

On the economic and health impact of the Covid-19 on Italian regions *A value chain approach*

T. Ferraresi L. Ghezzi F. Vanni M. Guerini F.
Lamperti G. Fagiolo A. Caiani M. Napoletano A.
Roventini S. Reissl



Sant'Anna
Scuola Universitaria Superiore Pisa

SciencesPo
ofce



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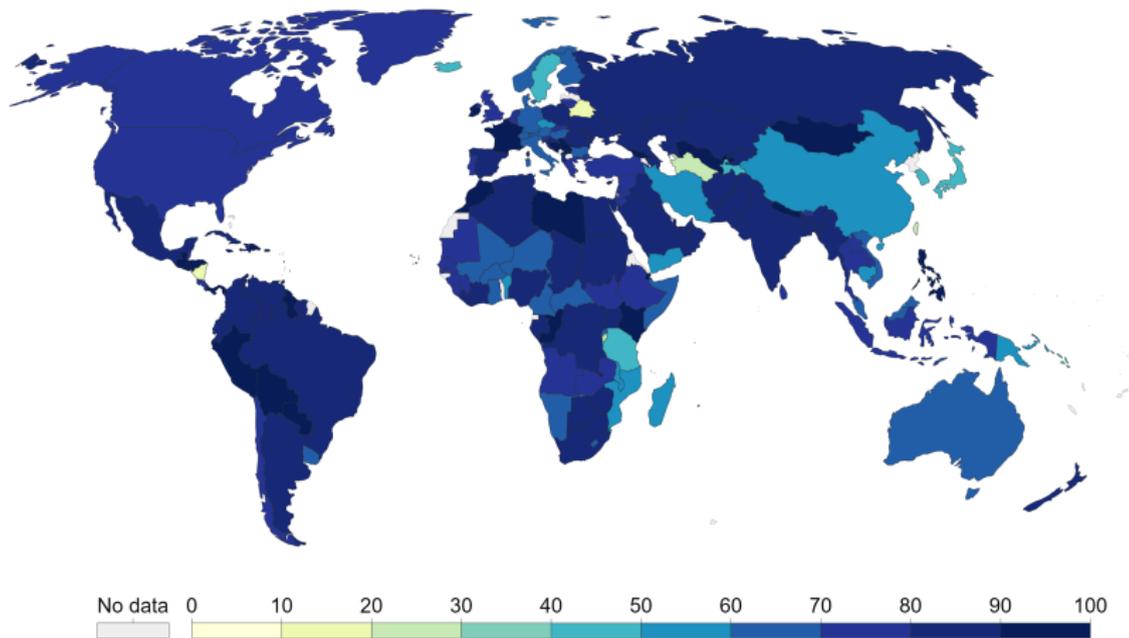
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MACROECONOMICS OF
SOCIO-ECOLOGICAL TRANSITION
28 OCTOBER - 30 OCTOBER 2021

#25FMM

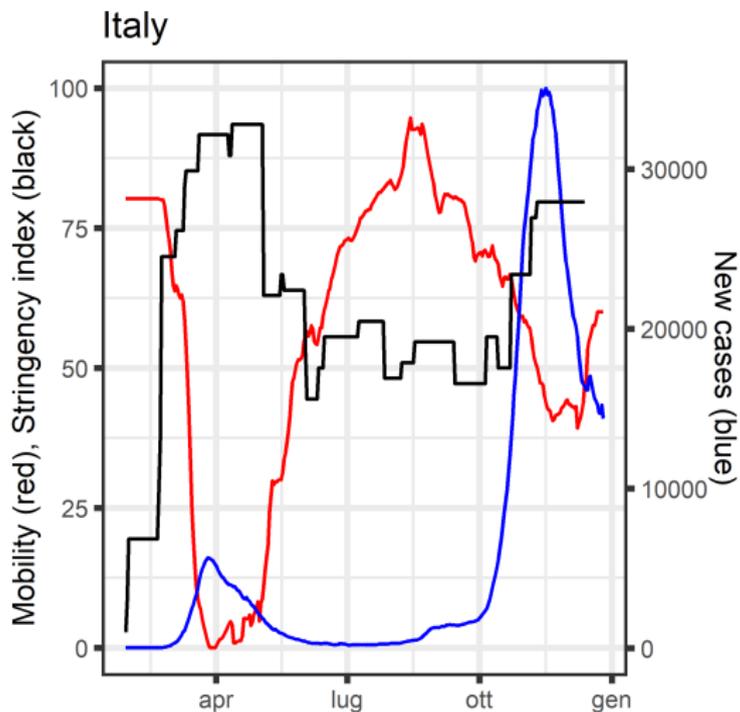
COVID-19: Government Response Stringency Index, May 7, 2020

