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KEY POINTS

- Data from a major telecoms provider in the Philippines show that urban mobility fell drastically in response to COVID-19 lockdowns, by up to 85% in Metro Manila.
- Months after maximum restrictions were lifted, national mobility remained about 30% lower than it was pre-lockdown.
- Mobility fell more in cities with a high share of workforce employed in services and in medium to large enterprises.
- Recovery in mobility was weaker in cities economically reliant on work-from-home friendly services and hospitality and recreation.
- Recommendations include designing social safety nets and lockdowns that are sensitive to cities' industrial composition, monitoring the need for supplementary non-pharmaceutical interventions in cities with large informal sectors, and combining new sources of big data with traditional data sources to assess the cost-effectiveness of lockdown policies and provide rapid updates on the impact of non-pharmaceutical interventions.

Impact of COVID-19 Community Quarantines on Urban Mobility in the Philippines

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INTRODUCTION

To limit the spread of COVID-19, national and subnational governments have instituted non-pharmaceutical interventions (NPIs) over the past 2 years (Hale et al. 2021). These public health measures have been imposed and enforced most strongly in high-density urban centers, and include closing schools and other public venues, instituting curfews, and limiting business activities and size of social gatherings. A nuanced understanding of the impact of restrictions on mobility (both during and after imposition) is important in policymaking because limited mobility has different livelihood implications depending on the restricted population's socioeconomic and employment composition.

The effects of lockdown policies on mobility in cities have been studied for several high-income countries. Those studies typically use big data sources to analyze how policies of differing stringency levels affect vehicular and non-vehicular mobility over time, considering the location's characteristics. Most studies find that mobility fell quickly and substantially in response to NPIs, but the effects of those lockdowns vary greatly by country and typically wane over time (Wang et al. 2021). There is evidence that the magnitude of the decline and extent of recovery in mobility depend on the location's economic characteristics (Hu et al. 2021). Mobility declines were relatively small after imposition of NPIs in countries with high informality, low share of remote work friendly jobs, and low government effectiveness (David and Pienknagura 2020).

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There are also assessments of the extent to which changes in mobility contributed to public health outcomes (transmission, hospitalization, and mortality) and economic outcomes (employment and production). This emerging research agenda has important policy implications for understanding and managing the global pandemic, drawing lessons for the "living with COVID-19" approach being piloted in many countries, and navigating future crises. Data from 208 countries included in Johns Hopkins University's COVID-19 Dashboard show that NPIs have been effective in flattening the pandemic curve, especially when implemented quickly; population density and temperature are low; and a higher share of population is elderly (Deb et al. 2021). Much of the evidence on economic impact of lockdowns comes from the United States, where NPI effects vary by industrial composition of cities. Low-skilled service workers in big cities suffered most because they were dependent on demand from workers in industries that had shifted to remote work (Althoff et al. 2022).

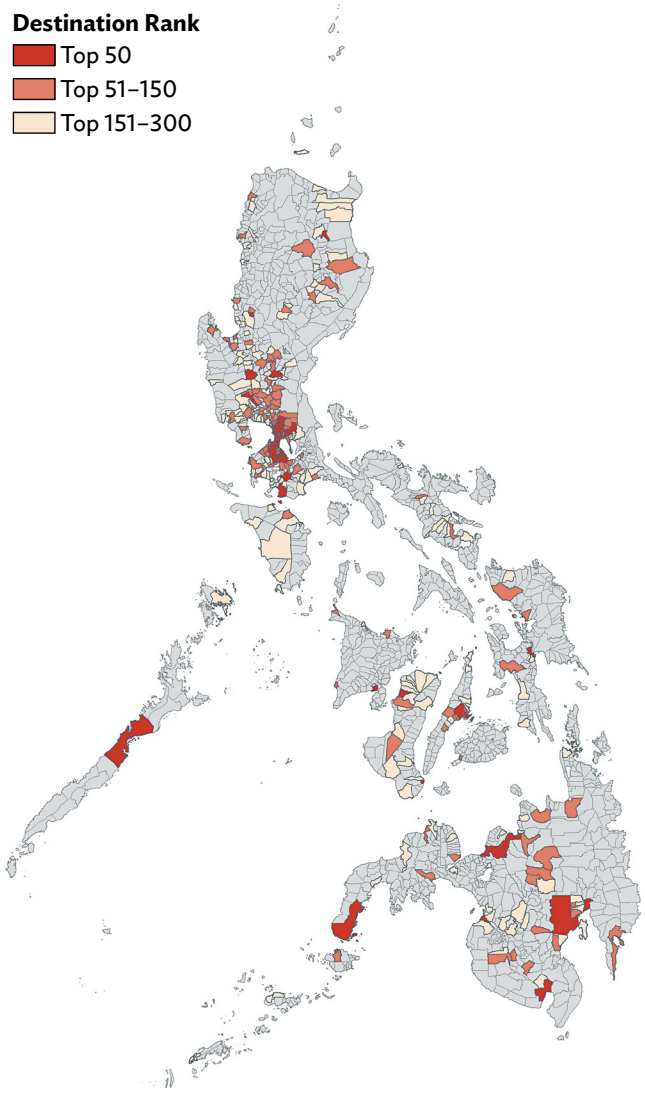
There is less evidence on how mobility has responded to lockdowns in developing countries, where lockdowns have often lasted longer, caused more economic damage, and entailed higher enforcement costs. One reason for missing evidence in these countries is lack of frequent, high-quality administrative data on travel. Big data collected through information technology platforms has emerged as a good substitute and serves as the basis for this policy brief.

