ASSESSING ECONOMIC RESILIENCE IN ITALY: A COMPARATIVE ANALYSIS OF SHOCKS AND SPATIAL DYNAMICS

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Abstract. This paper aims to assess the resilience of local economic units in Italy during two recent exogenous shocks: the financial crisis of 2008-2013 and the COVID-19 pandemic of 2019-2020. It examines resilience in terms of labour market performance and investigates the role of specialization, location and spillovers effects. It applies spatial analysis techniques to employment dynamics in Local Labour Market Areas to: (i) disentangle the role of specialization from that of location; (ii) identify the presence of homogeneous behavior patterns across units.

1. Introduction

The word "resilience" originates from the Latin verb *resilire*, that denotes the capacity of an agent to rebound following a shock or a disturbance.

Academic interest in the notion soared after the 2008 crisis. Notwithstanding its wide diffusion, there is no consensus on the exact definition of the concept. The most common ones range from engineering to ecological to adaptive resilience. As aptly noted by Compagnucci *et al.* (2022), by considering the ability/speed with which an economy recovers its initial equilibrium, engineering resilience refers to an approach *à la* Solow, according to which there exists a long-run growth path. Ecological resilience, instead, allows agents to reach a new equilibrium, given the magnitude of the shock. It studies a system's ability to adapt/evolve and follows an evolutionary, or Schumpeterian, approach. Within the evolutionary approach Martin (2012) and Martin and Sunley, (2015) develop the adaptive definition of resilience that focuses on the ability of an economy to withstand and/or recover from a shock by adapting its structure to the new conditions. From an empirical view point, resilience is often analysed with reference to two different phases, i.e. an area's ability to: (i) withstand shocks (resistance); and/or (ii) recover from them (recovery) (Martin, 2012).

Within economic geography, resilience focuses on the diverse abilities of territories to react to a downturn; by long, it is acknowledged as an important feature of territorial analysis. Even when a crisis hits all the units of a territory equally, its effects may spread unequally due to differences in local responses. Coming to the determinants of local resilience, the literature focuses on the sectoral structure of production as a key element that shapes the local reaction to a crisis, especially in the long run[2]. Highly specialized areas are generally thought to allow better

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[2] See, among others, Compagnucci et al. (2022), Lazzeretti and Oliva (2022), Lagravinese (2015).

resistance as they offer consolidated ties, shared routines, dedicated institutions and the like, while non specialized ones are generally more exposed to market forces, especially if they host new, innovative activities. However, diversified/unspecialized areas are also more sheltered from sector-specific crisis; being more flexible, they may grasp new opportunities and recover well in the longer run. Specialized ones, instead, could remain locked in traditional, often lagging, sectors (Boschma, 2015, Martini and Platania, 2019, Compagnucci *et al.*, 2022). What matters for resilience and long-run recovery is an appropriate mix of differentiation and specialization (Foray *et al.*, 2018), or production complexity (Hausmann *et al.*, 2013). In this framework the presence of technology-led, knowledge-intensive activities nested within the pre-existing structure is often found to be crucial for long run recovery. It allows agents to interact and cooperate, exchange ideas and develop innovative technologies, eventually adapting the local economy to the new external conditions.

This paper analyses the resilience of local economic units in Italy during and after two recent shocks: the 2008-2013 Great Crisis and the 2019-2020 COVID-19 pandemic. The two shocks are very different in nature. The first one, originated by the US credit boom and house price bubble, evolved into the sovereign debt crisis of 2011-13; it had both real and financial effects. The literature still debates its exogenous/endogenous character. In Italy as elsewhere, it caused the longest and deepest recession in peacetime. The second shock instead was entirely exogenous and had essentially short-lived effects. On this background, we investigate the role played by sectorial specialization and by location in local reactions to the crisis, with a focus on the well-known North-South divide. The latter is mirrored in the more diversified and advanced production structure of the Centre-North and in the far less diversified South, largely concentrated in low-technology traditional activities[3]. This suggests higher resistance in the South, but lower recovery post-crisis, and the opposite in the rest of the country. The paper tests this hypothesis. It focuses on the role of specialization and disentangles its effects from those of location. It addresses Local Labor Market Areas (LLMAs) in order to identify homogeneous local growth dynamics and spillover patterns for a rather fine territorial breakdown that differs from administrative boundaries and reflects only socio-economic factors[4].

