Do we learn from errors? The economic impact of differentiated policy restrictions in Italy

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Abstract

This paper investigates the economic impact of differentiated policy restrictions against the COVID-19 pandemic. We analyse the extent to which such tailored measures were able to produce stronger contraction of economic activities for higher levels of policy stringency and equal and homogeneous results for territories adopting the same level of containment measures. Exploiting a large-scale dataset encompassing daily credit card transactions mediated by a large Italian bank, we estimate panel event study models to disentangle the economic impact of low, medium and high restrictions levels in Italy during Autumn 2020. We show that differentiated policies tend to produce stronger welfare losses in terms of consumption reduction for progressively stricter regulations in specific sectors targeted by these policies. However, when we compare provinces implementing the same level of policy stringency, we show that territories with higher income per capita and larger concentration of manufacturing and service activities experience simultaneously significantly worse economic and epidemiological performances. Overall, our results suggest that policy makers should properly account for local socio-economic characteristics to produce equal and homogeneous results across territories.

Keywords

economic consumption, COVID-19 pandemic, differentiated policy restrictions, sectors

Introduction

Full national lockdowns have been widely implemented as main strategies to shrink the transmission of the first wave of COVID-19 pandemic. These policy restrictions represent a necessary immediate response to an unprecedented global health emergency (Chinazzi et al., 2020; Kraemer et al., 2020; Bourdin et al., 2021; Galeazzi et al., 2021). However, the adoption of such generalized policy measures disrupts local socio-economic systems, sparking a vivid debate on the trade-off between the containment of virus contagion and economic repercussions (Guan et al., 2020; Mitja et al., 2020; Saltelli et al., 2020; Verschuur et al., 2021). Indeed, policy restrictions can contribute to save human lives, but at the same time, they generate significant effects on the aggregate demand and supply, with individuals reducing consumption and workers decreasing their labour offer. Current estimates highlight how stringent restrictions have decreased aggregate GDP by 4.3% at world level in 2020, forcing national governments to significantly raise public debt by 20% in advanced economies, to face an unprecedented financial crisis, generating employment losses for 114 million FTEs and reducing worked hours by 5.2% and 16.7% during the first and second term of 2020 (ILO, 2020; IMF, 2020; World Bank, 2021). The economic inefficiency connected with non optimal levels of production and consumption thus represents a negative externality of policy measures against the pandemic, leading to relevant welfare losses.

As generalized lockdowns are not economically sustainable in a long term perspective, several studies at the intersection of epidemiology and economics analyse the impact of alternative restrictions on contagion and welfare loss, aiming to identify an adequate balance between saved lives and forgone consumption (Thunstrom et al., 2020; Farboodi et al., 2021; Iwamoto, 2021). Although a strong trade-off between the epidemiological and economic dimension emerges, such works highlight that uniform restrictions do not represent the optimal policy, as simultaneous better results both in terms of contagion and consumption reduction can be achieved through semi-targeted restrictions by people age (Acemoglu et al., 2020), and through a massive usage of available technologies such as antibody tests, test-tracing apps and vaccines (Chernozhukov et al., 2021;

Alvarez et al., 2021; Droste and Stock, 2021; Eichenbaum et al., 2021; Guimaraes, 2021).

Based on such empirical evidence and lessons learned from earlier national lockdowns, alternative health risk management approaches have been adopted worldwide to face new waves of the contagion (Wardman and Lofstedt, 2020; Wardman, 2020). In October and November 2020, UK and Italy issued a three tiers framework with increasing levels of restrictions, primarily determined by the basic reproduction number and the saturation of local healthcare infrastructures. Similarly, France designed zones with different levels of alert according to the local intensity of the pandemic, aiming to establish specific limitations based on the diverse risk associated with business activities in different areas. Since 2nd November 2020 Germany adopted a "light lock-down" imposing social distancing and closure of public facilities as swimming pools, restaurants and bars, with restrictions that were updated on a rolling basis with a time frequency of two weeks.

