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Jobs at risk in Turkey: Identifying the impact of COVID-19[1]

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Abstract

This paper analyzes to what extent jobs in different sectors of Turkey are vulnerable to the COVID-19 crisis considering both effects specific to COVID-19, and sector- and employment-specific vulnerabilities. With this objective, first, we identify sectors that are most amenable to working from home. We then use this index and other dimensions of vulnerability to develop an Employment Vulnerability Index for Turkey. We find that only 10 percent of workers in Turkey can work from home. Employment vulnerability is highest among textile and apparel, accommodation and food, and leather sectors; while jobs in ICT and finance are the least vulnerable. We find that overall, around 7 million workers are at the risk of losing their jobs due to the economic impacts of COVID-19.

JEL codes: J20, J21, J23

Keywords: COVID-19, employment vulnerability, working from home

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Table of Contents

1. Introduction

Coronavirus disease (COVID-19) outbreak has rapidly affected millions around the world since December 2019 when the first COVID-19 positive case identified in Wuhan, China. The first COVID-19 positive case in Turkey was identified on March 11, 2020. Since then, the number of cases has increased and reached over 200 thousand as of the beginning of July 2020.

In addition to the direct health impact, the COVID-19 crisis will likely have broad economic and employment effects. People in vulnerable employment face the risk of losing their jobs and livelihoods due to the social distancing and/or firm closures during this time, especially in sectors that are more likely to be affected by the outbreak, and for those workers who cannot easily complete their daily tasks from home. A recent study in Turkey shows that four out of five SMEs in Turkey are significantly negatively affected by the COVID-19 crisis (Business for Goals, 2020). Depending on the intensity of face-to-face interaction required in performing the job, some sectors have been instructed to close temporarily by the Government of Turkey (GoT) as a result of the COVID-19 outbreak. On the other hand, despite the risk of human interaction, some sectors continued operation. The government put additional measures to continue operations in health and agriculture, and operations continued to the extent possible in some other manufacturing sectors such as food production and petroleum production. Operations in the remaining sectors depend on to what extent daily tasks can be completed from home, such that non-essential sectors that require high face-to-face interaction are more likely to see a significant decrease in their operations (most sectors in services and construction).

Turkish labor market does not have only COVID-19 related problems. Indeed, labor market outcomes have been challenging even before the outbreak in Turkey. COVID-19 has exacerbated pre-existing vulnerabilities in Turkish labor market. Despite its impressive economic performance since 2000, growth have largely been dependent on credit booms and private sector debt in foreign currency since the Global Financial Crisis of 2008-2009. On the

labor demand side, problems in access to finance and unmet liquidity needs continue to pressure the cash-strapped firms, particularly MSMEs, in sustaining high demand for workers.[3] Thanks to economic growth and government programs (and subsidies) aimed at stimulating labor demand, the economy managed to create approximately 7.5 million jobs between 2009 and 2018. However, the real and financial sector were affected by external economic conditions in mid-2018, together with a depreciation in the Turkish lira. In this period, economy also suffered due to high foreign exchange debt, inflation rate reached its peak at 25 percent in October 2018. Labor market was affected by these circumstances in the economy; as a result, Turkey experienced jobs losses from 2018 to 2019 (around 700 thousand). In addition, informality has been one of the important challenges that the country has been facing. Despite the decline from around 47 percent in 2006, around one third of employment is still informal, and workers in sectors with high informality suffer from the lack of protection from shocks, such as the current one induced by the COVID-19 outbreak. Therefore, poorer households are expected to be most impacted because most of the people in poorer households are employed in informal sectors, especially in in construction and agriculture. Finally, in addition to high informality, low female labor force participation rates, high youth unemployment and high heterogeneity across regions of Turkey in many economic domains have traditionally been areas of improvement in the Turkish labor market (See Table A.1 in Appendix for detailed statistics).

On top of the existing vulnerabilities, the influx of over 4 million Syrian refugees since 2011 have led to further social, economic and political necessities, particularly as Turkey has moved from a standpoint of providing humanitarian assistance to one that induces refugees to

[3] According to the World Bank Enterprise Survey, most respondents (76 percent) in the affected regions by Syrian influx declare that access to finance deteriorated loan terms and conditions (interest rates, maturity, and collateral requirements). After high tax rates, access to finance is perceived as a top constraint on firms, particularly small and medium enterprises (SMEs), seeking to carry out and expand business in Turkey (Source: Enterprise Surveys (database), International Finance Corporation and World Bank, Washington, DC, https://www.enterprisesurveys.org/)

become economically active and provide their own livelihoods. The magnitude of the refugee and migrant influx continues to pose substantial development consequences for not only the displaced but also the communities into which they settle.[4]

Turkey immediately initiated several measures to mitigate the adverse effects of these developments for households, but the adequacy of these measures in preventing households from falling into poverty is yet to be seen. Similar to the measures around the world to respond to COVID-19 (see Schmillen, 2020 and Gentilini et al., 2020 for a review), Turkey uses social assistance, social insurance schemes and labor market regulations to prevent income losses for Turkish households. Over 5 million households were paid a one-time 1000 TL (around 154 USD) including the existing social assistance beneficiaries as well as new applicants that previously were not eligible for social assistance but are now in hardship due to COVID-19. Firms cannot lay off workers during this period, but a range of payments from short-term work allowance[5] to unpaid leave support[6] are available for firms that have difficulty in paying wages for their workers due to reduced operations or lockdowns. In addition to other measures such as utility waivers, other relatively vulnerable groups such as retirees and women receive conditional or unconditional additional cash support (see Gentilini et al, 2020 for a weekly updated version of these measures for Turkey and other countries). It is not yet known whether these measures are adequate to prevent significant increases in poverty. For example, the ban for layoffs is currently until August 17th, 2020 and

[4] From a labor market perspective, studies indicate that the refugee influx led to the displacement of Turkish citizens from the informal labor market, and while host community workers with higher education levels managed to move to formal jobs, women and low-skilled men faced further competition for already scarce and vulnerable jobs (Del Carpio and Wagner, 2015).

