

CONTAINMENT MEASURES, EMPLOYMENT
AND THE SPREAD OF COVID-19
IN SPANISH MUNICIPALITIES

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Abstract

In order to curb the advance of COVID-19, Royal Decree-Law 10/2020 of 29 March 2020 stipulated the temporary shutdown of all activities considered non-essential between 30 March and 9 April 2020. This paper uses municipal-level information to quantify the short-term effects of this measure both on employment and on containing the pandemic. Specifically, we analyse the relationship between the share of firms forced to shut down in each municipality and changes in Social Security registrations along with new COVID-19 cases in April. The results suggest that those municipalities most affected by the non-essential activity shutdown endured higher reductions in employment but, at the same time, they also witnessed a lower propagation of the pandemic during April. Finally, other characteristics such as ageing, colder temperatures, higher population density and proximity to the provincial capital are found to be associated with a higher incidence of COVID-19 at the municipality level.

Keywords: COVID-19, pandemic, employment, Spanish municipalities.

JEL classification: I1, J21, C53.

Resumen

Con el objetivo de contener el avance del Covid-19, el Real Decreto-ley 10/2020, del 29 de marzo, estableció el cese de toda actividad considerada como no esencial entre el 30 de marzo y el 9 de abril de 2020, ambos inclusive. Este documento explota información a escala municipal para cuantificar el impacto de corto plazo que ha tenido esta medida, tanto sobre el empleo como sobre la contención de la pandemia. En concreto, el peso de las actividades no esenciales en cada municipio se relaciona con la evolución de la afiliación a la Seguridad Social y con los nuevos casos de Covid-19 diagnosticados a lo largo del mes de abril. Los resultados sugieren que aquellos municipios más afectados por el cese de las actividades no esenciales habrían sufrido mayores pérdidas de empleo, pero, a la vez, habrían experimentado una propagación menos virulenta de la pandemia durante el mes de abril. Finalmente, otras características, como una población más envejecida, unas temperaturas más frías, una densidad de población más elevada o una mayor cercanía a la capital de la provincia, también se asocian a una mayor incidencia del Covid-19 a escala municipal.

Palabras clave: Covid-19, pandemia, empleo, municipios españoles.

Códigos JEL: I1, J21, C53.

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1 Introduction

As COVID-19 spread across Spain, a series of measures were adopted by the authorities aimed at mitigating the health effects of the pandemic. Specifically, on 14 March, the Government declared a state of alert and announced lockdown measures, ordering people to remain in their homes and the mandatory shutdown of certain sectors of activity such as accommodation and food services. Yet the rapid increase in the number of infections led to further stricter measures, embodied in Royal Decree-Law 10/2020 of 29 March 2020 which ordered the shutdown of all non-essential activity between 30 March and 9 April 2020, both inclusive.

This paper aims to quantify the short-term impact of the temporary shutdown of non-essential activity both on economic activity and the spread of COVID-19. For that purpose, we use the differences across municipalities in the suspension of non-essential activity – or sectoral shutdowns – mandated in Royal Decree-Law 10/2020¹ to estimate the relationship with the monthly change in Social Security registrations and with the number of new COVID-19 cases diagnosed in each municipality. The findings show that although the shutdown of non-essential activity had a negative impact on employment in the short term, it also made a considerable contribution to mitigating the spread of the pandemic. According to these findings, up to 30 April, an increase of 100 percentage points (pp) in sectoral shutdowns (equivalent to the difference between the municipality least affected and the municipality most affected) would reduce municipal-level employment growth by 21 pp. However, the findings also show that this increase in the shutdown of non-essential activity would have a positive effect in terms of health, with an estimated decline in infection of two cases per 100 inhabitants.²

The analysis presented here also casts light on other determinants that may have contributed to the spread of COVID-19 in the different municipalities during the most acute phase of the pandemic in Spain. Specifically, those municipalities that were hit hardest by the pandemic present lower temperatures, higher population density, greater proximity to a provincial capital and an older population. These findings are in line with the international evidence available. For example, for the United States, Desmet and Wacziarg (2020) find that population density and population ageing largely explain the incidence of the virus at county level.³

Lastly, it should be noted that the short-term impact documented in this paper may not be indicative of the long-term economic and health effects of the containment measures.

1 The National Statistics Institute (INE) has published municipal-level statistics on the share of non-essential activity in each municipality, drawing on the Central Companies Directory (DIRCE). See the technical note (Spanish version only) at https://www.ine.es/covid/nota_tecnica_dirce.pdf.

