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**MORAL FORCE:
LEADERS' ACTIONS
AND SOCIAL
DISTANCING**

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MORAL FORCE: LEADERS' ACTIONS AND SOCIAL DISTANCING¹

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Abstract

In the context of the COVID-19 pandemic, leaders' actions can influence whether individuals stay at home or ignore social distancing orders. Mexican President López Obrador held public events in different states of the country during the health emergency. This paper studies whether his example of contravening social distancing recommendations reduces social distancing. Using mobility data from UNDP-Grandata and a generalized event study design, findings indicate that López Obrador's public appearances at the beginning of the pandemic increased mobility rates in the municipalities of the states he visited in the days following the events. Furthermore, using electoral data from the 2018 presidential election, findings also indicate that mobility rates increase in municipalities where his political support is high after the President's events. Media coverage is the primary mechanism driving these results, which suggests that leaders' actions are relevant to influencing decisions when individuals have limited information.

Keywords: Leadership, COVID-19, social norms, social distancing.

JEL codes: D7, I12, Z13.

Mobility data used in this paper were provided by the United Nations Development Program (UNDP) and GRANDATA, under the umbrella of UNDP's call for papers "Exploring impact and response to the COVID-19 pandemic in Latin America and the Caribbean using mobility data", to promote policy-oriented research on the COVID-19 pandemic effects in LAC. Findings, interpretations, and conclusions are from the authors and do not necessarily represent UNDP's views.

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FUERZA MORAL: ACCIONES DE LÍDERES Y DISTANCIAMIENTO SOCIAL¹

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Resumen

En el contexto de la pandemia de COVID-19, las acciones de los líderes pueden influenciar la decisión de los individuos sobre quedarse en casa u obedecer las instrucciones de distanciamiento social. El presidente mexicano López Obrador realizó varios eventos públicos en distintos estados de la república durante la emergencia de salud. Este artículo analiza si su ejemplo contradiciendo las recomendaciones de salud redujo el distanciamiento social entre los ciudadanos. Haciendo uso de datos de movilidad de UNDP-Grandata y un estudio de evento generalizado, se encuentra que las apariciones públicas de López Obrador incrementaron las tasas de movilidad en los municipios de los estados que visitó durante el inicio de la pandemia en los días posteriores a sus visitas. También, con datos de las elecciones presidenciales de 2018, se encuentra que las tasas de movilidad incrementan después de los eventos en los municipios donde el apoyo político del Presidente es alto. La cobertura mediática es el principal mecanismo detrás de estos resultados, lo que sugiere que las acciones de los líderes son relevantes para influenciar decisiones cuando los individuos tienen información limitada.

Palabras clave: liderazgo, COVID-19, normas sociales, distanciamiento social.

Clasificación JEL: D7, I12, Z13.

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1. Introduction

Leaders can shape individual behaviour. There is a widespread consensus among economists that institutions and incentives are crucial to influencing human behaviour. Not surprisingly, leadership has mostly been analysed within this institutional framework focusing on formal authority. For instance, work on contract theory has focused on 'organizational leadership', where principals motivate agents only by altering incentives through the contract design. In contrast, less attention has been given to informal authority that alters behaviour by changing individuals' intrinsic motivations. Beyond incentives, leaders can influence behaviour by using rhetorical tools and charismatic communication (Antonakis et al., 2022; Hermalin, 2017), setting a social norm (Acemoglu & Jackson, 2015) or transforming people's values through their example (Ajzenman, 2021).¹

As Ajzenman et al. (2020) point out, an important and understudied domain in which leaders may have an impact is on health-related risky behaviour, which becomes highly relevant in the context of health emergencies. During the coronavirus disease (COVID-19) pandemic, Heads of State worldwide have responded heterogeneously in their policies and personal actions and speeches. Most Governments applied social distancing measures such as school closures, transport bans and workplace closures to prevent and contain the virus. Still, in the absence of strict sanctions or compensating measures, compliance with social distancing recommendations requires individuals to internalize the negative externality that their mobility induces the risk of contagion. Leaders' actions and speech can be of great importance in influencing the decision to follow social distancing recommendations. For instance, Banerjee et al. (2020) study the case of West Bengal, India. They find that receiving warnings and messages about health measures to contain the virus from a celebrity or public figure was more effective in promoting social distancing than when these came from other authorities. Ajzenman et al. (2020) find evidence that President Jair Bolsonaro's statements dismissing the pandemic and explicitly contravening lockdown recommendations affected social distancing in Brazil's municipalities.

This paper seeks to contribute to this issue by analysing the effect of a high-profile political leader's behaviour on citizens' actions. It examines the COVID-19 outbreak in Mexico, where government-appointed epidemiology experts implemented a non-compulsory social distancing policy named 'Jornada Nacional de Sana Distancia' [National Healthy Distance Day] (JNSD). The Mexican President, Andrés Manuel López Obrador, has contradicted his government officials' recommendations to prevent the virus's spread by holding several public events during the pandemic and ignoring the 'stay-at-home' social distancing policies.² In a press conference on 16 March, Mexico's COVID-19 czar, Hugo López-Gatell, was asked whether the President would take a COVID-19 test, given his public appearances and the risk of contagion. López-Gatell argued that López Obrador did not need to take the test and said, "The President's strength is moral in nature; his force is not that of contagion." López Obrador continued his public appearances and constantly minimized the pandemic's relevance with his declarations and refusal to wear a face mask. By January 2021, López Obrador had contracted COVID-19 during one of his tours around the country.

¹ For research about leadership from other social sciences, see Weierter (1997).

² López Obrador's public appearances outside of Mexico City are part of a predetermined work tour agenda around the country. These public events, which are not massive, are mainly the kickoff, supervision and inauguration of different public infrastructure works.

López Obrador is a central figure in contemporary Mexican politics. He has been the primary opponent of the political regime since the late-1980s. He ran in the 2006 and 2012 presidential elections and lost (Bravo Regidor & Iber, 2018). On his third attempt, López Obrador won the 2018 presidential election by the largest margin in Mexican history. Rather than left-wing ideology, López Obrador's politics are populist heirs of Mexican '*nacionalismo revolucionario*' narrative: the idea of the permanent struggle of ordinary people to improve their economic conditions in search of social justice (Hernández Rodríguez, 2020). One of López Obrador's trademarks is being on a constant tour of public events outside Mexico City. He has visited every state and municipality at least twice in his political career.³ On his social media accounts, he regularly publishes photos and videos of his public appearances, approaching ordinary people who attend or pass by his events: a genuinely charismatic leader appealing to ordinary citizens. Furthermore, even when his presidency has not resulted in improved outcomes—no economic growth, high levels of violence (Weinstein & Ang, 2020; Beck et al., 2020) and even within the COVID-19 context—López Obrador still has a high approval rate of over 55 percent (Moreno, 2020). Therefore, aside from his official image as President, he does have an important popular legitimacy.

Inspired by Lopez-Gatell's declaration, it is hypothesized that people are likely to follow his example and ignore preventive measures after his public appearances. Most citizens do not have the specialized knowledge needed to assess all the relevant information in a global pandemic, and they face difficulties in accurately evaluating the risk that their actions pose to the health of themselves and others. Therefore, most people have to rely on other individuals for guidance in this situation. It is conjectured that the Mexican President is a trusted individual whose actions can serve as a guideline in this context. Hence, this identification strategy exploits the variation in López Obrador's public events agenda across different states during the pandemic. With data from the United Nations Development Programme (UNDP)-Grandata, it is possible to construct robust daily estimators for mobility growth at the municipal level based on location data from mobile devices. A generalized event study design model is estimated, where the dependent variable is the mobility growth rate at the municipal-day level, and the variables of interest are indicators when López Obrador held a public event on a given day in a given state—specifically outside of the Palacio Nacional, his office in Mexico City. The findings indicate that one day after a public appearance, mobility rates increase over two percentage points in the municipalities of the state he visited.

However, López Obrador's bad example may not only have a local effect but can extend nationally. As previously mentioned, traditional and social media reproduce the President's public appearances on national outlets and newscasts. If López Obrador's leadership is relevant for influencing citizens' behaviour at the national level, it is argued that this effect would be more salient among his supporters. Data from the 2018 presidential election are used to construct López Obrador's political support in every municipality in the country. Extending the previous generalized event study design model, his political support across municipalities is interacted with indicators on whether he had a public appearance each day. While the local effect persists, the findings also reveal a national effect: after a public appearance, mobility rates increase by 1.25 percentage points on the second day after the event in municipalities that support him. Both local and national effects are mainly driven by media coverage, which means that López Obrador's bad example is only relevant in

³ Mexico is a federal republic with 32 states and 2,467 municipalities.

municipalities with access to traditional media (such as television, radio or newspapers) and social media, the latter being measured by Internet access.

This paper contributes to the literature on the influence of leaders' behaviour on individuals. The COVID-19 pandemic gave rise to increasing literature studying compliance with non-pharmaceutical interventions in the context of low enforcement. Allcott et al. (2020) study the effects of the partisan divide on social distancing in the United States, while Durante et al. (2021) study the effects of social capital in Italy. This paper's focus is specifically on the effect of a leader's actions in promoting risky behaviour related to health. It is closely related to Ajzenman et al. (2020), who analyse a similar issue in Brazil (also in the context of the COVID-19 pandemic) but focus on the effect of the President's speech rather than his actions. They examine two specific events using an event study design. Ayala-Cantu et al. (2021) replicate the study in Ajzenman et al. (2020) for Mexico using mobility patterns and focusing only on López Obrador's statements on 13 March. However, in contrast to Bolsonaro's case in Brazil, López Obrador's actions and speech contravening social distancing measures are not limited to a couple of days. Apart from his constant tour around the country, another trademark of the Mexican President is his daily press conferences, where he repeatedly dismissed the pandemic and measures to prevent the virus's spread. Using topic modelling for the daily press conferences of López Obrador and the COVID-19 czar Lopez-Gatell, Aguilar-Gomez et al. (2021) find that changes in tone and content in the messaging on the spread and prevalence of COVID-19 have had significant effects on population mobility. Thus, Ayala-Cantu et al. (2021) handpick a relevant day but ignore several others where López Obrador's example might have shaped behaviour. Schmidheiny and Sieglöch (2020) show that such an approach "leads to biased estimates unless the second and subsequent events are known to have no additional effect at all." Instead of focusing on López Obrador's speech or a single event, this paper studies his actions throughout the pandemic, exploiting variation across time and geography in his public appearances contravening stay-at-home instructions.

The paper is structured as follows. Section 2 summarizes the evolution of the pandemic in Mexico, and section 3 presents the data. Section 4 presents the identification strategy, and section 5 presents the main results. Section 6 presents robustness checks and mechanisms. Section 7 concludes.

2. COVID-19 in Mexico

By the beginning of August, Mexico had over 500,000 confirmed cases of COVID-19 and over 50,000 related deaths (Kitroeff & Villegas, 2020). The first COVID-19 case in Mexico was confirmed on 27 February in a 35-year-old man returning from Italy. The World Health Organization declared COVID-19 a pandemic on 11 March. Right after, on 14 March, the Government announced a set of non-pharmaceutical measures to contain the spread of the disease under JNSD, which would begin on 23 March (Rojas, 2020). These measures were meant to prevent the spread of the virus by suspending non-essential activities to promote social distancing (Redacción Animal Político, 2020).

