A first exploratory analysis of the regional economic impact of COVID-19 in Argentina[1]

Andrés Niembro[2] and Carla Daniela Calá[3]

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Abstract

In this article, we present a first exploratory analysis of the regional economic impact that COVID-19 pandemic and lockdown measures adopted in Argentina could have had during the last weeks of March and the month of April, the period of greatest economic impact, when restrictions were mainly raised at the sectoral level, without taking into account any regional criteria. To this end, we built an index of territorial economic impact by COVID-19 (ITEI-COVID), which takes into account, on the one hand, the regional production structure in terms of formal private employment, and on the other hand, the operational level of each sector. Results show that the regional impact of COVID-19 on private economic activity in Argentina was highly heterogeneous and that these unequal effects were largely related to the degree of productive diversity or the type of regional specialization. All these results are relatively stable and robust when comparing different geographical units of analysis, when changing the period chosen to define the private production structure, or when considering the informality and self-employment in addition to formal salaried employment.

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[2] Universidad Nacional de Río Negro. Argentina. aniembro@unrn.edu.ar
[3] Universidad Nacional de Mar del Plata. Argentina. dacala@mdp.edu.ar

1. Introduction

Both the analysis and measure of the economic impact of the COVID-19 pandemic necessarily require taking into account a regional perspective, not only to fully understand and manage the unequal impacts of the pandemic and isolation measures but also because the economic problems that arise tend to be region-specific (Bailey et al., 2020). The marked heterogeneity in the territorial distribution of economic activities, production, and employment in Argentina, which is expressed in different regional specializations, allows us to anticipate an unequal impact of the pandemic and the lockdown measures (named as Preventive and Compulsory Social Isolation or ASPO in Spanish). In this article, we present a first exploratory analysis of the regional economic impact that the pandemic and ASPO could have had during the last weeks of March and the month of April, when lockdown restrictions and exceptions were mainly raised at the level of sectors or economic activities, without taking into account any regional criteria. In this way, we aim to provide a territorial view of the heterogeneous impact that the pandemic and lockdown measures had on private economic activity in different geographical units of analysis: Provinces, Local Labor Markets (LLMs), and Urban Agglomerates[1].

At the beginning of the ASPO (last weeks of March and the month of April), while excepted or essential activities continued relatively normal (e.g. food and beverage processing, health services), many others faced a significant reduction in their operational level (transport) or even a complete and indefinitely lockdown (tourism, leisure, and cultural services). Despite mobility restrictions, some activities were able to adapt to working from home (various professional services, education), but others that naturally require the physical presence in the workplace (manufacturing, construction) have been much more affected (Albrieu, 2020; Bonavida Foschiatti and Gasparini, 2020; Delaporte and Peña, 2020; Dingel and Neiman, 2020; Hatayama et al., 2020; Saltiel, 2020).

To analyze the regional economic impact of the pandemic and ASPO, we built an index of territorial economic impact by COVID-19 (ITEI-COVID). This index takes into account, on the one hand, the regional production structure in terms of formal private employment, and on the other hand, the operational level of each sector. Although this is a relatively simple exercise, similar analyzes can be found, for example, for the United States (Muro et al.,

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[1] The 24 Argentine provinces represent the main subnational political level in the country, and generally the territorial level for which more data is available. However, the provinces in Argentina are considerably larger than in some developed countries. For example, the size of the province of Buenos Aires is similar to Poland or Italy. In this sense, having reliable information about different geographical units within the provinces is particularly useful for territorial analysis in Argentina. The LLMs are formed by a central city or node and a set of other cities based on the daily movements of workers between their workplace and their home (Borello, 2002; Rotondo et al., 2016). As a whole, the main 85 LLMs defined in Argentina account for 86% of total population (and 95% of registered employment in private companies), while the 32 urban agglomerates surveyed by the National Household Survey (NHS) barely exceed the 60% of total population.

2020), different countries or regions in Europe (Bachtrögler et al., 2020; Kitsos, 2020; González Laxe et al., 2020; Pérez and Maudos, 2020; Prades Illanes and Tello Casas, 2020), Colombia and Brazil (Bonet-Morón et al., 2020; Haddad et al., 2020), or the municipalities of Buenos Aires Province, in Argentina (Lódola and Picón, 2020).

After this introduction, in section 2 we contextualize the period under analysis in terms of the evolution of the COVID-19 pandemic and lockdown measures adopted in Argentina. In section 3, we present the index of territorial economic impact by COVID-19 and discuss some issues about the available databases and their respective limitations. Then, in section 4 we show and discuss de ITEI results according to the different geographical units of analysis. Finally, we close with some conclusions.

2. The COVID-19 pandemic and lockdown measures in Argentina

The first imported case of COVID-19 in Argentina was confirmed on March 3th. A few days later, the national government established a mandatory quarantine for travelers entering or returning to the country (and then the closure of national borders), the suspension of all artistic and sports shows, as well as classes at all educational levels. On March 19th, when confirmed cases in the country were barely 130 and there were still no signs of community circulation (80% of cases were imported and the remaining 20% were close contacts, see Figure 1), the President announced the beginning of a strict and mandatory quarantine for the entire population (the so-called ASPO), with the exception of those activities and workers that were considered essential (e.g. medical services and supplies, security personnel, food production, pharmacies, local food and cleaning supplies stores, public services, public transportation for essential workers, fuel dispensing, among others). It is worth noting that on the day of the announcement, about half of the 24 provinces of the country had not yet registered positive cases. Moreover, in more than half of the provinces with cases, there were only one or two infected people. In the vast majority of cities in the country, there were no confirmed cases for several weeks. However, during this first phase of strict quarantine and isolation, no territorial differences were recognized. It was not until May 11th, when phase 2 (administrative isolation) began, that the government began to take into account the context and the epidemiological evolution of each province and city. The latter was deepened on May 27th with the passage to phase 3, of geographical segmentation.

Figure 1. COVID-19 daily cases, deaths, and percentage of cases by community spread in Argentina (7-day moving average)
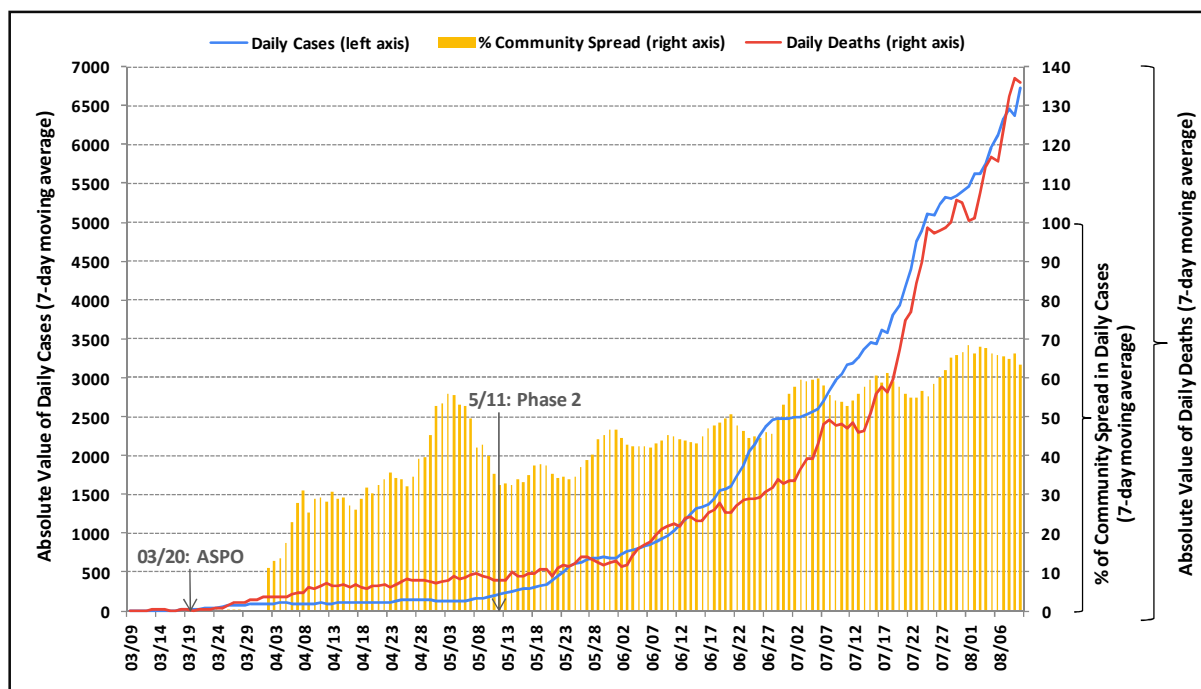
Source: Authors' calculation based on data reported by the Ministry of Health and compiled by Jorge Aliaga.

