TRANSPORT FINDINGS

Mobility Changes, Teleworking, and Remote Communication during the COVID-19 Pandemic in Chile

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Transport Findings

Results from a mobility survey from Chile during the COVID-19 pandemic show a decrease of 44% of trips in Santiago, with metro (55%), ride-hailing (51%), and bus (45%) presenting the highest reduction. Modes with the lowest reduction are motorcycle (28%), auto (34%), and walking (39%). While 77% of workers from low-income households had to go out and work, 80% of workers from high-income households worked from home. Other important factors that correlate with teleworking are gender, educational level, employment status, and occupation. Regarding the number of trips for purposes other than work, significant factors are gender, age, and employment status.

RESEARCH QUESTIONS AND HYPOTHESES

This article attempts to measure and understand the difference in the number of trips per purpose and mode between a normal week and a week during the COVID-19 pandemic in Santiago de Chile by analyzing the behaviour of different population segments.

METHODS AND DATA

Results are based on an online survey. Sample: 4,395 adults living in Chile. The survey was opened during the week March 23-29, 2020, and distributed via online forums, social media, email, messaging apps, and one public transportation app (Transapp). Ours is a convenience sample without poststratification, which is therefore not necessarily representative of the country or at the city level. Nevertheless, most income, age, gender, and modal strata are covered, which allows inferring impacts conditional on those groups, up to inevitable limitations imposed by self-selection in online surveys, mainly due to heterogeneity on internet-access. Table 1 shows the general descriptive statistics of our sample: 48% of respondents belong to households with a monthly income lower than 1,180 USD. Median household income in Chile was 931 USD in 2017¹ (INE 2018), which suggests a likely underrepresentation of low-income households. We also see an overrepresentation of females, since 59.1% of respondents are women, while this figure is 48.9% in the population.

¹ 1 USD = 846 Chilean pesos (April 10, 2020).

Table 1: Sample description (n=4,395)

Variable	Number of people	Percentage
Gender		
Male	2,598	59.1
Female	1,748	39.8
Other	15	0.3
Prefer not to answer	34	0.8
Age range		
Between 18 and 25 years old	1,024	23.3
Between 26 and 35 years old	1,410	32.1
Between 36 and 45 years old	1,048	23.8
Between 46 and 60 years old	688	15.7
Older than 60	225	5.1
Household income (USD/month)		
Less than 355	306	7.0
Between 355 and 710	885	20.1
Between 710 and 1,180	722	16.4
Between 1,180 and 1,775	582	13.2
Between 1,775 and 2,367	441	10.0
Between 2,367 and 3,550	456	10.4
More than 3,550	571	13.0
Not reported	432	9.8
City		
Santiago (greater urban area)	3,222	73.3
Concepción (greater urban area)	380	8.6
Valparaíso (greater urban area)	144	3.3
Rest of the country	644	14.8
Employment status		
Full-time worker	2,461	56.0
Part-time worker	309	7.0
Self-employed	427	9.7
Unemployed student	672	15.3
Unemployed (not a student), including homemakers	526	12.0

We asked for the number of trips performed by mode and purpose during two consecutive weeks:

Week 1 (W1): March 9 (Monday) to March 15 (Sunday), 2020

Week 2 (W2): March 16 (Monday) to March 22 (Sunday), 2020

Week 1 is considered “normal”, while Week 2 can be regarded as the first week of a nationwide response to the COVID-19 pandemic in Chile. It is immediately after the government declared suspension of classroom lessons at all levels on Sunday March 15th (Álvarez et al. 2020). Also, in several job sectors teleworking was adopted on Week 2, encouraged by the public authority.

A binary probit (BP) model and a linear regression (LR) model are estimated jointly to examine the factors affecting workers' mobility behaviour in the greater urban area of Santiago during the COVID-19 pandemic. The two alternatives in the BP model choice-set are: (1) Work from home during Week 2 and (2) Work away from home during Week 2. Alternative 2 is used as the base (or reference) alternative. The dependent variable in the LR model corresponds to the difference between the number of trips for purposes other than work or study (shopping, errands, medical, leisure) in Week 2 and Week 1. Both decisions, workplace (or "teleworking status") and the difference in the number of trips for other purposes are estimated jointly through the inclusion of a correlation parameter between the error terms. Regarding endogenous effects, teleworking is modelled as a dummy variable to influence the difference in the number of trips purposes other than work.

FINDINGS

MOBILITY CHANGES

Figure 1 depicts the number of trips per mode for the Santiago de Chile subsample, which is 73% of our sample. The overall reduction of trips was 44%. Modes that presented the highest reduction are metro (55%), ride-hailing (e.g., Uber, Cabify, and Didi, 51%) and bus (45%). On the other hand, modes with the lowest reduction are those that are considered personal, such as motorcycle (28%), auto (34%) and walking (39%). As an external validation, the Ministry of Transportation of Chile reported that public transportation smartcard transactions diminished 53% and 37% for metro and buses, respectively, during Week 2², very close to our survey results (55% metro and 45% buses). Regarding trips by purpose, we can see a 43%, 73%, and 38% trip reduction during Week 2 for work, study/school, and other purposes, respectively.

TELEWORK (OR TELECOMMUTING)

Figure 2 presents the telecommuting status of survey respondents during Week 2. Three-quarters of low-income workers (less than 710 USD/month) in the sample had to go out and work during the COVID-19 outbreak in Chile. On the other hand, 80% of high-income workers did it from home.