Between the announcement and the beginning of JNSD, the number of confirmed cases exceeded one hundred, and the Government confirmed the first death in the state of Durango. Some universities and private institutions started to close in the days following the announcement of JNSD. The closing of all public schools was announced on 20 March

by the Secretariat of Education. JNSD started on 23 March. The Secretariat of Health called for closing all non-essential activities, reducing access to public spaces by 50 percent and practicing social distancing. The General Health Council declared a state of national health emergency on 30 March. Over 1,000 people in the country were already infected with the virus.

With the end of JNSD, the 'New Normality' programme began on 1 June. This programme supposed a gradual transition into lifting social distancing measures depending on the situation of each state. A weekly 'epidemiologic traffic light' (*semáforo epidemiológico*) was implemented to determine the risk level of restarting activities. The programme started with all states in 'red'. Only essential activities were allowed, and people were supposed to stay in their homes. The first change in status for a state occurred on 29 June when Mexico City moved to 'orange'. Companies in non-essential activities were then allowed to operate with 30 percent of their staff. However, there were no clear guidelines as to why each status was assigned.

3. Data

A panel data set is constructed with information on daily mobility rates at the municipal level. UNDP-Grandata mobility data are used to construct robust estimators of daily municipal mobility growth rate from 3 March 2020 to 29 August 2020. Since the effect of López Obrador's public events is of interest, dummies by date and state indicating whether López Obrador had a public event at a given state are included to account for the local effects. To study the national effects, indicators by date indicating whether López Obrador had a public event outside Mexico City are also included. Lastly, measures of his political support across municipalities, fixed across time, are included.

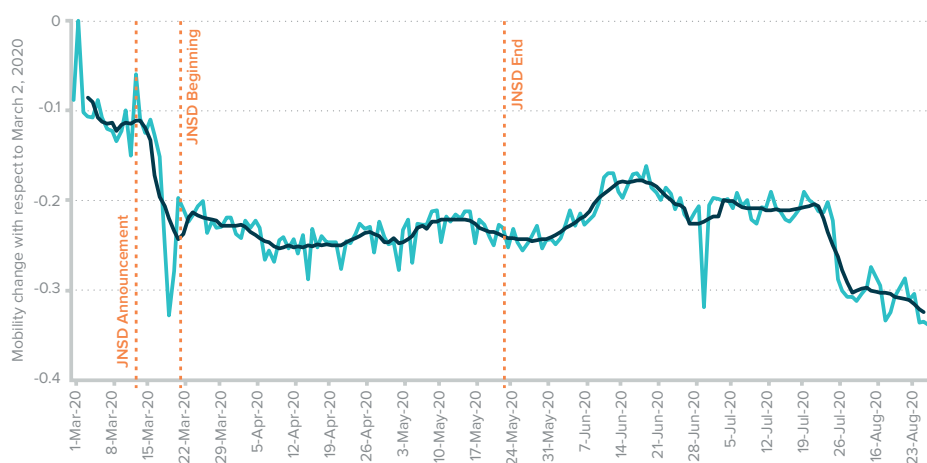
3.1. Mobility data

UNDP-Grandata provides mobility data at a fine grid spatial level.⁴ The mobility indicators are variables that aim to capture the amount of human movement that took place in a particular area. For instance, within a census track, the mobility indicator compares the level of movement in a day with respect to a benchmark date (2 March 2020, the first Monday with data available). A value of 0 indicates no change in mobility, whereas a value of 1 indicates a 100 percent increase in mobility compared to the benchmark. To address the high prevalence of outliers in the upper bound of the census track data, the decision was made to cap the sample at 1 to keep all the observations and use a robust location estimator, the Hodges-Lehmann (HL), to aggregate the data at the municipal level. A detailed explanation of this process is available in the appendix. While several issues are worth noting regarding this choice, a robustness check of the results was also performed using a trimmed sample and the median as a municipal estimator, which yielded a municipal mobility distribution that was most different from the preferred choice. The results are not substantially different.

⁴ See UNDP (2020) for a description of UNDP-Grandata's collection of mobility data.

Once the measures of mobility changes are aggregated at the municipal level, an unbalanced panel data set is obtained for 2,350 municipalities across 182 days. It is worth noting that some municipalities do not have information on mobility for certain dates, while 75 percent of the total municipalities have information during the entire period of study. Figure 1 shows the evolution of municipal mean mobility rates during the period analysed. The solid black line is the seven-day moving average, while the grey line illustrates the mean mobility rate time series. Figure 1 also shows three dates that are relevant in describing social distancing policies by the Secretariat of Health: 1) the announcement of JNSD, 14 March; 2) the beginning of JNSD, 23 March; and 3) the end of JSND, by 30 May, also referred to as 'New Normality'. Mobility at the municipal level decreased with respect to the baseline after the social distancing policies.

Figure 1. Municipal mobility and non-pharmaceutical interventions



Source: Authors' calculations, based on UNDP-Grandata mobility data.

Besides the variation across time, the mobility index varies substantially across geographical units. Figure 15 in the appendix shows the HL estimator of mobility for the first and last observation available at the municipal level. The lighter tones indicate that the change in mobility is hardly different from the baseline, 2 March. As the mobility change from the baseline increases, the municipalities are shaded towards red tones; as the mobility change decreases, the municipalities are shaded towards white tones. From the subpanels of figure 15, it is clear that there is substantial variation in mobility across geographical units during the study period.

3.2. López Obrador's public appearances during the pandemic

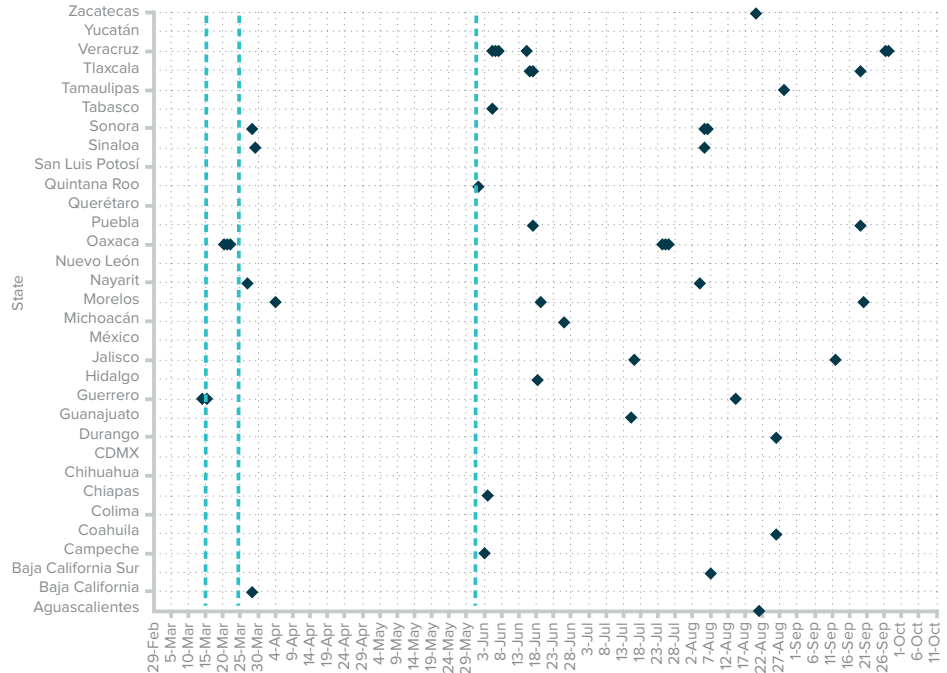
This study followed López Obrador's public appearances during the pandemic, relying on the weekly agenda released to the press by the Office of the President on its web page.⁵ A data set was then constructed with his daily location. Figure 3 shows two pictures of López

⁵ Figure 16 in the appendix shows an example of the official agenda of the President released by the Office of the President [Oficina de la Presidencia].

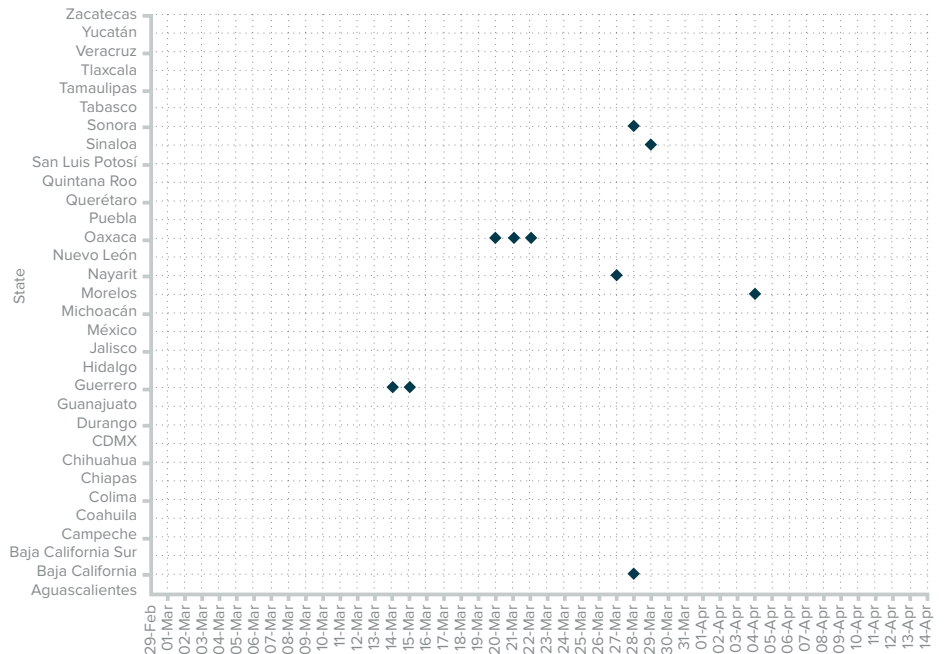
Obrador's public appearances: one the same day JNSD was announced and the other when JNSD had just finished.

Figure 2. López Obrador's public appearances at the state level

(a) Complete sample



(b) Beginning of the pandemic



Note: Based on own elaborated data following López Obrador's public appearances. See table 2 in the appendix.
 Source: Authors' calculations.

To provide an idea of López Obrador's public appearances across geographic units and time, following Baker et al. (2021), figure 2 shows a heat map in which López Obrador's public appearances at the state level are colored through the period of study. The first dashed line marks the announcement of JNSD, the second marks the beginning of JNSD and the third marks the end of JNSD and the beginning of the 'New Normality'. As panel (a) shows, López Obrador's public appearances take place in almost every state: only eight states did not receive a visit from López Obrador during the study period.

Figure 3. Examples of López Obrador's public appearances

(a) 14 March 2020



(b) 2 June 2020



Sources: Panel (a) taken from https://twitter.com/lopezobrador_/status/1238866717595578369?s=20. Panel (b) taken from <https://youtu.be/rBWj-ZtuRF4>.