In Spain, alternative policy interventions imposing different levels of restrictions across sectors (e.g. Retail, Accommodation, Restaurants, Transportation, Leisure, Education) were applied since Autumn 2020, when regional governments adopted a risk framework where territories were classified in 4 different levels of risk based on the virus incidence rate and the percentage of hospital and intensive care unit (ICU) beds occupied by COVID-19 patients. In US, heterogeneous policy responses were implemented by the different member states, with restrictions targeting specific sectors depending on the local severity of the contagion. In China, provincial governments had wide autonomy in choosing their own policies based on a centrally defined tiered-risk system with different levels of restrictions. In Japan the state of emergency applied different restrictions, imposing closures or limitation of opening hours to business activities according to the local severity of the pandemic. Allain-Dupre et al. (2020) and Warren et al. (2021) provide a detailed review of lockdown and differentiated policy measures adopted by main European and OECD countries.[1]

Differentiated policies represent the main attempt of national governments to take decisions

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[1]Additional details on policy responses for different countries in the world have been collected by the International Monetary Fund (IMF) and are available at the following link: https://www.imf.org/en/ Topics/imf-and-covid19/Policy-Responses-to-COVID-19.

based on evidence coming from the analysis of real-time world data and to strengthen the "science-policy" nexus (Warren et al., 2021). Nonetheless, several limitations affect extant evidence on the impact of these tailored restrictions. First, available works studying the impact of alternative policies tend to focus on interventions differentiating according to the age or the infectious status of the population (Acemoglu et al., 2020; Fabbri et al., 2021; Makris, 2021), completely neglecting targeted restrictions toward specific sectors, that may constitute heterogeneous channels of virus transmission and consumption reduction (Ascani et al., 2020, 2021; Ferraresi et al., 2021). Second, they mainly analyse the effects generated by differentiated policy restrictions on the epidemiological dimension, showing their capability to shrink the contagion, but disregarding the economic impact and the contraction of business activities associated with such differentiated measures (Guaitoli and Pancrazi, 2021; Bonfiglio et al., 2022). Third, despite the effort to demonstrate the uneven socio-economic effects of lockdowns (Adams-Prassl et al., 2020; Blundell et al., 2020; Bonaccorsi et al., 2020; Tisdell, 2020; Hacıoglu-Hoke et al., 2021), only limited empirical research investigated whether differentiated policy restrictions still generate heterogeneous impacts in terms of contagion and economic contraction, depending on local socio-economic characteristics of territories, or they can entail equal effects across areas implementing interventions with similar levels of stringency (Guaitoli and Pancrazi, 2021).

Against this background, our paper investigates the economic impact of differentiated policy restrictions in Italy implemented in the last term of 2020. We evaluate the extent to which differentiated policy restrictions were able to limit human activities consistently with the intensity of the pandemic, avoiding to generate disproportionate welfare losses in terms of consumption reduction. Furthermore, we compare epidemiological and economic performances of territories adopting policy interventions with similar stringency levels to understand whether pre-existing local socio-economic characteristics may have driven the effects produced by these policy interventions in terms of contagion and consumption reduction.

We focus on the italian case, as it constitutes an ideal candidate to study the impact of differentiated policy restrictions, since starting from the 6th of November 2020, it implemented a three tiers risk framework, according to which italian regions were classified as “low”, “medium” or “high” risk territories, depending on the local intensity of the pandemic. We build on a panel event study approach to investigate the local impact of policy measures with different levels of stringency at province level, exploiting a large-scale novel and unique dataset, encompassing daily transactions performed through credit and debit cards mediated by a large Italian bank. Once compared with available official statistics, we found such data to be highly accurate and representative of the underlying economic system.

Our analysis reveals that high risk provinces experienced a significant reduction of economic consumption in the Retail, Restaurants, Welfare sectors and when we consider the full sample of sectors, consistently with the higher stringency level of policy measures introduced in these territories with respect to low risk provinces. Similarly, in medium risk areas significant economic contraction is observed in the Accommodation, Restaurants and Retail sectors, that were characterized by more restrictive measures with respect to low risk provinces.

However, when we compare epidemiological and economic performances of territories adopting policy interventions with similar stringency levels, we still find evidence of significantly different patterns based on local socio-economic characteristics. In particular, we show that territories displaying higher income per capita, and larger concentration of manufacturing and service activities were characterized at the same time by a stronger reduction in economic consumption and more severe contagion.

Our contribution to the debate on the impact of differentiated policy restrictions is twofold. First, we quantify the welfare loss associated with different stringency levels of restrictions. In this way, we highlight the capability of such tailored measures to diversify their effects according to the local intensity of the pandemic, avoiding to disproportionately generate welfare losses in terms of consumption reduction in territories characterized by lower contagion.

