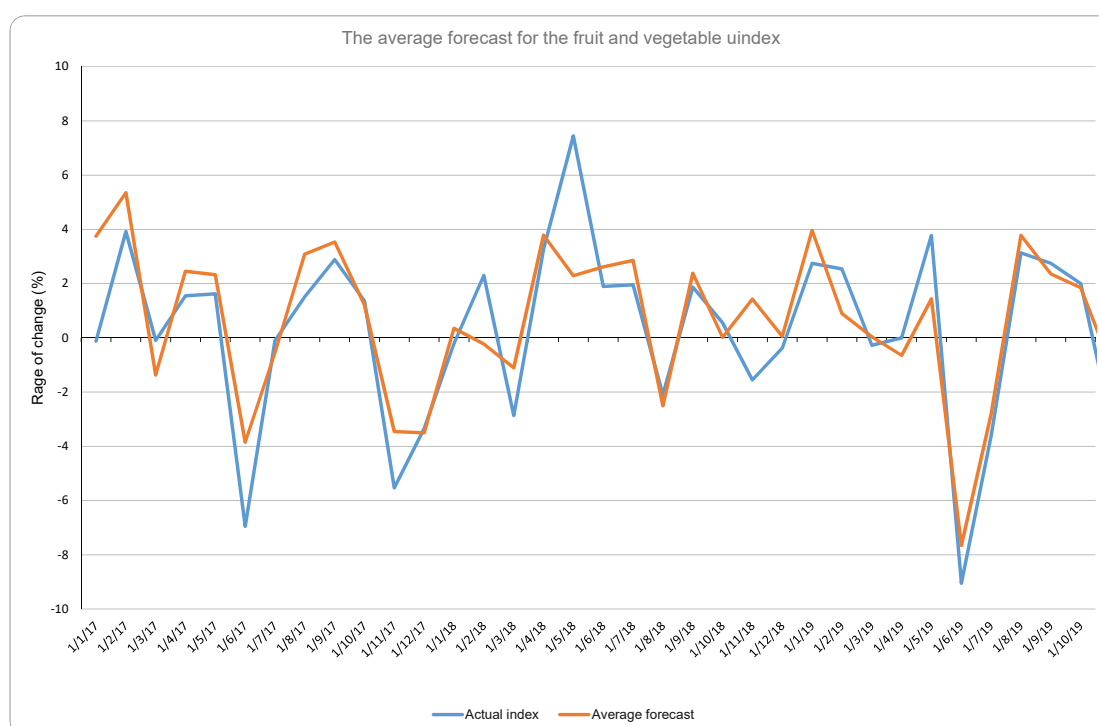
[14]   The weightings assigned to Shufersal and to Rami Levi Shivuk HaShikma are 0.67 and 0.33, respectively.

[15]   We found that accuracy of averaging these two forecasts (the existing one and the one based on the Database) is preferable to that of each one separately.
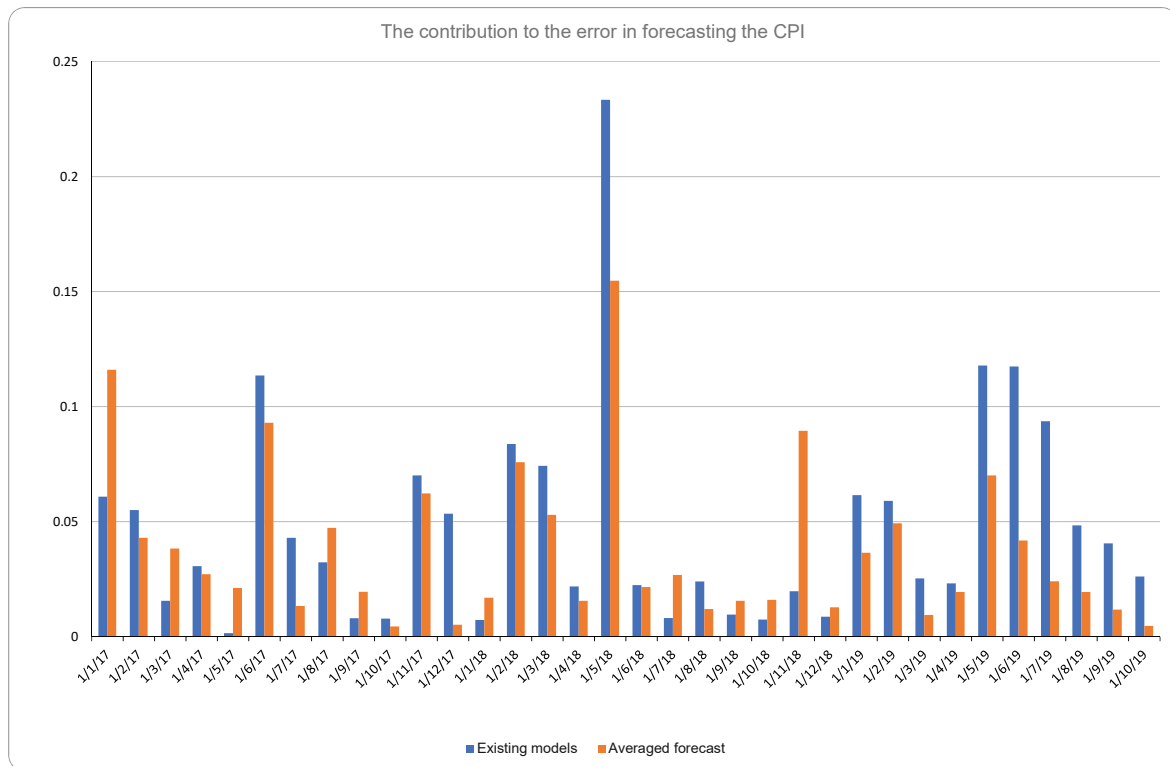
## 4. Results

