POLICY BRIEF
SERIES

NES New Economic School

INTERNAL MIGRATION AND THE SPREAD OF COVID-19

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The technical paper is available at: cepr.org/sites/default/files/news/CovidEconomics18.pdf
More information about my research here: sites.google.com/site/michelevalsecchi/

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EXECUTIVE SUMMARY

Once Covid-19 hits a country, it spreads. And it spreads because people move. Epidemiological models predict diffusion based on how people move in normal times (i.e., in the past) or using real-time data. Both approaches have shortcomings. Mobility in normal times might be extremely different from mobility during a pandemic (even in absence of government restrictions on mobility) and therefore its use might lead to misleading predictions. Predictions based on real-time data might come too late to be useful for preventive measures. Economics can provide useful insights on the motives for people to move during a pandemic, and might therefore help address these shortcomings.

The key idea of this policy brief and its underlying research is that a key agent in the diffusion of the virus might be the internal migrant. Covid-19 hits first the biggest economic centres in a country, because they are more exposed to international trade, tourism and international migration. As the virus spreads in these economic centers, central governments shut down economic activities and ask people to stay home. These measures leave recently settled migrants jobless and social isolated and therefore push them to go back to their home towns. By doing so, they spread the virus much further away from the outbreak than other models would predict. To a certain extent, internal migrants may become super-spreaders, not because of some medical condition, but because of their socio-economic condition.

The analysis proceeds in the following steps:

1. I develop a methodology to identify, for a given country, which regions are more exposed to return migration than others and I explain in detail what data are needed to calculate such exposure, so that anybody with access to subnational data on pre-Covid migration might calculate such index and therefore predict which regions have the highest risk.
2. I then validate this methodology using Italy regional-daily data on Covid deaths and pre-Covid data on recently settled migrants. The results of the analysis support the key idea of the paper: one percent increase in exposure to return migration leads to 1-2 percent additional daily Covid deaths per million inhabitants throughout most of the first wave of contagion. Such effect is not only statistically, but also quantitatively important. A back-of-the-envelope calculation suggests that, had all regions been as exposed as the one at the 10th percentile, Italy would have had 22-24 percent fewer deaths than the ones it experienced outside outbreak areas.

The index and its validation might be particularly important for Muslim countries. As the end of the Ramadan approaches, millions of people prepare to migrate back to their home towns to celebrate Eid al-Fitr. It is hard to over-stress how such return migration might result in a health disaster.

1 INDEX CAPTURING REGIONAL EXPOSURE TO RETURN MIGRATION

The goal of this index is to identify regions or any subnational unit more exposed to return migration than others. The key ingredients of such index are i) the identification of outbreak areas, and ii) data on the number of people who migrated to these areas during the past 3-5 years.

Let *outbreak* indicate the set of regions with the first Covid deaths in a given country. The exposure index is essentially the number of people that moved from region of origin *o* to any region of destination *d* located in the outbreak area within the previous *s* years. The index is normalized to the population in region of origin *o*.

$$exposure_{o,t-1} = \frac{1}{pop_o} \sum_{d \in \{outbreak\}} \sum_{s=1}^{3} d_{o,d}^{t-1,t-s}$$

Higher values of this index indicate higher exposure to return migration and therefore to Covid-19.

It is hard to tell a priori how many past years one should consider, *i.e.*, what *s* should be. For Italy (see next section), I experimented with 1, 3 and 5 years and results were very similar, possibly because internal migration in Italy is very persistent over time. In other contexts, one should perhaps repeat such experimentation or make a well-educated guess based on how volatile internal migration is or on whether internal migration there went through some change in recent years.

The index illustrated above does not take into account physical distance to the outbreak. In most settings, this is inconsequential. Let me explain why. Absent internal migration, distance to the outbreak should be associated with fewer Covid deaths, because the virus transmits through human-to-human interactions, and therefore far away regions will be affected last. In most settings, greater distance should also be associated with fewer migrants, because greater distance means greater costs to migrate. In all these settings, the greater $exposure_{o,\,t-1}$, the greater is the threat of Covid-19.

However, in some contexts (like Italy, see next section), pre-Covid migration to outbreak areas is *positively* correlated with distance to outbreak areas[1] and it is therefore important to condition the index to distance to the outbreak. Let $distance_{o,outbreak}$ be the physical distance between region of origin *o* and the outbreak area. Then estimate:

$$exposure_{o,t-1} = \alpha + \beta ln(distance_{o,outbreak}) + \varepsilon_{o,t-1}$$

1. In Italy, migration to the North, and Milan in particular, is stronger in regions most far away from it.

The residuals of this estimation correspond to the adjusted index: $\widetilde{exposure}_{o,\,t-1}$.