REMOTE COMMUNICATION

We asked if survey respondents communicated remotely through text, voice, and video during Week 1 and Week 2 with family members, friends, neighbours, workmates, and classmates. Figure 3 presents the remote communication increment between Weeks 1 and 2. Remote communication increased on almost all fronts. Texting and calls increased 1% to 8%, except communication between neighbours, in which case texts increased by 17%

² <https://www.latercera.com/nacional/noticia/santiago-y-regiones-sufren-fuerte-baja-en-los-viajes-traslados-en-metro-merval-y-biotren-se-reducen-a-la-mitad/SUL6KV476RD45E2N7K3FAIFZWY/>, accessed May 14th, 2020

Figure 1: Total trips for Santiago sample (n=3,222)

Figure 2: Workplace during the week of March 16-22, 2020

Figure 3: Remote communication increment – Week 2 vs Week 1

and voice calls decreased by 2%. Notably, video communication increased 55% between relatives, and more than doubled between friends, neighbours, workmates, and classmates.

MODEL ESTIMATION RESULTS

Table 2 presents the estimation results of the joint model for workers from Santiago. Regarding the chances of teleworking (from home) during the pandemic, we highlight the following results:

- The income effect is confirmed (see Figure 2), even after controlling by other socioeconomic factors.³
- Higher educated individuals are more likely to work from home.
- Women are more likely to work from home than men. This might be related to the fact that the COVID-19 pandemic has a disproportionately negative effect on women's employment opportunities and obligations such as child-care (Alon et al. 2020).
- Healthcare workers and other essential services workers are more likely to work away from home than others, as expected.

³ Income was imputed for 9% of our sample based on a probabilistic assignment using other similar individuals (in terms of employment status, educational attainment, gender, age, district, and student status).

Table 2: Parameter estimates of the joint model for workers from Santiago

Variable description	Binary dependent variable		Continuous dependent variable	
	Work from home during Week 2 (base is <i>work away from home during Week 2</i>)		Difference in number of trips for purposes other than work (Week 2 – Week 1)	
	Coeff.	t-stat	Coeff.	t-stat
Constant	-0.3529	-3.22	-0.1364 ^a	-0.296
Gender (base is <i>Male</i>) Female	0.3498	5.71	-0.4367	-1.98
Age range (base is <i>Between 18 and 25 years old</i> and <i>Between 36 and 45 years old</i>) Between 26 and 35 years old Between 46 and 60 years old Older than 60	0.1461	2.27	1.0699 1.9480	3.27 2.71
Educational attainment (base is <i>High-school or less</i>) University degree Post-graduate degree	0.4909 0.6844	6.01 6.96		
Household income [USD/month] (base is <i>Less than 710</i>) Between 710 and 1,180 Between 1,180 and 1,775 Between 1,775 and 3,550 More than 3,550	0.2209 0.3657 0.6821 0.7081	2.40 3.61 6.92 6.17	-0.5224 -0.5224 -0.7216 -0.7981	-2.70 -2.70 -2.92 -2.90
Employment status (base is <i>Formal dependent worker</i>) Formal independent worker Informal worker	0.3046 0.3950	3.36 3.12	-1.2476 -1.5096	-3.84 -3.09
Essential worker status (bases is <i>Not an essential worker</i>) Healthcare worker Another basic service worker	-1.6931 -0.8064	-13.92 -9.52		
Household size	-0.0397	-2.08	-0.1037 ^b	-1.91
Endogenous effect Work from home during the pandemic	NA	NA	-2.0199	-4.16
Standard deviation of the error term	1.00	(fixed)	5.3971	43.7
Correlation between error terms	0.318 (t-stat: 2.33)			

Estimation sample size 2,293

Log-likelihood null model: -20,511.8

Log-likelihood only constants model: -18,529.0

Log-likelihood final specification: -8,376.3

 Adjusted ρ^2 w.r.t null model: 0.5903

 Adjusted ρ^2 w.r.t. only constants model: 0.5465

All parameters significant at 5% level of significance unless otherwise noted.

NA: Not applicable

^a: Not significant at any reasonable level

^b: Not significant at 5% level of significance but significant at 10% level of significance

- The larger the size of the household, the more likely workers work away from home. Among possible reasons for this result are that workers living in larger households tend to have higher financial obligations; they also have a higher probability of living with children, providing poorer conditions for teleworking.

Regarding the difference in the number of trips for purposes other than work, we highlight the following results:

- Women have a higher reduction of trips during the pandemic than men. This can be related to the fact that men might engage more in health-related risks during (and even prior to) the COVID-19 pandemic (Walter and McGregor 2020), implying more trips.
- Older than 46 years old individuals have a lower reduction in their number of trips during the pandemic than younger individuals, being this reduction even smaller for individuals older than 60. This is surprising since they are a great COVID risk group.
- Individuals from high-income households have a higher reduction of trips, probably because they have better access to delivery options and the financial capability to buy more in fewer trips and hire services at home.
- Individuals that work from home have a higher reduction in the number of trips for purposes other than work as well.

The correlation parameter is positive and significant, meaning that unobserved effects impact simultaneously and in the same direction to both decisions. Other important variables that were not significant in our joint model are self-reported health status, being in a high COVID risk group due to health conditions, auto-ownership, and individuals' evaluation of government's COVID policies, among others.

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