Figure 2 shows the forecast averaging the current Bank of Israel forecast and the Database-generated forecast, vs. the Central Bureau of Statistics' F&V index. The RMSE (Root Mean Square Error) of the current forecast☐a commonly used benchmark for forecast accuracy☐is 2.2, compared to RMSE of 2.0 for the forecast using the Database, a 10 percent improvement[16]. When we average these two forecasts, we obtain an RMSE value of 1.5 – a 33 percent reduction compared to the current forecast[17]. As can be seen in Figure 3, nearly all errors of the average forecast are within one standard deviation of the F&V index (3.3), and typically much lower. Table 1 shows a summary of performance of the different forecasts, including mean error and median error.

The improvement is also reflected in the contribution of the error in the F&V component to the overall error in pseudo out-of-sample forecasting of the Consumer Price Index. Figure 4 shows that the contribution to error in the proposed forecast is lower (in absolute value) than in the current forecast, sometimes by a large margin. For example, in July 2019, the contribution to error of the current forecast was 0.09 percentage points, whereas that of the proposed forecast was 0.02 percentage points, a 77 percent improvement. The contribution to error of the proposed forecast does not exceed 0.1 percentage points, and on average, it is 0.035 percentage points☐improvement in both these parameters compared to the current forecast



The average forecast error relative to the actual index

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The contribution to the error in forecasting the CPI

Legend: ■ Existing models  ■ Averaged forecast

(maximum error of 0.23 percentage points, and average error of 0.05 percentage points). In similar fashion, we may compare these forecasts with respect to error in the overall index. Using the proposed forecast improves the forecast for the overall index by 10 percent in RMSE terms. If we re-examine July 2019, we see that the error of the current forecast is 0.23 percentage points, compared to only 0.15 for the proposed forecast – a 35 percent improvement.

In order to understand the parts that bring about this improvement, and which parts may be improved even further, we reviewed the breakdown of the forecast into subsections – fruits separately and vegetables separately. This breakdown shows that in some cases, the errors in these two components□fruit and vegetables□are opposed, which results in a smaller overall error when combined.

We should note that this is a preliminary, experimental forecast. The results shown above are a preliminary test of this forecast. Indeed, results are encouraging□but in order to regularly use the forecast we need to verify its results, advantages and disadvantages over time.

## 5. Thoughts for the future and conclusion

The forecast resulting from averaging the data in the retail price database with the current forecast at the Bank of Israel, based on data from the Ministry of Agriculture, significantly improves the forecasting capacity for the F&V component of the Consumer Price Index. We may further improve the forecast derived from the Database in several ways—use of improved data, use of prices including promotions, inclusion of forecasts from other databases and so forth. The application presented in this study reflects the start of a trend—growing use of big data, which would allow us to answer new questions and would improve the accuracy of forecasting inflation and other economic variables in real time.

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# IS A LOW LEVEL OF PUBLIC TRANSIT SERVICE A BARRIER TO WORKING OUTSIDE THE HOME? FINDINGS FROM A SURVEY AMONG ARAB WOMEN[1]

- Approximately one-third of women ages 20 to 60 living in Arab localities reported using public transportation. Younger women and women without access to a car tend to use public transportation more frequently.
- Arab women use public transportation first and foremost for shopping and running errands (including medical services), and next for visiting friends and family, for school, and finally for work.
- Arab women who are not employed outside the home consider public transportation as a minor factor in non-employment. However, public transportation emerges as an important barrier to employment for young women who sought employment in the past two years, a group that accounts for 9 percent of the sample.

This document presents an analysis of a survey of Arab women on public transportation and employment. The survey was commissioned as part of a research study conducted by the Bank of Israel to identify barriers to employment in Arab society, as a follow-up to a study entitled "The Effect of Public Transportation on Employment in Arab Society" (Barak, 2020).

Barak's (2020) study, based on administrative data on employment and on bus services in Arab localities, found that the improvement in public transportation between 2010 and 2015 made only a minor contribution to Arab women's employment. This result raised the question of whether the lack of public transportation's impact on employment derived from the fact that the added services were either inadequate or mismatched to needs, or whether public transportation was not the main cause of Arab women's non-employment. To address this question we decided to approach the target population directly and ask Arab women about their public transportation usage habits and employment preferences. The telephone study was conducted on behalf of the Bank of Israel by the Afkar Institute headed by Dr. Hisham Jubran in two waves in August-September 2019, based on 657 participants. After data cleansing, the sample comprised 621 observations of females of employment age (between age 20 and 60), residents of Arab localities.