DATA AND METHODS

Cellphone-based hourly flow data from a major local telecommunications service provider, combined with detailed city-level employment data, was used to investigate how mobility responded to lockdown policies in the Philippines. Mobility was measured in terms of estimated weekday morning commuting trips to maintain focus on labor implications.[1] The data record cellphone user flows between *barangay* (village) pairs for every hour from January to September 2020.[2] The *barangay*-level flows were aggregated to the city level for analysis.[3]

To focus the analysis on the urban areas that host most of national employment, the sample was restricted to those with most popular destination cities in terms of pre-lockdown morning trips. This is done by summing the hourly morning flows into each city and averaging it across weekdays from 2 January to 13 March 2020.

Map: Top 300 Morning Destination Cities and Municipalities



Note: Cities and municipalities are ranked based on the sum of inflows between 4 a.m. and 10 a.m. averaged over weekdays from 2 January to 13 March 2020.

Source: Authors.

[1] Morning is defined as between 4 a.m. and 10 a.m.

[2] A *barangay* is the smallest administrative unit in the Philippines.

[3] There are 1,634 cities and municipalities consisting of 42,046 *barangays* in the Philippines by 2019. One problem with the flow data at a geographic unit as small as a *barangay* is that not every *barangay* has cell site and the user information in those *barangays* will be counted for the *barangay* whose cell site captures it. Aggregation based on city and municipality levels largely mitigates this data bias problem. Moreover, cities and municipalities are the main policymaking bodies in the Philippines and are thus of key interest.

The 300 cities and municipalities with the highest average inflows were retained from the total 1,560. These top 300 cities and municipalities account for 78% of total morning flows, 57% of the population, 86% of employment, and 21% of the total land area of the country. The map on page 2 illustrates where these top 300 are located across the country. The analysis excluded all city pairs with road-based distance exceeding 150 kilometers, since they are too far apart for regular commuting trips. This leaves 1,387 cities and municipalities as origins and more than 39,000 origin–destination pairs. Flows over morning hours were summed and then averaged across workdays for each week. The unit of observation is thus city-level, origin–destination pair per week.

Between January and September 2020, lockdown measures had been imposed in most areas of the Philippines since the 12th week of the year (see Box on Community Quarantines in the Philippines). However, the hourly profiles of the 8 weeks in May and June show patterns distinct from those of other weeks. Due to lack of clear explanation for this irregularity, data for those weeks were excluded from the analysis. Thus, the final dataset in this study covers 31 weeks, 20 of which coincided with the pandemic. The resulting dataset of flows was validated as a measure of work-related mobility using the most recent available data from the 2010 Census of Population and Housing.[4]

Table 1 reports the summary statistics of flows by week. Positive flows are observed between 34,000 and 35,000 pairs of cities before the 12th week. The average flows ranged from 2,800 to 3,400 in the pre-lockdown weeks, with median around 15 to 20. The number of observed origin–destination pairs declined significantly over the first several weeks during the lockdown as flows between some pairs had disappeared completely.

Data on the List of Establishments from the Philippine Statistics Authority (2018) is the second main data source used in this study. It contains data on total employment at province level and number of firms at city and municipality level by size category and sector. Two groups were created based on firm size: (i) micro (less than 10 employees) and small firms (10 to 99 employees), and (ii) medium (100 to 199 employees) and large firms (more than 199 employees).

Sectors are also grouped into seven categories based on similarity, share in the economy, and ease of working from home of the industries. For instance, a category encompasses power, utilities, and construction industries; another category includes trade and transport industries; and another one is hospitality and recreation industries. Other tertiary industries are treated as work-from-home (WFH)-friendly (e.g., information and communication technology and financial services) and non-WFH-friendly categories (e.g., arts and recreation and domestic services), respectively, based on 3-digit industry codes with some discretionary adjustments for the Philippines in the context of the pandemic (e.g., classifying call center and teaching jobs as WFH-friendly).[5] From a public policy perspective, understanding how cities with different industrial compositions respond to lockdown measures differently is important, as it is easier for policy interventions to target industries rather than occupations.