Second, we clarify the extent to which differentiated interventions were able to produce equal and homogeneous epidemiological and economic performances across territories implementing policy measures with similar restrictions intensity, differently from generalized lockdowns that contributed to exacerbate socio-economic disparities across territories. Due to the different levels of face-to-face contacts, human interactions, and need of direct coordination across business activities, the local composition of economic sectors may significantly affect the virus diffusion (Ascani et al., 2020, 2021). Furthermore, the need for regulators to keep open sectors providing primary needs goods and services even during periods of healthcare emergency, and the fact that certain business activities can be more or less easily preformed from remote with respect to others, may have a critical role in explaining the economic contraction induced by restrictions (Ferraresi et al., 2021; Barbieri et al., 2022). However, many of these factors that may influence the effect of such policy measures across territories were not explicitly accounted by regulators, who designed restrictions mainly based on the local intensity of the pandemic. Therefore, from a regional policy perspective, it is of paramount importance to understand whether differences in terms of contagion and consumption reduction can be completely explained by the heterogeneous levels of restriction imposed by specific tailored policy measures, or if instead such different behaviours are still (partially) driven by local socio-economic characteristics not properly accounted by policy makers.

This paper is structured as follows: section 2 provides an overview of the economic impact associated with differentiated policy restrictions. Section 3 describes the data and methods employed in the analysis and shows a set of robustness check to demonstrate that our dataset is representative of the Italian economic system. Sections 4 displays the results and policy implications, while the paper concludes by showing the main contributions of this research.

Theoretical Background

The pressing need to resume economic activities, keeping under control the contagion and the pressure on healthcare infrastructures, have stimulated a careful assessment of the economic and health impacts associated with lockdown and re-opening policies (Gatto et al., 2020; Inoue and Todo, 2020; Dall Schmidt and Mitze, 2022; Roe et al., 2022). As long term generalized lockdowns generate major disruption in the global value chain, milder restrictions, allowing to partially resume economic activities with a limited rebound of contagion, are suggested as alternative more sustainable solutions that may be applied to manage new waves of the pandemic (Bertuzzo et al., 2020). In particular, a massive usage of available technologies such as personal protective equipment, swabs testing and tracing apps should inform the decision-making process on emergency management, since these technological tools may enable a better trade-off between infections and the resumption of economic activities (Ferraresi et al., 2021). Furthermore, a re-tightening of the containment measures through stop and go approaches based on local contagion risk, and the implementation of remote working may represent possible mitigation factors to the economic losses induced by policy restrictions (Boeri et al., 2020; Dingel and Neiman, 2020; Barbieri et al., 2022).

Overall, empirical evidence suggests that horizontal lockdown interventions represent sub-optimal restriction strategies, as they abstract from specific characteristics of the local economic structure, and do not equally target healthcare risks and potential economic losses (Ferraresi et al., 2021; Guaitoli and Pancrazi, 2021). As a consequence, new tailored restrictions should be designed by policy makers taking into account those factors that may affect both contagion and the contraction of economic activities.

For instance, the economic provincial base has a pivotal role in driving infections, and territories characterized by higher specialization of economic activities and a higher concentration of labour force employed in essential sectors may experience higher contagion and mortality rates (Ascani et al., 2020, 2021). Territories whose production systems are more embedded in investment and export related supply chains may be subject to more severe economic losses during lockdown rather than regions specialized in essential sectors (Ferraresi et al., 2021). Furthermore, the magnitude of reduction of economic activity is affected also by the level of integration and the intensity of business linkages across sectors, with firms whose downstream sectors are more constrained by social distancing subject to most negative economic results (Inoue and Todo, 2020; Laeven, 2022).

Since additional local factors such as temperature, income per capita, concentration of transportation infrastructures, agriculture and service share population may significantly affect the spread of the contagion and economic losses, it is evident that new COVID-19 waves should be faced through more carefully tailored interventions, equally targeting epidemiological and economic risks at local level (Guaitoli and Pancrazi, 2021). However, limited empirical evidence has been produced on the capability of policy makers to design specific regulations taking into account the local economic structure and other factors that may drive contagion and economic consequences of restrictions.

The main reason for this shortage of structured ex-post evaluations of the impact of differentiated policy measures, especially under the economic dimension, may be associated with the lack of precise and high frequency data allowing to assess almost in real time the variation in consumption and production patterns of individuals and firms. Indeed, while epidemiological information on the number of new infections and deaths are updated on a daily frequency, with an adequate level of spatial granularity, official data on the economic response of consumers and firms are not released in real time as the events take place, and are usually characterized by insufficient geographical detail. As a consequence, the majority of extant works employ simulation models in order to estimate the expected cost of social restrictions interventions (Bekkers and Koopman, 2022; Bonet-Moron et al., 2020; Spelta et al., 2020; Capello and Caragliu, 2021).

