The commuting behavior of informal workers

How centralized are informal jobs?

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XIV Encuentro Nacional de la Asociación
Colombiana de Estudios Regional - ASCER 2022
Universidad del Norte
Barranquilla-Colombia
25 November 2022

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Motivation

- The analysis of commuting behavior is important for several reasons:
  - time spent in commuting ranks among the lowest activities in terms of "instant enjoyment" obtained by individuals (Kahnemand and Krueger, 2006)
  - there are psychological costs associated with travel and commuting and health outcomes are negatively related (Kahnemand et al., 2004)
  - Increases in congestion in cities has led to commuting times being a significant part of the total time devoted to the labor market (Kenworthy and Laube, 1999)

- Labor economics $\Longrightarrow$ in job search models commuting is considered a source of labor mobility that allows workers to access geographically-dispersed labor markets (Cameron and Muellbauer, 1998)

- Urban economics $\Longrightarrow$ commuting is generally assumed to confer disutility to households, so that households are located to maximize the utility obtained from housing and amenities (Alonso-Mills-Muth monocentric city model, Muller-Gerreau polycentric city model)

- Transport economics $\Longrightarrow$ commuters choose a mode of transport to minimize the monetary and opportunity costs of travel (DeSalvo and Huq, 1996)

- Spatial Mistmach Hypothesis $\Longrightarrow$ workers residing far away from jobs may experience poor labor market outputs because they are disconnected from job opportunities

Contribution

- Despite the relevance of this issue, there are few studies that have previously analyzed the commuting patterns among workers and, in particular, in developing countries
- The evidence shows that workers have different commuting patterns:
  - Developed countries: self-employed workers look for places where they can establish a business, while employees look for job vacancies (US-Europe: Giménez-Nadal et al., 2018, 2020a, 2020b; Spain: Albert et al., 2019)
  - Developing countries: commuting distances and times are shorter for informal workers, because jobs in this sector are more dispersed than jobs in the formal sector (Brazil: Motte et al., 2016; Mexico: Suárez et al., 2016)
- In developing countries accessibility is a critical issue, because the limited opportunities, high job informality and deep socioeconomic differences that exists in these countries is in part explained by low accessibility
- This paper aims at showing new empirical evidence on the differences in commuting patterns between formal and informal workers, studying the case of Latin America cities

  $\Longrightarrow$ measure the difference in commuting times by type of work

  $\Longrightarrow$ analyze the determinants of this difference

Data and descriptive statistics

- The data used in this paper comes from the 2016 CAF (*Banco de Desarrollo de América Latina*) survey (ECAF) for the main Latin American cities (10):
  - Argentina: Buenos Aires
  - Bolivia: La Paz
  - Brazil: Sao Pablo and Fortaleza
  - Colombia: Bogotá
  - Ecuador: Quito
  - Mexico: Ciudad de México
  - Perú: Lima
  - Uruguay: Montevideo
  - Panamá: Ciudad de Panáma
- This cross-sectional survey contains individual-level information at the urban level on demographic and socioeconomic information from the respondents and a set of characteristics at the household level
- In addition, the ECAF contains specific modules that offer information on accessibility, satisfaction in urban transport services, security, garbage recollection, water and sanitation, electricity, and housing. Each year there is a different module
- The sample includes a total of 4,038 individuals that in the expanded sample represents approximately 13 million people

Data and descriptive statistics

Labor informality

Informal workers are those employees who do not contribute to the social security system: health and pension (Perry et al., 2007; Jütting and De Laiglesia, 2009: García, 2017)

Formal and informal workers in Latin America

City	A. Sample			B. Expanded sample		
	Formal	Informal	Total	Formal	Informal	Total
Bogotá	370	321	691	1,272,475	644,540	1,917,015
	53.55%	46.45%	100%	66.38%	33.62%	100%
Buenos Aires	259	390	649	1,392,219	1,421,571	2,813,790
	39.91%	60.09%	100%	49.48%	50.52%	100%
Fortaleza	249	247	496	250,120	206,944	457,064
	50.20%	49.80%	100%	54.72%	45.28%	100%
La Paz	38	117	155	32,264	108,902	141,166
	24.52%	75.48%	100%	22.86%	77.14%	100%
Lima	103	201	304	605,748	1,154,515	1,760,263
	33.88%	66.12%	100%	34.41%	65.59%	100%
Ciudad de México	133	147	280	711,954	826,729	1,538,683
	47.50%	52.50%	100%	46.27%	53.73%	100%
Montevideo	327	107	434	256,430	79,592	336,022
	75.35%	24.65%	100%	76.31%	23.69%	100%
Ciudad de Panamá	120	108	228	247,341	201,524	448,865
	52.63%	47.37%	100%	55.10%	44.90%	100%
Quito	139	218	357	141,313	234,219	375,532
	38.94%	61.06%	100%	37.63%	62.37%	100%
São Paulo	270	174	444	1,941,094	1,284,441	3,225,535
	60.81%	39.19%	100%	60.18%	39.82%	100%
Total	2,008	2,030	4,038	6,850,958	6,162,977	13,013,935
	49.73%	50.27%	100%	52.64%	47.36%	100%