Table 2 shows that employment by micro and small firms account for 73% of total employment across the top 300 cities and municipalities on average, with individual cities' shares ranging between 13% and 100%. Medium and large firms hire between 0% and 87% of workers across cities, with the average share of employment a little more than one quarter.

Philippine cities vary considerably in terms of industrial composition. On average, trade and transport combined is the largest sector category; followed by manufacturing, hospitality, and recreation; and WFH-friendly tertiary sector. On one end of the sector distribution spectrum, manufacturing employment accounts for 82% of total employment. On the other end, trade and transport account for 75%. There are other cities dominated by hospitality and recreation sectors, WFH-friendly tertiary sectors, or non-WFH-friendly tertiary sectors, which are likely to respond to mobility restrictions differently.

KEY FINDINGS

To assess how mobility evolved over the first 6 months of the COVID-19 pandemic in the 300 most active Philippine cities, this study estimated the statistical relationship between change in flows relative to the pre-lockdown baseline (the first 9 weeks of 2020) and weeks elapsed since the imposition of enhanced community quarantine (ECQ). This study used a linear regression model that includes destination city fixed effects and controls for city COVID-19 cases in the past 2 weeks. Findings of the study are as follows:

Finding 1: Urban mobility responded quickly and substantially to enhanced community quarantine. Figure 1 traces the response in mobility over time for the country (change in flows based on 1,001,955 origin–destination pairs). Figure 2 does the same for non-metro cities (871,932 origin–destination pairs), Metro Manila (104,681 origin–destination pairs), Metro Cebu (13,444 origin–destination pairs), and Metro Davao (11,989 origin–destination pairs). Mobility relative to the pre-lockdown norm declined precipitously in the month following ECQ imposition, reaching a low of 26% in the fourth week after ECQ before recovering and stabilizing at around 70% of the pre-lockdown level of flows when most of the country was under modified general community quarantine (MGCQ) in August and September of 2020.

[4] The correlation coefficient between census-based commuting flows and average cellphone-based morning flows over all pre-pandemic weeks (weeks 1–11) is around 0.95, suggesting that this study constructed a valid work-related mobility measure.

[5] Reference was made to the classification system developed in Eckert, Ganapati, and Walsh 2020.

Box: Community Quarantines in the Philippines

Faced with the threat of COVID-19, the Government of the Philippines introduced "community quarantine" as a restriction policy to contain the rapid transmission of the virus. According to Inter-Agency Task Force for the Management of Emerging Infectious Diseases (2020), the policy has four levels: enhanced community quarantine (ECQ), modified enhanced community quarantine (MECQ), general community quarantine (GCQ), and modified general community quarantine (MGCQ). Among these levels, ECQ is the most stringent while MGCQ is the most lenient.

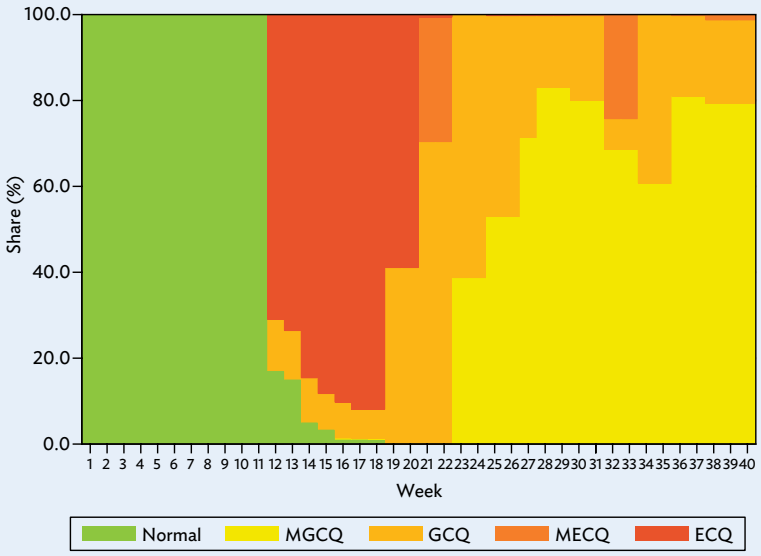
Under ECQ, mobility in cities is generally restricted, with public transportation suspended. Only individuals accessing basic goods and services and workers in industries permitted to operate are authorized to leave their residences. Essential industries, particularly hospitals and frontline health services, manufacturers of essential goods, agriculture, forestry, fishing, and logistics and delivery service providers of essential goods, are allowed to operate with full on-site capacity. Industries providing essential retail trade and services, food preparation (for take-out and delivery), and media outlets are also allowed but should operate at 50% of maximum workforce on-site and the remaining through work-from-home or other flexible work arrangements. Non-essential businesses are permitted with skeleton on-site capacity during ECQ. This includes other health-related services, financial transactions, water and sanitation, energy, information technology and telecommunication, aviation and maritime, other manufacturing industries, business process outsourcing, export-oriented businesses, mining and quarrying, construction companies or priority projects, repair and maintenance, property renting, employment agencies for permitted sectors, and other essential services. Government offices also function through skeleton staff on-site with the rest of the staff under alternative work arrangements. All hospitality and recreation industries are prohibited to operate during ECQ, except for accommodation establishments accredited to cater to clients for legitimate purposes under a state of public health emergency; but they are only allowed to provide basic services through skeleton employees.

