Employment characteristics and the spread of COVID in Chile

Matias Berthelon, Universidad Adolfo Ibañez
Diana Kruger, Universidad Adolfo Ibañez
Bernardo Lara, University of Talca

Abstract

The economic impact of the COVID-19 pandemic has been widely analyzed in the past 59 weeks. Most academic research has documented large negative impacts on GDP, employment, and individual incomes. Furthermore, the employment effects of the crisis have not been borne equally: women have been affected disproportionately (Alon et al., 2021; Albanesi et al., 2021; Alon et al., 2020; Hupkau and Petrongolo, 2020; Del Boca et al., 2020), as well as economically disadvantaged groups (Lee et. al, 2021; Chetty et al., 2020; Alstadsæter et al. 2020).

A related line of inquiry has sought to understand which economic factors affect the spread of COVID. Among the factors that have been found to increase COVID case and/or death rates in the United States are: county characteristics, such as population density, city size, public transportation usage, demographic age structure, and proximity to an international airport (Desmet and Wacziarg, 2020). Using county-level and zip-code level data for the U.S., studies also find that race and ethnicity are correlated with COVID cases and deaths, even after controlling for socio-economic characteristics (McLaren 2020; Benitez et al. 2020). Finally, characteristics of individuals' employment are also correlated to COVID rates; women and lower-education workers in Canada have higher risk of contracting COVID due to their concentration in higher-risk occupations (Baylis et al., 2020), while certain occupations in the U.S., as well as the inability to telecommute, were found to increase the risk of COVID (McLaren, 2020; Knittel and Ozaltun, 2020).

In this paper, we seek to contribute to the latter line of investigation into the economic characteristics that may be correlated with the spread of COVID—and specifically, characteristics of individuals' jobs that may affect the likelihood of contracting COVID. The vast majority of research to date relating to the economic causes of COVID has used data from the United States and countries in Europe. Our paper will analyze the relationship between employment characteristics and COVID case and death rates in Chile, a country with high levels of income inequality. Indeed, studies by epidemiologists and other disciplines have documented the role of income inequality in Chile in the spread of Covid (Gozzi et al., 2021; Mena et al., 2021) and the effectiveness of public health policies (Bennet, 2021). Our stuy will contribute to the knowledge on the relationship between job characteristics and COVID in a developing country setting.

We will use two different sets of data to analyze the effects of industry and occupation of employment on the spread of COVID in Chile. First, we will match weekly administrative data on confirmed COVID cases and deaths at the municipal level with municipality demographic and socio-economic characteristics that can affect COVID rates. Municipality information will come from the 2017 national Census (rural population, population age structure, population density), and socio-economic characteristics will be obtained from Chile's most recent pre

pandemic national socio-economic survey, CASEN, fielded in 2017.[1] We are especially interested in constructing measures of the share of the local labor force employed in occupational categories (following the International Standard Classification of Occupations 2008, or ISCO-08) and industries (following the International Standard Industrial Classification of All Economic Activities, ISIC), to analyze whether the kind of job performed by workers, or their sector of employment, led to higher COVID contagion and death rates. CASEN will also allow us to construct municipal-level measures of (pre-determined) average school attainment, average income per capita, average poverty rates, among other controls.

We will complement the municipality-level part of the analysis with individual-level data from the recently released *Encuesta de Protección Social* (*Social Protection Survey* or EPS 2019, for its Spanish acronym).[2] The EPS is a longitudinal survey designed to measure and analyze social protection coverage in Chile, and has been fielded every 2 to 4 years since 2002. The 2019 wave began in the last quarter of 2019 and was interrupted by the pandemic in March of 2020. To gather information on the effects of the pandemic, a follow-up survey was taken of a sub-sample of individuals who had completed the EPS questionnaire before March, including questions on whether anyone in the household had contracted COVID. For the sample of approximately 2,000 individuals, the incidence of COVID illness can be matched to characteristics about individuals' most recent employment before the pandemic, including their occupation and industry, and to their employment history, as well as to individual characteristics.

Our methodology will be to estimate linear regressions to measure the correlation between employment and socio-economic characteristics and the spread of COVID across Chilean municipalities. Our preliminary analysis to date considers the first wave of the pandemic, so we have calculated rates of contagion and deaths at the municipality level by including cumulative number of cases and deaths as of November 30, 2020. Furthermore, as of November, the national vaccination program had not yet begun. The control variables measure pre-existing socio-economic and employment structures three years prior to the pandemic, in November of 2017.

We include a summary of our preliminary regressions in Table 1 below. Columns (1) and (2) control for socio-economic variables only. Column (1) reveals that in municipalities with higher income per capita, and with less dense population (higher rurality), COVID rates were lower. Column (2) reveals that once average schooling is included, the correlation between income and COVID rates disappears, suggesting that income and school attainment are correlated. School attainment is a measure of workers' skill, so that column 2 suggests that in areas with lower-skilled workers, COVID rates were higher.

Column (3) introduces variables that measure the pre-existing labor force distribution in the municipality into the different industry and occupation categories. We find that COVID contagion was affected by the industry of employment and the occupation structure of the local

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[1] The more recent national CASEN survey was fielded last year and is not publicly available; furthermore, since it was fielded during the pandemic, municipal economic and employment characteristics may have been altered by the pandemic. A special COVID-CASEN was fielded in 2020 to collect information on COVID effects, but is not representative at the municipal level.