Data and descriptive statistics

Mean commuting times to the workplace (one way in minutes)

City	Formal	Informal	Formal - Informal	Total
Bogotá	49.718	46.997	2.721	48.803
	(33.070)	(35.596)		(33.941)
Buenos Aires	36.061	30.71	5.351*	33.358
	(36.185)	(31.261)		(33.863)
Fortaleza	38.171	32.173	5.998*	35.455
	(31.358)	(26.990)		(29.582)
La Paz	35.534	26.047	9.487	28.216
	(39.821)	(22.733)		(27.731)
Lima	43.771	34.178	9.593*	37.479
	(31.448)	(34.229)		(33.558)
Ciudad de México	57.789	37.772	20.017*	47.033
	(34.451)	(32.734)		(34.940)
Montevideo	29.331	20.417	8.914*	27.219
	(26.570)	(17.033)		(24.920)
Ciudad de Panamá	52.244	40.554	11.690*	46.996
	(39.483)	(36.442)		(38.508)
Quito	44.957	38.972	5.985	41.225
	(32.921)	(37.710)		(36.053)
São Paulo	44.727	30.06	14.667*	38.886
	(40.345)	(31.503)		(37.730)
Total	44.583	34.344	10.239*	39.734
	(36.534)	(33.006)		(35.276)

Notes: Standard errors are in parenthesis. * represents statistical significance at the 5% level.

Data and descriptive statistics

Mean commuting times to workplace by transport mode (one way in minutes)

City	Formal			Informal			Total		
	Transport mode								
	Public	Private	Bike/ Walking	Public	Private	Bike/ Walking	Public	Private	Bike/ Walking
Bogotá	64.898	43.948	30.723	59.13	36.875	34.329	62.625	42.706	32.486
	(3.685)	(2.588)	(3.328)	(5.286)	(4.763)	(6.188)	(34.438)	(25.915)	(34.280)
Buenos Aires	54.333	25.278	10.009	47.269	24.768	13.728	50.935	25.082	12.296
	(4.239)	(2.685)	(0.885)	(5.382)	(4.724)	(1.883)	(38.378)	(19.793)	(13.253)
Fortaleza	54.899	22.453	19.014	50.74	23.301	17.012	53.249	22.818	17.884
	(3.613)	(2.440)	(1.918)	(5.363)	(3.177)	(2.644)	(32.689)	(15.053)	(13.141)
La Paz	54.288	41.723	20.687	41.115	23.741	19.258	43.882	29.828	19.534
	(8.359)	(17.767)	(2.835)	(9.955)	(18.416)	(3.752)	(26.219)	(39.991)	(16.165)
Lima	47.027	49.73	25.951	48.624	30.662	18.328	47.913	36.745	19.688
	(3.373)	(12.357)	(7.713)	(5.039)	(13.468)	(8.572)	(32.193)	(31.179)	(28.626)
México	60.747	55.065	47.518	52.933	37.026	15.919	57.127	46.171	23.480
	(4.808)	(5.368)	(10.004)	(6.454)	(7.760)	(10.269)	(35.448)	(29.209)	(26.111)
Montevideo	41.473	24.728	12.36	33.244	19.681	12.528	40.023	23.904	12.424
	(2.627)	(2.526)	(1.082)	(3.979)	(3.487)	(2.816)	(26.798)	(22.326)	(11.442)
Panamá	57.987	47.465	41.601	47.547	37.953	17.303	52.721	44.722	27.292
	(6.021)	(4.823)	(11.235)	(7.707)	(10.031)	(11.808)	(41.611)	(32.399)	(28.822)
Quito	56.462	29.146	12.361	47.487	29.032	14.746	50.885	29.076	13.895
	(3.324)	(6.391)	(1.920)	(4.855)	(11.055)	(3.557)	(36.449)	(31.831)	(12.948)
San Pablo	62.922	32.609	13.711	51.044	22.637	11.897	58.926	29.245	12.730
	(3.631)	(4.159)	(1.620)	(5.983)	(4.920)	(2.300)	(39.922)	(28.474)	(12.246)

Notes: Standard errors are in parenthesis.

Data and descriptive statistics

Workplace and transport mode by formal and informal workers

	Formal	Informal	Total
Workplace			
Permanent non-household	64.80%	35.20%	100%
Household	26.07%	73.93%	100%
Fixed position on public road	29.21%	70.79%	100%
Peddler	26.62%	73.38%	100%
Transport mode			
Public (metro, bus or taxi)	55.78%	44.22%	100%
Private (car or motorcycle)	64.30%	35.70%	100%
Bike or walking	37.80%	62.20%	100%