[5] For firms that reduced working hours or halted operations during the outbreak, a Short-term Work Allowance covers the wages of workers. The allowance provides 1,752 TL/month (around $271) for those that receive minimum wage in the last 12 months. The allowance can be provided for a maximum of 3 months and can be extended to 6 months through a Presidential decree. The first extension has already been made.

[6] Firms can force employers to take unpaid leave, in which case the worker will receive 1,170 TL (around $180) from the government.

is expected to be postponed to October 17th, after which there may be high number of layoffs.

Despite those policies initiated by the GoT, the above-mentioned issues are expected to be important drivers of a prolonged period with negative labor market consequences of the COVID-19. Therefore, it is important to consider both the immediate effects in the labor market, and effects that may realize as a result of the existing vulnerabilities of the Turkish labor market. The current paper is a first attempt with this objective, and it analyzes how and to what extent the sectors are vulnerable to the COVID-19 crisis considering both effects specific to COVID-19, and the type of economic risk that the worker faces in the job due to sector- and employment-specific vulnerabilities. Thus, the paper aims to give a better sense to what extent the COVID-19 crisis is likely to lead to job losses in different sectors of Turkey. The analysis uses a two-step methodology, where in the first step, we identify sectors that are most amenable to working from home using the methodology developed in Hatayama, Viollaz and Winkler (2020). We then use this index and other dimensions of vulnerability to develop an Employment Vulnerability Index for Turkey, and discuss employment vulnerability in Turkey's sectors.

The next section provides the analysis of amenability to home-based work, Section 3 details the Employment Vulnerability Index, Section 4 discusses the results, and the final section concludes the paper.

2. Amenability to working from home in Turkey

Working from home is one of the measures taken by the employers to reduce the detrimental effects of COVID-19, at least in the short run. Workers with the ability to continue their work from home are more likely to keep their jobs, and firms with a higher percentage of workers that are able to continue their daily tasks from home are more likely to continue their operations at a pace closer to the pre-COVID period. Amenability to working from home is thus an important indicator to identify the ability of workers, firms and sectors to adapt to the COVID-19 shock.

With the above motivation, in this section we identify the percentage of workers that can complete their daily tasks from home as accurately as possible. We use the methodology developed by Hatayama, Viollaz and Winkler (2020), which allows us to use the Turkey 2014/2015 micro dataset for the OECD Survey of Adult Skills (PIAAC) to identify Turkish workers' amenability to working from home using the responses in the survey about their daily tasks. In other words, rather than an occupation-based classification (as implemented in earlier studies such as Dingel and Neiman, 2020), this methodology uses the skills and tasks at work as stated by workers themselves.[7]

The indicators used for this analysis are presented in Table 2.1. The index posits that the job is less amenable to working from home if it has high physical and manual intensity, requires face-to-face interaction and ICT use is low at work. It also takes into account internet connectivity at home, as workers cannot possibly work from home if they do not have the

[7] Dingel and Neiman (2020) use occupation-based information from two Occupational Information Network (O*NET) surveys that cover work context and generalized work activities. They define an occupation as not performable from home if answers to the surveys show that the occupation require daily work outside of home, for example, in the form of working outdoors or operating vehicles or equipment. Using this methodology for Turkey implies that we would need to assume that the daily tasks of workers in the US for each occupation are not significantly different than those in Turkey, which may not necessarily hold given the differences in skills levels and technological infrastructure between the two countries.

necessary infrastructure. The resulting index can take negative or positive values and higher values of the index indicate higher possibility of working from home. We use the index values for the ranking of sectors and the Employment Vulnerability Index that will be explained in the next section.

Moreover, the authors adopt a more flexible strategy in the sense that, instead of transforming variables into binary outcomes, they are able to use categorical information and can rank job depending on how many of the different conditions (see indicators in Table 2.1 below) are satisfied. We use the binary version of the index to estimate the percentage of workers that can work from home as this version is easier to interpret and draw percentages. The binary version of the index is calculated using the same criteria, but less information compared to the actual index. In particular, it assumes that the respondent's job is not amenable to working from home if it involves working physically for a long period or selling a product or a service at least once a week; or the respondent uses e-mail less than once a month; or they do not use computer or internet at home or their everyday lives.

Table 2.1 Indicators used in the analysis of amenability to working from home

Sub-index	Indicators
Physical and manual	Job is physically intensive Repairing equipment Operating heavy machinery
Face-to-face (F2F)	Supervising others Contact with customers, public, students
Low ICT at work	Low or no computer use at work Low or no cell phone use at work
Low ICT at home	No internet connection at home

Source: Hatayama, Viollaz and Winkler (2020)