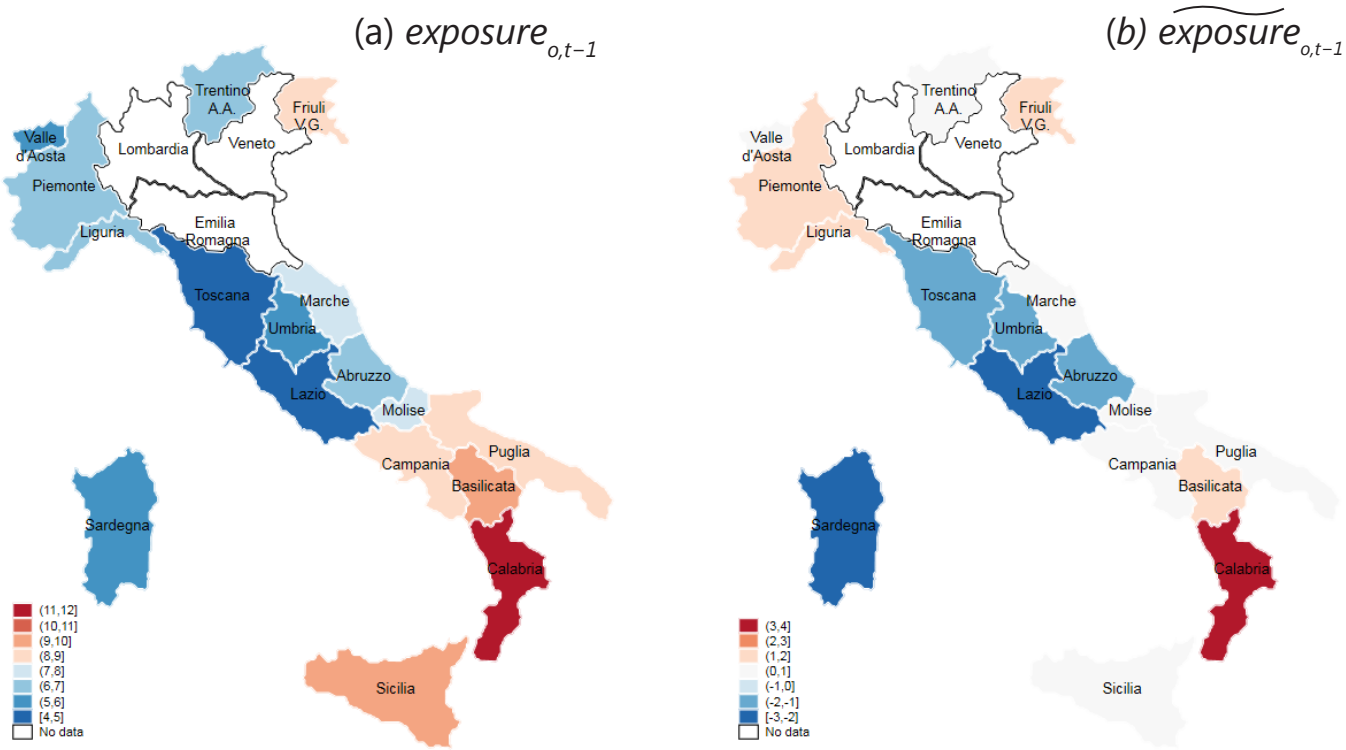
Needless to say, in case of doubt it is always best to compute the index in both ways, compare the results and rely on the adjusted index if the results do not coincide.

2 VALIDATION USING ITALIAN DATA

In recent work,[2] I test whether this exposure index helps explain Covid deaths across Italian regions outside outbreak areas.

Italy is a good setting to test this hypothesis, because historically there is substantial internal migration and because such migration varies greatly across regions. In addition, the outbreak of Covid-19 was quite unambiguously localized in three Northern regions: Lombardia, Veneto and Emilia-Romagna (henceforth, LVE). These regions experienced the first Covid deaths between the 21th and 26th February, while the rest of the country did not experience any until the 2th March.

FIGURE-1 Exposure to return migration from outbreak areas across Italian regions



Notes: exposure to return migration (panel a) is the number of people who changed residence from region o to outbreak areas (in white: Lombardia, Veneto and Emilia-Romagna, or LVE) for every 1000 inhabitants. Panel b) shows the same index partialled out by log (distance to LVE).