The paper is organized as follows: paragraph 2 briefly describes the data and the methodology, providing some descriptive statistics; paragraph 3 presents the results while paragraph 4 summarizes and outlines some indication for further research.

2. Data and methodology

As in most of the literature, resilience is analysed with reference to employment[5]. Data are taken from ISTAT's (the Italian National Institute of Statistics) Labour Force Survey and refer

[3] See, among others, Chapman and Pipitone (2023), Chapman and Pipitone (2022), Asso et al. (2021).
[4] LLMAs are often identified as the best territorial breakdown to analyse local growth processes. For a discussion, see Martini and Platania (2019).
[5] The other alternative is value added, which is not currently available for Italian LLMAs.

to 610 LLMAs over 2008-2022[6]. For each LLMA we retrieve data on employment and on 17 specialization groups[7].

On the basis of employment dynamics in Italy we identify years 2008-13 and 2019-20 as crisis periods, in which we measure local units' ability to keep employment growth in line with the national rate (resistance)[8]. The periods between 2013-19 and 2020-22 are instead the years in which we expect recovery, defined as local units' capacity to outperform the country's average employment growth.

We measure resilience with reference to the indexes defined by Martin *et al.* (2016) for regional employment. As in Martini and Platania (2019), both resistance (y_{res}) and recovery (y_{rec}) indexes are modified in order to account for LLMAs.

$$y_{res} = \frac{(\Delta EMP_{llma}/EMP_{llma}) - (\Delta EMP_{nat}/EMP_{nat})}{|\Delta EMP_{nat}/EMP_{nat}|}$$

$$y_{rec} = \frac{(\Delta EMP_{llma}/EMP_{llma})}{(\Delta EMP_{nat}/EMP_{nat})}$$

($\Delta EMP_{llma}/EMP_{llma}$) and ($\Delta EMP_{nat}/EMP_{nat}$) are the percentage changes in employment respectively in the LLMA and in the country over a given period, measured as the difference between the first and last years of each period[9].

A preliminary picture of the territorial pattern of resistance/recovery in Italy's LLMAs may be gained from Figs. 1a and 1b.

Fig.1a maps resistance in the two crises, namely 2008-13 and 2019-20. At first sight, the map confirms a marked divide between the Centre-North and the South. However, behaviour changes a lot over time.

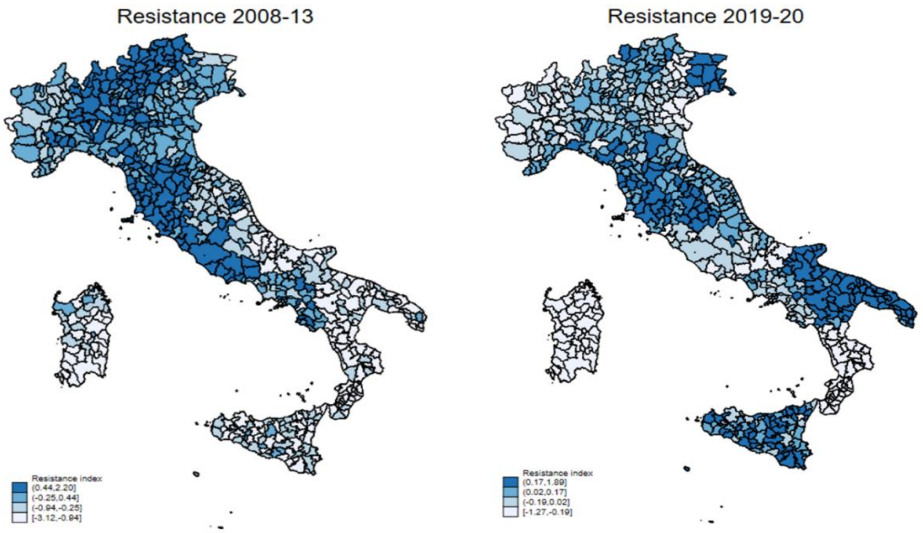
[6] LLMAs are self-contained areas defined on the basis of residents' commuting patterns for work. They are identified by ISTAT with reference to the 15th General Census of Population and Housing, using the new EURO methodology.