As figure 2 panel (b) shows, at the beginning of the pandemic and after the announcement of the forthcoming implementation of JNSD by the Health Secretary, López Obrador continued his work agenda around the country as usual. When JNSD formally began, the President continued his work tour, visiting Nayarit, Baja California, Sonora, Sinaloa, Oaxaca and Morelos. Right after the end of JNSD, while the country was still at 'high epidemiologic risk' according to the health authorities, López Obrador resumed his public events, visiting Quintana Roo, Yucatán, Campeche, Chiapas, Tabasco and Veracruz, against advice from the Secretariat of Health. Table 2 in the appendix also shows the date and location of all the presidential public appearances outside of Mexico City during the analysis period.⁶ The study also includes indicators of whether the visit was related to the COVID-19 pandemic and notes on what kind of public event he held. From early March until late September, he went out 68 times, disobeying the stay-at-home policies. Furthermore, he always refused to wear a face mask during public events and press conferences and said that he would only wear one when Mexico's corruption ended. Moreover, most of his cabinet members do not wear a mask, and several of his close collaborators have tested positive for COVID-19, as had he by January 2021.

4. Identification strategy

This study seeks to evaluate whether López Obrador's example of holding public events and travelling around the country matters in the context of the COVID-19 pandemic after the announcement of JNSD, when he was contravening government officials and institutions that were urging people to stay at home and promoting social distancing measures.

⁶ Since López Obrador sometimes holds public events in more than one state in a day, both states are included.

It is hypothesized that López Obrador's public appearances, which disobey 'stay-at-home' policies, influence citizens' decisions to follow social distancing measures. Tests are conducted on two possible channels of the effect of the President's public events on mobility rates. First, an analysis is conducted on the effect of his public events in the states where they happen, given that the event is more likely to be reported in local media.⁷ Second, the study adds the possibility that the effect of the President's example is not constrained to the state where his events happen. Given López Obrador's role as a prominent social and political leader and the fact that his events are covered nationally in traditional press, television and social media, his events might affect the mobility decisions of his political supporters.

4.1. Local effects

A natural candidate for identification strategy in this setting is the difference-in-differences method. There is a recent burgeoning literature working on new methodological advances on difference-in-differences, two-way fixed effects and event study designs for causal inference (Arkhangelsky & Imbens, 2019; Borusyak & Jaravel, 2018; Callaway & Sant'Anna, 2020; de Chaisemartin & D'Haultfoeuille, 2018, 2020; Goodman-Bacon, 2021; Marcus & Sant'Anna, 2021; Sant'Anna & Zhao, 2020; Sun & Abraham, 2021).⁸ However, most of the new literature is focused on new developments in difference-in-differences with staggered treatment adoption, in particular, settings in which once a unit is treated, it stays always treated.

In this setting, it is hypothesized that López Obrador's leadership influences citizens' behaviour when he holds public events outside his office, most probably with some persistent effect, but he does not have any effect when he does 'stay at home'. Thus, these units are switching from treated to not treated, given López Obrador's public agenda. This setting is more similar to an event study design with no staggered treatment adoption and multiple events.

Schmidheiny and Siegloch (2020) and Sandler and Sandler (2014) show that single event studies can be generalized to multiple events of equal intensity happening at different times across units. Following Schmidheiny and Siegloch (2020), this study uses a generalized event study design approach with the following econometric specification:

$$y_{m,s,t} = \sum_{j=\underline{j}}^{\bar{j}} \beta_{t+j} d_{m,s,t+j} + \mu_{m,s} + \theta_t + \varepsilon_{m,s,t} \quad (1)$$

$$d_{m,s,t+j} = \begin{cases} \sum_{j=-\infty}^{\underline{j}} 1[AMLO \text{ state public appearance}]_{m,s,t+j} & \text{if } j = \underline{j} \\ 1[AMLO \text{ state public appearance}]_{m,s,t+j} & \text{if } \underline{j} < j < \bar{j} \\ \sum_{j=\bar{j}}^{\infty} 1[AMLO \text{ state public appearance}]_{m,s,t+j} & \text{if } j = \bar{j} \end{cases} \quad (2)$$

where $j \in \{\underline{j}, \dots, -1, 0, 1, \dots, \bar{j}\}$ and $\underline{j} < 0 < \bar{j}$

⁷ Note that López Obrador's public events are not expected to increase mobility because of people's movements to attend the event. These events are usually inaugurations of public infrastructure works and involve only local government representatives and media, with no general public attendance.

⁸ See Cai (2021) for an updated review on methodological advances for applied microeconometrics.

The term $y_{m,s,t}$ in equation 1 represents the mobility rate for municipality m , in state s , at day t . Mobility growth rates are taken with respect to the UNDP-Grandata baseline day, 2 March 2020. Since mobility varies across time and geographical units, there are undoubtedly observed and unobserved factors in both dimensions that could bias these estimates. For instance, at the municipal level, local infrastructure or geographic characteristics can affect mobility patterns. To control time-invariant unobserved characteristics, municipal fixed effects, $\mu_{m,s}$, are included. Moreover, since other variables at the day level can affect mobility patterns, such as the weekday or the daily messages from both López Obrador and the COVID-19 czar (Aguilar-Gomez et al., 2021), day fixed effects, θ_t , are also included to control for daily unobserved characteristics common to all municipalities.

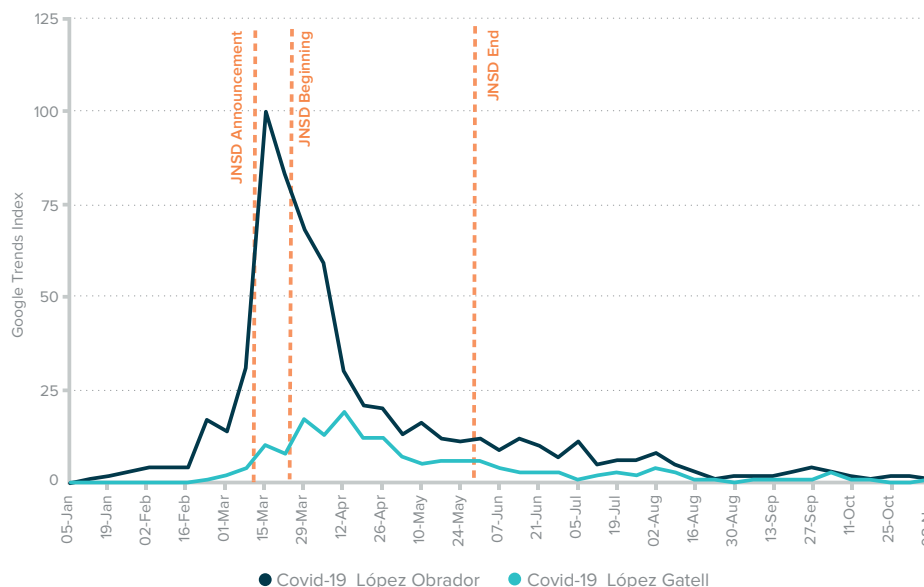
The term $I[AMLO\ state\ public\ appearance]_{m,s,t}$ in equation 2 is a dummy equal to one if 1) López Obrador held a public appearance on day t in state s where municipality m belongs; and 2) the public appearance is after the announcement of JNSD, when people should follow the 'stay-at-home' recommendations. β_t measures the effect of López Obrador's state public appearances where these happen.

Since López Obrador's example on mobility rates may not be limited to the same day of his public event, it is of interest to identify dynamic treatment effects. The President's events could affect mobility decisions before they happen if his plans are broadcasted on the news or shared on social media and serve as a guideline. The same is true for long-lasting effects; López Obrador's events could continue to affect mobility rates days after they happen. According to Schmidheiny and Siegloch (2020) and Sandler and Sandler (2014), dynamic treatment effects can be identified in this setting by adding indicators for all lags and leads of the treatment. It must be assumed that the treatment effect is proportional to the observed treatment intensity so that the generalized event study described by equations 1 and 2 delivers unbiased estimates.

In practice, to estimate this model, the effect window must be restricted to a finite number of leads, j , and lags, \bar{j} . The latter requires assumptions that treatment effects will stay constant before j and after \bar{j} . Following Schmidheiny and Siegloch (2020), this is done by adding treatment events in the form of binned event indicators, as defined in equation 2. Indicators at the endpoints, the maximum lag (and lead) in the effect window, account for all the observable past (and future) events going beyond the effect window. For example, the effect window is restricted to 5 days before and after the event so that $b_{m,s,t} - 5$ is the sum of all López Obrador's public appearances at the state level happening on or before $t - 5$, and 0 otherwise. Additionally, $\beta_{m,s,t} - 1 = 0$ is normalized by dropping the change in treatment for the period before the event, because the parameters β_j are only identified up to a constant due to the fixed municipal effect. Different window sizes are also tested, but the results are invariant to the election of leads and lags.

Standard errors clustering by the municipality, state and day are used. Abadie et al. (2020) argue that empirical work "should assess whether the sampling process is clustered or not, and whether the assignment mechanism is clustered". In this setting, the sampling process clusters at the municipality-day level. Nevertheless, the treatment assignment mechanism is at the state-day level. Thus, clustering occurs at three levels.

Figure 4. Google trends



Source: Authors' calculations, based on Google trends data.

The underlying assumption behind the choice of treatment variable is that López Obrador's public appearances do not affect daily mobility in the absence of social distancing measures. Citizens' search for guidelines and the President's actions may work as one, once the social distancing policies are announced and in a context of uncertainty about the virus's characteristics, coupled with citizens' limited capacity to accurately assess risk by themselves. Moreover, once the Secretariat of Health suggests staying at home, an unattractive measure, people seem to search for alternative guidelines. The latter assumption is supported by figure 4, which depicts the weekly evolution of Google trends for search queries of 'COVID-19 López Obrador' and 'COVID-19 López Gatell'. Searches for 'COVID-19 López Obrador' rise significantly after the announcement of JNSD, much more than those of 'COVID-19 López Gatell', the COVID-19 czar in Mexico. The search is reduced significantly towards the end of JNSD, suggesting that López Obrador's example and the Secretariat of Health's indications are less relevant for people as time passes. A possible explanation for this is that more information is available as the pandemic evolves. People have learned about the pandemic. At that point, they may know someone who has contracted the disease or may have become infected themselves. With information about the probability of becoming infected and the effects of the disease, people may have updated their beliefs and behaviour accordingly and no longer look to López Obrador's example. This also explains why we consider that municipalities that have been visited by Lopez Obrador are not treated outside of the event window unless another event occurs. This is, we do not allow for a long-term effect of the event. In this context of uncertainty and rapid change, Lopez Obrador's mobility decisions can work as a real-time indicator of the state of the pandemic, but its influence may only last until the next influential piece of information arrives.