## 1. Representativeness of the data: Comparison with Central Bureau of Statistics Data

The geographic distribution of the sample is similar to the geographic distribution of the relevant female population according to Central Bureau of Statistics (CBS) data: Approximately 60 percent reside in the Galilee, approximately 29 percent in the Triangle[2], and approximately 11 percent in the Negev.[3,4] Women

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[1]  Written by Arnon Barak. I would like to thank Adi Brender, Eyal Argov, Shay Tsur, Noam Zussman, Koby Braude, Ran Sharabani, Tanya Suhoy, Nitsa Kasir, Sharon Malki, and Dan Rader for the useful comments. Thanks are also extended to Gal Amedi for assistance in data processing, and special thanks to Gilad Shalom for the many hours of listening for quality control and data cleansing purposes.

[2]  An area with numerous Arab localities.

[3]  In the survey, the Triangle area has an over-representation of 2 percent, at the expense of the Golan (2 percent), the Negev (1 percent), and Jerusalem (1 percent).

[4]  Although the quality of public transportation services in Nazareth is unusually high compared to other Arab localities, the analysis presented in this document includes women who live in Nazareth because no significant differences were found in their reported public transportation usage and those of the women residing in other localities.

in the sample and the women sampled in the CBS Social Survey are also similar in terms of their average age, marital status, religious affiliation, driver's license ownership, and employment status (Table 1). However, the current sample is skewed toward more educated and religiously non-observant women,[5] who, according to the survey, tend to have higher employment rates and access to a car (Table Appendix 1). Nonetheless, the main differences in the women's educational attainment or religious observance stem from the fact that more highly educated/less religiously observant women are younger.[6] Still, in order to take into account the under-representation of women who are not high school graduates, we also calculated weighted means based on sampling weights designed to correct such bias. The results presented in the final column of Table 1 indicate that correcting for the share of women who did not graduate from high school also reduced the difference in the frequency of religiously observant women between the survey sample and CBS data. Nevertheless, this correction causes some degree of bias in favour of older women who are more likely to be married and have more children. As older women also are less likely to be employed outside the home or have a driver's license, the use of these inflation factors consequently produces lower rates of employment and drivers' license ownership compared to CBS data.

Furthermore, the survey analyzed here over-represents women who reside in major Arab localities (localities whose populations exceeds 25,000): Approximately 58 percent of the women in the current sample reside in major localities, compared to only 33 percent of the relevant population (Arab women aged 20-60 living in Arab localities).[7] However, the survey results indicate that there are no statistically significant differences between women who reside in large localities and women in small localities (Table 2), other than a greater likelihood that women in large localities have access to a car (and even in this case, the difference borders on 10 percent statistical significance). More specifically, the women in both groups are similar in their marital status, religious affiliation, and degree of religious observance, and therefore it seems that if any differences between the two groups exist, these differences are not cultural.

In summary, it appears that the women sampled in the current survey constitute a representative sample of the relevant female population on most of the features that we examined. Although the sample includes an over-representation of educated women and non-observant women, but study findings show that these features do not have a significant impact on the main variables of study, which are Arab women's public transportation use and employment rates.

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[5]   The under-representation of women who did not graduate from high school and of religiously observant women probably stems from the fact that these women typically cooperate less with surveys. This tendency is less of a concern for the CBS social survey where response is mandatory under the Statistics Ordinance.

[6]   Differences in employment levels and access to a car are considerably smaller within the group of younger women in the 20–29 age group.

[7]   Geographic distribution data are based on the CBS locality classification system.

**Table 1**
**Descriptive statistics - the sample compared with Central Bureau of Statistics data**

|  | Current sample | CBS Social Survey |
|---|---|---|
| Average age | 36.8 | 36.7 |
| Married (%) | 68.9 | 67.6 |
| Muslim (%) | 86.2 | 82.2 |
| Religious (%) | 54.8 | 72.8 |
| Average number of children | 2.6 | 2.8 |
| Completed high school (%) | 85.8 | 69.2 |
|   of which: share of higher academic educaiton | 33.2 | 29.0 |
| Have a drivers license (%) | 65.1 | 59.7 |
| Employment rate | 38.5 | 36.8 |
|   of which: employed in their residential locality | 57.7 | 50.3 |
|   of which: share that take public transportation to work | 12.2 | 5.2 |

Social Survey data refer to Arab women ages 20-59 who live in localities with fewer than 100,000 residents (excluding Jewish villages)

## 2. Who are the Arab women who use public transportation, and for what purposes?

Approximately 30 percent of the women in the sample reported using public transportation. Of the remaining two thirds, approximately 86 percent reported that the reason they do not use public transportation is that they have no need for it. This finding is consistent with the finding that 68 percent of the women who do not use public transportation have access to a car,[8] because public transportation use is significantly affected by access to a car: Public transportation use is approximately 55 percent for women with no access to a car but only 15 percent for women with access to a car (Table 2). Whether they have access to a car or not, younger women (20–29 age group) tend to use public transportation more frequently, and specifically, the majority of this age group who have no access to a car (72 percent) use public transportation. The main purpose younger women use public transportation is for school, while older women use public transportation primarily for shopping and errands.