The economic downturn in the last weeks of March was practically total. For example, according to Google's mobility index, the presence at the workplace in Argentina fell 83 points from Wednesday March 11th (previous to any measures) to Wednesday March 25th. In the provinces, the decrease was about 86 points on average, with a minimum drop of 77 and a maximum of 100. According to a survey carried out in the first days of April to 1,000 companies distributed throughout the country, only 10% of them were fully operational, while more than half were completely non-operational. Around two-thirds of manufacturing and commercial companies and three-quarters of construction companies were non-operational (FOP, 2020a).

Throughout April, some sectors began to resume their activities, either because: a) the first essential activities managed to adapt their labor and transport protocols for their workers, b) some new sectors were excepted during the month (for example, primary activities, such as forestry or mining, or industrial continuous processes), or c) remote working conditions were established when possible (mainly in service activities). However, official statistics show a historical decline in this month, of which there are practically no similar records. According to the National Institute of Statistics and Censuses (INDEC in Spanish), the monthly economic activity estimator registered a fall of more than 26% compared to April 2019, while the contraction registered in March (the whole month) had been 11.5%, compared to the same

month of 2019. The industrial manufacturing production index (IMPI), showed a year-on-year fall of almost 17% in March and of more than 33% in April.

As we mentioned before, during this first stage, the restrictions and exceptions to the economic activity were raised at the level of sectors or branches, without taking into account any territorial criteria. However, as we will show in this article, given the differences in regional production structures, there were naturally regions more and less affected by the economic downturn. For example, according to another survey of FOP (2020b), carried out between May 7th and 12th (end of the strictest phase of quarantine), the Patagonia (South) region showed the highest percentage of non-operational firms, in contrast to the North of the country. Regarding sectoral differences, while a quarter of all surveyed companies were not operational, this percentage reached only 7% in the agricultural and natural resources sectors and between 30% and 40% in manufacturing and construction.

From then on, the restrictions on different economic activities were gradually eliminated, taking into account the epidemiological evolution of each province and city. The economic rebound compared to the worst month in history was not long in coming (see Figure 2) and the seasonally adjusted series of the IMPI showed a recovery of 9% in May (in comparison to April 2020) and 14% in June (in comparison to May). On the other hand, the psychosocial and economic exhaustion generated by a long and sustained quarantine (phase 5, of social distancing or new normality, would only begin in June just in some regions) was reflected in mobility indices, which demonstrated a marked distance between *de jure* quarantine and *the facto* isolation (Levy Yeyati and Sartorio, 2020). This not only accounts for the gradual reduction in the effectiveness of quarantine measures but also the real impossibility of sustaining or restoring strict restrictions, even when the epidemiological situation has been worsened markedly. At the beginning of August, Argentina overcame the barrier of 200,000 confirmed cases, with an average of around 5,500 new cases per day and about 60% by community circulation (Figure 1).

Figure 2.Manufacturing activity (year-on-year change, 14-day moving average)
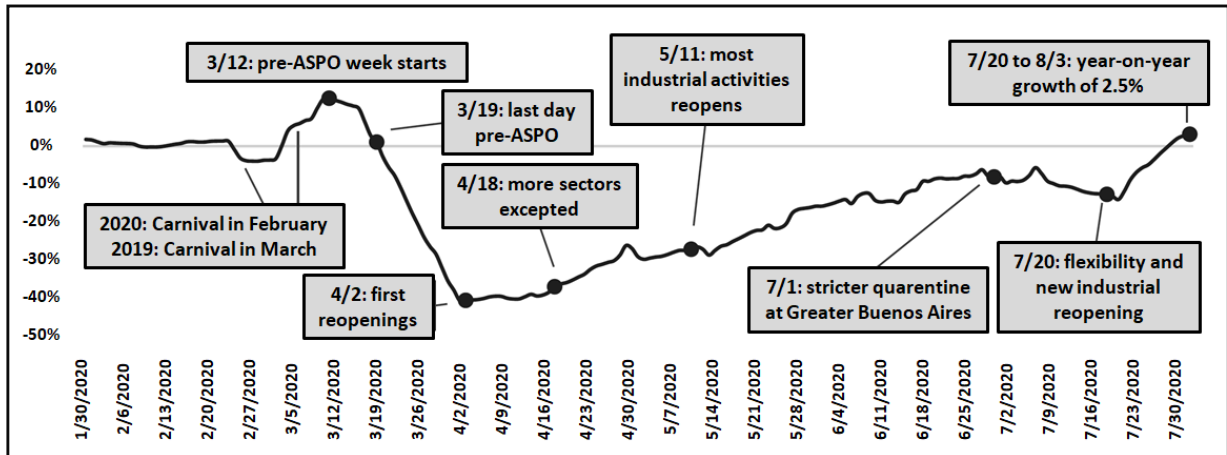
Source: Own translation of CEPXXI (2020).

Although the early and strict quarantine had a considerable popular and political support, since it allowed the government to buy time to develop protocols and expand the capacity of intensive care beds, a retrospective look and the current results invite at least to discuss part of the proposed strategy. In particular, the first phase of the ASPO, between the end of March and the first days of May, predictably coincided with the greatest economic impact of the pandemic and quarantine measures in Argentina. However, as we will see in this article, along with the absence of territorial criteria, the regional economic impact was also highly heterogeneous.

3. Calculation and scope of the index of territorial economic impact by COVID-19

The ITEI-COVID in region j is calculated as:

$$ITEIj = 100 - \sum_{i=1}^{n} Sij * OPi$$

Where Sij is the weight of sector i in region j and OPi is the operational level of sector i in the country. The ITEI-COVID should be interpreted as a negative index, since it takes higher values (near 100) if the economic activity has been severely affected (non-operational) by the pandemic and ASPO, and vice versa.

Since in Argentina we do not have complete, homogeneous and updated sectoral value-added statistics at the territorial level, to define the sectoral weights we use data on total salaried employment registered in the private sector, from the provincial and LLM databases of the Employment and Business Dynamics Observatory (EBDO), under the Ministry of

Labor, Employment, and Social Security. In particular, in the case of the LLMs, we use average employment data from the 2016-2018 period -which in other working paper allowed us to describe the regional production structure before the pandemic (Niembro et al., 2020)- and we calculated the weight of formal private employment in each sector (ISIC at 2 digits) over the total formal private employment of each LLM. In the case of the provinces, we carry out the same calculation both for the 2016-2018 period and the second quarter of 2019, which includes the month of April.

It is worth noting that data on formal salaried employment in the private sector -provided by the EBDO both for provinces and LLMs- cover the entire universe, since they are based on administrative records of the Argentine Integrated Social Security System (SIPA in Spanish) and the Federal Public Revenue Administration (AFIP). In other words, they are not estimates or projections based on sample data -as occurs, for example, with the National Household Survey (NHS) of INDEC-. Obviously, the main limitation of these databases to describe the regional (private) production structure is that they leave aside informal employment and self-employed[2]. For this reason, we also use data of the NHS, from the second quarter of 2019, to calculate the sectoral weights not only for formal salaried employment but also for informal employment and self-employed. In section 4.3 we show that, although some changes occur when incorporating data on informality and self-employment, the territorial patterns remain quite similar.