4.2. National effects

López Obrador's misbehaviour in dismissing social distancing measures may not only impact mobility decisions in the state he visits. As mentioned earlier, López Obrador can constantly appear in daily media coverage because of his role as President, his daily morning conferences and his constant use of social media. Thus, a test is conducted to determine whether his public appearances are also a relevant example at the national level and affect municipal mobility rates. To test this possibility, the econometric specification in equation 1 is modified to the following:

$$y_{m,s,t} = \sum_{j=\underline{j}}^{\bar{j}} \beta_{t+j} d_{m,s,t+j} + \sum_{j=\underline{j}}^{\bar{j}} \alpha_{t+j} t_{m,s,t+j} + \mu_{m,s} + \theta_t + X'_{m,t} \delta + Z'_{s,t} \gamma + \varepsilon_{m,s,t} \quad (3)$$

$$d_{m,s,t+j} = \begin{cases} \sum_{j=-\infty}^{\underline{j}} 1[AMLO \text{ public appearance}]_{t+j} \times AMLO's \text{ political support}_{m,s} & \text{if } j = \underline{j} \\ 1[AMLO \text{ public appearance}]_{t+j} \times AMLO's \text{ political support}_{m,s} & \text{if } \underline{j} < j < \bar{j} \\ \sum_{j=\bar{j}}^{\infty} 1[AMLO \text{ public appearance}]_{t+j} \times AMLO's \text{ political support}_{m,s} & \text{if } j = \bar{j} \end{cases} \quad (4)$$

$$t_{m,s,t+j} = \begin{cases} \sum_{j=-\infty}^{\underline{j}} 1[AMLO \text{ state public appearance}]_{m,s,t+j} & \text{if } j = \underline{j} \\ 1[AMLO \text{ state public appearance}]_{m,s,t+j} & \text{if } \underline{j} < j < \bar{j} \\ \sum_{j=\bar{j}}^{\infty} 1[AMLO \text{ state public appearance}]_{m,s,t+j} & \text{if } j = \bar{j} \end{cases} \quad (5)$$

where $j \in \{\underline{j}, \dots, -1, 0, 1, \dots, \bar{j}\}$ and $\underline{j} < 0 < \bar{j}$.

Note that specification in equation 3 resembles equation 1, but the treatment changes. Here, López Obrador's public appearances at the national level, $1[AMLO \text{ public appearance}]_{t+j}$, are considered equal to one if 1) López Obrador held a public appearance on day t and 2) the public appearance occurs after the announcement of JNSD. Note that López Obrador's public appearances at the national level are common to all geographic units: if traditional and social media cover López Obrador dismissing social distancing, the effect might not be exclusive to the state or municipality where the events happen. It is expected that his example resonates more among his supporters. Since national public appearances are colinear with the day fixed effects, they are interacted with López Obrador's political support at the municipal level, $AMLO's \text{ political support}_m$.

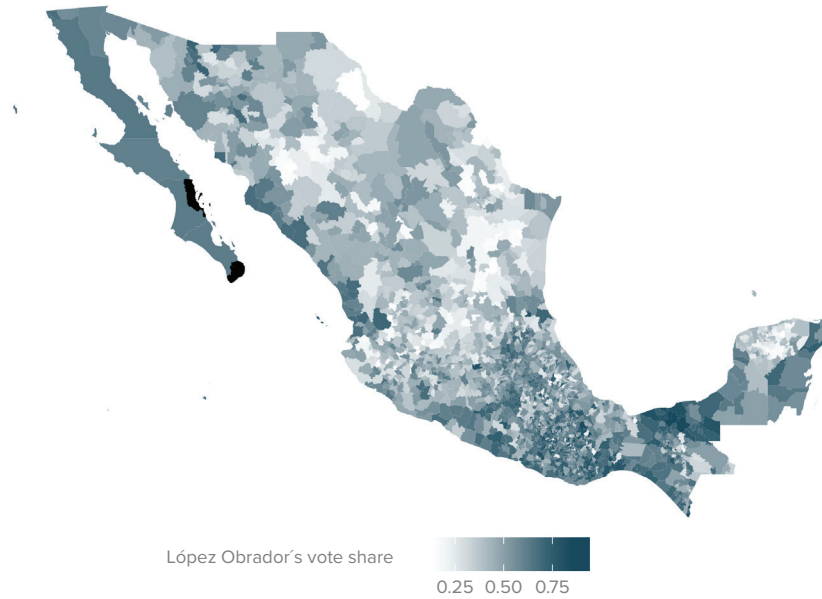
López Obrador's political support is measured using data from the 2018 presidential election. As mentioned previously, he won the 2018 election by the highest margin in Mexican electoral history. His mean share of votes at the municipal level is 50.79 percent (standard deviation of 16.49 percent). Figure 5 shows the municipal vote share, for which there is substantial geographical variation. Given the simple majority system in Mexico, measuring López Obrador's political support through the vote share is misleading. For instance, López Obrador won municipalities obtaining a higher vote share than the candidate with the second-highest vote share, even when the sum of vote shares for all other candidates but López Obrador was higher. Namely, López Obrador could have won by majority rule even when the majority of the municipal population did not choose him. Moreover, he won with many voters during the 2018 election whom he did not have in the previous elections and who are not part of his strong base vote share (Merino et al., 2018). Thus, to get a better measure of his actual

followers, López Obrador's political support as the difference between his vote share and the vote share of the other three presidential candidates of the 2018 election is defined as:

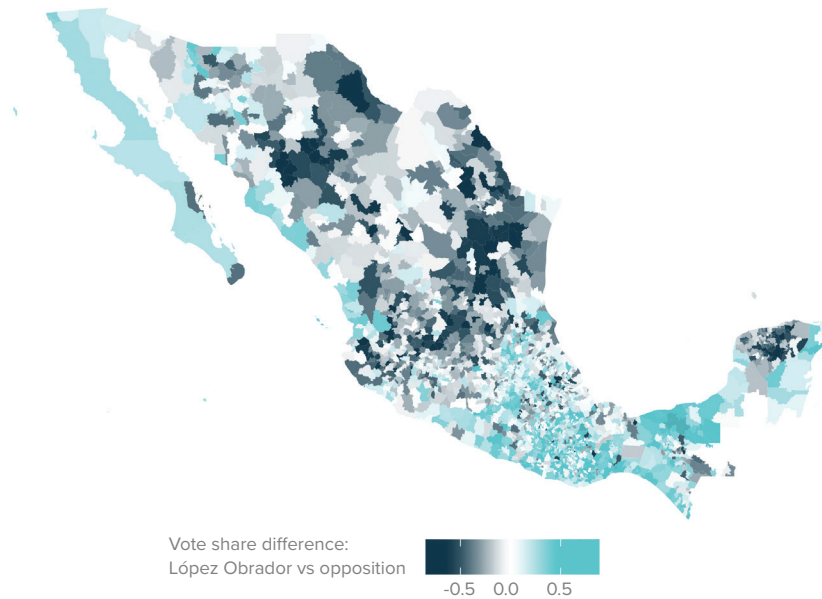
$$AMLO\ political\ support_m = AMLO\ vote\ share_m - Any\ candidate\ but\ AMLO\ vote\ share_m \quad (6)$$

Figure 5. López Obrador's political support at the municipal level

(a) Vote share



(b) Political support



Source: Authors' calculations, based on 2018 presidential election data.

An extensive margin dummy is constructed indicating whether equation 6 is positive, and the intensive margin is constructed by the differences accounted by equation 6. Summary statistics of the 2018 presidential election are available in table 3 in the appendix.

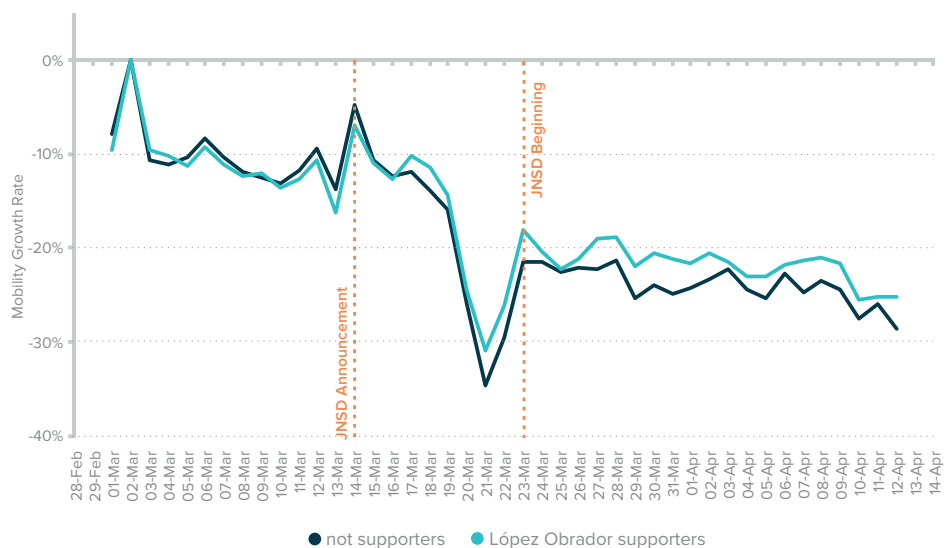
The coefficients of interest in equation 3 will be biased if López Obrador's public appearances are correlated with day-varying unobservables at the municipal or state level that simultaneously affect mobility rates. For instance, the intensity of the treatment could depend on the extent to which López Obrador's public events are broadcasted, which could vary over time for different reasons, affecting the number of people who learn that he contravened stay-at-home orders on a given day. Moreover, López Obrador's state public appearance might be correlated with characteristics of the municipalities within the state visited that also affect mobility: mean income at the municipal level can influence the nature of López Obrador's visits and simultaneously proxy how many people can work from home, which then affects mobility rates (Monroy-Gómez-Franco, 2021). Thus, heterogeneous slopes are included, interacting a continuous variable of time with municipally invariant characteristics, captured by the term $X_{m,s,t}$ in equation 3, such as media access, share of population living in rural areas, mean years of schooling, share of population under the food poverty line and mean (log) per capita income.⁹ Time-state interactions are also included, captured by $Z_{s,t}$ in equation 3: state-linear trends, as well as an interaction between time and the state party to control for possible different state-level policies that might affect mobility rates.

As in the previous specification, it is also assumed that the treatment effect is proportional to the observed treatment intensity (specifications in equations 3 and 4). This assumption might be violated if López Obrador's example is increasing in political support so that the intensity of the treatment is not constant across municipalities. To account for the latter, both extensive and intensive margin measures of political support are used. Also, note that all the linear terms from the interaction in this treatment in equation 4 disappear with the municipal and day fixed effect. Furthermore, the β_{t+j} coefficients in specification 3 would be biased if the effect of López Obrador's public appearances where they happen is not accounted for, since they vary both between time and geographic units. $t_{ms,t+j}$, the binned leads and lags of López Obrador's state public appearances are also included.

The underlying identification assumption of the econometric specification in equation 3 is that of parallel trends: the expectation of the outcome without treatment follows the same evolution over time in every group. Any systematic difference in the evolution of the two groups, supporters and non-supporters, can only be attributed to the effect of López Obrador's national public appearances after JNSD was announced. It implies that municipalities supporting López Obrador did not experience mobility-relevant shocks that differ from those that do not support him. This assumption would be violated if the evolution of cash assistance or some other policies that could affect social distancing was different between municipalities with different political support for the President. While this assumption is not directly testable, the trends can be examined before the treatment, and they should not show any systematic difference in the evolution of the two groups. Figure 6 supports this identification assumption graphically, although the available sample is small.