2. Valsecchi, Michele. 2020. "Internal Migration and the Spread of Covid-19," CEPR Covid Economics 18 (15th May 2020).

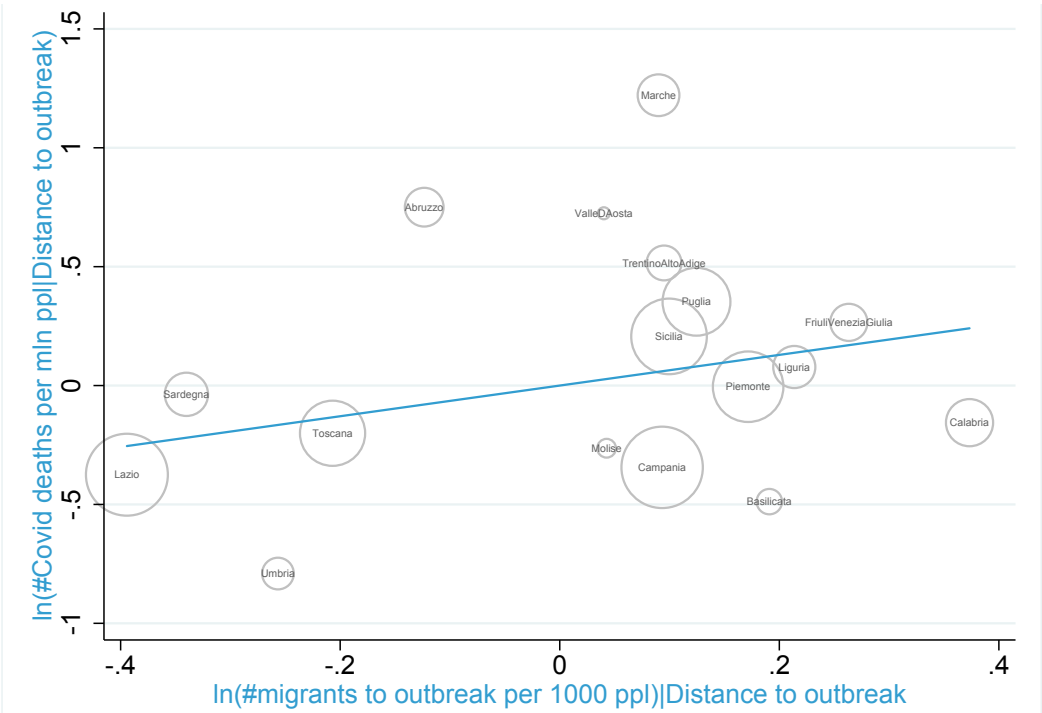
Using cross-regional yearly data on changes of residence and the method described in the previous section, I computed the exposure of each Italian region to the outbreak areas. Figure-1.a) illustrates the cross-regional variation in exposure the raw index ($exposure_{o,t-1}$). Since Italy is one of those countries where, historically, regions more far away from the North have the highest number of migrants,[3] I computed the adjusted index as well (Figure-1.b).

The important takeaway of figure-1 is that regions located at similar distance to the outbreak areas have different exposure to Covid-19.

Next, I test whether different exposure to return migration from outbreak areas is associated with higher Covid fatalities. Even though a discussion of the statistical methods used for this test is beyond the scope of a policy brief and it is relegated to the technical report,[4] there are two transparent and insightful ways to see whether the relationship holds.

First, one can look at the cross-sectional relationship between exposure and mortality. Figure-2 shows that the relationship is positive and does not depend on any specific Italian region. The slope of the relationship (0.65) indicates that a one percent increase in exposure to return migration is associated with 0.65 percent additional Covid deaths (per million inhabitants).[5]

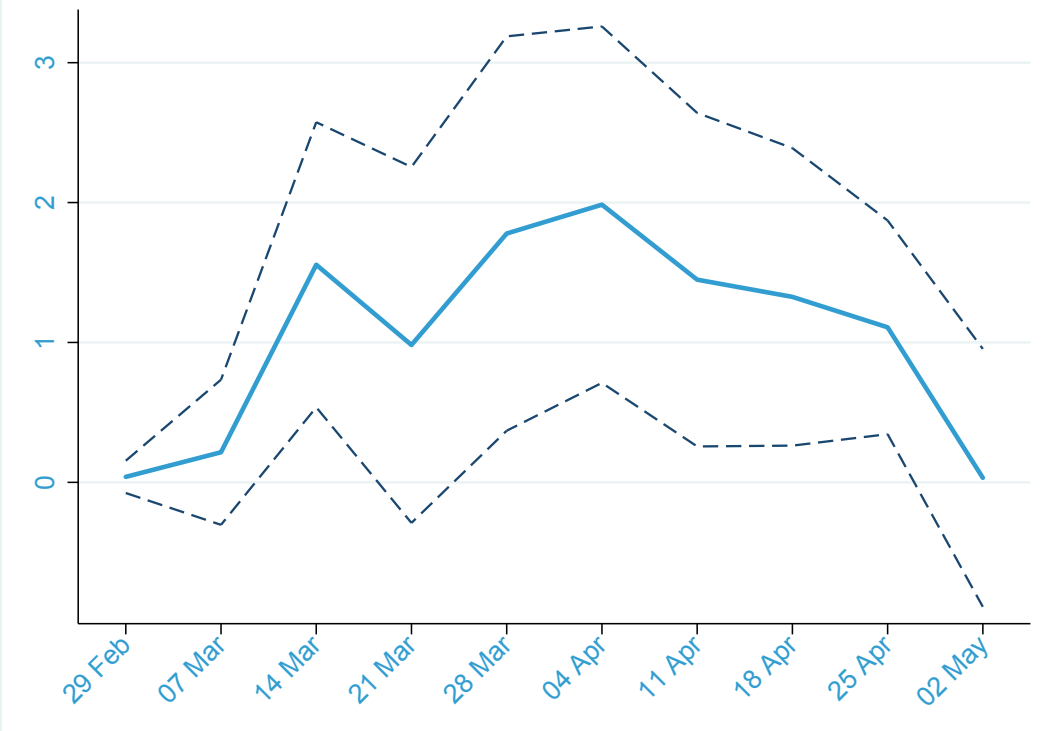
FIGURE-2 Exposure to return migration and Covid deaths in Italy