**Table 2**
**Share of women using public transportation, by access to a car and age groups**

|  | Total | 29-20 | 49-30 | 60-50 |
|---|---|---|---|---|
| Use public transportation | 33.7 | 49.5 | 24.5 | 32.0 |
| Number of observations | 621 | 198 | 326 | 97 |
|  | **Women with access to a car** | | | |
| Use public transportation | 15.5 | 24.5 | 13.3 | 3.2 |
| Number of observations | 335 | 94 | 210 | 31 |
|  | **Women without access to a car** | | | |
| Use public transportation | 54.9 | 72.1 | 45.8 | 46.5 |
| Number of observations | 286 | 104 | 116 | 66 |

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[8]   In this study, "access to a car" means she has a driver's license and that a car is available for her use.

A regression analysis also clearly shows that the rate of public transportation use decreases as a function of age and access to a car (Table 3). For example, a 20-year old woman is approximately 15 percent more likely to use public transportation than a 40-year old woman (given that these women are matched on other features), and a woman with no access to a car is 40 percent more likely to use public transportation than a woman with access.[9] This analysis also indicates that a married woman whose spouse is employed is 10 percent less likely to use public transportation, but if she lives in a large locality, she is 10 percent more likely to use public transportation. The results for large localities is consistent with the fact that public transportation services tends to be more efficient in densely populated areas where mass transit systems benefit from economies of scale, yet this finding is not obvious as the main difference in public transportation services between Arab localities and non-Arab localities stems from the limited public transportation services in the major Arab localities.[10]

As for additional variables, no difference was found between public transportation usage rates of employed and non-employed women. These groups differed only in the purpose of public transportation use, as a portion of employed women use public transportation for work. Moreover, no statistically significant association was found between public transportation use and degree of religious observance, number of children, educational attainment, or distance from a bus stop.

Women who use public transportation daily tend to use it for school or work, while women who use public transportation less frequently tend to use it for shopping or errands or to visit friends and family (Table 4). Because only 22 percent of the women who use public transportation do so on a daily basis, the findings of the survey indicate that Arab women use public transportation mainly for shopping and errands (including medical services), followed by visits to friends and family, school, and finally work (Table 4). This finding is consistent with the findings of Barak's 2020 study on public transportation's impact on Arab society, which indicated that the expansion of public transportation services was associated with an increase in the number of passengers yet made little contribution to Arab women's employment rates.

It is possible that Arab women use public transportation mainly for non-work purposes because the quality of public transportation services is sufficient for occasional needs yet is insufficiently reliable as a daily transportation alternative. Although it is difficult to refute this argument, we cautiously note that the survey findings suggest a different direction of association: Approximately 60 percent of the women who use public transportation reported that a bus that reaches a relevant center of employment, stops at the bus stop closest to their home at least once every 30 minutes. Although only one-third of the women stated that the walking distance to the closest bus stop is 5 minutes or less,[11] the women's survey responses indicate that there is no clear-cut association between the walking distance to the bus stop and the frequency of public transportation use.[12] Nonetheless, Arab women noted that the main factor that might encourage them to use public transportation more frequently is a bus stop close to their home—14 percent of women who do

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[9] Note that this does not imply causality. We cannot rule out the possibility that families that reside in places with limited public transportation have a greater likelihood of purchasing a car.

[10] Bank of Israel (2019). "The supply of bus services to Arab localities," Selected Research and Policy Analysis Notes (October 2019).

[11] An additional one-third of the women report that a bus stop is within a 10-minute walk from their home.

[12] With the exception of the strong positive correlation between the responses "Do not use public transportation at all" and "I don't know where a bus stop is located."

not use public transportation on a daily basis made this claim,[13] and this rate unsurprisingly increases the farther women live from a bus stop and for women with no access to a car. The distance to a bus stop was found to be a significant factor mainly for non-employed women.

**Table 3**

**The connection between the use of public transportation and the qualities of individuals**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Age | -0.008*** (0.001) | -0.007*** (0.001) | -0.008*** (0.001) | -0.008*** (0.002) | -0.006*** (0.002) | -0.007*** (0.002) | -0.008*** (0.002) | -0.007*** (0.002) |
| Access to a car[a] | -0.403*** (0.034) | -0.381*** (0.035) | -0.396*** (0.035) | -0.404*** (0.037) | -0.385*** (0.037) | -0.417*** (0.037) | -0.396*** (0.037) | -0.407*** (0.038) |
| Married to an employed person | | -0.095*** (0.035) | -0.098*** (0.035) | -0.097*** (0.036) | -0.075* (0.039) | -0.097*** (0.035) | -0.098*** (0.035) | -0.105*** (0.038) |
| Large locality[b] | | 0.089** | 0.089** (0.034) | 0.103*** (0.036) | 0.089** (0.036) | 0.088** (0.034) | 0.089** (0.035) | 0.092** (0.037) |
| Religious[c] | | | | 0.011 (0.039) | | | | |
| Number of children | | | | | -0.014 (0.014) | | | |
| Education level[d] | | | | | | 0.021 (0.013) | | |
| Employed | | | | | | | -0.001 (0.037) | |
| Distance from bus stop[e] | | | | | | | | 0.026 (0.019) |
| Number of observations | 621 | 621 | 621 | 562 | 569 | 618 | 621 | 545 |
| $R^2$ | 0.214 | 0.223 | 0.231 | 0.241 | 0.218 | 0.234 | 0.231 | 0.241 |

Standard deviations presented in parentheses. *refers to significance at the 10 percent level. ** refers to significance at the 5 percent level. *** refers to significance at the 1 percent level.