The operational level of each sector ranges from a maximum of 100 (complete) to a minimum of 0 (null), going through intermediate values of 75 (high), 50 (medium), and 25 (low). In order to carry out a simple sensitivity analysis, we define for each sector a hypothesis of minimum operational level and another of maximum level, based on the search and interpretation of secondary information, such as recent statistics published by INDEC and other official agencies, reports from consultants and research centers, and information from various surveys and sectoral chambers. Annex 1 presents the list of the sectors considered, the two hypotheses defined, and the sources reviewed in each case. It is worth mentioning that the definition of an operational or vulnerability level for each sector has also been a common step in other recent studies (Bachtrögler et al., 2020; Bonet-Morón et al., 2020; González Laxe et al., 2020; Lódola and Picón, 2020; Pérez and Maudos, 2020; Prades Illanes and Tello Casas, 2020).

It is important to highlight that the ITEI does not intend to account for the changes in formal salaried employment in the private sector in each region during the pandemic and ASPO. Instead, the index is based on the production structure, approximated by previous data on

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[2] Employment in the public sector is also not taken into account, but it is not the purpose of this article to analyze the impact of the pandemic or ASPO on the production of services in the public sector.

formal private employment, with the aim to analyze the heterogeneous impact that the quarantine could have had on the private economic activity at the territorial level in Argentina. Taking into account that the government established different restrictions on firing formal workers, as well as some important support measures, such as the Emergency Assistance Program for Work and Production[3], it is expected that, at least for a while, formal employment could be dissociated from the effective level of production and sales. According to the Ministry of Labor, Employment, and Social Security, although there was a drop in jobs in April, other adjustments during this month took the form of suspensions and wage reductions, along with a significant drop in hiring.

Finally, It should be noted that the impact on private economic activity may be due to the restrictions (and exceptions) imposed by the ASPO and the feasibility (or not) of working from home in the activities thatwere not excepted, as well as to the decrease in domestic or external demand and other logistic complications, all factors that may be associated in one way or another with the pandemic. For these reasons, and as with any other index, the ITEI should be interpreted with some caution, prioritizing a relative comparison between regions and not an interpretation of the absolute values in each case.

4. Results according to the different geographical units of analysis

4.1. ITEI-COVID results for the main 85 Local Labor Markets

Figure 3 shows the average, lower, and upper value of the index for the main 85 LLMs of the country. In a simple robustness analysis, we observe that the main results at the extremes of the distribution do not change even if, on the one hand, we bring the operational level closer to its maximum hypothesis for the most affected LLMs, and on the other hand, we bring the operational hypothesis towards the minimum for the least affected LLMs. The *ITEI-Lower* for the 8 most affected LLMs is on average 43.5, while the *ITEI-Upper* for the 10 least affected LLMs is on average 42.2.

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[3] For example, one of the main contributions of this program was paying up to 50% of the salaries of formal workers, depending on the type of company, its economic situation, and salary levels.

Figure 3. ITEI for LLMs: average, upper, and lower limits
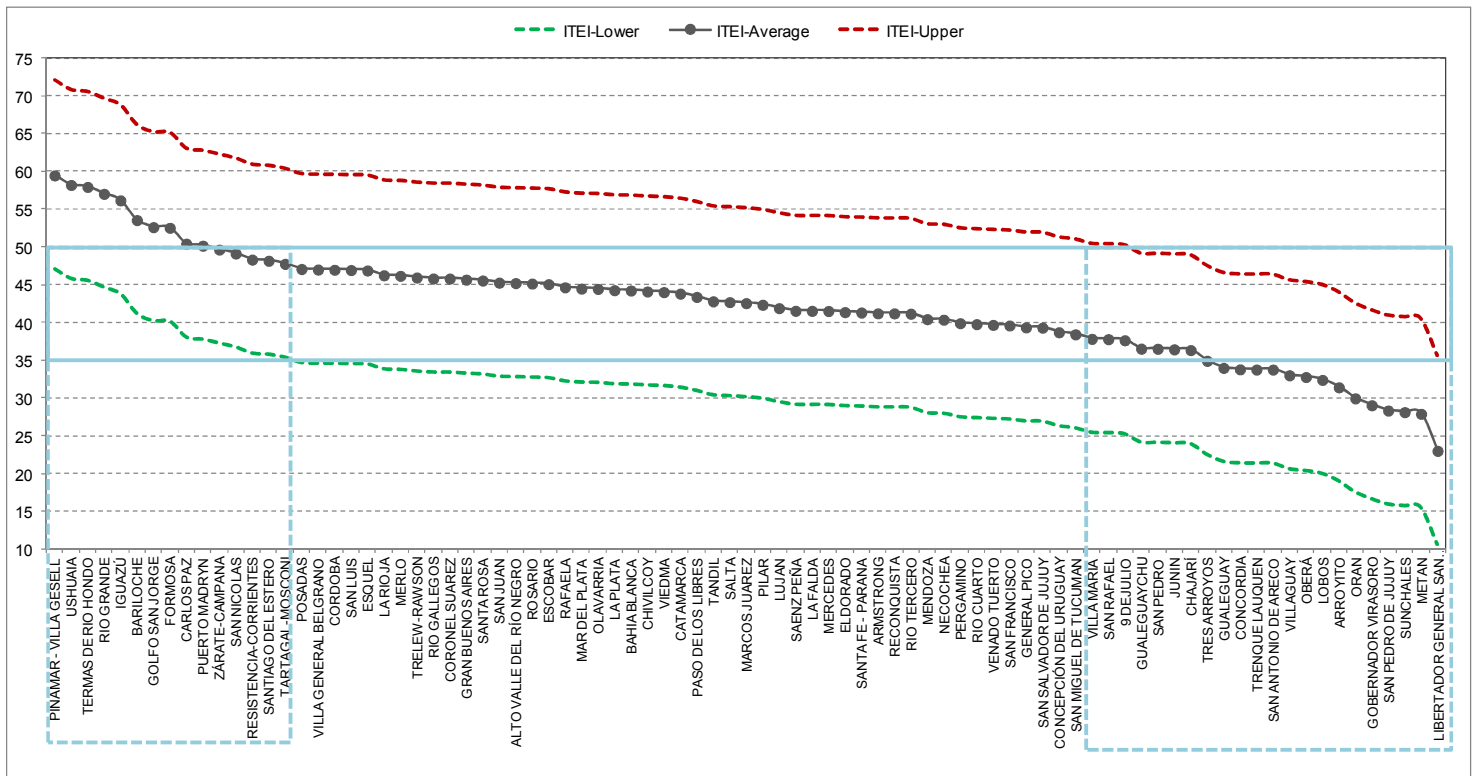
Source: Own elaboration.

Table 1 groups the LLMs according to the economic impact they face (the most affected ones are shown in shades of red and the least affected ones in shades of green) and their type of production pattern (or type of specialization), based on the typology elaborated by Niembro et al. (2020). Among the most affected regions, predictably, we observe LLMs specialized in tourism -like Campos-Vazquez and Esquivel (2020) for Mexican regions- and in some industries that were highly restricted (non-operational) in the first stage of the quarantine. Some of these LLMs are also specialized in the extraction or exploitation of natural resources, such as oil and minerals, activities that have been limited both by the pandemic and by the sectoral crisis in the case of hydrocarbons. At the other extreme, among the most intense greens, we note that specialization in agricultural and food sectors has been essential to minimize the impacts of the pandemic and ASPO. In general, the production pattern of the most and least affected LLMs shows relatively low levels of diversification, with a type of specialization that leans towards more and less affected (non-operational) sectors, respectively.