The Government Response Stringency Index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest response).



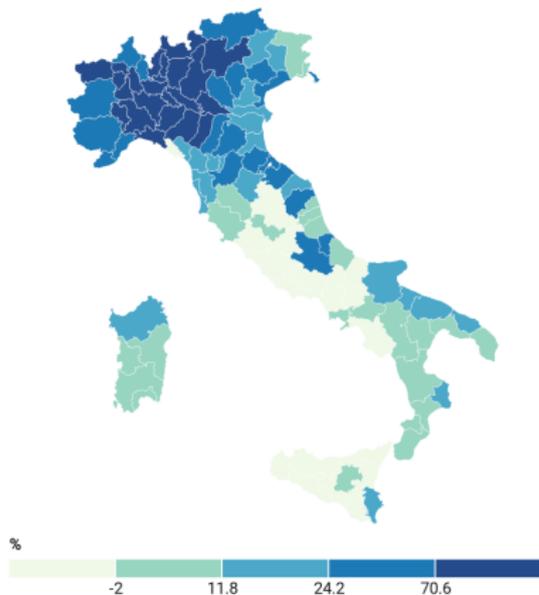
Source: Hale, Webster, Petherick, Phillips, and Kira (2020). Oxford COVID-19 Government Response Tracker – Last Updated 5th June.
Note: This index simply records the number and strictness of government policies, and should not be interpreted as 'scoring' the appropriateness or effectiveness of a country's response.
OurWorldInData.org/coronavirus • CC BY

Italy: Covid-19, containment measures and mobility



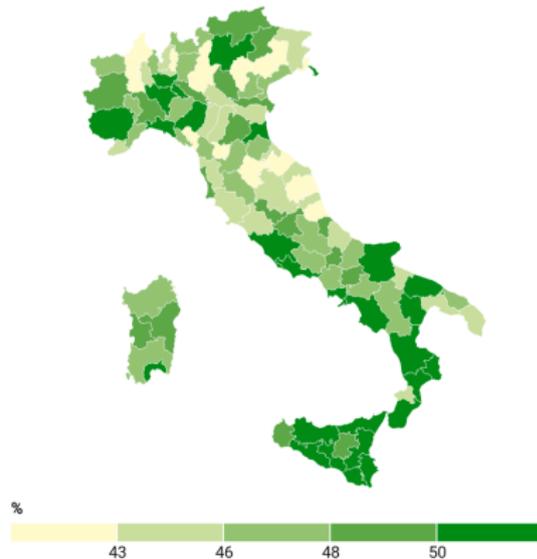
The demand for a regional and sectoral approach

Excess mortality



Source: Elaborations on ISTAT data - Created with Datawrapper

Employment in sectors providing essential goods and services



Source: Elaborations on ISTAT data - Created with Datawrapper

The demand for an interregional-intersector approach

Production steps:
manufacturing, business
services, logistics,
commercial services



Localized final demand
activates
geographically
dispersed production



Each production step
can be thought as a
collection of tasks,
each characterized by
a different degree of
contagion risk, as well
as a different remote
work potential

Our work in a nutshell

1. We build up interregional value chains from a final demand perspective and distinguish the places of consumption from those of production
2. For each value chain we estimate – by region and sector – activated production and employment
3. To each occupation we attach a risk of being infected by Covid-19 and a probability for telework
4. We explore the correlation between economic exposure and health risk