In all columns, the dependent variable is a binary variable that receives a 1 if the woman said that she uses public transportation at any frequency.

The results presented are based on an OLS estimation without sampling weights. Similar results are obtained by the Logit method as well as with the use of sampling weights to correct for under-representation of women who did not complete high school.

a The access to a private vehicle is a binary variable that receives a 1 if the woman holds a drivers license and a private vehicle is available to her.

b A large locality is a binary variable that receives a 1 if there are at least 25,000 residents.

c A religious woman is one who identified herself as "religious" or "very religious". Fifty-nine women declined to answer this question.

[13]  The next factors in descending order of importance are reliability of service (5 percent), and reduction of travel time (4 percent). Among women who already use public transportation (but not on a daily basis), 49 percent noted that a bus stop close to their home would cause them to use public transportation more often.

**Table 4**
**The goal of travel on public transportation, by frequency of use**

| | | All | On a daily basis | At least once a week | Less than once a week |
|---|---|---|---|---|---|
| 1 | Shopping and errands | 46.4 | 28.2 | 47.2 | 56.8 |
| 2 | Visiting friends and family | 31.1 | 17.4 | 32.6 | 37.8 |
| 3 | Studies | 30.1 | 45.6 | 27 | 24.3 |
| 4 | Work | 19.6 | 45.7 | 11.2 | 13.5 |
| 5 | Other | 1.9 | 2.1 | 2.2 | 1.4 |
| Number of observations | | 209 | 46 | 74 | 89 |

Regarding the changes in public transportation in recent years, close to one-half of women who use public transportation reported that public transportation services improved in recent years, and the percentage increases as bus stop distance from home decreases. Furthermore, employed women are more likely to report an improvement in public transportation. This finding indicates that employed women are not indifferent to the service improvements in the recent years.[14]

### 3. How do Arab women travel to work?

The employment rate among all the women in the sample is 38.5 percent. Of all employed women, over 80 percent are employed at least 10 months a year, and over 85 percent work at least six hours a day. This implies that the majority of the employed women in our sample hold a job of significant scope and that employment is not a side job for these women. Arab women who are more likely to be employed are women who have access to a car,[15] are educated, are not young, are married but have a relatively small number of children.

Similar to other women, Arab women also mainly travel to work by car. Use of a car is even higher among Arab women, and is mainly at the expense of their use of public transportation for commuting to work.[16] This trend appears to have strengthened in recent years, as 14 percent of the survey respondents reported having had used a different means of transportation to work in the past, and the most common transition was from public transportation to driving a car.

Approximately 75 percent of employed Arab women have access to a car, and over 90 percent of this group use their car to commute to work. The 25 percent of employed Arab women with no access to a car commute to work with someone who drives them (43 percent) or use public transportation (40 percent). The remainder walk to work, and only a minority use employer-provided transportation.

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[14] Furthermore, the rate of women who reported an improvement in services, by area of residence, is positively correlated with the increase in the number of bus travels in the Arab localities in their area, based on administrative data of the Ministry of Transportation (Table 3), although the differences between the groups are not statistically significant.

[15] Note that this does not imply causality. Employed women have a higher mean income and therefore a greater likelihood of being able to afford to purchase a car.

[16] According to the 2018 social survey, approximately 57 percent of Jewish and other women use a car and approximately 23 percent use public transportation to travel to work. In contrast, approximately 73 percent of Arab women commuted to work by car and only 10 percent commuted by public transportation (similar results emerged for Arab women in the current study).

Use of public transportation for commuting is higher for women who work outside their residential locality (22 percent) than for women who work in their residential locality (5 percent). Arab women tend to work in their residential locality—more than half do so,[17] compared to only 35 percent of Jewish women who

**Table 5**
**The connection between the use of public transportation as a means of getting to work and the qualities of individuals**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Access to a car[a] | -0.343*** | -0.331*** | -0.324*** | -0.344*** | -0.317*** | -0.278*** | -0.310*** | -0.329*** |
| | (0.043) | (0.044) | (0.044) | (0.047) | (0.045) | (0.045) | (0.046) | (0.047) |
| Employed in residential locality | -0.133*** | -0.126*** | -0.115*** | -0.102** | -0.120*** | -0.0891** | -0.121*** | -0.133*** |
| | (0.038) | (0.038) | (0.039) | (0.040) | (0.038) | (0.039) | (0.038) | (0.044) |
| Lives in the Triangle area[b] | | 0.117*** | 0.124*** | 0.128*** | 0.126*** | 0.091** | 0.122*** | 0.130*** |
| | | (0.044) | (0.044) | (0.047) | (0.044) | (0.045) | (0.044) | (0.049) |
| Lives in the Negev area[b] | | 0.019 | 0.016 | 0.017 | 0.020 | 0.002 | 0.017 | 0.026 |
| | | (0.068) | (0.068) | (0.068) | (0.068) | (0.068) | (0.068) | (0.072) |
| Age | | | -0.003 | | | | | |
| | | | (0.002) | | | | | |
| Religous[c] | | | | -0.008 | | | | |
| | | | | (0.040) | | | | |
| Married to an employed person | | | | | -0.054 | | | |
| | | | | | (0.039) | | | |
| Number of children | | | | | | -0.015 | | |
| | | | | | | (0.011) | | |
| Level of education[d] | | | | | | | -0.023 | |
| | | | | | | | (0.015) | |
| Distance from bus station[e] | | | | | | | | -0.003 |
| | | | | | | | | (0.022) |
| Number of observations | 238 | 237 | 237 | 210 | 237 | 220 | 236 | 205 |
| $R^2$ | 0.268 | 0.293 | 0.300 | 0.296 | 0.299 | 0.215 | 0.301 | 0.297 |

Standard deviations presented in parentheses. *refers to significance at the 10 percent level. ** refers to significance at the 5 percent level. *** refers to significance at the 1 percent level.