Table 1. LLMs according to ITEI and type of specialization

| AEL	ITEI-Lower	ITEI-Average	ITEI-Upper	Ranking	Typology 2016-2018 (Niembro *et al.*, 2020)
USHUAIA	45.8	58.3	70.8	2	Radio-TV and other activities
RIO GRANDE	44.6	57.1	69.6	4	
GOLFO SAN JORGE	40.2	52.7	65.2	7	Specialization in extractive activities
PUERTO MADRYN	37.7	50.2	62.7	10	
ZARATE-CAMPANA	37.2	49.7	62.2	11	Specialization in metallurgical industry
SAN NICOLAS	36.7	49.2	61.7	12	
PINAMAR - VILLA GESELL	47.0	59.5	72.0	1	
TERMAS DE RIO HONDO	45.5	58.0	70.5	3	
IGUAZU	43.7	56.2	68.7	5	Specialization in tourism
BARILOCHE	41.1	53.6	66.1	6	
CARLOS PAZ	38.0	50.5	63.0	9	
SANTIAGO DEL ESTERO	35.7	48.2	60.7	14	Textile industry and various activities
FORMOSA	40.1	52.6	65.1	8	
RESISTENCIA-CORRIENTES	35.9	48.4	60.9	13	Urban and related services
TARTAGAL-MOSCONI	35.3	47.8	60.3	15	
SAN LUIS	34.5	47.0	59.5	19	Heavy industry, light industry and services
CORONEL SUAREZ	33.4	45.9	58.4	25	High specialization in light industry
CORDOBA	34.5	47.0	59.5	18	
GRAN BUENOS AIRES	33.2	45.7	58.2	26	KIS and heavy industry
ROSARIO	32.7	45.2	57.7	30	
VILLA GENERAL BELGRANO	34.6	47.1	59.6	17	Specialization in tourism
MERLO	33.7	46.2	58.7	22	
LA RIOJA	33.8	46.3	58.8	21	Textile industry and various activities
SAN JUAN	32.8	45.3	57.8	28	
POSADAS	34.7	47.2	59.7	16	
ESQUEL	34.4	46.9	59.4	20	
TRELEW-RAWSON	33.5	46.0	58.5	23	Urban and related services
RIO GALLEGOS	33.4	45.9	58.4	24	
SANTA ROSA	33.1	45.6	58.1	27	
ALTO VALLE DEL RIO NEGRO	32.8	45.3	57.8	29	
RAFAELA	32.2	44.7	57.2	32	
CHIVILCOY	31.7	44.2	56.7	37	Agriculture, support industries and urban services
MARCOS JUAREZ	30.1	42.6	55.1	43	
RIO TERCERO	28.7	41.2	53.7	53	
NECOCHEA	27.9	40.4	52.9	55	
ESCOBAR	32.6	45.1	57.6	31	Heavy industry, light industry and services
PILAR	29.9	42.4	54.9	44	
ELDORADO	28.9	41.4	53.9	49	High specialization in light industry
ARMSTRONG	28.8	41.3	53.8	51	High specialization in machinery
MAR DEL PLATA	32.1	44.6	57.1	33	
LA PLATA	31.8	44.3	56.8	35	
BAHIA BLANCA	31.8	44.3	56.8	36	KIS and heavy industry
TANDIL	30.4	42.9	55.4	41	
SANTA FE - PARANA	28.9	41.4	53.9	50	
OLAVARRIA	32.0	44.5	57.0	34	Specialization in extractive activities
PASO DE LOS LIBRES	31.0	43.5	56.0	40	Specialization in tourism
LA FALDA	29.1	41.6	54.1	47	
CATAMARCA	31.4	43.9	56.4	39	
LUJAN	29.5	42.0	54.5	45	
SAENZ PENA	29.1	41.6	54.1	46	Textile industry and various activities
MERCEDES	29.1	41.6	54.1	48	
RECONQUISTA	28.8	41.3	53.8	52	
VIEDMA	31.6	44.1	56.6	38	
SALTA	30.3	42.8	55.3	42	Urban and related services
MENDOZA	28.0	40.5	53.0	54	
RIO CUARTO	27.3	39.8	52.3	57	
VENADO TUERTO	27.3	39.8	52.3	58	
SAN FRANCISCO	27.2	39.7	52.2	59	Agriculture, support industries and urban services
GENERAL PICO	26.9	39.4	51.9	60	
VILLA MARIA	25.4	37.9	50.4	64	
9 DE JULIO	25.2	37.7	50.2	66	
JUNIN	24.0	36.5	49.0	69	
CONCEPCION DEL URUGUAY	26.3	38.8	51.3	62	
SAN RAFAEL	25.4	37.9	50.4	65	Specialization in agri-food
GUALEGUAYCHU	24.1	36.6	49.1	67	
CHAJARI	23.9	36.4	48.9	70	
PERGAMINO	27.5	40.0	52.5	56	Textile industry and various activities
SAN PEDRO	24.1	36.6	49.1	68	
SAN SALVADOR DE JUJUY	26.9	39.4	51.9	61	Urban and related services
SAN MIGUEL DE TUCUMAN	26.0	38.5	51.0	63	
TRES ARROYOS	22.5	35.0	47.5	71	Agriculture, support industries and urban services
SUNCHALES	15.7	28.2	40.7	83	
ARROYITO	19.0	31.5	44.0	79	High specialization in machinery
GUALEGUAY	21.6	34.1	46.6	72	
CONCORDIA	21.4	33.9	46.4	73	
TRENQUE LAUQUEN	21.3	33.8	46.3	74	
VILLAGUAY	20.6	33.1	45.6	76	
OBERA	20.3	32.8	45.3	77	
LOBOS	20.0	32.5	45.0	78	Specialization in agri-food
ORAN	17.5	30.0	42.5	80	
GOBERNADOR VIRASORO	16.6	29.1	41.6	81	
SAN PEDRO DE JUJUY	15.9	28.4	40.9	82	
METAN	15.5	28.0	40.5	84	
LIBERTADOR GENERAL SAN MARTIN	10.6	23.1	35.6	85	
SAN ANTONIO DE ARECO	21.3	33.8	46.3	75	Textile industry and various activities

Source: Authors' calculation.

On the other hand, those LLMs with more diversified production patterns are generally located in intermediate positions, leaning towards one side or the other of the distribution depending on the relative weight of more and less affected activities. It seems that productive diversity may have diversified the risk of negative economic impacts among more activities, and thus, it reduced the chances of falling into the most unfavorable scenarios. For example, in the middle of the table (yellow color), we find some LLMs with diversified production patterns, where the pandemic and ASPO probably impacted in some sectors but not in others.

Figure 4 shows the different LLMs, through out the Argentine provinces, according to the initial impact of the pandemic and ASPO. We observe that the economic impact was relatively low in the LLMs of some provinces, such as Jujuy and Entre Ríos, while the Patagonian (Southern) LLMs are usually among the most affected ones. The heterogeneity within provinces such as Buenos Aires, Córdoba, or Misiones is also clearly appreciated. The latter invites to relativize, to some extent, the provincial results that are presented in the following section.

4.2. ITEI-COVID results for Argentine provinces

One of the limitations that we are not able to overcome with the LLM database (average of the years 2016-2018) is the possible seasonality of some activities, such as those related to tourism. Probably, in some tourist cities where the economic activity and employment have maximum peaks in very specific months (such as the summer season in Pinamar and Villa Gesell), the use of annualized data implies a certain degree of overestimation of the impact of the ASPO during the mid-low season (end of March and April). Obviously, this restriction is more limited for destinations that receive a more stable flow of tourists throughout the year (such as Iguazú) or that have different seasons (winter and summer, such as Bariloche), since the winter season is lost. However, it is expected that the impact of COVID-19 will be much longer and sustained on tourism (e.g. there is uncertainty about the next summer season), even when other activities are gradually returning to a new normality.