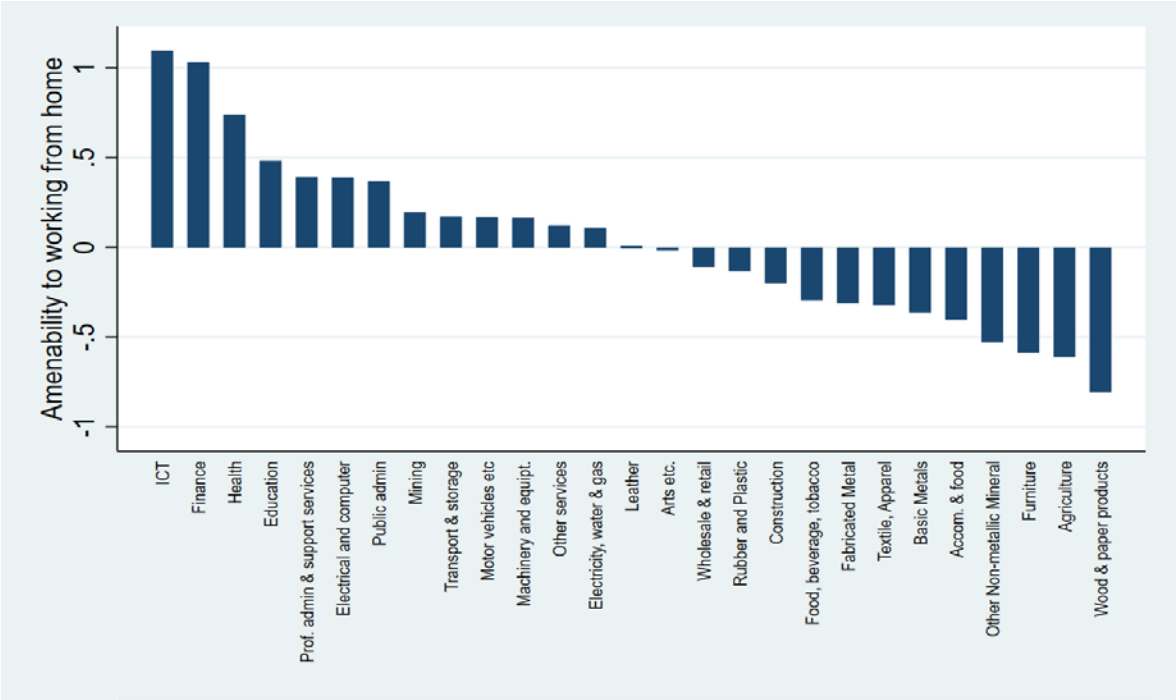
Our results show that finance and ICT are the sectors with highest amenability to working from home, while agriculture, textile, apparel, leather, construction are the sectors with workers that are least likely to continue their daily tasks from home (Figure 2.1). Overall, working from home is feasible for around 10 percent of workers in Turkey.[8] Detailed results for different sectors in Turkey may be found in Table A.2 in Appendix.

While the analysis captures several different dimensions that contribute to the amenability of the job to home-based work, it fails to capture whether the daily task is physically attached to a specific location. For example, our analysis finds that mining and transport and storage sectors are relatively amenable to working from home, primarily because the daily tasks of workers require less face-to-face interaction. However, around 60 percent of workers in the mining sector and 70 percent of workers in the transport and storage sector are plant and machine operators and assemblers, and workers in elementary occupations. Majority of

[8] This calculation is made using the binary version of the index.

these workers possibly require to be present at a specific location to perform their daily tasks, and hence cannot work from home. While the physical and manual dimension of our index can capture part of this information, it may not capture this dimension for workers whose jobs are not necessarily physically intensive or does not require operating heavy machinery.

Figure 2.1 Amenability to working from home by sectors



Source: Authors' calculations based on Turkey PIAAC

3. Sectors most at risk in Turkey: Employment Vulnerability Index

Countering the economic damage and/or reversing the negative impacts of the COVID-19 pandemic requires knowing which jobs are most vulnerable. The impact of shocks over the last ten years has hit sectors and workers has differed by period, so the impact of COVID-19 may also differ given the dual demand- and supply-side shock. In this section, we assess the

jobs that are most at risk by developing a vulnerability index to understand possible impacts of COVID-19 on employment. The analysis relies on three dimensions (i) a macroeconomic analysis of the sectoral vulnerabilities, (ii) the immediate risks faced by workers due to problems in amenability of their jobs to working from home, and finally, (iii) the risks that are a result of structural problems faced in the Turkish labor market.

There are several such vulnerability indices[9] developed to provide a ranking according to the risk of job losses. For example, Australian Employment Vulnerability Index was developed to identify the spatial distribution of job losses in the face of economic conditions (Baum and Mitchell, 2009; Baum, Mitchell and Flanagan 2013). Since there is no consensus on which indicators need to be used in calculation of the index, each country considers its own dynamics to capture employment and job vulnerabilities. They can include variables, for example, jobs-related vulnerabilities (e.g occupation category, responsibility for supervising other employees and ability to decide how daily work is organized), employer-related vulnerabilities (e.g. type of employment contract, employment relationship, type of organization, firm size and ability to influence policy decisions regarding the organization's activities). For instance, Bazillier et al. (2016) develop an employment vulnerability index for Europe by aggregating an "employer-related vulnerability index" and a "job-related vulnerability index", and for this they use 2008 European Social Survey (ESS)[10].

The Australian Urban Research Infrastructure Network (AURIN) under the project "Assessing Risk with Spatial Indexes of Economic Prosperity and Employment Vulnerability" (2015) develops an Australian Employment Vulnerability Index using several employment- and

[9] According to the ILO definition, vulnerable employment (or precarious employment) is the sum of own-account workers and unpaid family workers who are less likely to have formal arrangements and therefore decent working conditions.