2 These findings corroborate, for Spain, the international evidence available. For example, Askitas et al. (2020) find that measures such as limiting gatherings or closing workplaces played a very significant part not only in containing the pandemic but also in the deterioration of the economic situation in those countries where such measures were introduced, at least in the short term.

3 Also, using county-level death rates in the United States, Knittel and Ozaltun (2020) find a positive correlation with ageing and with the use of public transport.

Indeed, the literature contains evidence of the long-term economic and health effects of various containment measures drawing on the experience of the 1918 influenza pandemic in the United States that contrasts with the short-term impact identified in this paper. In terms of the economic effects, these studies find that the containment measures had a positive impact on economic activity in the long term (see Correia et al., 2020). The reason being that had containment measures not been adopted, the pandemic could have ultimately affected a high proportion of workers in strategic industries, such as transport or energy, with significant adverse consequences for the local economy (see Bodenstein et al., 2020). In terms of the impact on health, Barro (2020) shows that the containment measures adopted in the United States in 1918 would not have been effective long term, even though they were effective in flattening the curve in terms of deaths in the short term. This is because the measures were too short-lived (for instance, the ban on public gatherings lasted 36 days on average) and the virus spread rapidly again once the restrictions were lifted. Accordingly, it would be interesting to monitor these developments as the necessary municipal-level data become available to researchers.

Below we present in more detail the empirical exercises performed to obtain the findings described in this introduction. Section 2 outlines the different municipal-level data sources used in the analysis. In section 3 we explain the econometric methodology considered and discuss the effects identified by the different estimation exercises. Lastly, in section 4, we summarise the main conclusions of the analysis and outline a number of suggestions for possible COVID-19 containment strategies drawing on the international evidence available.

2 Data

The main variable of interest in this paper is the percentage of firms in each municipality that do not provide essential services, in accordance with INE data drawing on DIRCE data.⁴ This information provides, for every Spanish municipality, a highly accurate indicator of the percentage of economic activity that was affected by the lockdown measures announced in Royal Decree-Law 10/2020 of 29 March 2020 which ordered the shutdown of all non-essential activity between 30 March and 9 April. Below we refer to this indicator as sectoral shutdowns at municipal level. Table 1 shows that in the 8,091 municipalities with business activity, 21% of firms were obliged to shut down. In some essentially agricultural municipalities no firms were affected by the sectoral shutdowns, while in the most vulnerable municipality 100% of firms were affected. These differences allow us to identify the effect of the larger or smaller proportion of shutdowns on employment and on the spread of the pandemic at municipal level. As Chart 1.1 shows, the municipalities with the highest incidence of shutdown of activity are located in southern Spain and in the islands.

To assess how employment has evolved at municipal level, we use the month-end Social Security registration figures. Specifically, we consider the rate of change between

Table 1

MUNICIPAL-LEVEL DESCRIPTIVE STATISTICS

	Observations	Average	p5	p25	p75	p95
Sectoral shutdowns (% of firms)	8,091	21.0	0.0	10.5	31.9	40.5
Change in Social Security registrations March (%)	7,610	-3.1	-12.8	-5.4	0.0	3.6
Change in Social Security registrations March and April (%)	7,606	-3.1	-13.5	-6.0	0.0	5.9
COVID-19 incidence (cases per 1,000 inhabitants) (a)	2,140	3.8	0.0	0.7	4.9	11.1
COVID-19 incidence April (cases per 1,000 inhabitants) (b)	397	4.2	1.0	2.0	4.9	10.4
Temporary employment ratio (%)	7,178	26.5	0.0	13.1	35.8	63.3
Weight of agriculture (%)	7,191	16.0	0.7	4.7	24.0	42.9
Population density (inhabitants/km ²)	8,093	176.6	1.5	4.7	54.7	634.9
Dependency ratio (pop. aged 65+/16-64)	8,098	50.5	17.1	28.8	64.2	106.4
Temperature (°C)	8,008	12.7	9.1	11.1	14.5	16.9
Distance from provincial capital (km)	8,098	44.2	11.1	26.3	58.3	87.9

SOURCES: Banco de España, INE and Ministerio de Inclusión, Seguridad Social y Migraciones.

a Data from the municipalities of Andalusia, Asturias, Balearic Islands, Basque Country, Canary Islands, Cantabria, Catalonia, Madrid region and Murcia region. No published data for municipalities of Murcia region with less than five cases.

b Data from the municipalities of Basque Country, Cantabria, Catalonia and Madrid region with at least ten cases detected up to 1 April.