Figure 4. LLMs according to ITEI
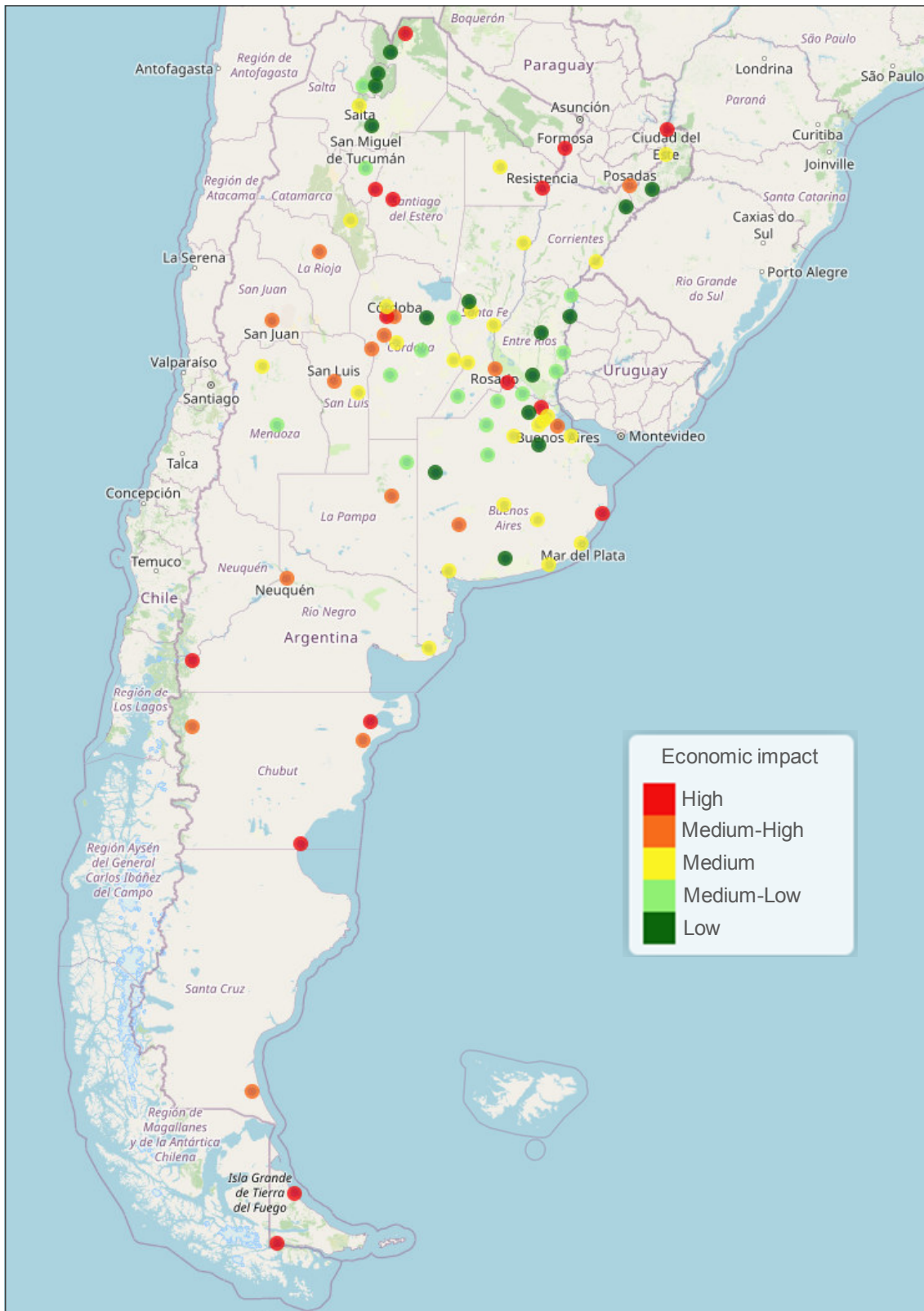
Source: Authors. Note: the map shows the location of the central city or node of each LLM, but not all its geographical scope.

Based on the data published by EBDO on formal salaried employment in the private sector at the provincial level[7], we calculate the ITEI for Argentine provinces both for the 2016-2018 period and the second quarter of 2019. Thus, we can also account for the impact of the pandemic and ASPO by considering a production structure that could be more similar in terms of seasonality (same period of the previous year).

Figure 5 shows the ITEI by province. Firstly, we see that most of the Patagonian provinces (Tierra del Fuego, Neuquén, Santa Cruz and Chubut) are among the most affected ones, while agrifood-based provinces (such as Tucumán, Entre Ríos, and Jujuy) are the least affected. Precisely, the exception in Patagonia is Río Negro, the province in the region with the highest agri-food profile and the lowest weight of hydrocarbons. The strongest impact among Patagonian provinces has been pointed out in other studies (Day, 2020; FOP, 2020b), due to the relative weight of hydrocarbon production and tourism -and we should add the initial restrictions in electronic production in Tierra del Fuego-.

Secondly, it can be seen that ITEI values are very similar if we use annual data (2016-2018) or data from the second quarter of 2019. The changes in the ranking of provinces are also very limited (Table 2). In other words, the effect of seasonality on the regional production structure does not seem to be very relevant, at least at the provincial level, which to some extent supports the use of data from the 2016-2018 period for the case of LLMs. Except for Jujuy, the effect of seasonality, when observed, seems to decrease the impact of the pandemic and ASPO at the provincial level, especially in the cases of Formosa, Catamarca, Chaco, La Rioja, Misiones, and Tucumán.

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[7] In this database, Buenos Aires province is divided into two parts (Greater Buenos Aires and the rest of the province). Therefore, besides calculating the provincial aggregate, we show the ITEI results for both divisions.

Figure 5. ITEI for Argentine provinces: sectoral weights according to 2016-2018 average or second quarter of 2019
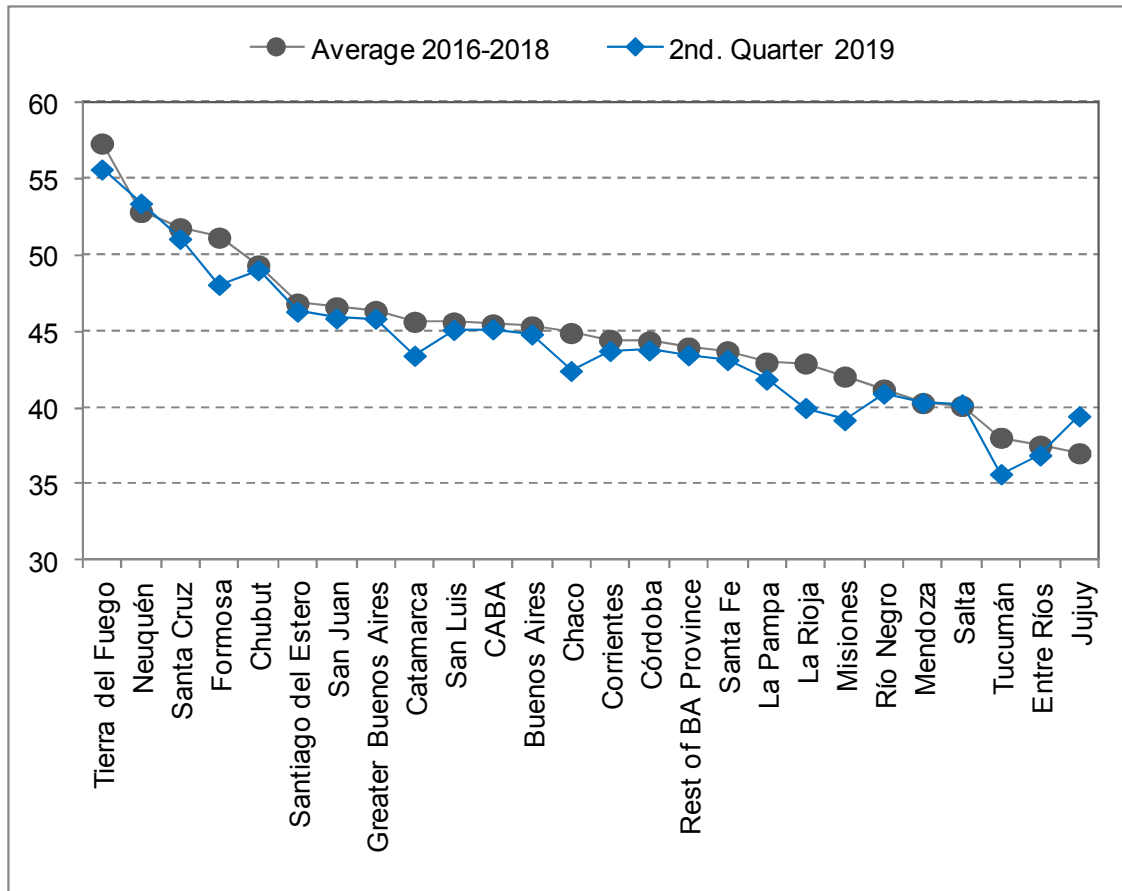
Source: Authors' calculation.