⁹ Poverty share and mean income per capita data are from López-Calva et al. (2020); media access, the share of the rural population and mean years of schooling are from the 2020 National Census by the Instituto Nacional de Estadística, Geografía e Informática. Media access is measured using the percent of households with radio, television, computer, cell phones and Internet at the municipal level to consider the different ways people can be informed about López Obrador's public events. Principal component analysis is used to create the index, and the first component explains over 88 percent of the variance.

Figure 6. Trends by political support



Source: Authors' calculations, based on mobility data from UNDP-Grandata and 2018 presidential election data.

Figure 6 plots the mean trends in municipal mobility, grouping municipalities by this extensive measure of political support, for the first 45 days of the study period. It is clear that, prior to the announcement of JNSD, municipalities supporting and not supporting López Obrador did not differ systematically in their mobility patterns. Nevertheless, a couple of days after the JNSD announcement, the municipalities supporting López Obrador decreased their mobility patterns with respect to the municipalities that do not support the President. Besides the graphical evidence, since the econometric specification discards the unobserved heterogeneity across time with the day fixed effects and the unobserved heterogeneity across units with the municipal fixed effects, it is reasonable to argue that this setting does not violate the identification assumptions. Different robustness tests are shown in Section 6.

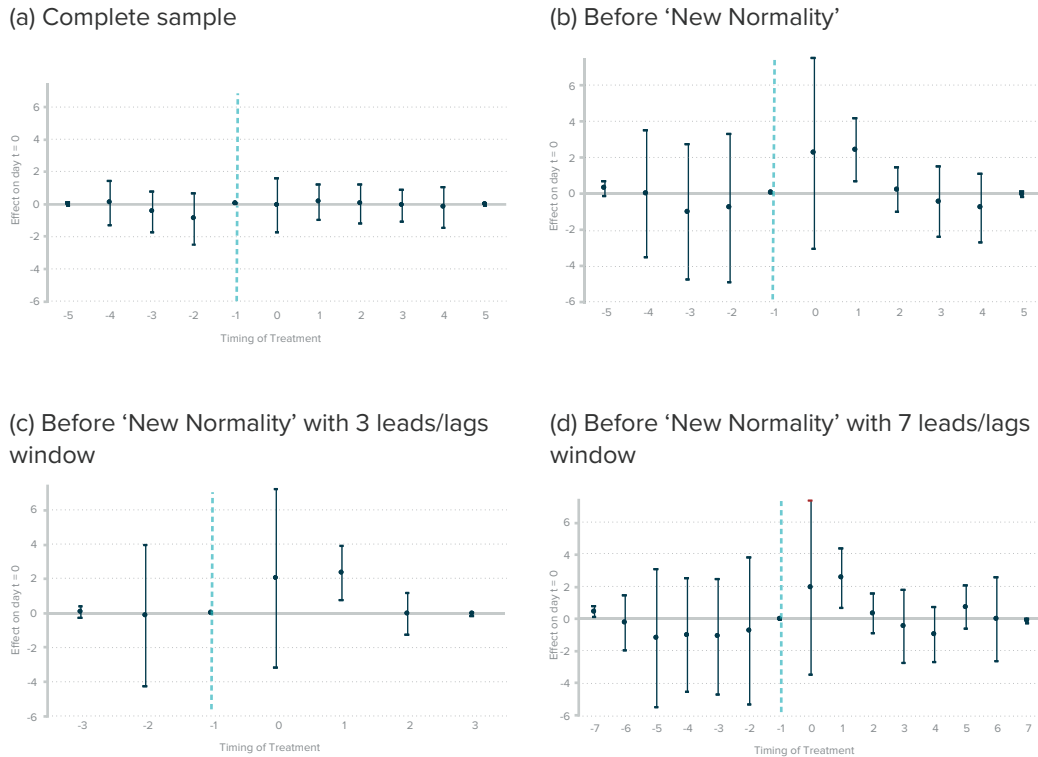
It is worth noting that one of the implications of the characteristics of our mobility data is that our results are only representative of mobility decisions of individuals with smartphones and Internet access. On one hand, this supports our identification strategy as these people are more likely to be informed about Lopez Obrador's events through traditional and social media. On the other hand, if the likelihood of connectivity is different between those who support the President and those who do not, our support variable could be measured with error, still this may be partially mitigated by controlling for internet access at the municipality level as we do.

5. Results

Figure 7 shows the results for the effects of López Obrador's appearances on municipal mobility in the states where they happen as modeled through specification in equation 1. The dependent variable is the mobility growth rate for the HL estimator of the capped sample. As panel (a) shows, no significant event was found of López Obrador's state public appearances on mobility rates using the complete sample. However, panel (b) shows that, with a focus on the sample before the 'New Normality', López Obrador's public appearances increased mobility

rates. Before the event, any of the lead indicators are not statistically different from zero. Thus, there is no anticipation effect of López Obrador's events. The event only has an effect statistically different from zero on the day after it happens, $t = 1$. There is a sharp increase of 2.3 percentage points in mobility rates in municipalities that belong to the event's state. The effect disappears the second day after the visit. Panels (a) and (d) show that the results do not differ substantially when choosing a different window size for the effect. The effect remains only statistically significant on the first day after the visit and is almost of the same magnitude.

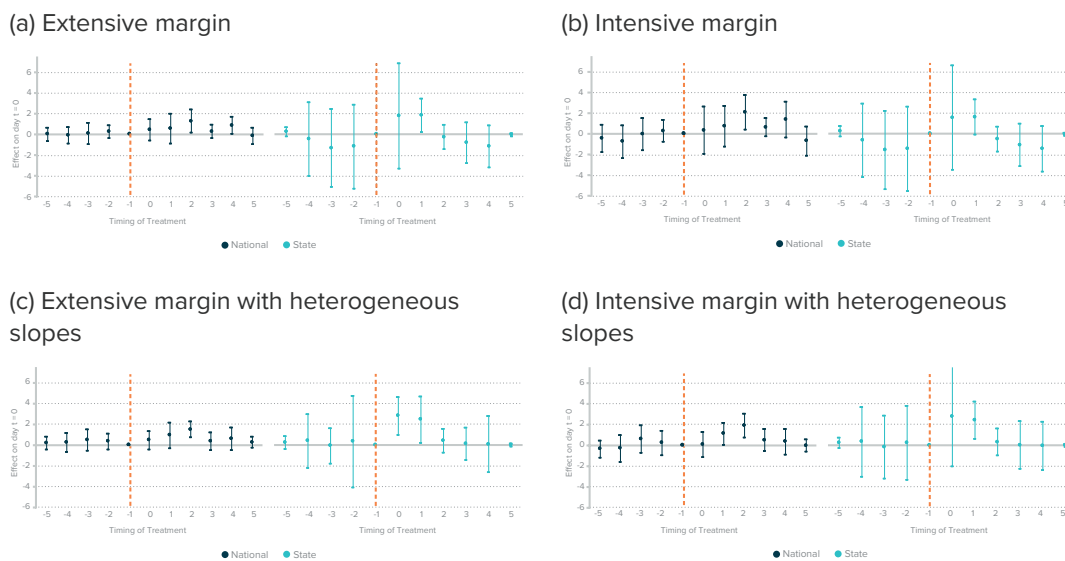
Figure 7. Local effects of López Obrador public appearances



Notes: Coefficients expressed in percentage points. Dependent variable is the Hodges-Lehman estimator of municipal daily mobility growth rate, with respect to 2 March. Effects are normalized to one day before the event. Error bars show confidence intervals at 95 significance level for standard errors clustering by municipality, state and day. The complete sample contains observations from 1 March to 29 August. The sample referred to as before 'New Normality' includes observations from 1 March to 30 May. Source: Authors' calculations.

Since the findings indicate that the effects of the leader's events are only salient at the beginning of the pandemic, the specification in equation 3 is only estimated on the sample before the New Normality. The results are shown in figure 8. Panel (a) shows the results for the extensive margin of the political support measure and its interaction with the public appearance at a national level after the announcement of JNSD. When López Obrador appears in public dismissing social distancing, mobility rates increase in 1.25 and 0.8 percentage points two and four days after the event in municipalities that support him. Note that the parallel trends assumption holds: none of the lead indicators is statistically different from zero. Also, local effects persist. There is an additional and statistically significant effect in the states where the event happens. Mobility increases by 0.8 percentage points two days after the event. The rest of the coefficients are not statistically significant. Most notably, all the effects outside of the window, five days removed from the event, are zero.

Figure 8. Local and national effects of López Obrador public appearances



Notes: Coefficients expressed in percentage points. Dependent variable is the Hodges-Lehman estimator of municipal daily mobility growth rate, with respect to 2 March. Effects are normalized to one day before the event. Error bars show confidence intervals at 95 significance level for standard errors clustering by municipality, state and day. Heterogeneous slopes are the interaction between a linear time term and a vector of variables at the municipal level: media access, share of population living in rural areas, mean years of schooling, share of population under food poverty line and mean (log) per capita income. The specifications also include interactions between a linear time term and state and political party at the state level. Source: Authors' calculations.

Figure 8 panel (b) shows the same pattern for the intensive political support measure. Two days after López Obrador's public appearance, mobility rates increase by 0.2 percentage points for each 10-point increase in political support in the municipality. In other words, if a municipality with full political support for López Obrador ($= 1$) is compared to one with neutral support ($= 0$), the effect of a public event increases mobility in the former by two percentage points with respect to the latter. The remaining dynamic treatment effects are not statistically different from zero at a 95 percent significance level. The local effect is no longer significant. Panels (c) and (d) add heterogeneous slopes at the municipal and state levels to account for different mobility patterns due to different characteristics. The magnitude and the overall pattern of dynamic treatment effects are robust to the inclusion of the interactions between time and media access, share of population living in rural areas, mean years of schooling, share of population under the food poverty line, mean (log) per capita income, the political party governing the state and a state linear trend. Thus, every time López Obrador held a public event at the beginning of the pandemic, mobility rates increased in the state he visited; however, effects were also seen at the national level among his political supporters.

6. Robustness and mechanisms

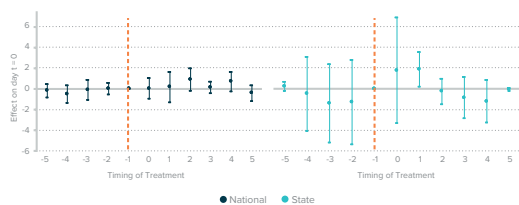
6.1. Robustness

The robustness of the results previously described is tested. First, the same specification is evaluated using an alternative independent variable. Similar to Ajzenman et al. (2020),

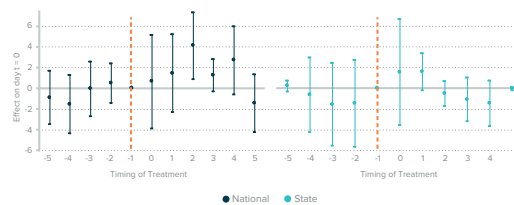
an alternative measure of political support is used. In the extensive margin, the alternative political support measure takes a value of one if the municipal share of votes is above the median municipal vote share for López Obrador. In the intensive margin, the measure is the difference between López Obrador's municipal vote share and López Obrador's median municipal vote share. Panels (a) and (b) in figure 9 show the results for the extensive and intensive margin, respectively. For the extensive margin, the national effect two days after the event is an increase in 0.8 percentage points, statistically significant at 10 percent; the local effect one day after the event is an increase in 1.8 percentage points, statistically significant at 5 percent. For the intensive margin, the same coefficients are an increase of 0.4 and 0.16 percentage points for each 10-percentage-point difference in support for the national and local effects; the last is only statistically significant at 10 percent. Thus, similar results are found using an alternative political support measure, although the estimates are noisier.