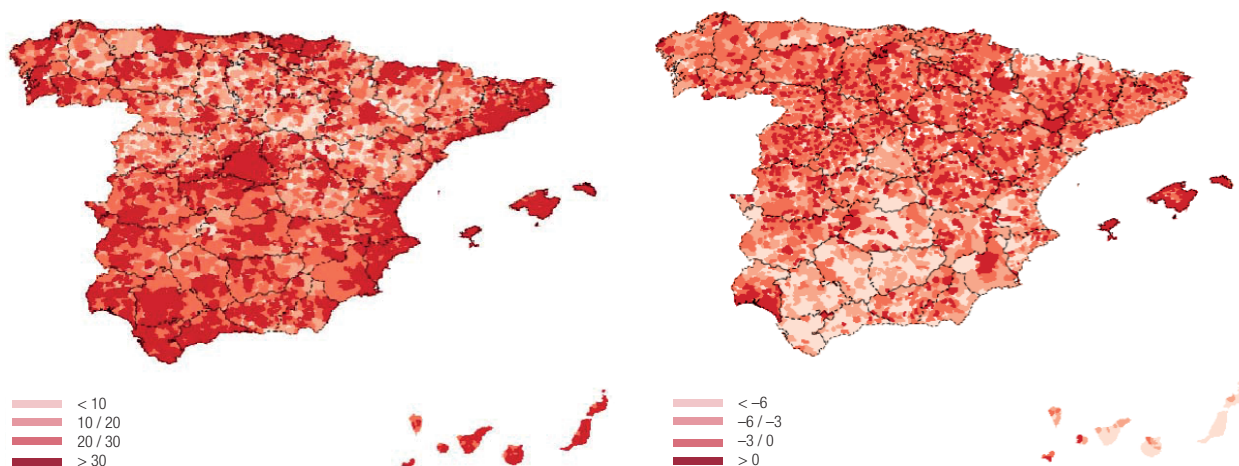
⁴ For this purpose, the Spanish National Classification of Economic Activities (CNAE 2009) is used to identify the activities that are classed as "essential" in Royal Decree-Law 10/2020 of 29 March 2020. See the technical note (Spanish version only) at https://www.ine.es/covid/nota_tecnica_dirce.pdf. According to the DIRCE, firms numbered 3.36 million at 1 January 2019.

Chart 1

SECTORAL SHUTDOWNS BY MUNICIPALITY AND RATE OF CHANGE OF SOCIAL SECURITY REGISTRATIONS

1 PERCENTAGE OF FIRMS PURSUING NON-ESSENTIAL ACTIVITIES

2 CHANGE IN SOCIAL SECURITY REGISTRATIONS BETWEEN FEBRUARY AND APRIL 2020



SOURCES: Banco de España, INE and Ministerio de Inclusión, Seguridad Social y Migraciones.

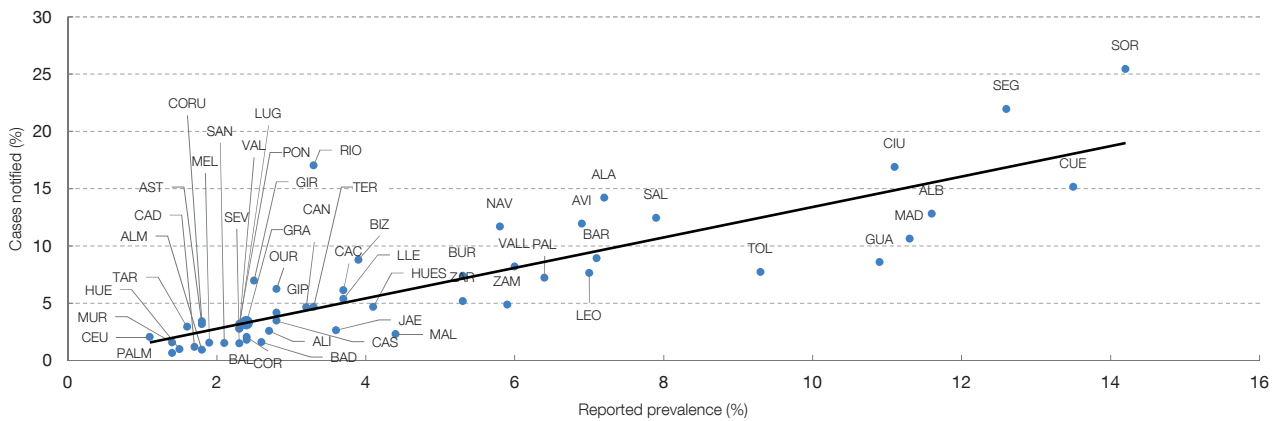
29 February and 30 April 2020. Table 1 shows that, on average, Social Security registrations fell by 3.1% in that period, with very substantial differences across municipalities: in one in four municipalities, Social Security registrations fell by more than 6%, while in one in 20 they rose by more than 6%. By region, the pattern was very uneven (see Chart 1.2), with most deterioration in employment in the Canary Islands and southern Spain.