The IRPET-ICIO database, 2015

Region	Intermediates			Final demand			
	Pie	Vda	r	ROW	Pie	Vda	ROW
Sector	1..32	1..32	1..32	1..32	1..5	1..5	1..5
Pie	32..1						
Vda	32..1						
s	32..1						
ROW	32..1						
Value added							
Indirect taxes							
Transport margins							

The value chains through the Leontief inverse



$$\begin{bmatrix} l_{11} & \dots & l_{1j} & \dots & l_{1r} \\ l_{21} & \dots & l_{2j} & \dots & l_{2r} \\ \vdots & & & & \vdots \\ l_{s1} & & l_{sj} & \dots & l_{sr} \\ \vdots & & \vdots & & \vdots \\ l_{r1} & \dots & l_{rj} & \dots & l_{rr} \end{bmatrix} \times \begin{bmatrix} Fd_1 \\ \vdots \\ Fd_s \\ \vdots \\ Fd_r \end{bmatrix} = \begin{bmatrix} \sum l_{1j} Fd_j \\ \vdots \\ \sum l_{sj} Fd_j \\ \vdots \\ \sum l_{rj} Fd_j \end{bmatrix}$$

$$Fd + AFd + A(AFd) + \dots + A(A^{n-1})Fd$$

$$(I + A + A^2 + \dots + A^n)Fd$$

$$(I - A)^{-1}Fd = LFd$$

The **value chain**

⇐ The activation of each sector/region to directly/indirectly serve final demand needs

Our value chains

Internal consumption	<i>Essential</i> Food Beverages Health	<i>Medium</i> Communication Housing Transport Education	<i>Others</i> Clothing Furnishing Recr. & culture Restaurants & hotels Misc.
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Internal investment	Construction investment Other investment
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Exports	Australia, Austria, Belgium, Bulgaria, Brazil, Canada, Chile, China, Cyprus, Czech Rep., Germany, Denmark, Spain, Estonia, Finland, France, UK, Greece, Croatia, Hungary, Indonesia, India, Ireland, Japan, South Korea, Lithuania, Luxembourg, Latvia, Mexico, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Sweden, Turkey, Taiwan, US, Rest of World
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Attaching employment, Covid-19 risk and remote work

1. Once estimated production activated by each demand shock we compute employment by multiplying by regional/sector employment per euro of production (i.e., $L_{i,j,z} = \frac{L_{i,j}}{Y_{i,j}} \times Y_{i,j,z}$ where i = region, j = sector, z = value chain).
2. We compute Covid-19 related risk and the teleworkability of each profession by relying upon INAPP (ICP) and ISTAT (Forze di Lavoro) data (years: 2016, 2017, 2018)

Covid-19 risk

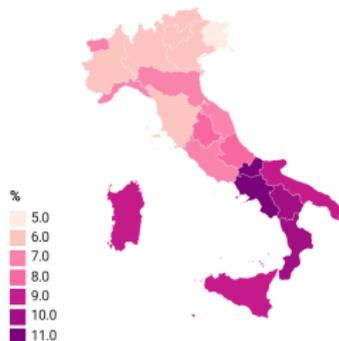
1. INAPP survey: exposure to infections, physical proximity
2. No substitution among dimensions: Covid risk index as a $\max(x, y)$; alternative: the two dimensions are kept separated so as to capture two different aspects of Covid related risk
3. Matching with FDL survey in order to get sectors of employment at the regional level
4. We considered as at risk the occupations displaying a risk index above the average

Remote work

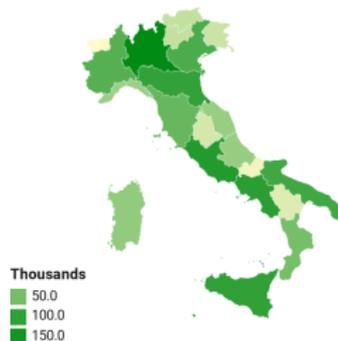
1. INAPP survey which captures different aspects of working life at 5 digits level
2. Teleworkable professions at 4 digits as identified in Duranti et al. (2020): <http://www.irpet.it/wp-content/uploads/2020/06/cr-covid-19-n-1-29-05-2020-1.pdf>; alternative: index built as in Barbieri et al. (2020)... however: they allow for substitution among dimensions...
3. Matching with FDL survey in order to get sectors of employment at the regional level
4. We then considered as at risk the employees i) with a Covid-19 risk above the average and ii) who cannot work from home