Nonetheless, a growing body of literature is relying on transaction data to assess the contemporary effect of natural disasters, since they may provide an accurate representation of slow-moving national accounts and they are collected at high time frequency, although they are not gathered through traditional, carefully designed, structured surveys (Carvalho et al., 2020). Consequently, some works based on this type of information are emerging to provide almost immediate evidence of the impact of policy measures and support regulators in taking timely corrective actions (Baker et al., 2020; Sheridan et al., 2020; Chen et al., 2021).

A large amount of evidence from these works shows that economic consumption data are able to properly capture the fast reaction of economic activities to restrictions, with expenditures from high-income households experiencing a stronger decline (Carvalho et al., 2020; Chetty et al., 2020; Chronopoulos et al., 2020; Cox et al., 2020). Entertaining, large Retail chains, Restaurants and Travel are the most negatively impacted sectors, with economic losses that are only partially compensated by a growth in online purchases (Bounie et al., 2020; Alexander and Karger, 2020; Chen et al., 2021). Moreover, the economic reaction following these policy measures has been heterogeneous with respect to the age cohorts of the population and with respect to the different socio-economic characteristics of territories (Baker et al. 2020; Martin et al., 2020; Sheridan et al., 2020).

Furthermore, high frequency data representing transactions in sectors mapping human mobility, such as Transportation, are employed as a proxy for movements and used in models of COVID-19 contagion, thus constituting an alternative to the most widely used mobility data (Carvalho et al., 2020; Persson et al., 2021; Xiong et al., 2020).

All these works show the high potential of transaction data in explaining the economic impact of policy restrictions during the lockdown and the evolution of infections. However, the vast majority of extant studies focuses on the first wave of contagion, analysing the effects produced by generalized policy measures. On the other hand, Warren et al. (2021) highlight the need to assess how policy responses to new waves of COVID-19 pandemic benefit from past lessons.

Indeed, strategies adopted to control the contagion are still often designed according to preliminary, partial and limited analyses and tend to slowly evolve based on new emerging empirical evidence (Halperin et al., 2021). Many countries continue to implement sub-optimal policy restrictions, disproportionately affecting socio-economically local territories, even though tailored, context-sensitive interventions involve fewer economic, societal, and quality-of-life costs, resulting more effective to control the pandemic and limit the contraction of economic activities (Escandon et al., 2021). Therefore, there is an explicit need to demonstrate how carefully designed restrictions targeting specific sectors which require close human interactions, and the definition of peculiar measures to protect disadvantaged and vulnerable population cohorts, are at the same time more sustainable and effective strategies than broad stay-at-home orders (Haug et al., 2020; Lai et al., 2020).

In the next sections, we show how high credit card payment data can be employed to analyse the economic impact of differentiated policy restrictions. In this way, we aim to contribute to two relevant and fast growing streams of research: on the one hand, the literature on the usage of real time transaction data to investigate the impact of policy restrictions during COVID-19 pandemic. On the other hand, we fuel the debate on the effectiveness of differentiated regional policies to reduce economic activities consistently with the local intensity of the contagion and to generate equal epidemiological and economic results in territories implementing interventions with similar stringency levels. Overall, we strengthen the science-policy relationship, providing robust empirical evidence that might support policy makers in the design of more carefully tailored restrictions to deal with COVID-19 pandemic.

Data and Methodology

Policy Description

This section aims to synthesize the strategy adopted by the Italian government to face the COVID-19 pandemic, providing an overview on the temporal sequence of the main differentiated policy measures adopted during Autumn 2020. We suggest to refer to Bull (2021) for a more complete and detailed description and timeline of the Italian government policy responses during the first half of 2020.

After a summer period proceeded with almost no restrictions until 16th August when dance clubs were closed due to the resurgence of the contagion, new stricter policy interventions started from the second half of October, when gyms, swimming pools, leisure centers, theatres and cinemas were closed down and limitation were imposed to the opening hours of restaurants and bars. Since 6th November a new framework with three tiers of progressively stricter regulations was applied in order to impose more carefully targeted limitations to human activities according to the local severity of the pandemic at regional level. In particular, the risk status associated to each Italian region was based on a specific algorithm designed by the national healthcare institute (Istituto Superiore Sanità (ISS)), taking into account the values assumed by different epidemiological parameters during the two previous weeks (e.g. the basic reproduction number and the saturation level of local healthcare infrastructures). Based on such framework, italian regions were divided in three different categories of risk ("low", "medium" and "high") and the risk status was updated on a weekly frequency. This risk management framework was held until the end of 2020 and also during 2021. In Appendix B, Tables B1, B2, B3, B4, B5 and B6 provide detailed information about the set of sectors closed in low, medium and high risk regions, respectively.[2]

Overall, we observe that in low risk regions the majority of restrictions applied to the Arts, Entertainment and Recreation sectors, closing libraries, museums, fitness facilities and discos. Furthermore, individuals could move across different regions, with mobility forbidden only between 10 p.m. and 5.am. with the exception of work reasons and healthcare emergency. Moreover, Retail activities were closed only during the weekend with the exception of essential sectors that could stay open also on Saturday and Sunday. Restaurants and bars were open until 6 p.m. and delivery was allowed until 10 p.m. Cinemas and theatres were closed and online education was implemented in high schools and universities.