Regarding the incidence of the virus, we consider the number of cases recorded up to 30 April for those regions that provide this information at municipal level: Andalusia, Asturias, Balearic Islands, Basque Country, Canary Islands, Cantabria, Catalonia, Madrid and Murcia. Overall, these regions accounted for some 70% of cases, in line with their share of the Spanish population. On average, the municipalities in these regions recorded 3.8 cases per 1,000 inhabitants, while in around 15% of the municipalities no cases were recorded (see Table 1). To investigate the part played by the sectoral shutdowns in containing the spread of the virus, we also consider the number of new cases per 1,000 inhabitants diagnosed in April. This information is only available for 397 municipalities in the Basque Country, Cantabria, Catalonia and the Madrid region, accounting for 35% of the Spanish population.⁵ The average incidence of new COVID-19 infections in these municipalities in April was 4.2 cases per 1,000 inhabitants (see Table 1). Although the number of cases

⁵ Given the strict restrictions on mobility, we confine the sample to municipalities that had at least 10 cases on 1 April. Of the new cases diagnosed in April in these regions, 95% correspond to municipalities that had more than 10 cases on 1 April.

Chart 2

RELIABILITY OF THE COVID-19 CASES NOTIFIED BY THE REGIONS (a)



SOURCES: Banco de España and Escovid19data.

a COVID-19 cases by province notified by the regions at 11 May are compared with the results of the first round of the seroprevalence report drawn up between 27 April and 11 May.

detected depends on each region’s testing capacity, there is a correlation of 84%⁶ between our measure of incidence and the findings of the provincial level seroprevalence study (see Chart 2).

Lastly, regarding other characteristics of the Spanish municipalities, the analysis also considers the percentage of temporary employment⁷ and agricultural employment, the population density measured in terms of inhabitants per km², the dependency ratio (population over 65 to population in the 16 to 64 age group), and also variables relating to temperature and distance in kilometres from the provincial capital, calculated drawing on WorldClim⁸ and GIS data, respectively. Table 1 shows the descriptive statistics of these variables.

6 The correlation between our measure of incidence and the results of the seroprevalence study, considering only provinces that publish municipal-level data on the incidence of COVID-19, is 81%.

7 The percentage of workers with temporary employment contracts in each municipality is obtained from the Central Balance Sheet Data Office (CBSO) microdata which contain information on the percentage of temporary employment at 900,000 firms in 2018. The correlation between workers registered with Social Security by municipality in March 2019 and municipal-level employment resulting from adding together employees in all firms in the municipality is 94%.

8 Temperature refers to the annual average temperature measured in degrees Celsius (°C). For more details on the construction of this indicator, see <https://www.worldclim.org/> and Oto-Peralías (2020a).

3 Methodology and results

As shown in Chart 3.1, there is a strong negative correlation between municipal exposure to shutdowns of activity and employment growth between 29 February and 30 April. That is, those municipalities with a higher percentage of firms that do not provide essential services are estimated to have experienced a greater fall in Social Security registrations.⁹ Likewise, Chart 3.2 shows the strong negative association between new COVID-19 cases diagnosed in each municipality during April and the percentage of shutdowns of activity in late March and early April. In other words, the spread of the virus during April is estimated to have been more contained in those municipalities where the shutdown in economic activity and the consequent decline in employment were most pronounced.

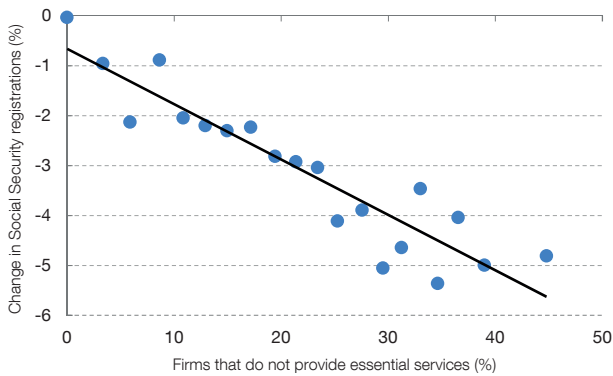
3.1 Containment measures and employment

In order to quantify the impact of the shutdown of non-essential activity on employment, we performed a regression analysis between the rate of growth of Social Security registrations and the percentage of firms which do not provide essential services in each municipality.