[10] Bazillier et al (2016) included Turkey in the analysis and the results showed that while Greece is the country with the highest level of employment vulnerability (an index of 0.55), Turkey (an index of 0.44) is the second country with the highest level of employment vulnerability.

education-related indicator, such as the proportion of the working age population (population 15 years and over) without a post school qualification. Garrota Sanchez et al. (2020) uses essential jobs, potential to working from home and face-to-face interaction to identify the vulnerability of jobs across the European countries.

In developing the Employment Vulnerability Index, we reviewed many indices, including the above-mentioned ones. Our index considers several aspects of employment vulnerability, including higher economic vulnerability in the sector, vulnerabilities due to deficiencies in worker protection and income generation capability of workers, as well as education and skills levels of workers (Table 3.1). The analysis does not include employer-related vulnerability indicators listed above since the aim of the analysis is to capture potential impacts of COVID-19 shock on the employment. But, to account for the adaptability of workers to the COVID-19 shock, we also include the amenability to working from home in the index.

Higher macroeconomic vulnerability in the sector is indicated by the Sector Vulnerability Index (SVI)[11]. SVI takes into account demand shocks and supply shocks as a result of COVID-19 as well as the sector's existing financial vulnerabilities (more information on the SVI is available in Table A.3 in Appendix).

We augment the SVI by adding several dimensions of employment vulnerability. Employment protection in the form of informal job arrangements, lack of employment stability (e.g., flexible contracts such as part-time employment) are important dimensions for vulnerability of employment since cost of firing is lower for these groups[12]. We capture employment protection with two indicators: part-time employment (those who have less working hours

[11] SVI is developed by the Turkey Equitable Growth, Finance and Institutions (EFI) team.

[12] For example, Chaykowski (2005) finds that full-time workers are expected to be less vulnerable, compared to part-time workers.

compared to full-time employment) and informal employment (those who do not contribute to social security system).

Evidence on developing countries shows that wage distribution of informal workers is at/around minimum wage (see for example Maloney and Mendez, 2013). In case of economic shock, workers who earn at/around minimum wage are more likely to move from formal to informal or out of labor force. As a proxy of probability of transition from formal to informal or out of labor force and low-income generation; in the analysis, we included percentage of MW incompliance as one of the indicators of employment vulnerability.[13]

Two further dimensions of vulnerability are related to the education level and skills of workers, such that we assume workers with secondary education and under, and those who work in routine jobs are more likely to be vulnerable. We take the routine jobs definition from Acemoglu and Autor (2011, p.1076), who define routine tasks as not mundane, but "rather sufficiently well understood that the task can be fully specified as a series of instructions to be executed by a machine". Individuals conducting routine tasks at the workplace are thus more likely to be vulnerable as their tasks are easier to be taken over by new workers, or technological improvements may take over their tasks at work.[14]

Finally, we also include the amenability to working from home index explained in the previous section in this analysis, with the rationale that workers that can complete their daily tasks

[13] MW incompliance is calculated as the percentage of workers who earn less than net hourly MW in 2018 (with a 20 percent band).

[14] The index includes indicators on both routine jobs and amenability to working from home. We keep both indicators in the final analysis for two reasons. First, the two indicators measure different characteristics of daily tasks, one measuring if the daily tasks are repetitive or easily specified through an algorithm, the other whether they can be completed from home, indicating that there is no one-to-one relationship between them. For example, accounting clerks have routine jobs that is highly amenable to working from home. Or, lab technicians are in the non-routine group, but they cannot work from home. Second, amenability to working from home does not seem to vary with the skills content of jobs: testing the significance of the difference in WFH scores between routine and non-routine jobs through a two-sided t-test gives a p-value of 0.84.

from home are less likely to be vulnerable in a shock like COVID-19. The EVI is then calculated using the Principal Component Analysis (PCA).

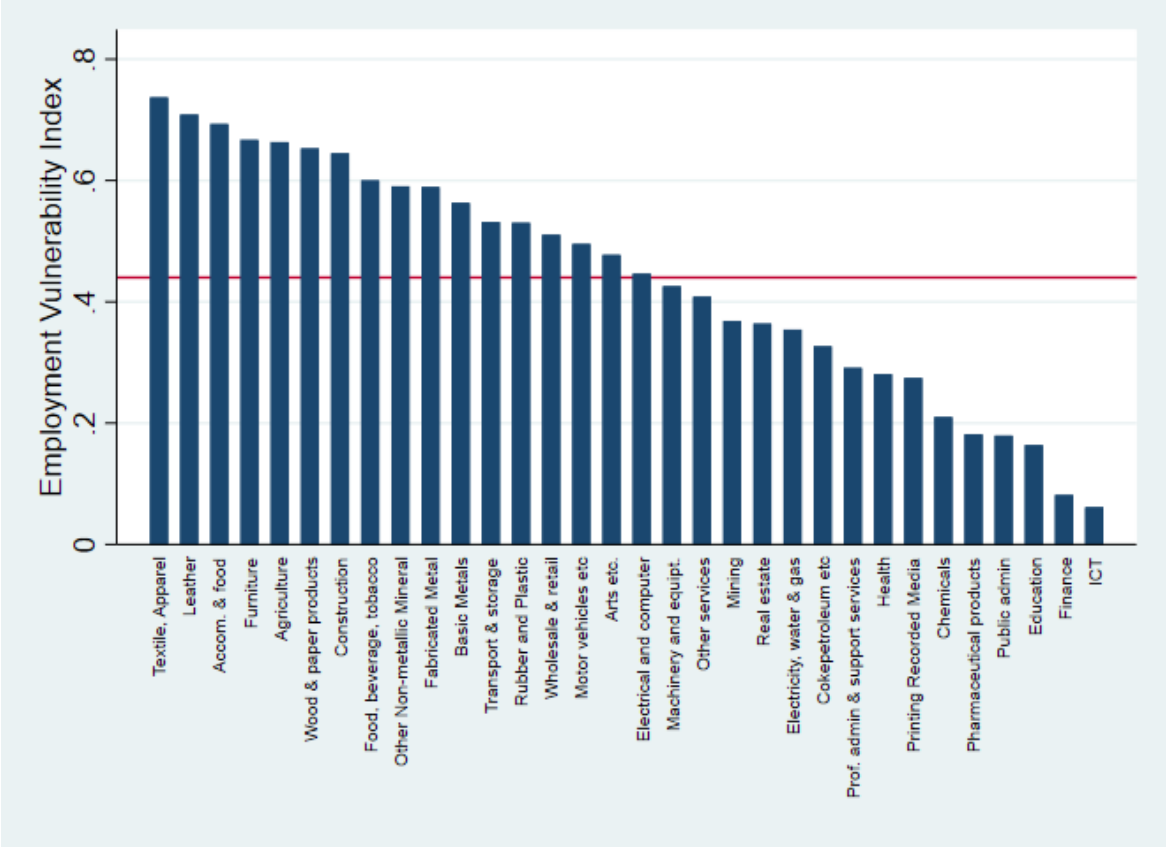
Table 3.1 Indicators used in the Employment Vulnerability Index