[2] The 2019 EPS was made available to public researchers on Monday, April 26, 2021.

workforce. Specifically, we find that in municipalities with higher proportion of workers in the mining, public administration and health and social service sectors, the rate of confirmed COVID cases in the municipality were higher. Additionally, COVID rates were higher in areas with greater participation of workers in Services and Sales, Skilled agriculture, Craft and artisan, and non-skilled occupations. Domestic service workers were less likely to be infected with COVID, probably because households have laid off domestic workers during the pandemic due to the reduced demand for childcare services, as many parents that employed domestic workers are working from home and taking care of their children due to nation-wide school closures.

Column (4) presents results for death rates at the municipal level; the results are not as statistically significant as the correlations found for contagion rates. Nonetheless, we find that in municipalities with greater employment in the hotel and restaurant industry and as domestic workers, death rates have been lower; this is likely due to the reduced demand for workers in these sectors, who have been furloughed or dismissed. Municipalities with a greater share of workers in transportation and public administration have suffered higher death rates. The relationship with occupational structure reveals that municipalities with greater employment in the armed forces and clerical support workers have experienced lower death rates, whereas greater employment in crafts and artisan occupations has been correlated with higher death rates.

These preliminary results reveal that occupation and industry of employment have affected the spread of COVID in Chile. In areas where the workforce is employed in jobs that cannot be performed from home, and jobs that are likely in the informal sector, COVID has spread among a greater share of the population. We are currently analyzing the recently released from EPS survey, which contains individual data that including information on whether household members contracted COVID and their employment characteristics; preliminary analysis suggests that the results at the individual level are consistent with those reported here.

Lessons from this paper have relevant policy implications for policymakers in Chile, and other countries in the region with high levels of poverty and income inequality. Our regression results suggest that not all workers have the same risk of contracting—or dying—from COVID. Firstly, in order to be able to re-open businesses and reactivate the economy, further research is needed to identify which aspects of employment need to be addressed to reduce the risk of spreading COVID through the workforce. And secondly, the structure of local employment can provide information as to where prevention measures should be focalized more efficiently.

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Table 1
Chile: Employment characteristics and municipal COVID contagion and death rates

Variables	(1) Case rate	(2) Case rate	(3) Case rate	(4) Death rate
		Dependent variable:		
Municipal socio-economic variables				
Income per-capita (pesos)	-2.40e-05***	-8.31e-06	5.71e-06	-2.62e-07
	(3.28e-06)	(9.39e-06)	(1.07e-05)	(5.25e-07)
Average school attainment		-3.109*	0.631	0.00816
		(1.728)	(1.529)	(0.0674)
Rural population (share)	-17.96***	-27.13***	-15.49***	-0.648***
	(3.126)	(5.306)	(3.914)	(0.187)
Share of local workforce in the following industry classifications[1]				
Mining			46.41**	1.662
			(21.82)	(1.185)
Manufacturing			15.34	0.000780
			(17.82)	(0.865)
Utilities (electric, gas, water)			-61.05	1.323
			(64.44)	(2.234)
Construction			14.71	0.991
			(23.60)	(0.925)
Commerce			13.93	-0.536
			(17.10)	(1.058)
Hotels and Restaurants			-19.50	-2.882*
			(24.64)	(1.472)
Transportation			12.30	2.026*
			(26.32)	(1.175)
Finance			-61.95	-0.863
			(75.47)	(3.931)
Real Estate			44.75	-0.171
			(32.18)	(1.538)
Public administration			45.20*	1.824*
			(24.44)	(0.992)
Education			37.68	-1.516
			(31.96)	(1.148)
Health and other social services			62.76**	1.036
			(27.33)	(1.395)
Domestic workers			-41.76*	-2.910***
			(24.63)	(1.031)
Share of local workforce in the following occupation groups[2]				
Armed forces			-17.44	-4.311*
			(44.95)	(2.251)
Government			12.28	0.174
			(35.73)	(1.648)
Technicians and associate professionals			14.22	-1.010
			(35.75)	(1.765)
Clerical support workers			3.768	-3.306*

	(40.91)	(1.717)
Services and Sales workers	82.54***	1.277
	(30.87)	(1.514)
Skilled Agricultural, Forestry Workers	63.73**	-0.220
	(29.79)	(1.197)
Craft and related trades workers	107.9***	2.382*
	(35.52)	(1.354)
Plant and machine operators and assemblers	42.71	-1.447
	(35.32)	(1.450)
Elementary occupations	76.95***	0.305
	(27.35)	(1.240)
Constant	-47.05	0.870
	(36.10)	(1.571)
Observations	324	324
R-squared	0.807	0.782

Sources: Ministry of Science public data reports on COVID cases and deaths and CASEN 2017. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables are number of confirmed COVID cases and deaths per 1,000 persons in the population. All regressions include fixed effects for Chile's 16 administrative regions.

1: Excluded category is primary sector (agriculture and fishing).

2: Excluded category is Managerial and Professional workers.