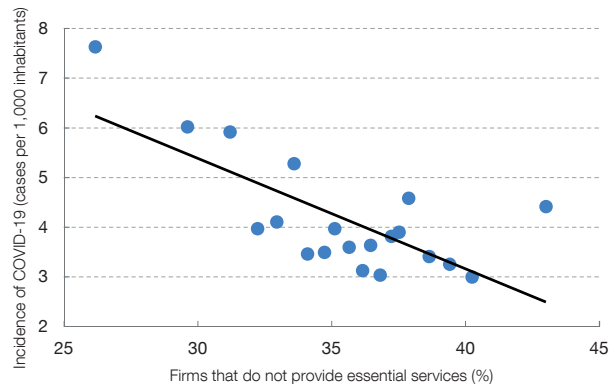
Chart 3

SECTORAL SHUTDOWNS BY MUNICIPALITY, INCIDENCE OF COVID-19 AND RATE OF CHANGE IN SOCIAL SECURITY REGISTRATIONS

1 CHANGE IN SOCIAL SECURITY REGISTRATIONS BETWEEN FEBRUARY AND APRIL AND SHUTDOWNS BY MUNICIPALITY (a)



2 INCIDENCE OF COVID-19 IN APRIL AND SHUTDOWNS BY MUNICIPALITY (a)



SOURCES: Banco de España, INE and Ministerio de Inclusión, Seguridad Social y Migraciones.

a The relationship between the percentage of firms that do not provide essential services and the rate of change in Social Security registrations (Chart 3.1) and the incidence of COVID-19 in April (Chart 3.2) is shown through scatter diagrams for grouped data. Each point shows the average of the x-axis and y-axis values within a group. The groups are defined as from 20 quantiles of the x variable.

⁹ Specifically, the correlation between the two variables stands at -27% . This figure contrasts with the much weaker correlation of -3% at provincial level. Accordingly, as a result of the greater heterogeneity across Spanish municipalities, the association between sectoral shutdowns and employment can be identified better. This association seems to be masked at provincial level, where the weight of non-essential activity ranges from 22% to 40%, which is considerably lower than at municipal level. We find municipalities where all firms have been able to continue their activity and others where all productive activity has been suspended.

Chart 2

RATE OF CHANGE IN SOCIAL SECURITY REGISTRATIONS AND CONTAINMENT MEASURES

	February-March 2020		February-April 2020	
	(1)	(2)	(3)	(4)
Sectoral shutdowns (s.e.)	-0.103*** (0.015)	-0.186*** (0.024)	-0.110*** (0.016)	-0.211*** (0.027)
Temporary employment ratio (s.e.)	-0.020** (0.008)	-0.021*** (0.007)	-0.016* (0.01)	-0.017* (0.009)
# obs	6,535	6,535	6,535	6,535
R2	0.085	0.072	0.067	0.055
Province (fixed effect)	Yes	Yes	Yes	Yes
Estimation	OLS	2SLS	OLS	2SLS

SOURCE: Banco de España.

NOTE: *** p < 0.01, ** p < 0.05, * p < 0.1.

The regression includes fixed provincial effects, as well as the proportion of temporary employment in the municipality, so as to take into account the fact that in municipalities with a higher incidence of temporary employment, there may be larger falls in Social Security registrations. The changes in registrations are analysed over two periods: first, from 29 February to 31 March 2020 and, subsequently, from 29 February to 30 April 2020.

In any event, the effect estimated by ordinary least squares (OLS) could be biased as a result of the impact of temporary layoffs or short-time work arrangements (ERTEs by their Spanish abbreviation). Specifically, municipalities with a greater presence of firms pursuing non-essential activities (for example, travel and tourism firms) will show a greater incidence of ERTEs and, consequently, registrations will be more favourable in relative terms since the ERTEs are not recorded as falls in Social Security registrations. This would produce a positive bias in the elasticity of shutdowns to employment, because the changes in employment recorded would be less unfavourable, although the fall in activity would be sharper. To attempt to correct this bias in the estimation, the weight of agricultural employment in the municipality in 2011 is considered as an instrumental variable of the percentage of firms not providing essential services and the model is estimated by using two-stage least squares (2SLS). In other words, the weight of employment in agriculture is assumed to be negatively related to the weight of non-essential activity because agriculture was considered an essential activity. However, it is assumed that the weight of the agricultural sector in 2011 is not related to the use of ERTEs in 2020 insofar as the heterogeneity across municipalities in this connection is due to the relative importance of the various non-agricultural branches of industry and the services deemed essential or non-essential under Royal Decree-Law 10/2020 of 29 March 2020.