Dimension of vulnerability	Indicators used
Higher economic vulnerability	Sector vulnerability index– includes supply shocks, demand shocks and financial vulnerability
Less protection of workers	Self and unpaid employment
	Part-time employment
	Informal employment
More difficulty for workers to generate income for the household	Percentage of workers who earn less than 80% of the net minimum wage
Lower education levels	Percentage of workers with secondary education and under
Lower skills, higher potential to be replaceable by other workers	Percentage of workers working in routine jobs (as defined in Acemoglu and Autor, 2011)
Potential for home-based work	Average amenability to working from home (Hatayama, Viollaz and Winkler, 2020)

The results show that manufacture of textile and apparel, manufacture of leather, accommodation and food, and agriculture are the sectors with highest employment vulnerability (Figure 3.1 and Table 3.2, a detailed table for all sectors may be found in Table A.4 in Appendix). On the other hand, ICT and finance sectors have low employment

vulnerability results. These sectors are stylized by high-skilled workers, non-routine jobs and high protection and earnings.

Figure 3.1 Employment Vulnerability Index for Turkey



Source: Authors' calculations

The sectors suffering from a drastic fall in output according to a recent study conducted by ILO[15] are transport, storage, communication, accommodation and food services, real estate, business and administrative activities, manufacturing and wholesale and retail (ILO, 2020). These sectors are mostly in line with the vulnerable sectors we identified in Figure 2 above for Turkey. And, as in most countries, these sectors employ millions of people. Indeed, the

[15] ILO assessed the impact of the crisis on economic output at the sectoral level by using real-time and financial data and ILOSTAT baseline data on global estimates of sectoral distribution of employment (ISIC Rev. 4).

most vulnerable sectors including manufacture of textile, manufacture of leather, agriculture accommodation & food, manufacture of furniture, construction and transport to storage (the ones that are above mean employment vulnerability score in Figure 2), correspond to 66 percent of total employment in Turkey, as of 2018. They often employ low-paid, low-skilled workers, particularly in the case of manufacture of textile, leather and construction sectors. Therefore, the risks will be felt particularly hard by workers in those sectors.[16]

Different characteristics of each of these sectors make them more vulnerable: for example, accommodation and food has high number of workers with less protection and earnings, while leather, textile employ low-skilled people.

[16] In order to get a sense of which types of workers need more support, a linear OLS regression is also performed to analyze the determinants of employment vulnerability. The model specification includes EVI as dependent variable with several explanatory variables related to workers (gender, age, hours worked per day, firm size and region where the workers live in). We find, for example, that females are more likely to work in less vulnerable sectors. However, this result should be interpreted carefully. One explanation would be that mostly educated females enter the labor market and employed in high qualified jobs. As of 2018, female labor force participation rates are the highest among university graduates (80 percent), whereas it is 66 percent among high school graduates. Other findings reveal that employment vulnerability decreases with age, meaning that youth are at higher risk in terms of employment vulnerability. Workers employed in larger firms are less likely to face vulnerabilities related with employment, whereas working long hours per week implies high employment vulnerability. Indeed, selection bias problem is obvious in the current specification. In future analysis, model specification can be improved by considering such selection bias and other circumstances.

Table 3.2 Characteristics of some the most and least vulnerable sectors in Turkey

	% Self and unpaid workers	% Part time workers	% Informal workers	% Workers earning less than 80% of MW	% Workers with less than HS degree	% Workers with routine jobs	Share in total employment	Sector vulnerability
Accommodation & food	15%	6%	31%	61%	63%	8%	6%	Vulnerable
Agriculture	89%	27%	83%	69%	89%	0%	18%	
Leather	6%	4%	39%	54%	81%	86%	1%	Vulnerable
Textile, apparel	13%	12%	33%	50%	76%	84%	6%	Vulnerable
Construction	14%	8%	34%	41%	70%	35%	7%	Vulnerable
Wholesale & retail	28%	8%	28%	51%	50%	19%	14%	
Finance	4%	3%	6%	8%	8%	48%	1%	
ICT	11%	4%	11%	19%	12%	17%	1%	
Health	1%	4%	29%	39%	37%	9%	5%	
Public admin	0%	1%	1%	4%	23%	20%	6%	
Education	1%	13%	4%	8%	11%	7%	6%	

Source: Authors' calculations based on Turkey HLFS (2018) and SVI results

4. Discussion: Implications for the labor market in Turkey's sectors

EVI suggests that textile and apparel, accommodation and food, and agriculture are the three most vulnerable sectors in Turkey. As stated above, around 66% of employment are in sectors with higher than average employment vulnerability score.