In all columns, the dependent variable is a binary variable that receives a 1 if the woman said that she takes public transportation to work at any frequency. The results presented are based on an OLS estimation without sampling weights. Similar results are obtained by the Logit method as well as with the use of sampling weights to correct for under-representation of women who did not complete high school.
a The access to a private vehicle is a binary variable that recieves a 1 if the woman holds a drivers license and a private vehicle is available to her.
b The women in the base group lived in the Galilee area.
c A religious woman is one who identified herself as "religious" or "very religious". Fifty-nine women declined to answer this question.

17 According to the current study, 57.7 percent of the women work in their locality of residence (50.3 percent according to the CBS social survey).

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live in localities with a population of up to 100,000.

The regression estimation[18] of the probability that an employed woman will use public transportation to commute to work shows that having access to a car reduces the probability of public transportation use by slightly more than 30 percent, and with respect to employment within the residential locality, which reduces the probability by approximately 10 percent (Table 5). Furthermore, women who live in the Triangle have a stronger tendency to commute to work by public transportation, compared to women who live in the Galilee (a similar result did not emerge for women who are residents of the Negev). This result may stem from the geographic proximity of Triangle localities' to major centers of employment, which increases the ability of offering these women access to public transportation services that are relevant for commuting to work.

## 4. Do Arab women refrain from working outside the home because of limited public transportation services?

Of the women who do not work outside the home, only 5 percent reported that they did not work outside the home because of a lack of employment opportunities within reasonable commuting time or because of inadequate public transportation (Table 6). According to this finding, public transportation is less important than other factors in explaining non-employment, headed by the need to care for children or

**Table 6**
**Reasons for non-employment, by age group**

|  | Total | Age group | | |
|---|---|---|---|---|
|  | 20-60 | 20-29 | 30-49 | 50-60 |
| Caring for children or other family member | 43.5 | 12.6 | 63.7 | 37.2 |
| Health problems | 17.8 | 1.8 | 15.0 | 47.4 |
| Currently in school/training | 14.9 | 48.6 | 1.6 | 0.0 |
| Insufficient experience/training | 10.2 | 7.2 | 11.4 | 11.5 |
| No suitable work | 6.3 | 8.1 | 7.3 | 1.3 |
| Other reason | 6.3 | 7.2 | 4.1 | 10.3 |
|  |  |  |  |  |
| **There is no work within a reasonable travel time/insufficient transportation** | **4.7** | **9.9** | **3.6** | **0.0** |
| Language barriers | 3.1 | 5.4 | 2.1 | 2.6 |
| It isn't customary in the family | 3.1 | 3.6 | 3.1 | 2.6 |
| Number of observations | 382 | 111 | 193 | 78 |

The table presents the responses to the question: what are the main reasons that you are not working today?

The responses don't add up to 100 perent because it was possible to give more than 1 response to the question.

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[18]  The following regression estimates using the Heckman correction showed no bias and generated similar results.

family members. Notably, even for women without access to a car, public transportation is a relatively minor reason for non-employment.

Non-employment due to care of children or family members is prevalent mainly among women in the middle-aged (aged 30–49) age group and less so among older women (aged 50–60), for whom care of children or family members are the second most important cause of non-employment, after health-related problems. In contrast, younger women (aged 20–29) are not employed mainly because they are in school or training. Moreover, for this age group, the lack of employment opportunities within reasonable commuting distance or lack of adequate public transportation is the third most important cause of non-employment, lagging only slightly after care of children or family members.

Table 7 presents the distribution of causes of non-employment in subgroups of younger women. Findings indicate that the main reason for non-employment in every subgroup is (leading other reasons by a large margin) school or vocational training. For the group of younger women overall, caring for children or family members and lack of employment opportunities within reasonable commuting distance are next in importance. This is also the case in the subgroups of women without access to a car, women with secondary and post-secondary (but not academic) education, and religiously unobservant women.[19] In contrast, for younger women who use public transportation, and especially for younger women who searched for employment in the past two years, a lack of employment opportunities within reasonable commuting distance and inadequate public transportation services are more important reasons for non-employment.[20] A similar picture emerges from the regression analysis, which shows that if a woman reported that she had been searching for a job in the past two years, she is 10 percent more likely to report non-employment due to a lack of employment opportunities within reasonable commuting time or inadequate public transportation