[7] These are: non-specialized LLMAs; non-manufacturing LLMAs (distinguished in: highly specialized urban, multi-specialized urban, non-specialized urban, port-oriented urban, Tourism, Agriculture); "Made in Italy" LLMAs (distinguished in Textile/clothing, Leather/hides, Machinery, Wood/furniture, Agro-Food, Jewelry/ eyewear/musical instruments); heavy manufacturing LLMAs (Means of transportation, Metal production/processing, Construction materials, Petrochemical/pharmaceutical).

[8] See, also Lagravinese, 2015, and Iacobucci and Perugini, 2021). Actually, after falling markedly in 2008-10, employment recovered somewhat in 2011, but fell further in 2012-13. It then grew until 2019; fell in 2020 and recovered later on. By 2022 it was slightly above the 2008 level.

[9] That is, respectively 2013 vs. 2008; 2019 vs. 2013; 2020 vs. 2019 and 2022 vs. 2020.

Figure 1a – *Resistance patterns in Italian LLMAs (2008-13 and 2019-20).*



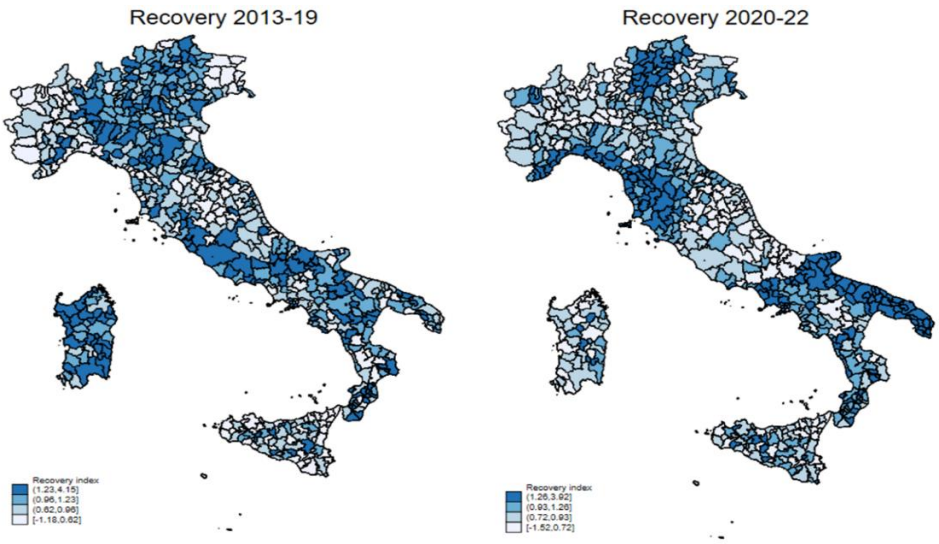
Source: our elaboration

Contrasting the literature, in 2008-13 the North and Centre (especially the Tyrrhenian coast) resist far better than the South[10]. Instead reactions to the 2019-20 shock are closer to the literature's indications, as many units in the North and in the Centre are badly hit, while the South generally resists better[11].

Fig. 1.b focuses on recovery patterns (respectively 2013-19 and 2020-22). In both periods the North-South divide is less evident. In 2013-19 recovery does not show any clear-cut territorial pattern, as many LLMAs throughout the country perform well (or badly). After the pandemic, recovery patterns change a lot: in the first place, response shows an evident regional distribution. Units perform well, or badly, depending on what occurs in the other units in the same (NUTS2) region, suggesting strong spillover effects. In the second place, and quite unexpectedly, while most units of the Centre-North (with some exception) lag behind, many ones in the South show high recovery. This again contrasts the indications of the literature that predict quicker and better recovery for more diversified, advanced territories such as those of the Centre-North[12].

[10] Martini and Platania (2019) reach similar results.
[11] Especially in the areas that refer to the (NUTS2) regions of Abruzzo, Campania, Puglia, Basilicata and Sicily. This does not apply to units in the areas of Molise, Calabria and Sardinia.
[12] As suggested by an anonymous referee, this can be explained by significant post-pandemic price pressure on manufacturing activity strongly affecting energy-intensive LLMAs in the Centre-North.