The food value chain

Production

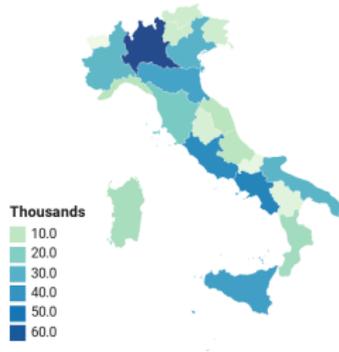


Employment



Created with Datawrapper

Employment at risk

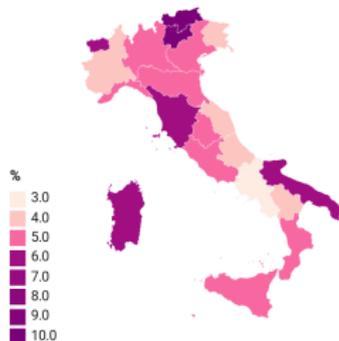


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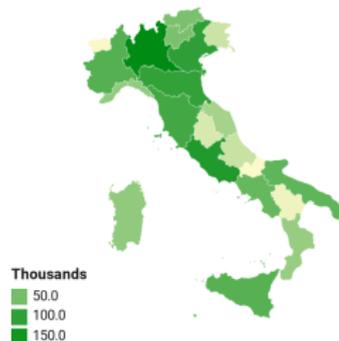
- More than 1 million of employees
- A large share of employment in manufacturing...
- ... and 37.0% of jobs at risk

The accommodation and restaurant value chain

Production

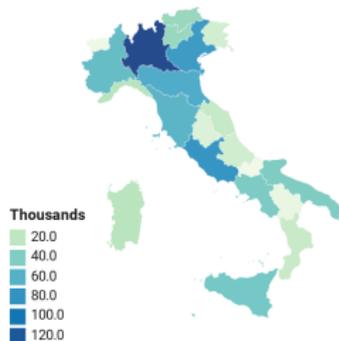


Employment



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Employment at risk

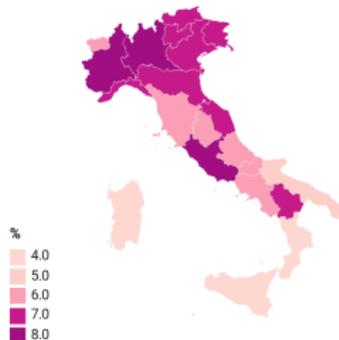


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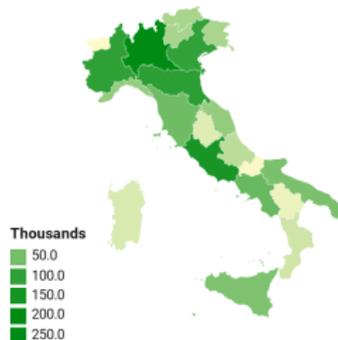
- More than 1 million of employees
- A large share of employment in service sectors...
- ... high Covid risk and low teleworkability (66.9%)

Non-construction investment

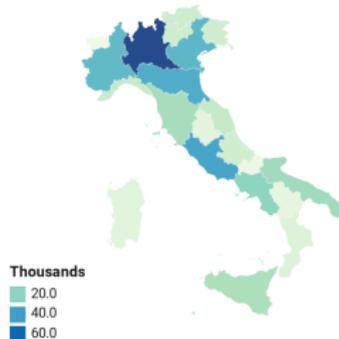
Production



Employment



Employment at risk



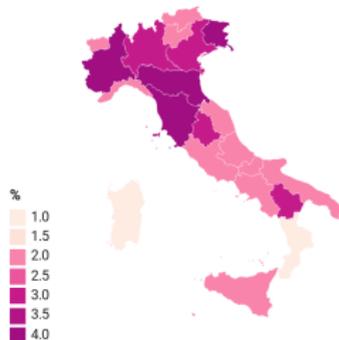
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- 1 mil. of employees, mostly in the North
- large share of manufacturing jobs
- less than 1 third of employment at risk