**Table 7**
**Reasons for non-employment among the subgroup of young women (ages 20-29)**

|  | All | No access to a car | Secondary school/post-secondary education (non-academic) | Not religious or not very religious | Uses public transportation | Sought work in preceding 2 years |
|---|---|---|---|---|---|---|
| Currently in school/training | 48.6 | 37.0 | 40.5 | 54.7 | 54.7 | 46.9 |
| Caring for children or other family member | 12.6 | 16.4 | 12.2 | 10.9 | 6.3 | 9.4 |
| **There is no work within a reasonable travel time/insufficient transportation** | **9.9** | **13.7** | **12.2** | **12.5** | **15.6** | **21.9** |
| No suitable work | 8.1 | 9.6 | 9.5 | 9.4 | 9.4 | 12.5 |
| Insufficient experience/training | 7.2 | 9.6 | 6.8 | 4.7 | 9.4 | 12.5 |
| Other reason | 7.2 | 8.2 | 9.5 | 4.7 | 6.3 | 3.1 |
| Language barriers | 5.4 | 8.2 | 6.8 | 1.6 | 3.1 | 3.1 |
| It isn't customary in the family | 3.6 | 4.1 | 4.1 | 4.7 | 0.0 | 0.0 |
| Health problems | 1.8 | 0.0 | 2.7 | 1.6 | 1.6 | 0.0 |
| Number of observations | 111 | 73 | 74 | 64 | 64 | 32 |

The table presents the responses to the question: what are the main reasons that you are not working today?

The responses don't add up to 100 perent because it was possible to give more than 1 response to the question.

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[19] Similar results (not reported here) emerged for young women with no children, young women in large/small localities, and young women who reported walking more than 5 minutes to the nearest bus stop.

[20] Of the women who searched for employment in the past two years, all women who noted "lack of employment opportunities within reasonable commuting time/inadequate public transportation" as the reason for their non-employment had no access to a car.

**Table 8**

**The connection between non-employment due to insufficient arrival time/transportation and individuals' characteristics**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Age | -0.003*** | -0.002** | -0.002** | -0.001 | -0.002** | -0.001 | -0.002** | -0.002** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Sought work in the preceding 2 years | | 0.112*** | 0.111*** | 0.123*** | 0.112*** | 0.0920*** | 0.114*** | 0.115*** |
| | | (0.034) | (0.034) | (0.036) | (0.034) | (0.034) | (0.034) | (0.037) |
| Access to a car[a] | | | -0.014 | | | | | |
| | | | (0.022) | | | | | |
| Religious[b] | | | | -0.039 | | | | |
| | | | | (0.026) | | | | |
| Married to an employed person | | | | | -0.001 | | | |
| | | | | | (0.022) | | | |
| Number of children | | | | | | -0.009 | | |
| | | | | | | (0.007) | | |
| Level of education[c] | | | | | | | -0.003 | |
| | | | | | | | (0.009) | |
| Distance from bus station[d] | | | | | | | | 0.000 |
| | | | | | | | | (0.013) |
| Number of observations | 382 | 380 | 380 | 350 | 380 | 345 | 380 | 336 |
| R$^2$ | 0.029 | 0.057 | 0.058 | 0.071 | 0.057 | 0.048 | 0.058 | 0.057 |

Standard deviations presented in parentheses. *refers to significance at the 10 percent level. ** refers to significance at the 5 percent level. *** refers to significance at the 1 percent level.

In all columns, the dependent variable is a binary variable that receives a 1 if the woman said that she doesn't work becaseu there is no employment within a reasonable travel time/insufficient transportation

The results presented are based on an OLS estimation without sampling weights. Similar results are obtained by the Logit method as well as with the use of sampling weights to correct for under-representation of women who did not complete high school.

a Access to a private vehicle is a binary variable that recieves a 1 if the woman holds a drivers license and a private vehicle is available to her.

b A religious woman is one who identified herself as "religious" or "very religious". Fifty-nine women declined to answer this question.

c The education level is a discrete variable that represents the highest diploma that the woman says she received.

services (Table 8). In contrast, no statistically significant connection was found between the dependent variable and other demographic items, with the exception of age. This is supported by the finding that approximately 35 percent of the younger women who searched for a job in the past two years explicitly stated that the changes in public transportation services helped them find a job, compared to only 10 percent of the younger women who did not search for a job in the past two years.

The explanation for the above findings appears to be that younger women who actively searched for employment managed to overcome the structural and cultural barriers that account for Arab women's relatively low rate of employment. Therefore, in the absence of more significant barriers, they stress commuting time, which is a relatively minor barrier to employment for other women. Notably, this group (younger women who searched for employment in the past two years) accounts for 9 percent of the sample.

## Summary

In this study, we analyzed the results of a survey of Arab women's use of public transportation and employment. The aim of this study was to examine why Barak (2020) did not identify significant effects of public transportation improvements in Arab localities on Arab women's employment. Specifically, did this result stem from the fact that the public transportation additions were not relevant to the population's employment needs, or was the lack of public transportation not the reason for the low participation rate of Arab women in the labor market? The answer that emerges from the findings of the current survey is that Arab women recognize the improvements in public transportation in recent years and use public transportation to satisfy a variety of needs. Furthermore, the majority of Arab women who do not work outside the home do so, not because of a lack of public transportation but mainly in order to care for children or family members, or, to a lesser degree, due to medical issues, or because they are in school or training. Nonetheless, for a specific group of women — younger women who searched for employment in the past two years —lack of employment opportunities within reasonable commuting time and inadequate public transportation services are significant factors in their non-employment. Moreover a high percentage of this group reported that the public transportation improvements in recent years helped them to find a job. Therefore it appears that the findings of the current survey are consistent with the findings reported by Barak (2020), and support the conclusion that the improvements in public transportation services benefited those women who managed to overcome other structural and cultural barriers that affect Arab women's low employment rates. Still, this group accounts for only 9 percent of the women in the current sample. It is also important to stress that the public transportation improvements contributed to the residents of Arab localities in other ways, as the population uses these services for a variety of needs, and the improvements reduced their travel costs in terms of time and money.