Figure 1b – *Recovery patterns in Italian LLMAs (2013-19 and 2020-22).*



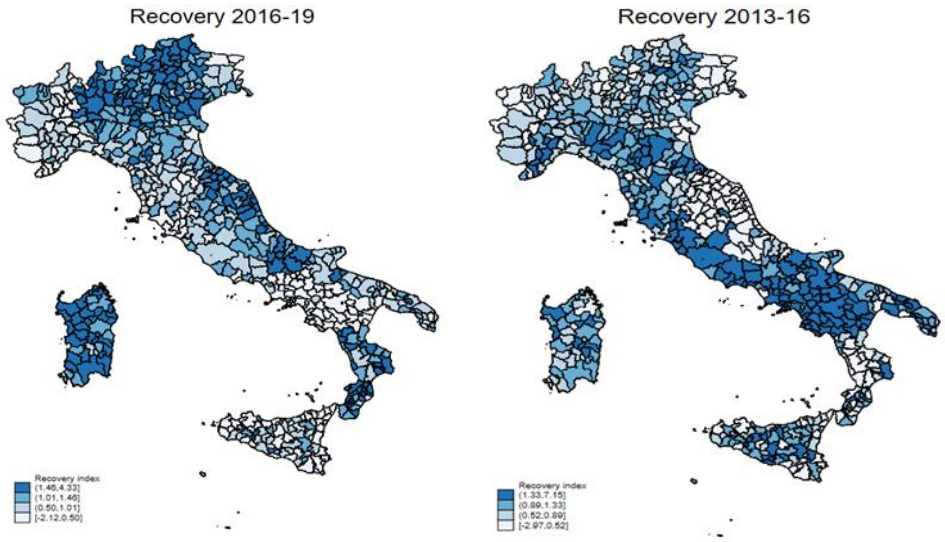
Source: our elaboration

On the other hand, Figs. 1a and 1b also suggest that resistance patterns carry on in the short run and shape the early phases of recovery[13]. This hypothesis is preliminarily investigated by splitting the 2013-19 recovery period into two phases: an initial one running from 2013 to 2016 and a later one starting in 2016, when resistance effects, if any, could be weaker. The breakdown is shown in Figure. 2. In the short run the map on the left (2013-16) broadly confirms similarity between resistance and recovery patterns, while in the longer run the map on the right (2016-19) shows that recovery largely follows different trajectories.

We conclude that the descriptive analysis strongly suggests that resilience patterns of Italian LLMAs confirm the literature's indications only in part. It also provides further hypothesis that are tested by means of spatial estimation techniques.

13 As expected, the correlation between resistance and recovery indexes for 2008-19 is negative, indicating that high resisting units recover weakly while low resisting ones display higher recovery. However, the correlation turns positive for 2019-22, suggesting that in this case recovery is largely dictated by resistance performance.

Figure 2 – *Recovery patterns in Italian LLMAs (2013-16 and 2016-19).*



Source: our elaboration

3. Estimates and results

We proceed to estimate the following simple equation for resistance and recovery indexes, conditional on (i) the specialization of each LLMA; and (ii) resistance/recovery in neighboring units, in order to capture spatial spillovers:

$$y = \beta_0 + \beta_1 X + \rho W y + \varepsilon \quad (1)$$

where $\boldsymbol{y}$ is a 610 x 1 vector of the resistance/recovery index for each LLMA; $\boldsymbol{X}$ is a 610 x 17 matrix of the LLMAs' 17 specialization dummies, $\boldsymbol{Wy}$ is the spatially lagged dependent variable y, $\boldsymbol{\varepsilon}$ is the vector of 610 x 1 vector of (normally distributed) errors. The response parameters are $\boldsymbol{\beta_0}$ (the constant), $\boldsymbol{\beta_1}$ and $\boldsymbol{\rho}$.

Equation (1) is estimated for each sub-period. Following the indications suggested by the descriptive statistics, the 2013-19 recovery is also split into two sub-periods. Results are shown in Tables 1 (2013-19) and 2 (2019-22).

Table 1 shows that during the Great Recession (2008-13) sectorial specialization matters for resistance: most sectors (14 out of 16), both in services and in manufacturing, perform significantly better than non-specialized ones (the reference group, omitted to avoid multicollinearity). Instead, specialization seems much less important for recovery; over the whole post-Recession period (2013-19), only two sectors -tourism and agriculture- significantly outperform non-specialized LLMAs[14].

[14] One –wood and furniture- significantly underperforms them.