Results at the level of LLMs and provinces are complementary and can help to understand some particularities behind both territorial units. Although the LLMs usually allow us to distinguish different situations within the same province, the analysis of the provincial database published by EBDO also allows us to identify some LLMs with special characteristics. For example, we can see that the LLM that includes both the autonomous city of Buenos Aires (CABA in Spanish) and Greater Buenos Aires municipalities encompasses heterogeneous realities within it. Greater Buenos Aires (which is part of Buenos Aires province) seems to be more affected by the pandemic and ASPO than the city of Buenos Aires, according to these data. The rest of Buenos Aires province appears below, in a better relative position. On the other hand, the LLM called *Alto Valle del Río Negro* includes several cities of Río Negro province with an agricultural profile (and therefore less affected), as well as the capital city and other cities of Neuquén province that are much more specialized in hydrocarbon production (and therefore more affected).

Table 2. Comparison between rankings of provinces

	Average 2016-2018		2nd. Quarter 2019	
	ITEI-Average	Ranking	ITEI-Average	Ranking
Tierra del Fuego	57.31	1	55.61	1
Neuquén	52.84	2	53.38	2
Santa Cruz	51.77	3	51.06	3
Formosa	51.16	4	48.07	5
Chubut	49.34	5	49.02	4
Santiago del Estero	46.84	6	46.31	6
San Juan	46.59	7	45.87	7
Greater Buenos Aires	*46.36*		*45.85*	
Catamarca	45.64	8	43.42	13
San Luis	45.60	9	45.12	9
CABA	45.48	10	45.16	8
Buenos Aires	45.34	11	44.83	10
Chaco	44.91	12	42.42	15
Corrientes	44.46	13	43.73	12
Córdoba	44.36	14	43.77	11
Rest of BA Province	*43.96*		*43.46*	
Santa Fe	43.71	15	43.15	14
La Pampa	42.97	16	41.86	16
La Rioja	42.92	17	40.01	20
Misiones	42.06	18	39.21	22
Río Negro	41.21	19	40.94	17
Mendoza	40.33	20	40.34	18
Salta	40.14	21	40.24	19
Tucumán	38.05	22	35.67	24
Entre Ríos	37.53	23	36.91	23
Jujuy	37.04	24	39.45	21

Source: Own elaboration.

4.3. A look at the Urban Agglomerates in Argentina

So far, we have described the regional (private) production structure based on data of formal salaried employment. As it could be a limitation, we repeat the analysis at the level of urban agglomerates by using data from the NHS corresponding to the second quarter of 2019. In this way, we can compare the results of the ITEI when adding the informal wage earners and self-employed in the definition of the sectoral weights (Sij). Annex 2 presents the list of the sectors considered (CAES at 2 digits), together with the hypotheses of minimum and maximum operational level.

Although some modifications occur when incorporating informality and self-employment, the most notable aspect in both Figure 6 and Table 3 is that the territorial patterns remain quite

similar. In general, the results for urban agglomerates are consistent with previous sections, but we can also suggest that the economic impact of the pandemic and ASPO could be greater when adding informality and self-employment (note the change in scale between the axes). However, the ITEI for urban agglomerates should only be taken as indicative, since the NHS only surveys a sample of the population of these agglomerates and the degree of detail requested to the data (formal, informal, and independent workers in sectors at 2 digits) may lead to high margins of statistical error.

Figure 6. ITEI for urban agglomerates: sectoral weights according to the type of occupational category
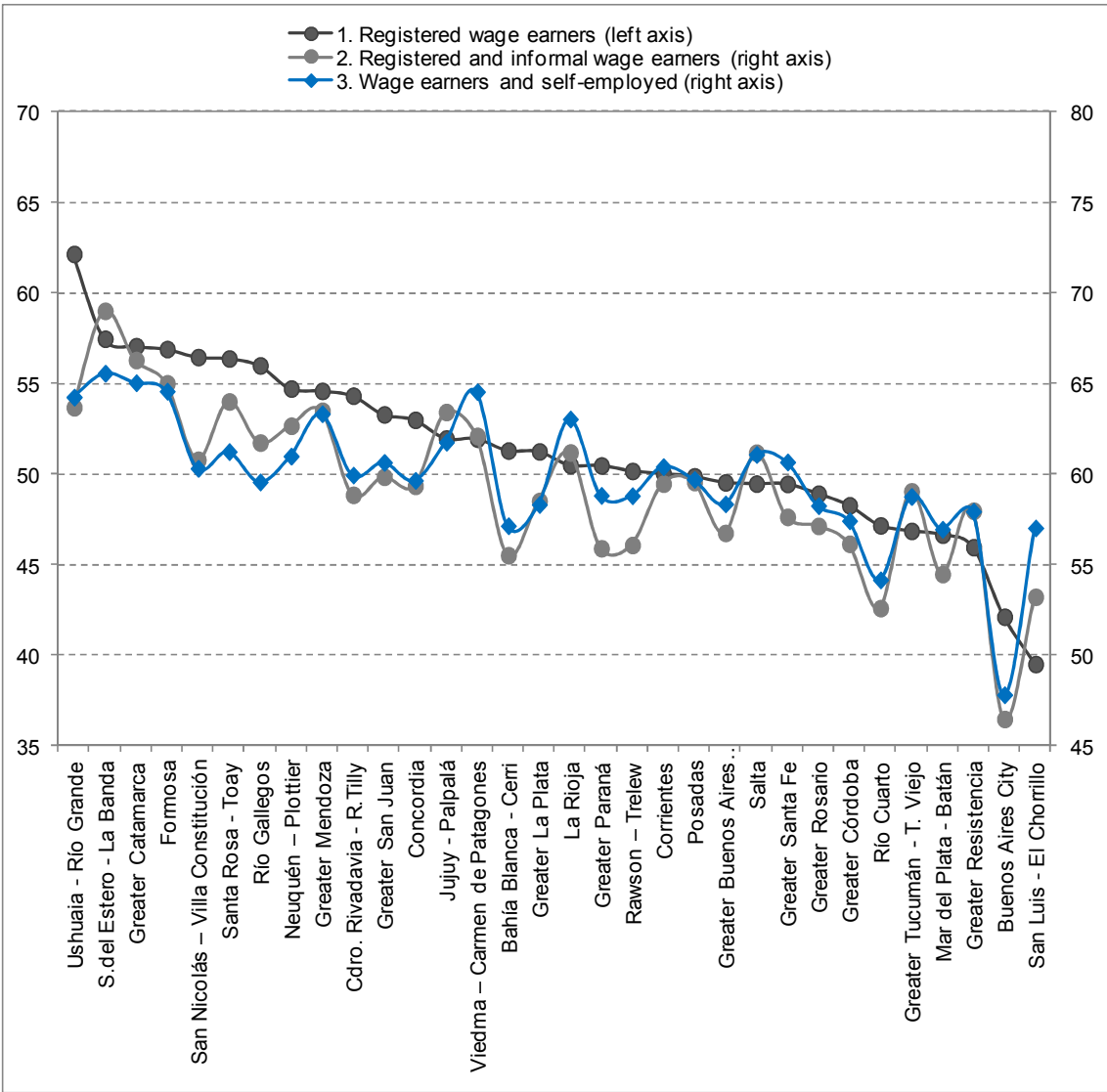
Source: Own elaboration.