MECQ, GCQ, and MGCQ are progressively more relaxed policies, with the lightest restrictions under MGCQ. Government and private offices and industries previously allowed to operate under stricter lockdowns can operate between 50% and 100% capacity with an option of flexible work. Under MGCQ, hospitality and recreational establishments are also allowed at a maximum of 50% capacity. However, for accommodation businesses, only those accredited may operate. Furthermore, all forms of transportation are generally allowed but should follow health protocols. Physical non-contact activities are also permitted within place of residence under MGCQ.

The graph shows the share of the top 300 city and municipality destinations under the various stringency measures by week. COVID-19 was first detected in the Philippines in the last week of January 2020 (week 5), and lockdown measures were imposed beginning in the third week of March 2020 (week 12). The country was unrestricted from weeks 1 to 11 before 71% of the areas were placed under ECQ in week 12. By week 18 (last week of April), ECQ covered 92% of the top 300 cities and municipalities. There was an easing of lockdown to GCQ in some areas during the first half of May (weeks 19 and 20). However, 60% remained under ECQ, particularly Metro Manila and surrounding provinces, Metro Cebu, and Metro Davao due to prevailing high-risk COVID-19 infections. Subsequently, 70% of the areas shifted to GCQ in the second half, whereas Metro Manila and other high-risk areas moved to MECQ.

Many cities and municipalities gradually transitioned to less stringent measures in the following months. In the first week of June (week 23), 61% were under GCQ, and by the end of July (week 31), 80% had eased to MGCQ. At the same time, Metro Manila and nearby provinces and other metropolitan areas shifted to GCQ. However, MECQ was reimposed in Metro Manila and neighboring provinces for 2 weeks in August (weeks 32 and 33). This was after medical frontliners appealed to the government for a break to prevent the collapse of the healthcare system amid the continuous surge in COVID-19 cases in those areas. Since then, Metro Manila and neighboring areas reverted to GCQ, with most part of the country in MGCQ.

Share of Community Quarantine Measures among Top 300 Destinations (by week)



ECQ = enhanced community quarantine, GCQ = general community quarantine, MECQ = modified enhanced community quarantine, MGCQ = modified general community quarantine.

Note: Lockdown policies data is obtained from Government of the Philippines, Official Gazette. https://www.officialgazette.gov.ph/section/laws/other-issuances/inter-agency-task-force-for-the-management-of-emerging-infectious-diseases-resolutions/ (accessed 26 Oct 2021).

Source: Authors.

Source: Authors.

Table 1: Summary Statistics of Morning Flows by Week

Week	N	Mean flows	SD	Min	Median	Max	Total flows
1	33,954	3,190	57,431	1	15	5,664,627	108,321,048
2	35,186	3,378	66,768	1	20	7,037,750	118,869,752
3	34,289	3,252	62,899	1	17	6,213,362	111,507,556
4	34,794	3,350	67,365	1	19	6,811,825	116,576,438
5	34,938	3,233	64,694	1	19	6,603,484	112,949,349
6	34,697	3,090	60,498	1	18	6,127,628	107,206,550
7	34,732	3,072	61,589	1	18	6,464,194	106,708,683
8	34,748	3,022	61,169	1	18	6,385,326	105,000,276
9	33,807	3,053	59,745	1	16	6,175,062	103,208,129
10	34,662	2,886	56,009	1	18	5,628,076	100,047,743
11	34,924	2,772	52,062	1	18	5,194,160	96,798,810
12	30,838	2,733	45,395	1	11	3,849,394	84,271,812
13	27,416	2,694	42,101	1	7	3,365,286	73,859,958
14	26,705	2,615	40,119	1	7	3,232,383	69,821,185
15	25,022	2,881	42,949	1	6	3,417,396	72,080,578
16	28,041	2,620	41,183	1	8	3,422,339	73,471,670
17	28,016	2,515	39,268	1	7	3,235,731	70,473,324
27	28,363	1,932	30,595	1	9	2,617,903	54,788,292
28	33,490	2,595	45,650	1	14	4,298,624	86,909,641
29	33,770	2,669	47,001	1	14	4,484,620	90,148,082
30	33,474	2,557	44,549	1	14	4,157,871	85,597,684
31	32,721	2,776	48,429	1	13	4,650,929	90,833,347
32	32,377	2,760	47,594	1	13	4,336,184	89,344,579
33	32,461	2,802	48,141	1	13	4,367,758	90,959,328
34	31,966	2,873	49,375	1	12	4,537,778	91,840,516
35	33,177	2,776	48,909	1	14	4,739,307	92,099,492
36	32,103	2,765	47,972	1	12	4,539,652	88,769,274
37	33,234	2,623	46,078	1	14	4,427,404	87,161,264
38	33,155	2,602	45,570	1	14	4,296,799	86,268,066
39	33,425	2,620	46,674	1	14	4,380,945	87,573,912
40	31,470	2,762	47,474	1	11	4,293,096	86, 916,676

N = number of origin–destination pairs, SD = standard deviation.