The temporal breakdown in two sub-periods adds some detail: in the first place, specialization proves to be ineffective in the short run (2013-16). When it is significant, it determines underperformance. This occurs for four categories, three of which belong to manufacturing. However specialization gains importance in the mid-term (2016-19), when no manufacturing sector is (any more) significantly below the reference group[15] and two non-manufacturing ones (tourism and agriculture) are above it. This also suggests that recovery in manufacturing LLMAs is slower than in urban service-oriented ones.

Results change deeply for the COVID-19 shock (Table 2), when specialization loses importance: it has significant (negative) effects on resistance only for 3 sectors.

In the early recovery (2020-22) it actually appears as a drawback, as 9 out of 10 manufacturing categories and 2 out of 5 urban, service-oriented ones perform significantly worse than non-specialized ones. In other terms, results suggest that while specialization did help LLMAs to resist during the 2008-13 crisis, it was less important for the following recovery, especially in the short run. Specialization patterns were even less important in the 2019-22 crisis: they were mostly irrelevant for resistance and actually had a negative impact on recovery, at least in the short term. This has important implications; given that in Italy non-specialized units are entirely located in the South, this result ultimately helps understand the relatively good performance of many Southern LLMAs in 2020-22 (see Figure 1b)[16].

In both episodes spatial effects are positive, significant, and growing over time[17]. This is especially true for resistance. However, a well-known problem of models with spatially lagged endogenous variables as equation (1) is the endogeneity of spatial dependence tha does not allow to interpret coefficients as simple partial derivatives[18]. Hence a change in an explanatory variable in any unit generates global spillovers, implying that it changes the unit's own dependent variable and also the dependent variable of all other units which, in turn, feed back into the initial unit.

[15] Except Means of transportation for which, however, low recovery could be linked to long-standing sectoral issues.
[16] Martini and Platania (2019) reach similar results for the 2008 shock. They find that over 2013-17 the non-specialized LLMAs of the South recover more than the specialized ones of the Centre-North.
[17] Wald's test points to highly significant spatial terms in all periods (including sub-periods).
[18] See, among others, Golgher and Voss (2015).

Table 1 – *Spatial Autoregressive Model Estimates: Resistance (2008-13) and Recovery (2013-19; 2013-16 and 2016-19).*

VARIABLES	Resistance	Recovery	Recovery	Recovery
LLMA specialization	**2008-13**	**2013-19**	**2013-16**	**2016-19**
Urban: highly specialized	**0.540****	0.202	0.139	0.100
	(0.260)	*(0.224)*	*(0.370)*	*(0.250)*
Urban: multi-specialized	**0.386*****	-0.140	**-0.326****	-0.116
	(0.113)	*(0.097)*	*(0.160)*	*(0.109)*
Urban: port-oriented	**0.245***	-0.118	-0.093	-0.166
	(0.141)	*(0.121)*	*(0.201)*	*(0.135)*
Urban: non specialized	**0.188***	-0.0265	-0.052	-0.060
	(0.111)	*(0.096)*	*(0.159)*	*(0.107)*
Tourism	**0.419*****	**0.130***	0.130	**0.140***
	(0.085)	*(0.071)*	*(0.117)*	*(0.079)*
Agriculture	0.0383	**0.146***	0.009	**0.180***
	(0.098)	*(0.084)*	*(0.140)*	*(0.094)*
Textile/clothing	**0.256****	-0.0416	-0.223	0.072
	(0.111)	*(0.095)*	*(0.157)*	*(0.106)*
Leather/hides	**0.253****	-0.078	-0.231	0.017
	(0.126)	*(0.108)*	*(0.179)*	*(0.121)*
Machinery	**0.304*****	-0.0365	-0.247	0.041
	(0.112)	*(0.095)*	*(0.157)*	*(0.106)*
Wood/furniture	**0.209***	**-0.195****	**-0.504****	0.050
	(0.116)	*(0.099)*	*(0.165)*	*(0.111)*
Food	**0.347*****	0.00639	-0.042	-0.009
	(0.095)	*(0.081)*	*(0.135)*	*(0.009)*
Jewel./eyewear/music. instr.	**0.393****	-0.0715	-0.226	-0.027
	(0.188)	*(0.162)*	*(0.267)*	*(0.181)*
Means of transportation	0.0302	-0.151	-0.138	**-0.269***
	(0.156)	*(0.135)*	*(0.223)*	*(0.150)*
Metal production/processing	**0.333*****	-0.0587	**-0.279***	0.032
	(0.120)	*(0.102)*	*(0.169)*	*(0.114)*
Construction materials	**0.467*****	-0.0880	-0.114	-0.139
	(0.149)	*(0.127)*	*(0.211)*	*(0.142)*
Petrolchemical/pharm.	**0.402*****	-0.169	**-0.304***	-0.114
	(0.129)	*(0.110)*	*(0.182)*	*(0.123)*
Wy	**0.821*****	**0.405*****	**0.590*****	**0.680*****
	(0.035)	*(0.049)*	*(0.052)*	*(0.041)*
Constant	**-0.345*****	**0.662*****	**0.416*****	**0.416*****
	(0.0583)	*(0.0596)*	*(0.061)*	*(0.061)*