Table 3. Comparison between ITEI rankings of urban agglomerates according to the type of occupational category

	Registered wage earners	Registered and informal wage earners	Wage earners and self-employed
Ushuaia - Río Grande	1	5	5
S.del Estero - La Banda	2	1	1
Greater Catamarca	3	2	2
Formosa	4	3	3
San Nicolás – Villa Constitución	5	13	15
Santa Rosa - Toay	6	4	9
Río Gallegos	7	10	19
Neuquén – Plottier	8	8	11
Greater Mendoza	9	6	6
Cdro. Rivadavia - R.Tilly	10	19	16
Greater San Juan	11	14	13
Concordia	12	17	18
Jujuy - Palpalá	13	7	8
Viedma – Carmen de Patagones	14	9	4
Bahía Blanca - Cerri	15	28	28
Greater La Plata	16	20	24
La Rioja	17	11	7
Greater Paraná	18	27	20
Rawson – Trelew	19	26	21
Corrientes	20	16	14
Posadas	21	15	17
Greater Buenos Aires (Municipalities)	22	24	23
Salta	23	12	10
Greater Santa Fe	24	22	12
Greater Rosario	25	23	25
Greater Córdoba	26	25	27
Río Cuarto	27	31	31
Greater Tucumán - T. Viejo	28	18	22
Mar del Plata - Batán	29	29	30
Greater Resistencia	30	21	26
Buenos Aires City	31	32	32
San Luis - El Chorrillo	32	30	29

Source: Own elaboration.

5. Final comments

Throughout this article, we have explored the heterogeneous impact on the economic private activity that the COVID-19 pandemic and lockdown measures in Argentina may have had in territorial terms. We have particularly focused on the first stage of the quarantine (last weeks

of March and April), the period of greatest economic impact, when restrictions were mainly raised at the sectoral level, without taking into account any regional criteria. We conclude that results are relatively stable and robust when comparing different geographical units of analysis, when changing the period chosen to define the regional production structure (2016-2018 average or second quarter of 2019), or when considering the informality and self-employment in addition to formal salaried employment. The salaried registered employment, as well as the informality and self-employment.

Regarding the results, in line with other recent studies, we observe that most of the Patagonian provinces and LLMs have been among the most affected regions, while in other provinces, such as Jujuy, Entre Ríos, or Tucumán, the initial impact of the quarantine would have been substantially smaller. Additionally, the greater analytical richness of studying the national territory at the level of LLMs allows us to highlight the heterogeneity within large and diverse provinces, such as Buenos Aires and Córdoba, and even in smaller ones such as Misiones.

Finally, it is worth noting that, like other recent studies that measure the regional economic impact of COVID-19, in this article we have calculated a relatively simple index. In further studies, we will try to propose more complex methodologies, taking into account that, from May onwards, there have been different dynamics of flexibilization of the quarantine at the sectoral level but also at the territorial level. This implies the need to consider the regional production structure, as well as other characteristics of the regions, such as their size, population density, quantity, frequency and speed of cases, mobility indexes and isolation compliance, among others. Other issues that could be relevant for future analysis are the role of productive diversity and the degree and type of commercial orientation (domestic versus foreign market) in regional recovery after the crisis.

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Annex 1. Sectoral operational hypotheses applied to EBDO data (ISIC)

Classification of economic activities used by EBDO (ISIC)		Operational hypothesis		Based on statistics, surveys or reports from chambers, centers or organizations:
2 digit	Activities	Minimum	Maximum	
1	Agriculture, livestock farming, hunting and related service activities	75	100	INDEC-ICA; CONINAGRO; Fund. Observ. PYME (FOP); CENE-UB
2	Forestry, wood extraction and related service activities	50	75	AFOA; ASORA; FAIMA
5	Fishing and fishing-related activities	50	75	INDEC-ICA; Subsecr. de Pesca y Acuicultura; Intercámaras de la Ind. Pesquera
11	Extraction of crude oil and natural gas; activities related to oil and gas extraction, except prospecting activities.	25	50	Secr. de Energía; CEPH; CEIPA; Ecolatina; Revista Trama
13	Extraction of metalliferous minerals	25	50	INDEC-ICA; CAEM
14	Exploitation of other mines and quarries	25	50	INDEC-ICA; CAEM
15	Foods	75	100	INDEC-IPIM; CAME; FIEL; FOP; UIA
16	Tobacco	25	50	INDEC-IPIM; CIT; FIEL; UIA
17	Textile products	25	50	INDEC-IPIM; CAME; FIEL; UIA
18	Confections	0	25	INDEC-IPIM; CAME; CIAI; FIEL; UIA
19	Leather	0	25	INDEC-IPIM; CAME; FIEL; UIA
20	Wood	50	75	INDEC-IPIM; AFOA; ASORA; FAIMA
21	Paper	75	100	INDEC-IPIM; FIEL; UIA
22	Edition	75	100	INDEC-IPIM; UIA
23	Petroleum products	50	75	INDEC-IPIM; FIEL; UIA
24	Chemical products	75	100	INDEC-IPIM; CAME; FIEL; UIA
25	Rubber and plastic products	50	75	INDEC-IPIM; CAME; UIA
26	Other non-metallic minerals	25	50	INDEC-IPIM; INDEC-ISAC; FIEL; UIA
27	Common metals	25	50	INDEC-IPIM; CAA; FIEL; UIA
28	Other metal products	25	50	INDEC-IPIM; ADIMRA; FIEL; UIA
29	Machinery and equipment	50	75	INDEC-IPIM; ADIMRA; FIEL; UIA
30	Office machinery	0	25	INDEC-IPIM; CAME; UIA
31	Electric appliances	0	25	INDEC-IPIM; CAME; UIA
32	Radio and television	0	25	INDEC-IPIM; CAME; UIA
33	Medical instruments	50	75	INDEC-IPIM; ADIMRA; UIA
34	Automotive	0	25	INDEC-IPIM; ADEFA; FIEL; UIA
35	Other transport equipment	0	25	INDEC-IPIM; UIA
36	Furniture	25	50	INDEC-IPIM; ASORA; CAME; FAIMA
37	Waste and scrap recycling	50	75	INDEC-IPIM
40	Electricity, gas and water	75	100	Secr. de Energía; ENARGAS; CAMMESA; Revista Trama
41	Collection, purification and distribution of water	75	100	INDEC-ISSP; Ecolatina
45	Building	0	25	INDEC-ISAC; CAMARCO; FOP
50	Sale, maintenance and repair of motor vehicles and their parts, pieces and accessories. sale, maintenance and repair of motorcycles and their parts, pieces and accessories. retail sale of fuel for motor vehicles and motorcycles.	25	50	ACARA; CECHA
51	Wholesale trade	25	50	CAC; CADAM
52	Retail trade and repair of personal and household goods	25	50	CAC; CACE; FOP
55	Hotel and restaurant services	0	25	INDEC-EOH; INDEC-ETI; FEHGRA; INPROTUR
60	Rail, automotive and pipeline transportation service	50	75	INDEC-ISSP; CNRT; FADEEAC
61	Sea and river transport service	50	75	CADYM
62	Air transport service for cargo and passengers	0	25	ANAC
63	Cargo handling, storage and warehousing services. complementary services for transportation. travel agency services and other complementary tourist support activities. management and logistics services for the transport of goods	50	75	INDEC-ISSP
64	Postal and telecommunications services	75	100	INDEC-ISSP; Ecolatina; Lódola & Picón (2020)
65	Financial intermediation and other financial services	75	100	ADEBA; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020); Lódola & Picón (2020)
66	Insurance services. retirement and pension fund management services	75	100	CENE-UB; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020); Lódola & Picón (2020)
67	Auxiliary services to financial activity, except insurance and pension fund management services	75	100	CENE-UB; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020); Lódola & Picón (2020)
70	Real estate services	0	25	CECBA; CIA; Reporte Inmobiliario; Lódola & Picón (2020)
71	Rental of transport equipment and machinery and equipment n.c.p. rental of personal and household goods n.c.p.	0	25	CENE-UB; Lódola & Picón (2020)
72	Computer activities. Consultant services. data processing. maintenance and repair of office, accounting and computer machinery	50	75	CAC; CESSI; CENE-UB; FOP; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020)
73	Research and experimental development in the field of engineering and of the exact and natural sciences and of the social sciences and humanities	75	100	CAC; CENE-UB; FOP; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020)
74	Legal and accounting, bookkeeping and auditing services; tax advice; market research and public opinion polls; business and management advice. architectural and engineering services and technical services n.c.p. advertising services. business services n.e.c.	50	75	CAC; CENE-UB; FOP; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020)
75	Temporary employment agencies	0	25	CENE-UB
80	Teaching. initial, primary, secondary, higher and postgraduate training. adult education and educational services n.e.c.	75	100	Ecolatina; FOP; Albrieu (2020); Bonavida Foschiatti & Gasparini (2020); Lódola & Picón (2020)
85	social and Health Services	75	100	Lódola & Picón (2020)
90	Waste and sewage disposal, sanitation and similar services	75	100	INDEC-ISSP
91	Services of business, professional and employers organizations. union services. association services n.c.p.	75	100	CAC; CENE-UB; FOP; Bonavida Foschiatti & Gasparini (2020)
92	Cinematography, radio and television services and entertainment and artistic entertainment services n.e.c. news agency services. library, archive and museum services and cultural services n.c.p. services for sports and entertainment practice n.e.c.	0	25	SICA; CENE-UB
93	Services n.c.p.	0	25	CENE-UB; Bonavida Foschiatti & Gasparini (2020)