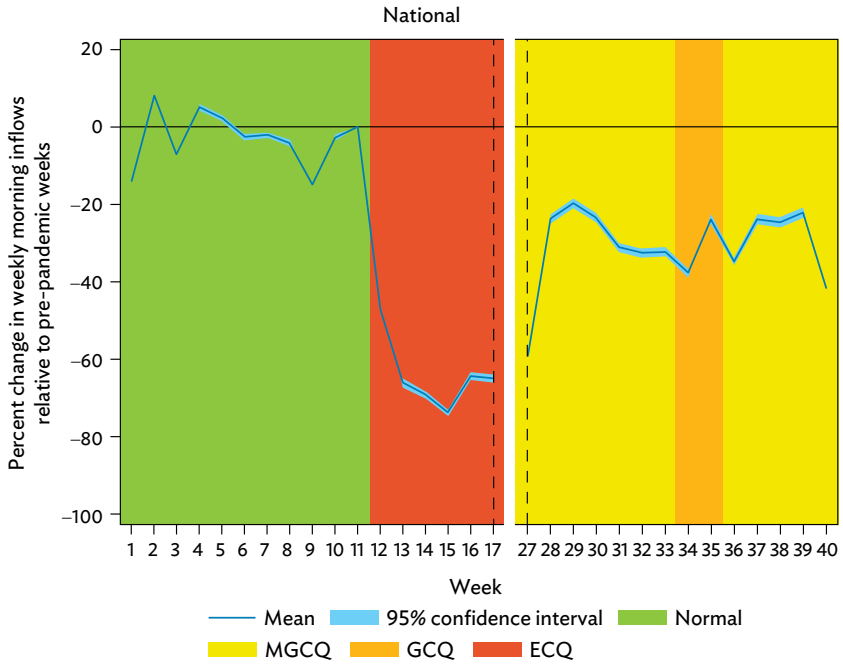
Source: Authors.

Table 2: Summary Statistics of City Employment Shares for Top Destination Cities

Classification	Category	N	Mean	SD	Min	Median	Max
Firm size	Small and micro	300	0.732	0.202	0.125	0.772	1.000
	Medium and large	300	0.268	0.202	0.000	0.228	0.875
Sector	Manufacturing	300	0.179	0.155	0.017	0.121	0.820
	Primary	300	0.040	0.074	0.000	0.013	0.489
	Power, utilities, and construction	300	0.039	0.036	0.000	0.028	0.229
	Trade and transport	300	0.351	0.113	0.047	0.353	0.748
	Hospitality and recreation	300	0.132	0.070	0.016	0.124	0.599
	WFH-friendly tertiary	300	0.133	0.071	0.005	0.121	0.550
	Non-WFH-friendly tertiary	300	0.126	0.070	0.012	0.113	0.513