Table 2 shows the estimations of the impact of the sectoral shutdowns on Social Security registrations. As can be seen, the percentage of firms not providing essential services

Chart 3

CUMULATIVE INCIDENCE OF COVID-19 PER 1,000 INHABITANTS AS AT 30 APRIL AND MUNICIPAL CHARACTERISTICS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sectoral shutdowns	-0.006					-0.022	-0.011
(s.e.)	(0.016)					(0.019)	(0.019)
Temperature		-0.535***				-0.622***	-0.144**
(s.e.)		(0.071)				(0.073)	(0.068)
Distance from provincial capital			-0.550***			-0.472**	-0.392***
(s.e.)			(0.203)			(0.219)	(0.123)
Dependency ratio				-0.007		-0.029*	0.043*
(s.e.)				(0.014)		(0.016)	(0.022)
Population density					0.482***	0.516***	0.155*
(s.e.)					(0.124)	(0.131)	(0.075)
# obs	2,140	2,140	2,140	2,140	2,140	2,140	2,140
R2	0.000	0.026	0.003	0.000	0.007	0.041	0.121
Province (fixed effect)	No	No	No	No	No	No	Yes

SOURCE: Banco de España.

NOTE: *** p < 0.01, ** p < 0.05, * p < 0.1.

has a significant negative effect on monthly registrations, both in March (columns 1 and 2) and in the figures recorded between March and April (columns 3 and 4).¹⁰ Furthermore, this effect is substantially greater if the 2SLS approach is applied, which indicates a greater use of ERTes by municipalities with a higher proportion of non-essential activity. Thus, for each 1 pp increase in the weight of non-essential activity, the rate of growth of employment would be approximately 2.1 pp lower in cumulative terms between March and April (column 4). Lastly, the significant negative relationship between the incidence of temporary employment in the municipality and Social Security registrations should be noted. This finding implies that job destruction is more likely to affect workers with temporary employment contracts as a result of Spain's dual labour market.¹¹

With regard to employment developments in subsequent months, Chart 4.1 replicates the two-stage least squares estimations in Table 3, using as a dependent variable the cumulative change in the number of Social Security registrations from February to May and June, as well as from February to March and April. The estimated impact of sectoral shutdowns on the cumulative change in employment to May and June holds at a very similar level to that estimated to April and has statistical significance of 99%. According to these

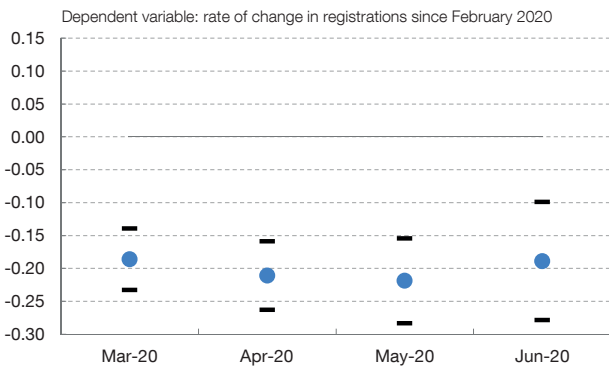
¹⁰ The results are robust if the year-on-year change in Social Security registrations is used as a dependent variable.

¹¹ Other control variables were included in several robustness checks but they do not prove to be significant and, therefore, they do not change the estimation of the coefficient of interest. Specifically, the following were included: the dependency ratio, population density in the municipality, a political fragmentation indicator, distance from the provincial capital, and binary variables defining the municipality as rural if it has less than 10,000 inhabitants and coastal if it is by the sea. Lastly, the standard errors are calculated by using clusters at provincial level, i.e. by taking into account the correlation in employment across various municipalities in the same province.

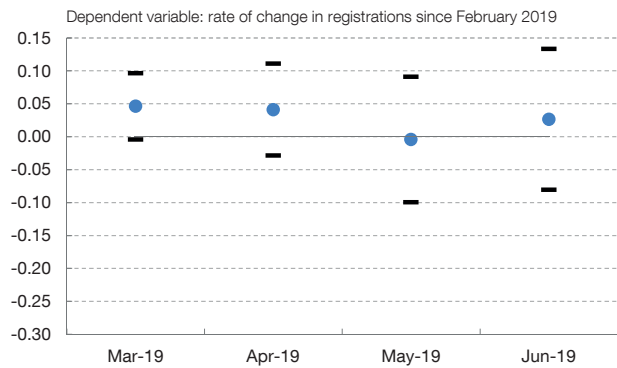
Chart 4

RATE OF CHANGE IN SOCIAL SECURITY REGISTRATIONS IN 2019 AND 2020 AND CONTAINMENT MEASURES

1 EFFECT OF SECTORAL SHUTDOWNS ON RATE OF CHANGE IN SOCIAL SECURITY REGISTRATIONS (a)



2 FALSIFICATION TEST. EFFECT OF SECTORAL SHUTDOWNS ON RATE OF CHANGE IN SOCIAL SECURITY REGISTRATIONS A YEAR EARLIER (b)



SOURCE: Banco de España.