In practice, to what extent employment in Turkey's different sectors may be affected by the COVID-19 crisis will depend on several additional factors. For example, the government deemed two sectors, health and agriculture, essential, making up of around 23 percent of total employment in Turkey (18% in agriculture, 5% in health). Despite being highly vulnerable and virtually impossible to work from home, employment in agriculture may remain relatively stable provided that the workers remain healthy and the government can sustain the current protection measures that include increased hygiene provision for seasonal agricultural workers. In sectors other than agriculture and health, 10% of workers can work from home, and around 48% of employment is in the vulnerable sectors where workers have relatively lower protection, skills and income levels. Two sectors, accommodation and food, and arts, entertainment and recreation, were in lockdown (full or partial), making up of around 6% of total employment and working from home is feasible for only around 2% of the workers in these sectors. Combined with the results of our analysis, we thus expect severe negative effects of COVID-19 in the accommodation and food sector.

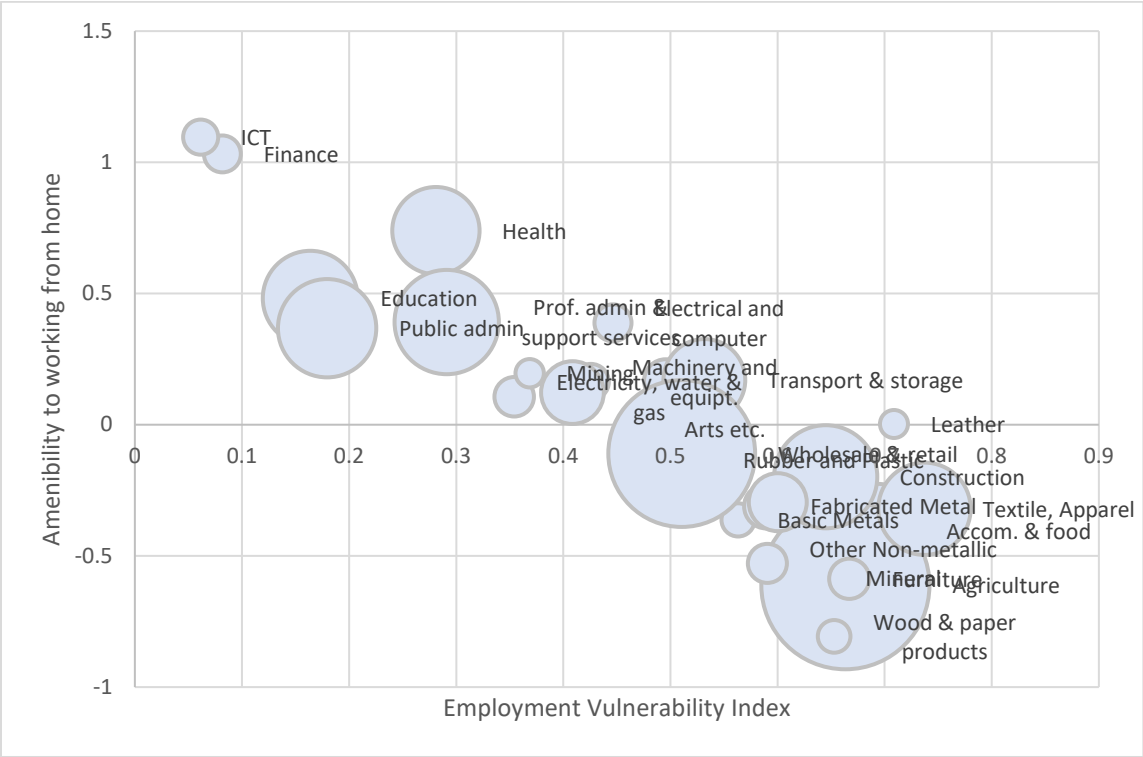
Education in our analysis deserves special emphasis, as our findings indicate that it is relatively less vulnerable and workers are more likely to work from home, but the reality may be quite different. Turkey has closed its school buildings and continued home-based learning methods since March when the outbreak started. The medium of instruction in schools have been through TVs, with private schools adapting to the situation to the extent of their financial or human resources. Anecdotal evidence suggests there have been cases where parents asked for reimbursement of private school fees, and to what extent parents will prefer schools with inadequate online teaching tools in the next education year is still an open question. Education sector, especially smaller private schools, can thus be faced with adverse effects, leading to significant employment losses in the sector. Public data on short-term work allowance suggests the majority of applicant firms (40%) are in manufacturing, followed by wholesale and retail (15%), accommodation and food (12%) and education (6%), largely

verifying the findings discussed in this paper as well as the particular situation of the education sector.[17]

Overall, the bulk of employment lies in sectors with high employment vulnerability. These sectors are also those that are less amenable to working from home (Figure 3). Figure 4 shows the results of sectoral and employment vulnerability analyses together. Textile and apparel, accommodation and food, leather, construction, transport and storage, and motor vehicles and transport vehicles are the sectors that are show both high sector vulnerability as well as employment vulnerability.[18] This result indicates that around 7 million workers are at risk of losing their jobs due to the crisis of COVID-19.