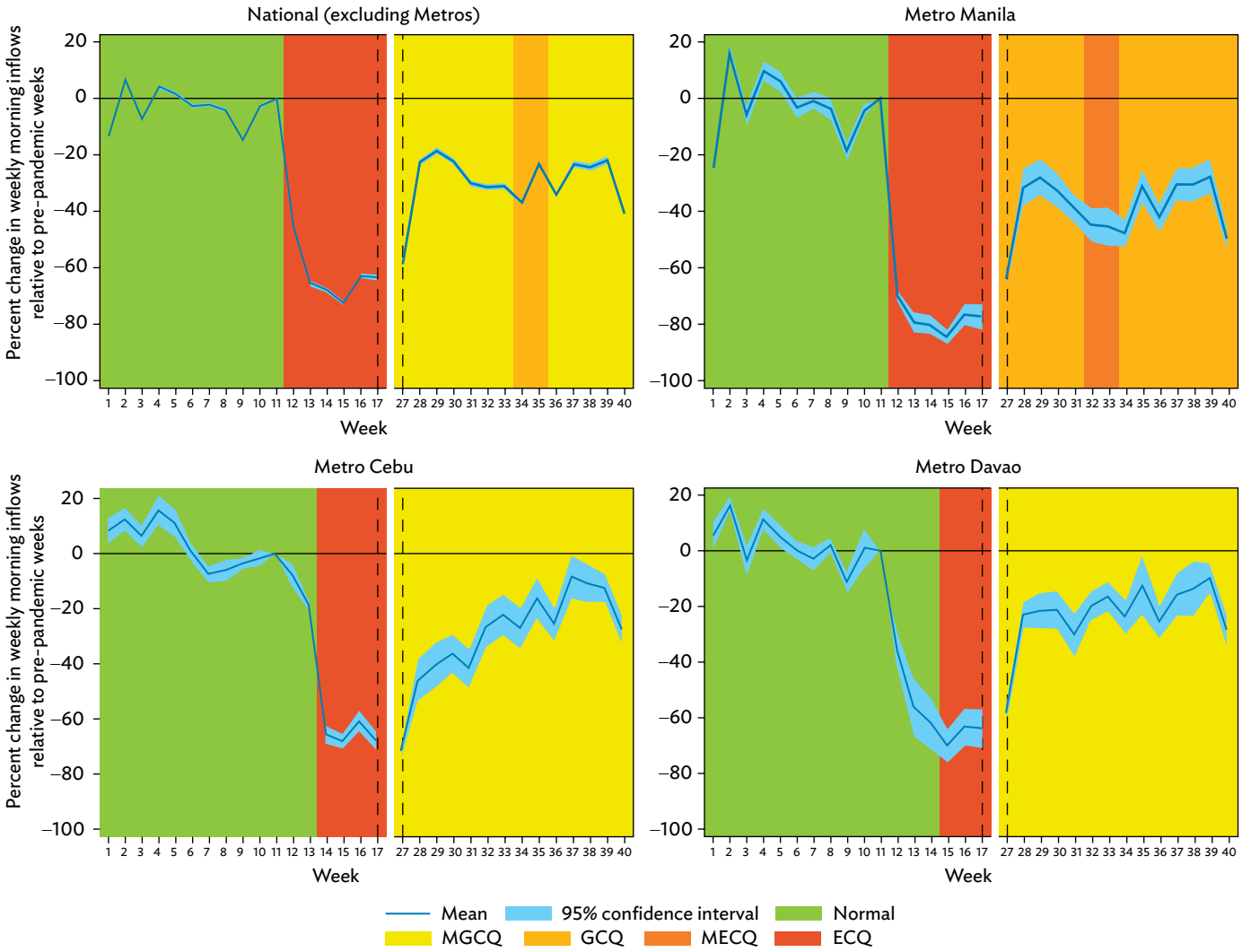
N = Number of cities, SD = standard deviation, WFH = work-from-home.
Source: Authors.

Figure 1: National Mobility Response to Imposition of Enhanced Community Quarantine



ECQ = enhanced community quarantine, GCQ = general community quarantine, MGCQ = modified general community quarantine.
Note: Shading reflects the weekly most common form of community quarantine (at the origin level).
Source: Authors.

Figure 2: Subnational Mobility Response to Imposition of Enhanced Community Quarantine



ECQ = enhanced community quarantine, GCQ = general community quarantine, MECQ = modified enhanced community quarantine, MGCQ = modified general community quarantine.

Source: Authors.

Finding 2: The effect of enhanced community quarantine was more pronounced and more persistent in Metro Manila than in other cities. The mobility response was most pronounced for Metro Manila, where flows fell to as low as 15% of the pre-lockdown norm. The recovery in the second half of 2020 was also weakest for Metro Manila, which remained in general community quarantine (GCQ) while the rest of the country was largely in MGCQ. The responses of non-metro cities, Metro Cebu, and Metro Davao were similar to each other. In these areas, the low was only around 30% of the pre-lockdown norm, and recovery to previous levels of mobility in the second half of 2020 was stronger than that of Metro Manila.

Finding 3: Mobility has recovered as community quarantines have become progressively less stringent, though not to pre-pandemic levels. While the study was interrupted due to data issues for May and June, it was observed that urban mobility in the Philippines was highly responsive to community quarantines and appeared to have tracked stringency levels in the expected manner, with the largest declines experienced during ECQ and recovery (to around 70% of pre-lockdown levels) experienced during MGCQ in September 2020. The average reduction due to ECQ or modified enhanced community quarantine (MECQ), GCQ, and MGCQ were 56%, 16%, and 18% respectively.

The geographic variation in response to community quarantine was also examined based on two aspects of workplace cities: industrial composition and firm size composition. The study focused on those two aspects because lockdown policies affect industries differently as remote workability varies considerably across industries, and lockdown enforcement cost could be closely related to firm size, which is related to formality. Using panel regression models, the study estimated the community-quarantine-specific relationship between changes in flows before and after the lockdown and a city's share of total employment in medium and large firms or in each industrial category.