3. This point is explained in more detail in the CEPR Covid version of this article.
4. Valsecchi. 2020. "Internal Migration and the Spread of Covid-19," CEPR Covid Economics 18 (15th May 2020)
5. Unfortunately, the need to partial out distance to outbreak areas in both the exposure index and the mortality index makes the two axes hard to read.

Second, one can look at how the relationship between exposure to return migration and Covid deaths evolves over time. Figure-3 shows that the relationship is absent during the first period, and then jumps to about 1, stabilizes there, and finally returns to about zero in the last week for which data are available. Importantly, the end of the analysis corresponds to the end of the of the first wave of Covid-19 in Italy: while at the peak (end of March, beginning of April) there were more than 900 deaths per day in the country, there were just above 200 per day at the beginning of May. Hence, what Figure 3 says is that, throughout most of the first wave of Covid-19, a one percent increase in exposure to return migration is associated with a 1-2 percent additional Covid deaths (per million inhabitants), i.e., a lot higher than what Figure-2 suggested.

FIGURE-3 Migrants to outbreak and Covid-19 deaths



Media reports suggest that, following the lockdown of school and universities in outbreak areas (23th-24th February), there was a substantial outflow of people to Southern regions. While it is hard to tell how long it could take for this differential migration to translate into additional deaths, the 2-3 weeks suggested by Figure-3 seem to be a reasonable amount of time. Along similar lines, it seems reasonable that, as the virus completes its curve and the effect of strict quarantine policies throughout the entire country, the difference between highly exposed and less exposed regions fades away.

How many deaths can we attribute to internal return migrants? A back-of-the-envelope calculation suggests that, had all regions had the same exposure to return migration as the region at the 10th percentile, Italy would have experienced 2,083-2,261 fewer deaths, *i.e.*, around 22-24 percent fewer deaths than what all regions outside outbreak areas actually experienced.

3 CONCLUSIONS AND POLICY IMPLICATIONS

This policy brief summarizes the analysis and the findings of a longer technical paper (Valsecchi 2020). I ask whether internal migration can help spread Covid-19.

The mechanism is simple: widespread closure of economic activities and self-isolation measures in outbreak areas leave many people jobless and socially isolated; among them, recently settled migrants might move back to their home-towns; such return migration will spread the virus further. Evidence based on regional-daily data on Covid deaths in Italy supports this mechanism. The findings suggest that the return migration mechanism exists and that it is quantitatively important, because it explains about 22-24 percent of Covid deaths outside outbreak areas.

Return migration is likely to be quantitatively important in many other countries, because i) internal migration to big cities is a common phenomenon around the world, and ii) big cities are likely to be hit by Covid-19 before any other areas of the country (because of international trade and migration). Countries with important internal migration flows should make a ranking of the regions more exposed to return migration, design national lockdown policies taking such ranking into account, allocate more resources to more exposed regions, alert the corresponding local governments (who might be in the best position to track return migrants) and increase the intensity of persuasion campaigns reminding return migrants that they might be asymptomatic carriers of the virus.

To help countries with this process, I provided the formula used to calculate regional exposure to return migration and explained in details the data needed to be implemented. This should allow policy-makers as well as supporting statistical agencies to calculate the ranking for their country.

The index and the insights provided in this brief might be very valuable especially for Muslim countries. As the end of the Ramadan approaches, millions of people prepare to migrate back to their home towns to celebrate Eid al-Fitr. It is hard to over-stress how such return migration might result in a health disaster.

Dated: 18 May 2020

For questions regarding the index or assistance with calculating the index for other countries, please contact me at: mvalsecchi@nes.ru

The technical paper is available at: https://cepr.org/sites/default/files/news/CovidEconomics18.pdf

More information about my research here: https://sites.google.com/site/michelevalsecchi/

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