Figure 9. Robustness

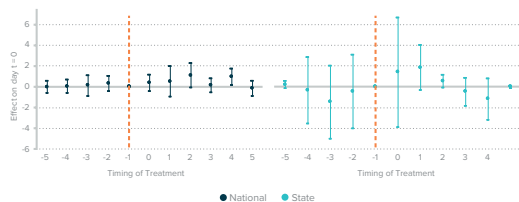
(a) Alternative political support: Extensive margin



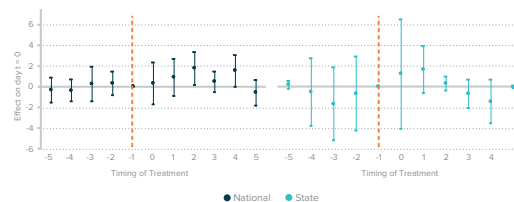
(b) Alternative political support: Intensive margin



(c) Alternative dependent variable: Extensive margin



(d) Alternative dependent variable: Intensive margin



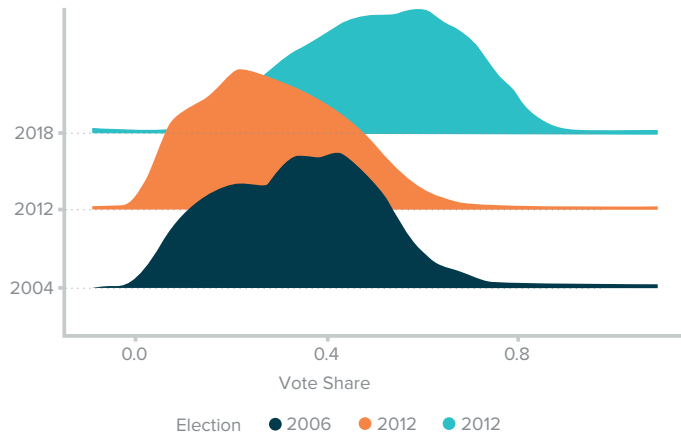
Notes: Coefficients expressed in percentage points. The dependent variable in panels (a) and (b) is the Hodges-Lehman estimator of municipal daily mobility growth rate, with respect to 2 March. The dependent variable in panels (c) and (d) is the median estimator of the trimmed sample of municipal daily mobility growth rate, with respect to 2 March. Effects are normalized to one day before the event. Error bars show confidence intervals at 95 significance level for standard errors clustering by municipality, state and day.

Source: Authors' calculations.

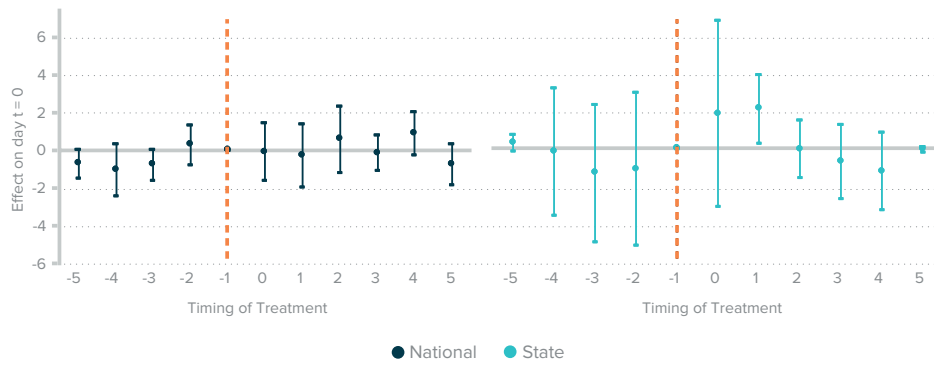
The robustness of the results is also tested using a different dependent variable. Previously, the HL estimator was used for the capped sample as the left-hand-side variable. The results' sensibility to the municipal estimator's choice and the choice of sample restriction is now tested. The trimmed sample's median mobility is now used, which is less sensitive for outlying observations. As table 1 in the appendix shows, it is the indicator with the lowest mean. Panels (c) and (b) in figure 9 show the results for specifications using the median mobility rate of the trimmed sample as the dependent variable, with the baseline political support measure (as in equation 6) as the right-hand-side variable for the national-level effects. The results at the national level are robust using the median instead of the HL estimator. However, the local-level effects are not statistically significant.

Figure 10. Robustness – Political support from previous elections

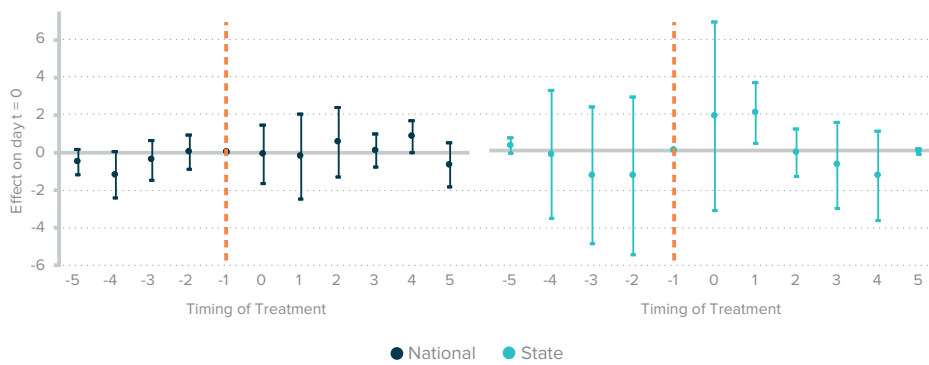
(a) López Obrador's vote share at the municipal level



(b) Political support in 2006



(c) Political support in 2012



Notes: Coefficients expressed in percentage points. Dependent variable is the Hodges-Lehman estimator of municipal daily mobility growth rate, with respect to 2 March. Effects are normalized to one day before the event. Error bars show confidence intervals at 95 significance level for standard errors clustering by municipality, state and day. Source: Authors' calculations.

As an additional robustness check, an analysis is conducted of an alternative to political support that can capture the sensibility of López Obrador's example. It exploits the fact that López Obrador has participated more than once in the presidential elections, also running in 2006 and 2012. Panel (a) in figure 10 shows the density of López Obrador's vote share at the municipal

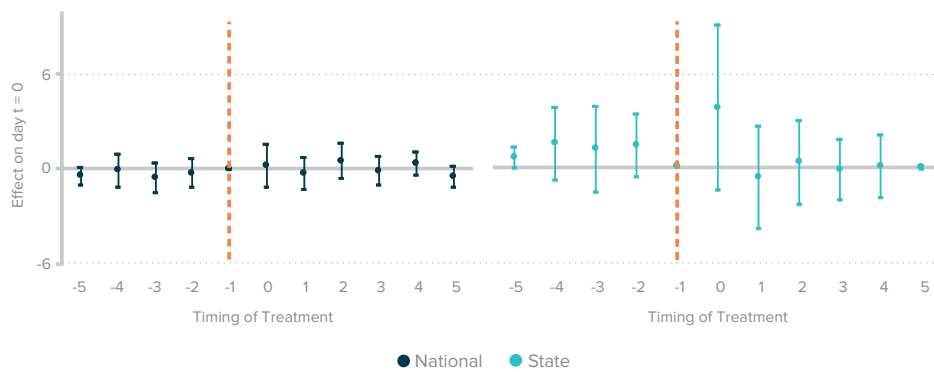
level for the three elections. Using data from Maldonado and Grau (2013), political support measures for López Obrador are computed with the 2006 and 2012 presidential election data, setting indicators equal to one if the municipal share of votes is above the median municipal vote share for López Obrador for a given presidential election.¹⁰ Then the effect is tested to see whether it holds, using political support of previous elections as dummies instead of the 2018 election. Panels (b) and (c) show the results. With regard to the national effect in municipalities that supported him in 2006, there is an increase in mobility rates in 1.38 percentage points four days after López Obrador holds a public appearance. The effect is smaller for municipalities that supported him in the 2012 election, with an increase in mobility rates of 0.8 percentage points. Independent of the measure of political support, the local effects persist.

6.2. Mechanisms

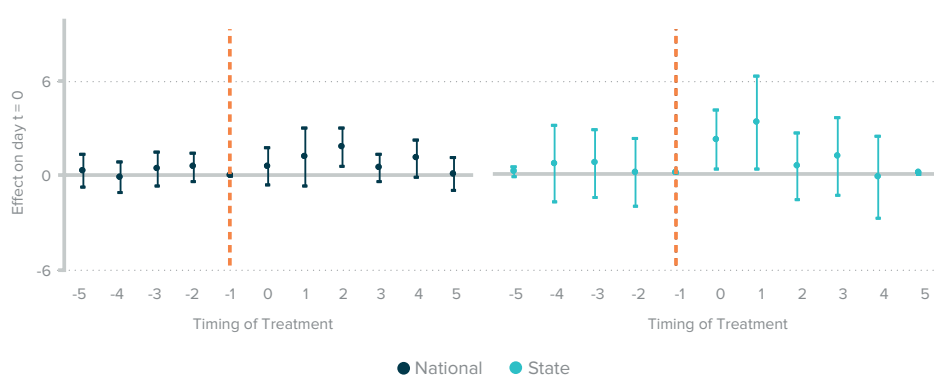
López Obrador's actions dismissing social distancing at the beginning of the pandemic affect municipal mobility rates. First, it was shown that when López Obrador holds an event in a state, mobility rates increase on the same day and the day after. Then, it was shown that his example resonates at the national level, regardless of the state he visited, and mobility rates in municipalities that support him increase two days after the event. However, in order for López Obrador's example to change citizens' behaviour, they must be aware of his actions. Therefore, media penetration is a crucial mechanism.