610 observations; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2 – *Spatial Autoregressive Model Estimates: Resistance (2019-20) and Recovery (2020-22).*

VARIABLES	Resistance	Recovery
LLMA specialization	**2019-20**	**2020-22**
Urban: highly specialized	0.123	-0.324
	(0.098)	*(0.217)*
Urban: multi-specialized	-0.046	**-0.306*** **
	(0.042)	*(0.094)*
Urban: port-oriented urban	-0.015	0.057
	(0.053)	*(0.118)*
Urban: non specialized	**-0.100** **	**-0.273** **
	(0.042)	*(0.093)*
Tourism	-0.022	-0.074
	(0.031)	*(0.069)*
Agriculture	**-0.146*** **	-0.117
	(0.037)	*(0.082)*
Textile/clothing	-0.041	**-0.252***
	(0.041)	*(0.0917)*
Leather/hides	-0.067	-0.168
	(0.047)	*(0.105)*
Machinery	-0.038	**-0.305*** **
	(0.041)	*(0.092)*
Wood and furniture	-0.016	**-0.207** **
	(0.043)	*(0.096)*
Food	0.048	**-0.132***
	(0.036)	*(0.079)*
Jewelry/eyewear/musical instruments	**-0.140** **	**-0.306***
	(0.071)	*(0.156)*
Means of transportation	-0.046	**-0.553*** **
	(0.059)	*(0.130)*
Metal production/processing	-0.031	**-0.279** **
	(0.045)	*(0.0987)*
Construction materials	-0.069	**-0.229***
	(0.056)	*(0.123)*
Petrolchemical/pharmaceutical	-0.055	**-0.334** **
	(0.048)	*(0.107)*
Wy	**0.871*** **	**0.457*** **
	(0.034)	*(0.060)*
Constant	0.027	**0.827*** **
	(0.020)	*(0.000)*

610 observations; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To investigate the spatial dimension of equation (1) we split the total effect of each specialization group into two components: a direct effect, that measures the impact on each unit's resistance/recovery (plus feedbacks) and an indirect one that accounts for spatial spillovers, i.e. it measures the effect on the dependent variables of all other LLMAs. Results are shown in Tabs. 3 and 4.

Table 3 – *Direct and indirect effects of specialization on resistance (2008-13) and recovery (2013-19).*

VARIABLES	**Resistance (2008-13)**		**Recovery (2013-19)**	
LLMA specialization	dir. effect	indir. effect	dir.effect	indir. effect
Urban: highly specialized	0.623**	1.320**	0.178	0.082
Urban: multi-specialized	0.445***	0.944***	-0.161	-0.075
Urban: port-oriented urban	0.283*	0.599*	-0.136	-0.063
Urban: non specialized	0.217*	0.461	-0.036	-0.017
Tourism	0.484***	1.025***	0.106*	0.049*
Agriculture	0.044	0.094	0.147*	0.068
Textile/clothing	0.295**	0.625**	-0.059	-0.027
Leather/hides	0.292**	0.619**	-0.097	-0.045
Machinery	0.351***	0.744***	-0.059	-0.027
Wood/furniture	0.241*	0.510*	-0.216**	-0.099**
Food	0.400***	0.848***	-0.010	-0.005
Jewel./eyew./music.instr.	0.453**	0.961**	-0.096	-0.044
Means of transportation	0.035	0.074	-0.162	-0.075
Metal prod/processing	0.384***	0.815***	-0.084	-0.039
Construction materials	0.538***	1.141***	-0.113	-0.052
Petrolchemical/pharm.	0.463***	0.982***	-0.173	-0.081