Annex 2.Sectoral operational hypotheses applied to NHS data (CAES)

Classification of economic activities used by NHS-INDEC (CAES)		Operational hypothesis	
2 digit	Activities	Minimum	Maximum
1	Agriculture, Livestock farming, Hunting and Support Activities	75	100
2	Forestry, Wood Extraction and Support Activities	50	75
3	Fishing, Aquaculture and Support Activities	50	75
5	Coal and Lignite Extraction	25	50
6	Crude Oil and Natural Gas Extraction	25	50
7	Metalliferous Minerals Extraction	25	50
8	Exploitation of other Mines and Quarries	25	50
9	Support Activities for Mining and Quarrying	25	50
10	Preparation of Food Products	75	100
11	Preparation of Beverages	75	100
12	Manufacture of Tobacco Products	25	50
13	Manufacture of Textile Products, except Garments	25	50
14	Manufacture of Garments, Finishing and Dyeing of Fur	0	25
15	Manufacture of Leather and Related Products	0	25
16	Production of Wood and Wood and Cork Products, except Furniture; Straw Articles and Braiding Materials	50	75
17	Manufacturing of Paper and Paper Products	75	100
18	Printing Activities and Support Services; Playback of Recordings	75	100
19	Manufacture of coke and petroleum refining products	50	75
20	Manufacture of Chemical Substances and Products	75	100
21	Manufacture of Pharmaceutical Products, Medicinal Chemical Substances and Botanical Products	75	100
22	Manufacture of Rubber and Plastic Products	50	75
23	Non-Metallic Mineral Product Manufacturing	25	50
24	Metal Manufacturing	25	50
25	Manufacture of Fabricated Metal Products and Metalworking Services, except Machinery and Equipment	25	50
26	Manufacture of Computer, Electronic and Optical Equipment	0	25
27	Manufacture of Machinery and Electrical Equipment	25	50
28	Manufacture of Machinery and Equipment n.c.p.	50	75
29	Manufacture of Motor Vehicles, Trailers and Semi-trailers	0	25
30	Manufacture of Other Transportation Equipment n.c.p.	0	25
31	Furniture and Mattress Manufacturing	25	50
32	Manufacturing Industries n.c.p.	0	25
33	Maintenance, Repair and Installation of Machines and Equipment	0	25
35	Electricity, Gas, Steam and Air Conditioning	75	100
36	Water Collection, Treatment and Supply	75	100
37	Sewerage	75	100
38	Collection, Treatment and Disposal of Waste; Recovery of Materials	75	100
39	Sanitation Activities and other Waste Management Services	75	100
40	Building	0	25
45	Trade and Repair of Motor Vehicles and Motorcycles	0	25
48	Trade, Except Motor Vehicles and Motorcycles	25	50
49	Land and Pipeline Transportation	50	75
50	Transportation by Waterway	50	75
51	Air Transport	0	25
52	Storage and Auxiliary Transport Activities	50	75
53	Mail and Messaging Services	75	100
55	Accommodation Services in Hotels, Camps and other types of Temporary Accommodation	0	25
56	Food and Beverage Services	0	25
58	Publishing of Books, Newspapers and other Publications, even integrated to Printing	50	75
59	Cinematographic Activities; Production of Videos and Television Programs; Sound Recording and Music Editing	25	50
60	Radio and Television Programming and Broadcasting Activities	75	100
61	Telecommunications	75	100
62	Computer Programming and Consulting Activities and other Related Activities	50	75
63	Information Services Activities	50	75
64	Financial Intermediation and Other Financial Services, except Insurance and Retirement and Pension Funds	75	100
65	Insurance, Reinsurance and Pension Funds, except Compulsory Membership Social Security Plans	75	100
66	Auxiliary Activities to Financial Services and Insurance	75	100
68	Real estate activities	0	25
69	Legal and Accounting Activities	50	75
70	Business Management Consulting Service Activities	50	75
71	Architecture and Engineering Services; Technical Tests and Analysis	50	75
72	Investigation and development	75	100
73	Advertising and Market Research	50	75
74	Other Professional, Scientific and Technical Activities	50	75
75	Veterinary Activities	25	50
77	Rental and Leasing Activities, except Real Estate, and Management of Non-Financial Intangible Assets	0	25
78	Activities Related to the Supply of Employment	0	25
79	Travel Agencies, Tour Operators and Related Activities	0	25
80	Investigation and Security Activities	25	50
81	Building Support Services and Cleaning Activities in General; Landscaping and Gardening Services	50	75
82	Administrative Activities of Offices and other Auxiliary Activities of Companies	75	100
84	Public Administration and Defense; Mandatory Social Security Plans	75	100
85	Teaching	75	100
86	Human Health Care Activities	75	100
87	Social Assistance Related to Health Care	75	100
88	Social Services without Accommodation	50	75
90	Artistic and Show Activities	0	25
91	Libraries, archives, museums and other cultural activities	0	25
92	Gambling and betting Activities	0	25
93	Sports and Entertainment Activities	0	25
94	Association Activities	75	100
95	Computer and Communication Equipment Repair; Effects of personal and domestic use	0	25
96	Other Personal Service Activities	0	25
97	Household Activities as Employers of Domestic Personnel	0	25
99	Activities of Extraterritorial Organizations and Agencies	50	75