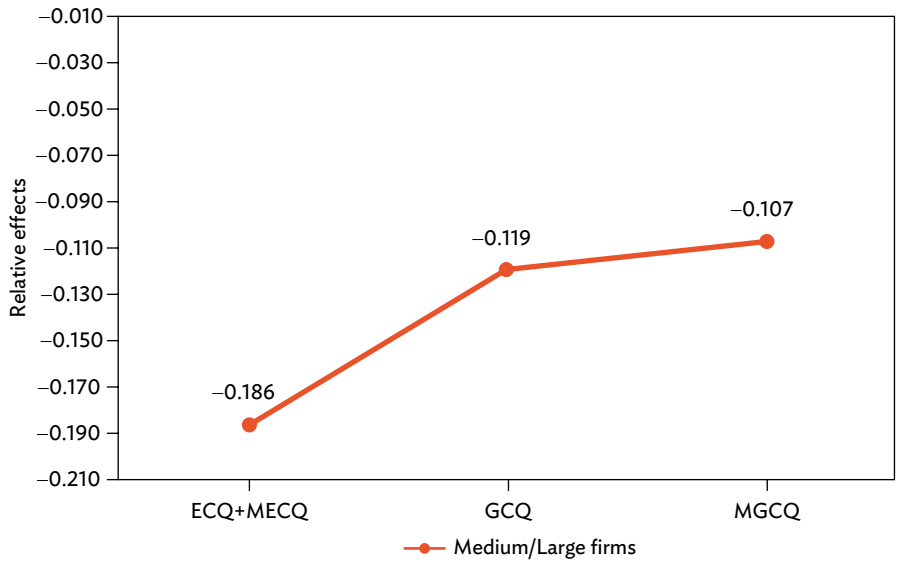
Finding 4: Community quarantines were less effective in cities dominated by micro and small firms. Mobility declined more in cities with a greater share of workers in medium and large firms (Figure 3). Firm size reflects formality, and formal employers were likely both more compliant and more closely monitored with respect to community quarantine. This may be related to the lockdown enforcement cost or tendency to comply. It is easier for the government to monitor and enforce lockdown measures with larger employers. Enforcement is much costlier when the firms are small and likely informal. It is also possible that larger firms chose to comply with the lockdown policies more.

The differential effects, however, decreased by half when the lockdown was relaxed from ECQ or MECQ to MGCQ. This is expected as gaps in enforcement costs and compliance tendency narrowed under less stringent lockdown.

Finding 5: Community quarantines were less effective in cities dominated by manufacturing. Cities with higher shares of employment in tertiary industries experienced a more pronounced decrease in mobility, while those with more workers in manufacturing and trade and transport industries experienced smaller decreases (Figure 4). Increasing the employment share of power, utilities, and construction industries; hospitality and recreation; and WFH-friendly or non-WFH-friendly tertiary industries by 10 percentage points in a destination city (at the expense of manufacturing share) decreases the expected morning inflows by additional 2.8% or 4.2%, when the city moves from normal period to ECQ and MECQ, or GCQ and MGCQ. In contrast, a 10-percentage-point increase in employment share of trade and transport industries would predict a 2.4% less decrease in morning flows into the city under ECQ and MECQ.

Finding 6: The rebound in mobility following relaxation of community quarantine was weaker in cities dominated by work-from-home friendly sectors and hospitality and recreation. When lockdown was relaxed from ECQ, more recovery of mobility occurred in cities that are heavy in non-WFH-friendly and power, utilities, and construction sectors, and less so in cities with more hospitality and recreation and WFH-friendly sectors (Figure 4).

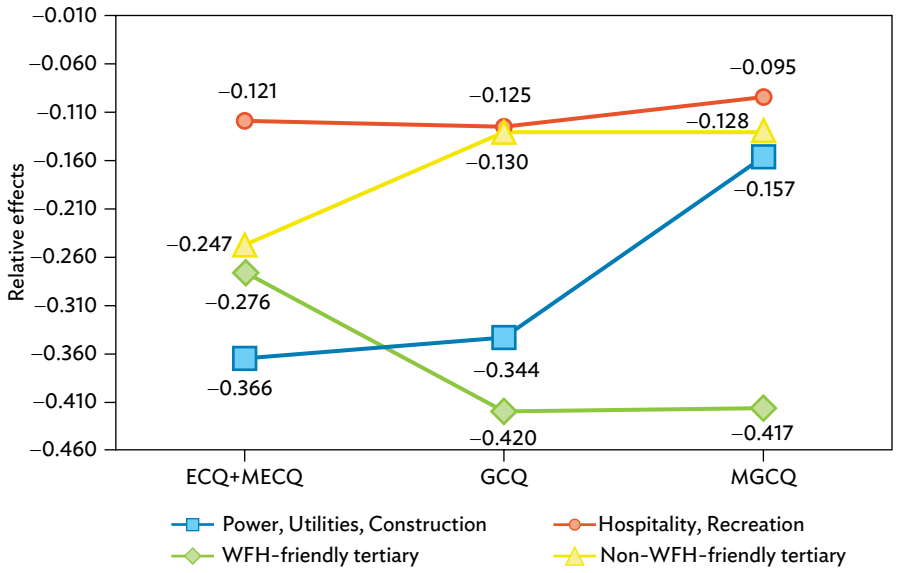
Figure 3: Differential Effects of Lockdown Measures on Cities of Different Firm Size Composition



ECQ = enhanced community quarantine, GCQ = general community quarantine, MECQ = modified enhanced community quarantine, MGCQ = modified general community quarantine.