- a The coefficients and 95% confidence interval of the two-stage least squares estimations of the impact of the sectoral shutdowns on Social Security registrations between March and June 2020 with respect to February are shown.
- b Falsification test consisting of estimating by two-stage least squares the impact of the sectoral shutdowns implemented in 2020 on Social Security registrations between March and June 2019 with respect to February. The coefficients and 95% confidence interval are shown.

findings, a significant rebound effect is not observed in employment in those municipalities which were initially hit hardest by sectoral shutdowns.¹² Lastly, for the purpose of validating our identification strategy, Chart 4.2 shows the results of a falsification test. Specifically, the relationship between the weight of non-essential activity and employment is estimated between March and June 2019. If the ratios estimated in Table 2 were due to the productive structure of each municipality and not to the shutdown of non-essential activity per se, a very similar relationship would be observed between the two variables also in 2019. This would be the case, for example, if municipalities with a higher weight of accommodation and food service activities show worse relative employment in these months, as they are also those hit hardest by sectoral shutdowns. As expected, the ratios estimated are not significantly different from zero and, consequently, we can conclude that the effects estimated for 2020 are not due to the existence of previous trends at municipal and sectoral level.

3.2 Containment measures and the pandemic

Although the sectoral shutdowns had a significant cost in terms of employment, they may also be expected to have been effective in terms of containing the pandemic, as is suggested by the association in Chart 3. In this respect, the available evidence indicates that, during an epidemic, around 37% of infections occur in the workplace (see Ferguson et al., 2006);

¹² In fact, the estimated impact of sectoral shutdowns on month-on-month rates in May and June is not statistically significant.

consequently lower economic activity would reduce the spread of COVID-19.¹³ Furthermore, from a statistical standpoint, the degree to which each municipality is exposed to sectoral shutdowns may be deemed exogenous to the unfolding of the pandemic, insofar as a national decree shut down non-essential activity, irrespective of municipal heterogeneity regarding the situation of the pandemic and economic structure.

In order to quantify the impact of the suspension of non-essential activity on the spread of the virus, we estimate the relationship between the number of COVID-19 cases diagnosed per 1,000 inhabitants recorded as at 30 April and the percentage of firms not providing essential services in each municipality. Table 3 shows the bivariate relationship of the cumulative incidence with each of the explanatory variables considered as possible determinants of the incidence of COVID-19 in addition to sectoral shutdowns. Likewise, column 7 shows the multivariate relationship, once the set of fixed provincial effects ensuring comparability across municipalities belonging to the same province has been included in the regression. In this way, possible biases triggered, *inter alia*, by possible differences in the processing and notification of incidence data in each region are also avoided.

Before analysing the estimated impact of the sectoral shutdowns, note that municipalities with lower cumulative incidence are expected to be those that are further from the corresponding provincial capital and have a lower population density (inhabitants per km²). This would suggest that the pandemic was less virulent in municipalities in rural areas (the so-called “empty Spain”) since they generally have these characteristics.¹⁴ Additionally, there is greater cumulative incidence in municipalities with a lower average temperature (see Oto-Peralías, 2020b). Lastly, the relationship estimated between cumulative incidence and the dependency ratio is less conclusive. Although a higher incidence is observed in municipalities with a younger population in column 6, the relationship changes sign when fixed provincial effects are included in column 7.

The sectoral shutdown variable, which approximates the percentage of activity suspended during confinement, does not show any significant relationship with cumulative incidence as at 30 April. One possible explanation of this finding is that, as at 29 March, the pandemic had spread to such an extent that the containment measures could not reverse the trends recorded until then. In other words, the sectoral shutdowns could not have had an effect on infections before 29 March. Therefore, in order to analyse the effectiveness of the measure on containing the pandemic, it is more appropriate to consider as a dependent variable the number of new cases diagnosed per 1,000 inhabitants in the weeks following the entry into force of the decree that shut down non-essential activity. Unfortunately, the new cases diagnosed in April are only available for a small number of municipalities – specifically,

13 In fact, according to the seroprevalence study, the average incidence of COVID-19 among workers in May was higher than among the unemployed (5.8% compared with 3.3%).