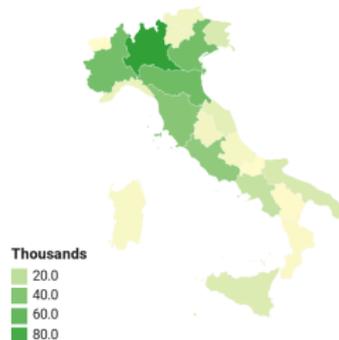
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Exports: US

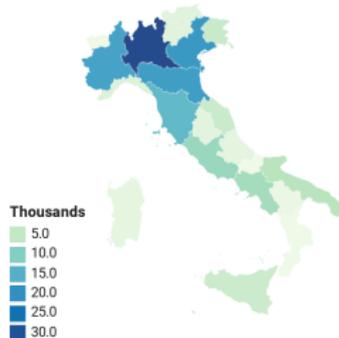
Production



Employment



Employment at risk



Created with Datawrapper

- 400 thousands employees, mostly in the North
- large share of manufacturing jobs..
- 1 third of employment at risk

Created with Datawrapper

Economic exposure: a summary

Region	<i>value-chain group</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Piedmont	9%	15%	16%	6%	8%	34%
Aosta Valley	10%	18%	17%	12%	6%	18%
Lombardy	9%	14%	18%	6%	8%	35%
Trentino Südtirol	9%	14%	21%	11%	7%	21%
Veneto	9%	14%	17%	7%	7%	35%
Friuli Venezia Giulia	9%	14%	18%	6%	7%	31%
Liguria	11%	20%	16%	7%	7%	24%
Emilia-Romagna	11%	14%	16%	6%	7%	34%
Tuscany	9%	16%	19%	7%	6%	30%
Umbria	12%	17%	19%	8%	6%	22%
Marche	11%	16%	20%	7%	7%	26%
Lazio	11%	17%	20%	8%	8%	18%
Abruzzo	12%	16%	16%	10%	6%	23%
Molise	16%	18%	16%	10%	6%	14%
Campania	15%	17%	17%	8%	6%	15%
Apulia	13%	20%	19%	8%	5%	15%
Basilicata	14%	15%	15%	12%	7%	22%
Calabria	15%	22%	18%	9%	4%	5%
Sicily	14%	24%	17%	7%	4%	9%
Sardinia	13%	20%	17%	8%	4%	16%

(1): Essential goods and services; (2) Goods and services of medium necessity; (3) Other goods and services; (4) Construction investment; (5) Other investment; (6) Exports

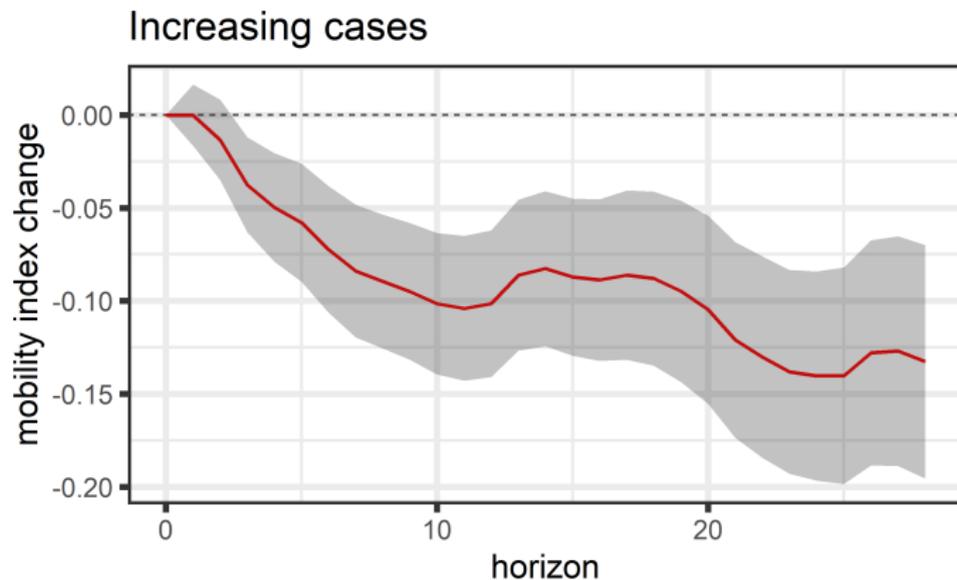
Employment at risk and remote work potential