The survey whose findings are presented in this document was conducted in August and September 2019, before the outbreak of the Covid-19 crisis. Several of the more recent changes in the labor market triggered by the Covid-19 crisis, and especially the increased rate of working from home, may persist for the long term and reduce the need of many employees to travel to their place of employment. Nonetheless, at least in the near and intermediate future, at-home employment options are relevant only for certain jobs and for employees with specific qualifications. Arab women are employed mainly in education, commerce,

and health and welfare services and therefore new at-home employment opportunities do not appear to be relevant for many of them. In conclusion, this study focuses on an analysis of structural factors underlying Arab women's non-employment, and specifically the role of public transportation. There are grounds to assume that the conclusions of this study will be relevant both during and after the pandemic.

**Table A-1**

**Descriptive statistics - comparison by level of religiousity**

| | All women in the survey | | | Age 20–29 subgroup | | |
|---|---|---|---|---|---|---|
| | Religous[a] | Not religious[b] | P-value[c] | Religous[a] | Not religious[b] | P-value[c] |
| Number of observations[d] | 308 | 254 | | 53 | 119 | |
| Mean age | 41.1 | 32.3 | 0.000 | 24.2 | 23.2 | 0.010 |
| Share that are marrried | 80.2 | 57.9 | 0.066 | 52.8 | 26.9 | 0.342 |
| of which: employment rate of husband | 90.0 | 84.0 | 0.233 | 85.7 | 78.1 | 0.420 |
| Share that are mothers | 82.3 | 62.6 | 0.079 | 50.0 | 26.0 | 0.353 |
| Share that are Muslim | 92.9 | 73.6 | 0.025 | 90.6 | 68.9 | 0.263 |
| Share that completed high school | 78.9 | 94.1 | 0.023 | 100.0 | 100.0 | - |
| of which: share with academic education | 19.8 | 46.9 | 0.035 | 22.6 | 38.7 | 0.381 |
| Share that hold a drivers license | 54.9 | 77.2 | 0.068 | 62.3 | 71.4 | 0.441 |
| Access to a private vehicle | 46.1 | 63.8 | 0.151 | 43.4 | 50.4 | 0.459 |
| Share that use public transportation | 33.1 | 32.3 | 0.480 | 49.1 | 49.6 | 0.497 |
| of which: share that take public transportation to work | 14.7 | 22.0 | 0.250 | 26.9 | 22.0 | 0.462 |
| Employment rate | 26.9 | 50.4 | 0.074 | 37.7 | 46.2 | 0.448 |
| of which: employed in residential locality | 60.2 | 57.8 | 0.445 | 40.0 | 45.5 | 0.467 |
| of which: share that arrive at work via public transportation | 14.5 | 10.9 | 0.323 | 25.0 | 18.2 | 0.444 |

a A religious woman is one who identified herself as "religious" or "very religious".

b A not-religious woman is one who identified herself as "not religious" or "not so religious".

c The P-value is calculated based on the t-test (one-tailed) of difference in outcomes.

d Fifty-nine women did not answer the question regardin their level of religiosity.

**Table A-2**
**Descriptive statistics - comparison by size of locality**

|  | Large localities[a] | Small localities | P-value[b] |
|---|---|---|---|
| Number of observations | 359 | 262 |  |
| Mean age | 37.3 | 36.0 | 0.162 |
| Share that are marrried | 70.1 | 67.6 | 0.430 |
| of which: employment rate of husband | 80.2 | 70.8 | 0.223 |
| Share that are mothers | 71.7 | 65.5 | 0.332 |
| Share that are Muslim | 83.8 | 75.2 | 0.215 |
| Share that are religious | 57.9 | 50.4 | 0.323 |
| Share that completed high school | 87.2 | 82.8 | 0.303 |
| of which: share with academic education | 35.5 | 30.0 | 0.351 |
| Share that hold a drivers license | 72.7 | 54.6 | 0.114 |
| Access to a private vehicle | 61.3 | 43.9 | 0.139 |
| Share that use public transportation | 33.7 | 33.6 | 0.497 |
| of which: share that take public transportation to work | 23.1 | 14.8 | 0.198 |
| Employment rate | 42.1 | 33.6 | 0.289 |
| of which: employed in residential locality | 60.3 | 53.4 | 0.335 |
| of which: share that take public transportation to work | 13.9 | 10.2 | 0.294 |

a Large locality is defined as one with at least 25,000 residents.

b The P-value is calculated based on the t-test (one-tailed) of difference in outcomes.

**Table A-3**
**The improvement in public transporation service in various areas: according to the survey and according to administrative data**

| Geographical region | The Negev | The Galilee | The Triangle |
|---|---|---|---|
| Share reporting improved service in recent years | 42% | 49% | 56% |
| Growth rate in number of bus trips - 2019 vs. 2017 | 16% | 42% | 62% |
| Growth rate in number of bus trips - 2019 vs. 2015 | 39% | 85% | 120% |