Table 4 – *Direct and indirect effects of specialization on resistance (2019-20) and recovery (2020-22).*

VARIABLES	**Resistance (2019-20)**		**Recovery (2020-22)**	
LLMA specialization	dir. effect	indir. effect	dir.effect	indir. effect
Urban: highly specialized	0.147	0.399	-0.379*	-0.184*
Urban: multi-specialized	-0.055	-0.149	-0.290***	-0.141***
Urban: port-oriented urban	-0.018	-0.048	-0.064	-0.031
Urban: non specialized	-0.120**	-0.325**	-0.204**	-0.099**
Tourism	-0.026	-0.070	-0.068	-0.033
Agriculture	-0.174***	-0.474***	0.050	0.024
Textile/clothing	-0.048	-0.131	-0.242***	-0.112**
Leather/hides	-0.078	-0.217	-0.163	-0.079
Machinery	-0.045	-0.122	-0.289***	-0.141***
Wood/furniture	-0.019	-0.052	-0.233**	-0.113**
Food	0.057	0.155	-0.170**	-0.083**
Jewel./eyew./music.instr.	-0.167**	0.454*	-0.238	-0.116
Means of transportation	-0.055	-0.150	-0.527***	-0.256***
Metal prod/processing	-0.037	-0.101	-0.274***	-0.133**
Construction materials	-0.083	-0.224	-0.214*	-0.104*
Petrolchemical/pharm.	-0.066	-0.179	-0.312***	-0.152***

Starting from the Great Recession, Table 3 shows that specialization –which, as argued above, matters a lot for resistance- produces average indirect effects, i.e. spatial spillovers, double in size with respect to own effects. In other terms, it favours resistance in neighbouring LLMAs more than it does in the initial one. Instead specialization has very weak spatial effects

for recovery. In the few cases in which it is significant -tourism, agriculture and (with a negative impact) wood and furniture- the own effect counts more than the indirect one.

As said, the results for the COVID episode differ. Table 4 shows that specialization determines significant (lower) resistance in only a few cases, namely in unspecialized urban LLMAs and in LLMAs specialized in agriculture and in jewelry, eyewear and musical instruments[19]. Indirect effects are again bigger in value than own ones. In recovery (2020-22) specialization has both negative direct and indirect effects, but own effects are far bigger in value (on average more or less double the direct ones).

In other terms, Tables 3 and 4 show that specialization creates big territorial spillovers only during resistance. When recovery occurs own effects prevail. This is especially evident for manufacturing in 2019-22.

4. Conclusion

This paper analyses the resilience patterns of Italian LLMAs over two recent, wide-sweeping, exogenous shocks: the Great Recession and the one tied to the COVID-19 pandemic. It highlights a number of points. First, response patterns change significantly over time; most units do not perform uniformly over the two episodes and in their aftermaths. Moreover, we find that, at least in the short run, recovery patterns largely overlap with resistance ones and that only over time a different trajectory takes shape. This suggests that resistance performance may have an impact on the early years that follow the crisis. Coming to the spatial dimension of the analysis, our results confirm the presence of a divide between the Centre-North and the South. Over time, a rather clear tendency towards the "regionalization" of response may be traced, as LLMAs located within a same region tend to perform uniformly. Also, spatial effects are strong and significant, especially for resistance. In other terms, resistance spreads spatially and has an impact on territories' performance. Instead recovery, if any, is mostly an individual matter.

Finally, and more important, we find that resilience patterns in Italy's LLMAs reflect the literature's indications only in the Great Recession, when specialized units resist well and recover with difficulty. This confirms that in that case traditional, less diversified structures offered a better shelter in a crisis but provided lower opportunities for recovery and often led to a lock-in. However, during the pandemic crisis, the pattern changed radically: it was the non-specialized units –all located in the South- that performed better with respect to the specialized ones of the Centre-North, suggesting that in this case non-specialized/diversified economic systems, such as those prevailing in the South, provided the flexibility/adaptability that allowed resistance and early recovery. This is an interesting result that needs to be investigated; we leave it to further research.

[19] The sector shows a significant positive indirect effect alongside a negative direct one, implying that this type of specialization favours resistance in neighbouring LLMAs, but not at home.

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