[17] The latest data is provided in a speech of Minister of Family, Labor and Social Services, Zehra Zumrut Selcuk.
[18] Sectors with above-mean EVI scores and SVI scores of 2 and above are considered.

Figure 4.1 Mapping Employment Vulnerability Index versus potential for working from home



Source: Authors' estimation based on HLFS (2018) and PIAAC survey

Note: Size of bubbles are according to the size of employment in each sector.

Figure 4.2 Mapping Sector Vulnerability Index Versus Employment Vulnerability Index

Source: Authors' calculations based on HLFS (2018) and PIAAC survey, sector vulnerability index by Turkey Equitable Growth, Finance and Institutions country team

5. Conclusion

This analysis aims to inform on the potential employment impacts of COVID-19 by using available sources of information in an evolving and uncertain context. It builds on and aims to complement the ongoing work of the Turkey Country Team on the COVID-19 impacts for Turkey.

This analysis investigates whether Turkish labor market can adapt to the current circumstances by moving to a modality of working from home. It then proposes an "Employment Vulnerability Index" which includes working from home index developed in the first part of the paper, several employment-related vulnerability variables (e.g. worker protection, education level of workers) and "Sector Vulnerability Index" (developed by Turkey Equitable Growth, Finance and Institutions team). Employment vulnerability is highest among textile & apparel, accommodation and food, leather sectors. ICT and finance sectors are found as least vulnerable sectors. In practice though, as the examples of agriculture and education show, we argue that the impacts will depend on a combination of these factors and the policy choices. We find that overall, around 7 million workers are at the risk of losing their jobs due to the economic impacts of COVID-19.

While the currently implemented short-term measures are designed to suppress the immediate effects of the shock in the labor market, medium term efforts can specifically target sectors/individuals suffering the most from the adverse effects of COVID-19. To prevent job losses and provide better job search opportunities, targeted measures may include providing integrated financial and advisory support to firms with financial difficulties to promote firm activity, and wage subsidies for essential and/or most vulnerable sectors to improve the chances of workers to stay in formal labor. For workers, online counseling and intermediation, training and on-the-job training programs can be designed to promote skills towards working from home, as well as designing a new outreach program for the newly unemployed or the newly informal workers. Besides, vulnerable sector analysis can help to target workers who needs additional support from social assistance system. Because vulnerable sectors employ mostly low-paid, low-skilled workers. Essential sectors and sectors with new opportunities in these circumstances can also be targeted through specific policies, for example, by preparing more qualified labor for these sectors in case of such

circumstances. This would help to reduce unemployment as well as match the labor demand of those sectors.

Future work can focus on providing more detailed information on the profile of vulnerable workers in order to feed policy choices. In addition, while our analysis currently emphasizes labor supply side factors apart from the sectoral vulnerability information, adding the dimension of labor demand can further evaluate the risks faced by workers. Finally, an additional analysis on some specific vulnerable groups, such as refugees, would be important in identifying policy options specific to groups with existing vulnerabilities.

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Appendix

Table A.1 Main features of the Turkish labor market

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	March 2020
Labor force participation rate	46%	46%	46%	46%	47%	48%	49%	50%	50%	51%	51%	51%	52%	53%	53%	53%	48%
Men	70%	71%	70%	70%	70%	71%	71%	72%	71%	72%	71%	72%	72%	72%	73%	72%	67%
Women	23%	23%	24%	24%	25%	26%	28%	29%	30%	31%	30%	32%	33%	34%	34%	34%	30%
Unemployment rate	11%	11%	10%	10%	11%	14%	12%	10%	9%	10%	10%	10%	11%	11%	11%	14%	13%
Men	11%	11%	10%	10%	11%	14%	11%	9%	9%	9%	9%	9%	10%	9%	10%	12%	13%
Women	11%	11%	11%	11%	12%	14%	13%	11%	11%	12%	12%	13%	14%	14%	14%	17%	14%
Youth (15-24)	21%	20%	19%	20%	21%	25%	22%	18%	18%	19%	18%	19%	20%	21%	20%	25%	25%
Informal employment	50%	48%	47%	45%	44%	44%	43%	42%	39%	37%	35%	34%	33%	34%	33%	35%	29%
Men	44%	42%	41%	40%	38%	38%	37%	36%	33%	30%	29%	28%	29%	29%	29%	31%	26%
Women	67%	65%	63%	61%	58%	58%	58%	58%	54%	52%	48%	46%	44%	45%	42%	42%	35%

Source: Household Labor Force Survey for several years

Table A.2 Detailed amenability to working from home results for Turkey's sectors

Name of sector	Amenability to working from home	Number of emp. (1000s)	Share in total emp.
Accom. & food	1.1%	1,630	5.70%
Agriculture	2.2%	5,297	18.40%
Arts, entertainment and recreation	7.9%	183	0.60%
Basic Metals	0.0%	207	0.70%
Construction	5.9%	1,992	6.90%
Education	25.9%	1,689	5.90%
Electrical and computer	12.8%	257	0.90%
Electricity, water & gas	5.7%	292	1.00%
Fabricated metal	9.0%	362	1.30%
Finance	20.2%	255	0.90%
Food, beverage, tobacco	3.5%	629	2.20%
Furniture	2.3%	303	1.10%
Health	21.6%	1,428	5.00%
ICT	27.0%	231	0.80%
Leather	10.7%	147	0.50%
Machinery and equipt.	24.3%	242	0.80%
Mining	17.0%	151	0.50%
Motor vehicles & transport veh.	12.5%	348	1.20%
Other Non-metallic Mineral	0.0%	285	1.00%
Other services	5.6%	588	2.10%
Prof. admin & support services	16.2%	2,038	7.10%
Public admin	24.6%	1,811	6.30%
Rubber and plastic	0.0%	229	0.80%
Textile, apparel	1.6%	1,596	5.60%
Transport & storage	7.7%	1,255	4.40%
Wholesale & retail	3.2%	4,038	14.10%
Wood & paper products	0.0%	200	0.70%
Other	0.0%	157	0.60%

Note: Amenability to working from home calculated using the binary version of the index. Sectors with less than 10 observations in the PIAAC dataset are not shown.