Figure 11. Mechanisms – Media coverage

(a) Bottom quintiles: Extensive margin

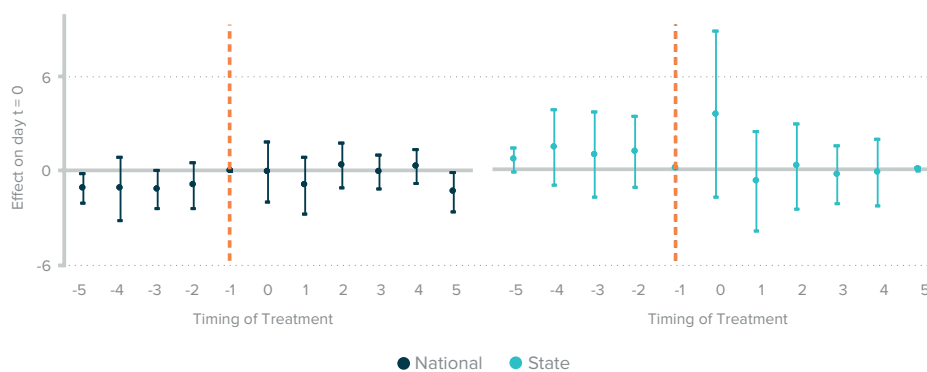


(b) Top quintiles: Extensive margin

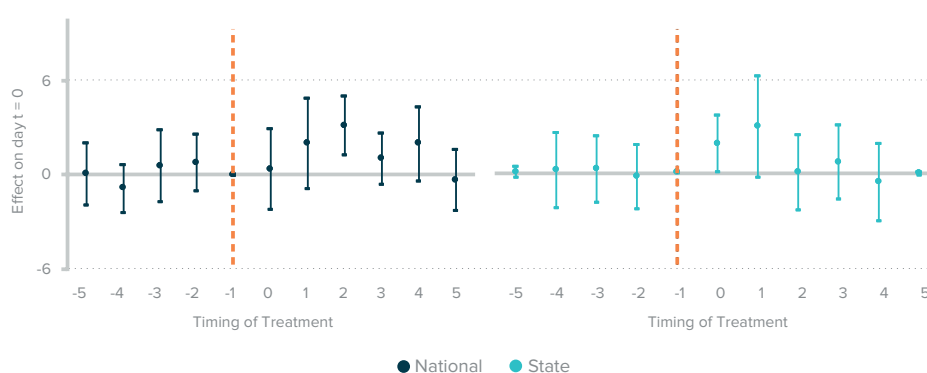


¹⁰ The alternative measure of political support presented in this section is used, rather than the original measure, given that López Obrador lost the first two elections.

(c) Bottom quintiles: Intensive margin



(d) Top quintiles: Intensive margin



Notes: Coefficients expressed in percentage points. Dependent variable is the Hodges-Lehman estimator of municipal daily mobility growth rate, with respect to 2 March. Effects are normalized to one day before the event. Error bars show confidence intervals at 95 significance level for standard errors clustering by municipality, state and day. All specifications include heterogeneous slopes. Heterogeneous slopes are the interaction between a linear time term and a vector of variables at the municipal level: media access, share of population living in rural areas, mean years of schooling, share of population under food poverty line and mean (log) per capital income. All specifications also include interactions between a linear time term and state and political party at the state level. Source: Authors' calculations.

Recent literature has documented the political effects of media (and social media in particular), specifically their use to the advantage of populist politicians (Guriev et al., 2020). Along the same lines, an index of media coverage at the municipal level is used to analyse whether higher media penetration boosts the effect of the President's events on municipalities that support him. The 2020 Mexican census is used to analyse media coverage at the municipal level. In particular, a media coverage index at the municipality index is computed. The percentage of households with radio, television, computer, cell phones and Internet is used to take into account the different ways people can be informed about López Obrador's public events. Principal component analysis is used to create the index, and the first component that explains over 88 percent of the variance is considered.

Figure 12 shows the results for separate regressions for the bottom quintiles (quintiles 1 and 2) and the top quintiles (quintiles 3–5) of the social media index distribution, using the specification in equation 3. Panels (a) and (b) show the results for the bottom and top quintiles of the distribution of media coverage for the extensive margin of the political support measure. Note that López Obrador's public appearances have no local or national effect for the bottom quintiles.

However, the effect happens for municipalities with high media access. The same pattern happens when using the intensive margin measure of political support, as shown in panels (c) and (d). Therefore, the findings indicate that media coverage is responsible for the impact of López Obrador's public appearances on increased mobility rates, both at the local and national levels for municipalities that support him. In other words, his example is salient for municipalities that can see him disobeying stay-at-home instructions.

7. Conclusions

This paper studied whether a charismatic leader, Mexican President López Obrador, affected social distancing by disobeying the 'stay-at-home' recommendations during the COVID-19 pandemic. The role of leaders is especially relevant in situations with asymmetric information and high uncertainty, such as a global pandemic. Most citizens do not have the specialized knowledge needed to assess information about the origin of the virus, its contagion and the effectiveness of social distancing measures and treatments. It is conjectured that, for his supporters, the Mexican President is a trusted individual whose actions can work as a guideline in this context.

Using a generalized event study design, this study shows that when López Obrador holds a public event outside of the Palacio Nacional, mobility increases in some of the days following in the states where he holds the event and among the municipalities where his political support is strong. Moreover, the effect is increasing in his political support when using an intensive measure. The result is robust to different political support measures for López Obrador, estimators of mobility and econometric specifications, as well as when narrowing and widening the time window of the effect of his public appearance. Media coverage is identified as a crucial mechanism in explaining the effect of López Obrador's public appearances on mobility rates. The findings did not indicate any local or national effect on the bottom quintiles of municipalities in the media coverage distribution. In contrast, the effect is more salient for the top quintiles. López Obrador's example is only relevant where people can see that he has held a public event while travelling around the country and contradicted the stay-at-home recommendations. The effect is limited to the period before the end of the social distancing period (JNSD) imposed by the Secretariat of Health. These results are consistent with the fact that there was more uncertainty at the beginning of the pandemic, so citizens had to look to trusted individuals like the President for guidelines. As the pandemic evolves, more information is available. People have learned. They may have updated their beliefs and behaviour accordingly and no longer look to López Obrador's example.

The President's example has significant consequences. Rojas (2020) estimates that social distancing measures reduce the number of COVID-19 cases by 65 percent, which implies "a reduction of 120,000 direct fatalities and of 121,000 deaths avoided by reducing the exerted pressure on the healthcare system. The benefits of these measures are monetized as US\$697 billion." These results cannot be extrapolated to estimate an effect on COVID-19 cases and deaths, which would require a careful construction under a set of assumptions about the pandemic's evolution that cannot be provided. Nevertheless, it is clear that the President's example diminished the benefits of social distancing, which could translate into more cases and deaths in comparison to a scenario in which he had followed and encouraged social distancing as recommended by the Secretariat of Health.

This work points out that the example of some influential individuals contravening government

recommendations can limit compliance by the public. As far as the authors are aware, this paper contributes to the literature as one of the first empirical studies using the generalized event study design proposed by Schmidheiny and Siegloch (2020) for a setting with multiple events of the same intensity. It also contributes to the literature studying social distancing through other mechanisms besides law enforcement (Allcott et al., 2020; Durante et al., 2021), the role of leaders (Acemoglu & Jackson, 2015; Ottinger & Voigtländer, 2021) and their effects on social distancing in the context of the COVID-19 pandemic (Aguilar-Gomez et al., 2021; Ajzenman et al., 2020; Banerjee et al., 2020). Moreover, these results align with the literature studying social media and politics (Guriev et al., 2020). The role of a leader's example is especially relevant in the Mexican case, where the proportion of the budget allocated to social assistance has been one of the lowest, even among Latin American countries. Future work on this issue should further develop what causes this phenomenon and shed light on how the Government could promote individual behaviours that protect the public interest in the absence of strict coercion. An important policy implication is that leaders can also be used to foster desired behaviours. It could be a low-cost tool to promote responsible behaviours in areas like health, consumption practices and even tax compliance. This becomes crucial in the case of a health emergency, since the individual decision to engage in risky behaviour harms others. If López Obrador's moral force impacts the potential of contagions, he should act responsibly.

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Appendix

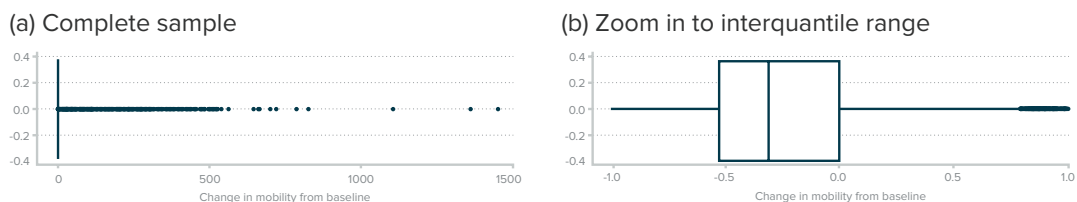
Obtaining mobility indicators at the municipal level

Since the UNDP-Grandata indicator of interest at the census-track level compares mobility on a given day with respect to 2 March 2020, the variable is bounded at -100 percent, but there is no upper bound (i.e. a census track can have mobility rates beyond 100 percent). Figure 13 in the appendix shows box plots of the census track observations during approximately six months. From panel (a), it is clear there are outlying observations, with a maximum change in mobility of 1,449 times the baseline. This is possible because census tracts are small in size and may be sensitive to the presence of essential businesses like supermarkets or hospitals that have been significantly busier since the pandemic started. A more straightforward explanation is that the chosen benchmark day did not reflect average mobility. The box plot at panel (b) shows that the observations' interquartile range is $(-0.5022, 0.1429)$, with a median of -0.2535 and a minimum of -0.9995 . Also, note that observations above 0.75 are considered outliers in the Tukey box plot. To deal with the outlying observations, two approaches are used. The first approach was to trim the observations with a change in mobility from the baseline above one (10.58 percent of the complete sample) and work with the sample capped as depicted in panel (b). The second solution is to bound the outlying observations to a maximum value of one.

The second problem with the mobility data is to choose an estimator to summarize the daily census track mobility indicators at the municipal level. Since this sample still has outliers, the mean would tend to overestimate mobility changes. Municipal estimators would indicate an increase in mobility when the mass of the observations within the municipality had a decrease in mobility. An alternative is to summarize the information at the census-track level with the median, which is robust to outliers but has a higher asymptotic variance than the mean for standard Gaussian distributions. A third alternative is used: to compute the HL estimator (Hodges & Lehmann, 1963). HL is a robust location estimator that has the advantage of being characterized by a bounded, continuous and smooth influence function and a high asymptotic Gaussian relative efficiency with respect to the sample mean.¹¹ Thus, the daily mean, median and HL estimator of mobility changes is computed from the baseline for each municipality. Table 1 in the appendix shows the summary statistics for each estimator, and figure 14 shows their density functions. As table 1 and figure 14 show, the HL estimator solves both location issues (its mean is between the median's mean and mean's mean) and issues of smoothness (its standard deviation is also between the other two estimators' standard deviations). The local specifications will use the HL estimator of the daily municipal mobility changes.

¹¹ The HL estimator for a sample $X^{(n)}$ is given by $HL^{(n)} = med_{1 \leq i, j \leq n} \frac{x_i + x_j}{2}$ which is the median of the pairwise mean for every pair of observations i and j in the sample n .

Figure A.1. Box plot of daily mobility indicators at census track level



Source: Authors' calculations, based on UNDP-Grandata mobility data.