Region	<i>Food & beverages</i>			<i>Restaurants & hotels</i>		
	Employees	at risk	but can telework	Employees	at risk	but can telework
Piedmont	70	48%	19%	72	78%	9%
Aosta Valley	2	53%	15%	4	84%	12%
Lombardy	187	45%	24%	198	74%	12%
Trentino Südtirol	19	48%	19%	45	78%	9%
Veneto	77	48%	20%	103	81%	12%
Friuli Venezia Giulia	18	49%	18%	18	77%	9%
Liguria	25	52%	15%	31	82%	11%
Emilia-Romagna	94	47%	21%	96	75%	13%
Tuscany	60	46%	22%	83	78%	13%
Umbria	15	46%	20%	14	77%	13%
Marche	26	49%	16%	24	78%	8%
Lazio	123	45%	23%	127	72%	14%
Abruzzo	26	50%	18%	19	79%	8%
Molise	6	51%	13%	3	79%	12%
Campania	109	48%	14%	59	78%	10%
Apulia	84	40%	15%	64	72%	11%
Basilicata	12	38%	14%	7	72%	10%
Calabria	49	35%	14%	26	66%	7%
Sicily	100	42%	14%	69	72%	11%
Sardinia	30	53%	13%	31	80%	12%

A link between economic exposure and contagion risk?

	(1) Workers at risk	(2) Workers at risk (non remote)
<i>Constant</i>	0,551***	0,480***
Beverages	-0,0360	-0,0254
Clothing	-0,235***	-0,166***
Housing	-0,295***	-0,249***
Furnishing	-0,133*	-0,0873
Health	-0,0554	0,0107
Transport	-0,121*	-0,0707
Communication	-0,222***	-0,180***
Recreation & Culture	-0,191***	-0,232***
Education	0,163**	-0,429***
Restaurants & Hotels	0,0408	0,0986*
Misc.	-0,213***	-0,158**
<i>Spec.</i>	-0,0954**	-0,0678**
Beverages x <i>Spec.</i>	-0,169*	-0,121
Clothing x <i>Spec.</i>	0,209***	0,158***
Housing x <i>Spec.</i>	0,132**	0,0950**
Furnishing x <i>Spec.</i>	0,0439	0,0119
Health x <i>Spec.</i>	0,185***	0,103*
Transport x <i>Spec.</i>	0,0560	0,0213
Communication x <i>Spec.</i>	0,00646	0,0712
Recreation & Culture x <i>Spec.</i>	0,0912*	0,0644
Education x <i>Spec.</i>	-0,0816	0,0730
Restaurants & Hotels x <i>Spec.</i>	0,107***	0,0765**
Misc. x <i>Spec.</i>	0,0794*	0,0584*
Business services	0,0817	-0,164*
Personal services	0,174***	0,124***
<i>N</i>	240	240

A trade-off between health and the economy?



Beyond the pandemic: Covid-19 as a natural disaster

- A bunch of extensions dealing with
 - supply chain disruptions: asynchronous lockdowns, Brexit, bottlenecks in the supply of raw materials and components
 - the inter-LMAs model
 - the impact natural disasters linked to climate change
 - the impact of FDIs, firms bankruptcies and relocations
 - digitization and green transition
- ..through the building of micro-macro links via agent- or quasi-agent based models (and inter-LMAs models for all Italian NUTS2 regions)
- and an extension to commuting data and inter-LMAs wage flows