Source: Authors.

Figure 4: Differential Effects of Lockdown Measures on Cities of Different Industrial Composition



ECQ = enhanced community quarantine, GCQ = general community quarantine, MECQ = modified enhanced community quarantine, MGCQ = modified general community quarantine, WFH = work-from-home.

Source: Authors.

With implementation of GCQ and MGCQ following ECQ or MECQ, the decrease in mobility (relative to the benchmark) in cities with larger power, utilities, and construction, and non-WFH-friendly tertiary industries shrank toward the benchmark, which suggests considerable job and business rebound in these sectors. Conversely, the relative decreases were greater in cities with larger WFH-friendly tertiary industries under GCQ as opposed to ECQ or MECQ, because their employees could continue working remotely without traveling to the office after restrictions were eased.

Cities with large hospitality and recreation sectors saw little differentiation in mobility response among community quarantine levels. Unlike for other sectors, the dampening effect of COVID-19 cases appears to have been a stronger determinant of mobility than community quarantine restrictions themselves. This is likely because to avoid infection, people self-regulated on hospitality- and recreation-related activities (such as dining out and partying) more than they did for less discretionary economic activities.

Robustness analysis shows that Findings 4, 5, and 6 are largely insensitive to reasonable tweaks in methodology such as exclusion of within-*barangay* flows, inclusion of origin–destination pairs in weeks for which they did not appear by assigning zero flow to these weeks, and use of afternoon outbound flows instead of morning inbound flows.

CONCLUSION AND RECOMMENDATIONS

Consistent with findings from advanced economies (Wang et al. 2021), community quarantines were an effective policy for reducing urban mobility in the Philippines during crisis, and mobility was responsive to different degrees of lockdown stringency. The strength of that response varies depending on city characteristics. This raises several considerations for economic policy, public health policy, and future policy research.

Partly by design, lockdown measures were less effective at restricting mobility in manufacturing-heavy cities. Maintaining that different treatment of manufacturing-based cities could be economically rational, given the evidence that keeping the industrial sector open lessens economic costs without worsening health outcomes because industrial activities are less contact-intensive (Furceri, Kothari, and Zhang 2021).

As main target of lockdown policies, the tertiary sector was more severely affected (aside from trade and transport industries). Distinct community quarantine impacts emerge based on how amenable a city's tertiary workforce is to work-from-home. Policymakers may want to take this into account in designing assistance programs or in allocating resources within their jurisdictions. Looking beyond the ongoing pandemic, as health-and climate-related disasters increase in prevalence, public interventions including social safety nets need to be

designed more proactively. An understanding of the implications of emergency measures for cities of differing economic profiles can contribute to efficient utilization of public resources.

More livelihood support may be needed in cities and municipalities that have a larger population share working in non-WFH-friendly tertiary industries, which are neither exempt from community quarantine restrictions nor amenable to remote work. Cities relying on tourism, wherein hospitality and recreation workers cluster, also need special policy attention. Under medium stringency of lockdown (GCQ), these industries were still heavily restricted due to high contact intensity. Even when MGCQ was in place, many jobs and businesses did not recover. Programs that help these workers to transfer to other sectors that reopened or are newly developed may be warranted to mitigate the adverse impacts of COVID-19 and lockdown policies.

Lockdown measures were less effective in cities dominated by micro and small firms. Employees of these firms have lower income and limited access to health and social security services in general. They are thus exposed to greater health and financial risks when continuing to work under lockdown. Supplementary NPIs may be needed to protect them from infection, as well as financial support to ensure their access to necessary health services.

Finally, this analytical study demonstrates the usefulness of big data like the cellphone-based mobility data in understanding policy impacts and supporting informed policymaking. Its granularity in space and time complements traditional data such as those based on large-scale household or firm surveys, which often contain better measures of economic outcomes. Imposition of government lockdowns comes at the cost of economic activity (Mandel and Veetil 2020). Identifying whether they have had the intended impact on disease transmission has emerged as a major research priority during the pandemic. Should the two be linked, more meaningful and relevant analyses may be carried out (for instance, whether these lockdown measures are cost-effective). Big data like those used in this investigation can support policy design on issues for which traditional data provide incomplete coverage, such as informal sector support and transportation planning.

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