Table A.3 Indicators for Sectoral Vulnerability Index

Main group	**Indicator**	**Indexation (Net Index)**
Demand Shocks	Reduced consumer demand for goods and services	Calculate simple average of 11 indicators for each sector
	Reduced External Demand	
	Forward Linkages	
Supply Shocks	Reduced access to imported inputs	
	Closures, reduced hours, lockdowns	
	Labor supply shock	
	Backward Linkage	
Financial Vulnerability	NPL (2019)	
	Debt to Equity (2018)	
	Days of Cash on Hand	
	Cash conversion ratio	

Table A.4 List of indices by sector (red=most vulnerable, green=least vulnerable)

Name of Sector	Self +Unpaid emp.	Part-time e.	Informal e.	MW incompliance	Under High school	Routine skills	WFHM	Sectoral Vulnerability Index	Employment Vulnerability index
Accom. & food	0.15	0.06	0.31	0.61	0.63	0.08	-0.40	2.19	0.69
Agriculture	0.89	0.27	0.83	0.69	0.89	0.00	-0.61	1.22	0.66
Arts, entertainment and recreation	0.25	0.21	0.36	0.36	0.35	0.14	-0.02	1.67	0.48
Basic Metals	0.01	0.01	0.06	0.20	0.45	0.68	-0.36	1.81	0.56
Chemicals	0.02	0.02	0.04	0.18	0.37	0.48	1.20	1.53	0.21
Coke and Petroleum	0.02	0.05	0.07	0.12	0.35	0.35	-0.03	1.03	0.33
Construction	0.14	0.08	0.34	0.41	0.70	0.35	-0.20	2.11	0.64
Education	0.01	0.13	0.04	0.08	0.11	0.07	0.48	0.94	0.16
Electrical and computer	0.02	0.01	0.06	0.23	0.42	0.65	0.39	1.92	0.45
Electricity, water & gas	0.27	0.05	0.29	0.19	0.50	0.24	0.11	1.33	0.35
Fabricated Metal	0.11	0.04	0.17	0.33	0.62	0.77	-0.31	1.69	0.59
Finance	0.04	0.03	0.06	0.08	0.08	0.48	1.03	0.89	0.08
Food, beverage, tobacco	0.08	0.06	0.21	0.49	0.63	0.65	-0.30	1.67	0.60
Furniture	0.12	0.03	0.22	0.38	0.71	0.73	-0.59	1.69	0.67
Health	0.01	0.04	0.29	0.39	0.37	0.09	0.74	1.25	0.28
ICT	0.11	0.04	0.11	0.19	0.12	0.17	1.10	0.86	0.06
Leather	0.06	0.04	0.39	0.54	0.81	0.86	0.00	2.17	0.71
Machinery and equipt.	0.02	0.03	0.07	0.20	0.45	0.68	0.16	1.53	0.43
Mining	0.00	0.00	0.04	0.24	0.56	0.58	0.20	1.17	0.37
Motor vehicles & transport veh.	0.01	0.01	0.04	0.15	0.39	0.65	0.17	2.08	0.50
Other Non-metallic Mineral	0.05	0.03	0.09	0.38	0.58	0.55	-0.53	1.58	0.59
Other services	0.33	0.09	0.39	0.50	0.63	0.35	0.12	1.06	0.41
Pharmaceutical products	0.00	0.01	0.04	0.17	0.19	0.39	0.71	1.03	0.18
Printing Recorded Media	0.11	0.06	0.19	0.39	0.47	0.61	0.90	1.14	0.27
Prof. admin & support services	0.16	0.11	0.17	0.25	0.33	0.22	0.39	1.22	0.29
Public admin	0.00	0.01	0.01	0.04	0.23	0.20	0.37	0.83	0.18
Real estate	0.23	0.06	0.28	0.53	0.56	0.08	0.89	1.69	0.36
Rubber and Plastic	0.03	0.02	0.11	0.37	0.62	0.76	-0.13	1.50	0.53
Textile, Apparel	0.13	0.12	0.33	0.50	0.76	0.84	-0.32	2.19	0.74
Transport & storage	0.23	0.08	0.26	0.35	0.60	0.19	0.17	2.08	0.53
Wholesale & retail	0.28	0.08	0.28	0.51	0.50	0.19	-0.11	1.64	0.51
Wood & paper products	0.11	0.03	0.18	0.37	0.57	0.54	-0.81	1.61	0.65

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ABSTRACT

This paper analyzes to what extent jobs in different sectors of Turkey are vulnerable to the COVID-19 crisis considering both effects specific to COVID-19, and sector- and employment-specific vulnerabilities. With this objective, first, we identify sectors that are most amenable to working from home. We then use this index and other dimensions of vulnerability to develop an Employment Vulnerability Index for Turkey. We find that only 10 percent of workers in Turkey can work from home. Employment vulnerability is highest among textile and apparel, accommodation and food, and leather sectors; while jobs in ICT and finance are the least vulnerable. We find that overall, around 7 million workers are at the risk of losing their jobs due to the economic impacts of COVID-19.

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