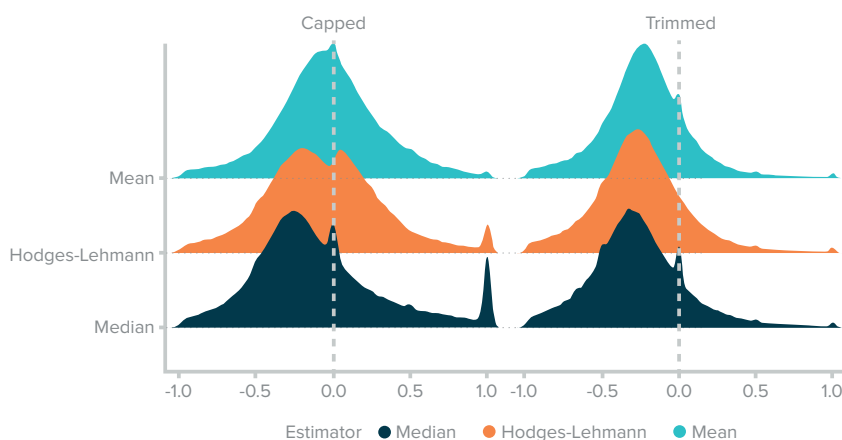
Table A.1. Mobility rates summary statistics

Estimator	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Capped sample						
Mean	-0.033	0.340	-0.996	-0.237	0.164	1.000
Hodge-Lehmann (HL)	-0.057	0.379	-0.996	-0.311	0.167	1.000
Median	0.090	0.432	0.996	0.373	0.107	1.000
Trimmed sample						
Mean	-0.222	0.290	-0.996	-0.385	-0.067	1.000
Hodge-Lehmann (HL)	-0.249	0.305	-0.996	-0.431	-0.088	1.000
Median	-0.264	0.316	-0.996	-0.461	-0.092	1.000

Notes: Capped sample uses all observations at the census track level and defines as 1 the outlying observations. Trimmed sample drops the outlying observations.

Source: Authors' calculations, based on UNDP-Grandata mobility data.

Figure A.2. Mobility estimators density at the municipal level



Source: Authors' calculations, based on UNDP-Grandata mobility data.

López Obrador's public appearances and political support

Table A.2. López Obrador's public appearances

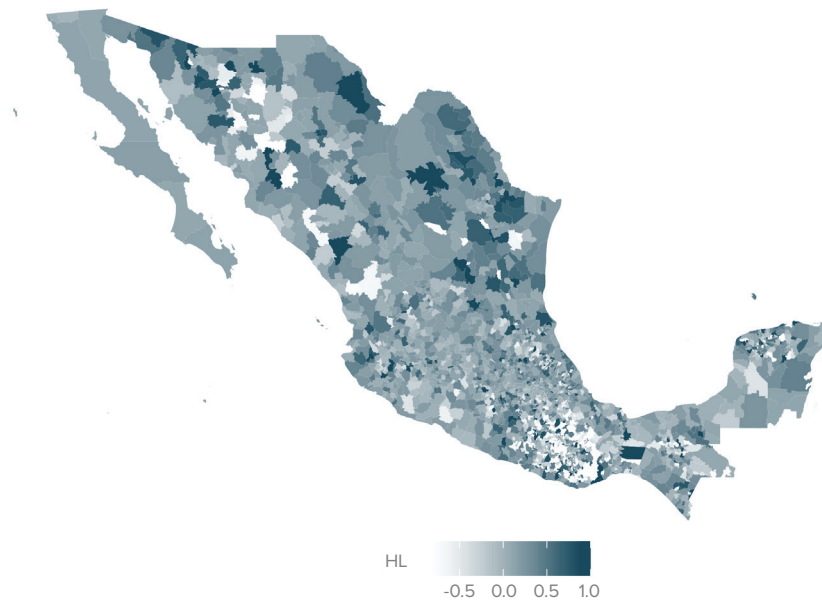
Date	State (1)	State (2)	COVID-19 related	Notes
2020-03-13	Guerrero	—	0	Ceremony
2020-03-14	Guerrero	Guerrero	0	Ceremony
2020-03-15	Guerrero	Guerrero	0	Ceremony
2020-03-18	Mexico City	—	0	Ceremony
2020-03-19	State of Mexico	—	0	Military
2020-03-20	Oaxaca	—	1	Hospital
2020-03-21	Oaxaca	Oaxaca	0	Ceremony
2020-03-22	Oaxaca	—	0	Infrastructure
2020-03-27	Nayarit	—	0	Infrastructure
2020-03-28	Sonora	Baja California	0	Infrastructure
2020-03-29	Sinaloa	—	0	Infrastructure
2020-04-01	—	—	1	Hospital
2020-04-03	State of Mexico	Ciudad de Mexico	1	Hospital
2020-04-04	Morelos	Ciudad de Mexico	1	Hospital
2020-06-01	Quintana Roo	Quintana Roo	0	Infrastructure
2020-06-02	Yucaten	—	0	Military
2020-06-03	Campeche	Campeche	0	Infrastructure
2020-06-04	Chiapas	—	0	Infrastructure
2020-06-05	Tabasco	Veracruz	0	Infrastructure
2020-06-06	Veracruz	Veracruz	0	Infrastructure
2020-06-07	Veracruz	—	0	Infrastructure
2020-06-15	Veracruz	—	0	Social programmes
2020-06-16	Tlaxcala	Tlaxcala	0	Infrastructure
2020-06-17	Tlaxcala	Puebla	0	Military
2020-06-18	Hidalgo	—	0	Social programmes
2020-06-19	Morelos	—	1	Hospital
2020-06-24	Mexico City	—	0	—
2020-06-25	State of Mexico	—	1	Hospital
2020-06-26	Michoacan	—	0	Military
2020-06-30	Mexico City	—	0	Military
2020-07-08	United States	—	0	—
2020-07-09	United States	—	0	—

2020-07-15	Guanajuato	—	0	Infrastructure
2020-07-16	Jalisco	—	0	Military
2020-07-17	Colima	—	0	Infrastructure
2020-07-24	Oaxaca	—	0	Infrastructure
2020-07-25	Oaxaca	—	0	Infrastructure
2020-07-26	Oaxaca	—	0	Infrastructure
2020-07-27	Mexico City	—	0	Ceremony
2020-08-04	Nayarit	Nayarit	0	Infrastructure
2020-08-05	Sinaloa	Sonora	0	Infrastructure
2020-08-06	Sonora	—	0	Infrastructure
2020-08-07	Baja California Sur	—	0	Infrastructure
2020-08-14	Guerrero	—	0	Infrastructure
2020-08-19	Queretaro	—	0	Ceremony
2020-08-20	Zacatecas	Zacatecas	0	Social programmes
2020-08-21	Aguascalientes	—	0	Ceremony
2020-08-26	Coahuila	Durango	0	—
2020-08-27	Nuevo Leon	Tamaulipas	0	Infrastructure
2020-08-28	Tamaulipas	—	0	Infrastructure
2020-09-11	State of Mexico	—	0	Infrastructure
2020-09-12	Jalisco	—	0	Infrastructure
2020-09-13	Mexico City	—	0	Ceremony
2020-09-19	Tlaxcala	Puebla	0	Infrastructure
2020-09-20	Morelos	—	0	Ceremony
2020-09-26	Veracruz	—	0	Social programmes
2020-09-27	Veracruz	Veracruz	0	Social programmes

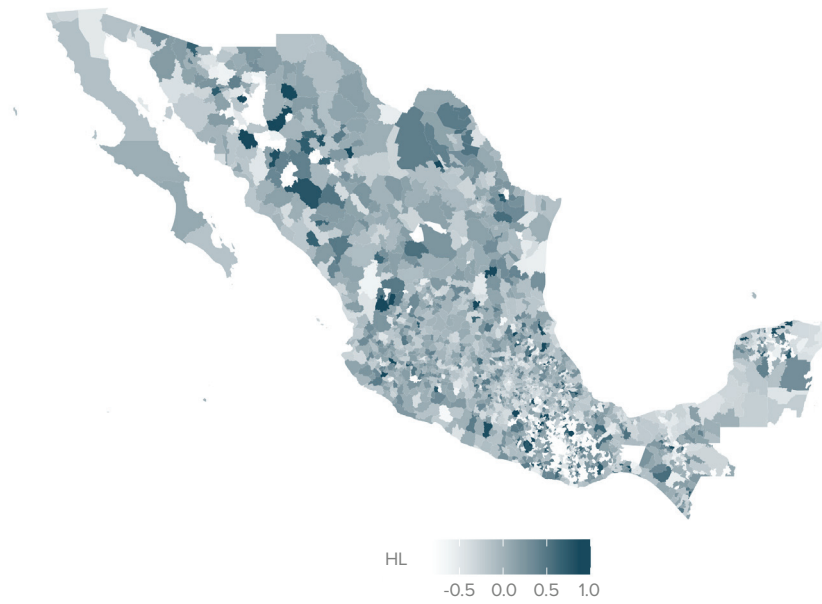
Source: Authors' calculations.

Figure A.3. Hodges-Lehmann mobility estimator by municipality

(a) JNSD announcement (14 March 2020)

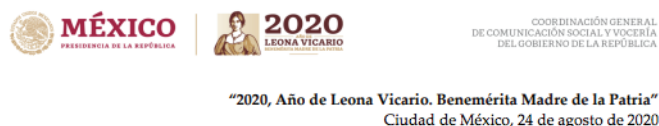


(b) JNSD ends (30 May 2020)



Source: Authors' calculations, based on UNDP-Grandata mobility data.

Figure A.4. López Obrador's public appearance agenda from the Office of the President web page



"2020, Año de Leona Vicario. Benemérita Madre de la Patria"
 Ciudad de México, 24 de agosto de 2020

Programa de actividades presidenciales
24 - 28 de agosto de 2020

Lunes 24 de agosto de 2020

07:00 Conferencia de Prensa. Palacio Nacional

Martes 25 de agosto de 2020

07:00 h Conferencia de Prensa. Palacio Nacional

Miércoles 26 de agosto de 2020

07:00 h Conferencia de Prensa. Coahuila
 10:30 h Evento Conagua. Durango.
 12:00 h Inauguración de Centro Comercial. Durango.
 16:00 h Inauguración de Centro de Búsqueda de Personas. Coahuila.

Jueves 27 de agosto de 2020

07:00 h Conferencia de Prensa. Nuevo León
 11:00 h Visita a Refinería. Nuevo León
 15:30 h Programa de Mejoramiento Urbano. Tamaulipas.

Viernes 28 de agosto de 2020

07:00 h Conferencia de Prensa. Tamaulipas.
 10:30 h Programa de Mejoramiento Urbano. Tamaulipas.

Programa sujeto a cambios

Source: <https://www.gob.mx/presidencia/>

Table A.3. López Obrador's political support at the municipal level

Measure	Mean	St. Dev.	Min	Pct(25)	Pct(75)	Max
López Obrador's vote share	0.508	0.165	0.077	0.389	0.634	0.943
Opposition vote share	0.492	0.165	0.057	0.366	0.611	0.923
López Obrador support:						
Extensive margin	0.517	–	–	–	–	–
Intensive margin						
López Obrador support Measure 2:						
Extensive margin	0.532	–	–	–	–	–
Intensive margin	0.016	0.330	–0.846	–0.221	0.269	0.885

Notes: Opposition vote share is the sum of the vote share for all the 2018 presidential candidates except López Obrador. López Obrador support measure 1 is the difference between López Obrador's vote share in a given municipality and López Obrador's mean vote share at the municipal level. López Obrador support measure 2 is the difference in vote share between López Obrador and the opposition.

Source: Authors' calculations.