14 For more information about the characteristics and location of “empty Spain”, see Gutiérrez et al. (2020a) and Gutiérrez et al. (2020b).

Chart 4

NEW COVID-19 CASES PER 1,000 INHABITANTS IN APRIL AND MUNICIPAL CHARACTERISTICS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sectoral shutdowns (s.e.)	-0.166*** (0.041)					-0.165*** (0.041)	-0.200* (0.100)
Temperature (s.e.)		-0.208* (0.122)				-0.103 (0.131)	-0.246* (0.112)
Distance from provincial capital (ln) (s.e.)			0.256 (0.200)			0.050 (0.208)	-0.089 (0.135)
Dependency ratio (s.e.)				0.119*** (0.027)		0.116*** (0.028)	0.126*** (0.033)
Population density (s.e.)					-0.079 (0.082)	-0.034 (0.089)	-0.075 (0.074)
# obs	397	397	397	397	397	397	397
R2	0.040	0.007	0.004	0.046	0.002	0.091	0.138
Province (fixed effect)	No	No	No	No	No	No	Yes

SOURCE: Banco de España.

NOTE: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

397 municipalities in the Basque Country, Cantabria, Catalonia and the Madrid region¹⁵ – but which cover 35% of the Spanish population.

Table 4 shows the results of the relationship estimated between the new cases diagnosed in April and the shutdowns of non-essential activity. As shown in the cases recorded up to 30 April in Table 3, the incidence of the virus in April was more pronounced in municipalities with lower temperatures and with a higher dependency ratio (an older population). Note that, in this case, the positive relationship between age and new cases diagnosed in April is conclusive since the ratio estimated is positive and significant in all specifications. However, the variables of distance from the provincial capital¹⁶ and population density are less significant when explaining new cases, as is to be expected against a backdrop of severe mobility restrictions. In fact, during confinement, travelling to work was one of the few activities that warranted mobility. Thus, Table 4 shows that the number of new cases diagnosed in April was substantially lower¹⁷ in the municipalities where sectoral shutdowns were more stringent (owing to the high percentage of firms which do not provide essential services). Indeed, we estimate that a 1 pp increase in the activity shutdown would entail 200 fewer cases per million inhabitants.

15 A total of 58% of the new COVID-19 cases detected in April belong to these four regions. Furthermore, as discussed in the data section, only those municipalities that recorded at least ten cases of COVID-19 as at 1 April were included. In any event, 95% of the new cases diagnosed in April in these regions belong to municipalities which as at 1 April had more than ten cases.

16 Although distance from Madrid was deemed a relevant factor in studies based on cross-provincial comparisons (Oto-Peralías, 2020b), it is not a significant determinant in the cross-municipal comparisons in the same province on which identification rests in this analysis.

17 Unlike the case of the monthly series of municipal Social Security registrations, the difficulty in building uniform municipal series on the incidence of COVID-19 retrospectively prevents the impact recorded up until May, June and/or July from being estimated.

4 Final considerations

The analysis presented here shows that the shutdown of non-essential activity in early April mitigated the spread of the pandemic in the short term. However, the economic impact in terms of job destruction in the short term was also significant. Indeed, the municipalities that were most exposed to non-essential activity and which, therefore, saw a greater reduction in their economic activity, recorded a smaller increase in the incidence of COVID-19 in April, but also a worse employment performance according to Social Security records.

Looking ahead, and considering the socioeconomic costs of the containment measures in the short term, it would be advisable to step up the testing and tracing capacity significantly.¹⁸ Exhaustive testing and tracing would make it possible to isolate diagnosed cases and their contacts, allowing potential local outbreaks to be immediately contained.¹⁹ Although this could be the backbone of a containment strategy, there are other supplementary measures that have proved effective in containing COVID-19. For example, social contact between different age groups may play an essential part in the spread of the virus (Scala et al., 2020). In this respect, if people are vigilant and refrain from mixing with the elderly, this could mitigate the health consequences of a possible fresh outbreak, easing the pressure on the health system and avoiding the economic costs of lockdown measures (see Acemoglu et al., 2020).

¹⁸ At the global level, Cherif and Hasanov (2020) propose strategies involving large-scale testing and isolation of individuals who test PCR positive. According to the calculations made in this study, the monthly cost of implementing such a strategy worldwide would be less than the economic losses that the pandemic could cause in under a week.

¹⁹ In this respect, the experience of countries such as Germany, South Korea and Taiwan confirms the possibility of success of this strategy. These countries carried out mass diagnostic testing of the population and the pandemic followed a relatively favourable course, with no need for strict lockdown measures such as those imposed in Spain or Italy.

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