Data and descriptive statistics

Descriptive statistics

Variable	Mean	SD	p25	p50	p75	Min.	Max.
Commuting time (minutes)	39.7344	35.2755	15	30	60	1	240
Informal worker	0.4736	0.4994	0	0	1	0	1
Salaried worker	0.5156	0.4998	0	1	1	0	1
Age (years)	37.6325	10.7551	29	36	46	20	60
Female	0.3849	0.4866	0	0	1	0	1
Presence of children	0.7246	0.4468	0	1	1	0	1
Tenure at job (years)	7.2896	7.6338	1.9167	5	10	0	48
Education level							
Primary	0.1160	0.3203	0	0	0	0	1
Secondary	0.6755	0.4682	0	1	1	0	1
Tertiary	0.2085	0.4063	0	0	0	0	1
Firm size							
One worker	0.2986	0.4577	0	0	1	0	1
2-5 workers	0.2592	0.4383	0	0	1	0	1
6-20 workers	0.1825	0.3863	0	0	0	0	1
21-50 workers	0.1032	0.3042	0	0	0	0	1
More than 50 workers	0.1565	0.3634	0	0	0	0	1
Workplace							
Permanent non-household	0.6798	0.4666	0	1	1	0	1
Household	0.1070	0.3092	0	0	0	0	1
Fixed position on public road	0.0492	0.2163	0	0	0	0	1
Peddler	0.1640	0.3703	0	0	0	0	1
Transport mode							
Public (metro, bus or taxi)	0.4969	0.5001	0	0	1	0	1
Private (car or motorcycle)	0.2231	0.4164	0	0	0	0	1
Bike or walking	0.2800	0.4490	0	0	1	0	1

Econometric model

To analyse the determinants of differences in commuting times between formal and informal workers, we use the Oaxaca-Blinder decomposition technique (Blinder, 1973; Oaxaca, 1973; Fortin et al., 2010)

The raw average gap between two collectives in the value of a continuous variable to be broken down into two parts:

- explained component: the average differences between the two groups in terms of observed characteristics
- unexplained component: measures the extent to which the coefficients of the characteristics of comparable individuals of the two groups are different

An additional advantage of the Oaxaca-Blinder decomposition is that it provides a detailed decomposition of both components according to the relative influence of each set of independent variables considered

Econometric model

Let $G_i = 1$ for formal employee and $G_i = 0$ for informal employee. We use the logarithm of the comutting time as the outcome variable, which we denote by Y_i

The raw difference in commuting times between formal and informal workers is:

$$\Delta = E[Y_i|G_i = 1] - E[Y_i|G_i = 0] \tag{1}$$

The predicted commuting time of formal workers, would they have the same observed characteristics as informal workers is $E_{X|G=1}[\mu_0(x)]$, with $\mu_0(x) = E[Y_i|G_i = 0, X_i = x]$, where X_i contains observed demographic and labor market characteristics of workers

Adding and subtracting $E_{X|G=1}[\mu_0(x)]$ in (1) gives

$$\Delta = \underbrace{E[Y_i|G_i = 1] - E_{X|G=1}[\mu_0(x)]}_{\text{unexplained } (\delta)} + \underbrace{E_{X|G=1}[\mu_0(x)] - E[Y_i|G_i = 0]}_{\text{explained } (\eta)}$$

η: the part of the raw gap in commuting times between formal and informal workers that can be explained by differences in the observed commuting time determinants X_i

δ: the difference in commuting times among workers that cannot be explained by jobs differences in the observed commuting time determinants

Results

Oaxaca – Blinder decomposition

	Total	Characteristics	Coefficients
A. Mean log commuting times			
Formal	3.393***		
	(0.0226)		
Informal	3.109***		
	(0.0257)		
Difference	0.285***		
	(0.0342)		
B. Total difference explained by			
Characteristics	0.180***		
	(0.0371)		
Coefficients	0.105**		
	(0.0449)		
C. Detailed decomposition			
Personals factors (gender, age)		0.004	0.161
		(0.0040)	(0.3833)
Family factors (children)		0.002	0.033*
		(0.0040)	(0.0202)
Education		-0.014	-0.029
		(0.0120)	(0.0237)
Tenure at job		-0.003	0.015
		(0.0031)	(0.0452)
Firm size		0.076***	0.023
		(0.0245)	(0.0396)
Occupation		-0.011	-0.009
		(0.0133)	(0.0271)
Workplace		0.050*	0.020
		(0.0255)	(0.0270)
Transport mode		0.102***	-0.006
		(0.0170)	(0.0131)
City		-0.025**	-0.047***
		(0.0123)	(0.0137)
Constant			-0.057
			(0.3796)

Notes: Standard errors in parentheses. * p<.1; ** p<.05; *** p<.01.

Conclusions

- This paper examines the commuting behaviour of formal and informal workers in Latin America and evaluate how centralized are informal jobs in terms of commuting times
- We use the information of CAF (*Banco de Desarrollo de América Latina*) survey which gathers individual information on commuting patterns in the main Latin American cities
- We use Oaxaca-Blinder econometric methods of decomposition to measure the difference in commuting time between formal and informal workers and determine what part is due to difference in characteristics and what part is due to unexplained
- We find that, on average, Latin American workers take 40min to get to work, being Bogotá, Ciudad de México and Ciudad de Panamá the cities where times are the highest (around 50min)
- Formal workers take 28% longer commuting times to get their jobs than informal workers, which could indicate that informal jobs are more decentralized than those formal ones
- The difference in commuting behaviour is mainly explained by differences in job characteristics (firm size and workplace) and transport mode used between formal and informal workers