More stringent interventions in medium risk regions concerned mobility with individuals required to move only in the municipality for work and health reasons. Moreover, restaurants were closed 7 days per week with food delivery allowed only until 10 p.m.

Finally, high risk provinces were characterized by severe restrictions in the Wholesale and Trade sector, with non essential business activities closed for 7 days per week. Furthermore, mobility was forbidden at any hour with the exception of work and health reasons, while online education was

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[2]Additional information on the decree n. 275 implemented since 6th November 2020 is available at the following link: https://www.salute.gov.it/portale/nuovocoronavirus/homeNuovoCoronavirus.jsp? lingua=English.

implemented also in secondary schools. Similarly to second tier provinces, restaurants were closed 7 days per week with food delivery allowed only until 10 p.m. All the three risk tiers were subject to a 50% reduction of public transport capacity, while no explicit restriction involved the Accommodation sector.

Data Source

Our data come from a major Italian bank whose clients are distributed across the entire national territory. The average market share of the bank is around 22% both at province and regional level.[3] Furthermore, excluding Trentino Alto Adige, where the bank presence is around 8%, in all other regions the market share is at least 14% with values above 30% for Aosta Valley, Lombardy, Piedmont, and Veneto (for further information about the geographical presence of the bank across Italian regions and provinces, please see Annex A).

We obtain daily records of the number and monetary value of transactions from cardholders making purchases in physical (offline) and digital (online) point-of-sales (POS). In our empirical analysis we aggregate transactions at the level of Italian provinces on the vendor side. Since we can identify the location of the vendor only for physical transactions, while vendor location for online transactions is not available, we use only offline transactions aggregated at province level from the vendor side for the rest of the empirical analysis. Only in this section we aggregate the data at the national level considering both offline and online channels to validate them with official statistics. Due to the significant limitation of human mobility, excluding online transaction could represent a limitation of our analysis. Annex C provides additional details on the incidence of online consumption, showing different reasons why relying on physical transactions should still provide an accurate representation of the consumption behaviour of italian territories during the COVID-19 pandemic. Main motivations are related to the limited penetration rate of online spending with respect

[3] We compute the market share as the ratio between the number of clients of the bank (at province or regional level) and the amount of population with age higher or equal to 18 years old.

to physical transactions and a high homogeneity in terms of incidence of online transactions across territories.

Finally, vendor information also contains details regarding the classification of sold products among categories which we use to identify transactions occurring in specific sectors of the economy. The whole empirical analysis is based on the monetary value of transactions (rather than on the number of physical transaction), coherently with our research objective to estimate the impact of differentiated policy restrictions on welfare losses in terms of economic consumption reduction.

Comparison against Official Statistics

This section compares credit card payment data (hereinafter, CCPD) and official statistics disclosed by national offices (ISTAT). Specifically, Figure 1 shows the relationships between the level of consumption reported in our sample and two relevant economic quantities, namely the Gross Domestic Product (GDP), as a measure of the aggregate output of an economic system, and income levels.

Consumption contributes as one of the components of GDP along with investments, public expenditures and net exports. We find that for year 2020 the share of total consumption of CCPD at province level displays a high and significant correlation (0.955, P-value $\simeq$ 0) with the share of GDP at the same level of aggregation (the highest available resolution from official statistics). In addition, the correlation at province level between the share of CCPD total yearly consumption and income for year 2019, as disclosed by the Ministry of Economics and Finance (MEF) (the latest available year from official statistics at the moment of writing) is 0.934 (P-value $\simeq$ 0).

We also focus on the time-series properties of our transaction data (see Figure 2). To account for seasonality in the consumption levels, we analyse the year-over-year (Y-o-Y)[4] growth rates of

[4] Y-o-Y growth rates of quarterly total national consumption levels are defined as:

$$Y - o - Y_t = \frac{Spending_t - Spending_{t-4}}{Spending_{t-4}}$$

quarterly total national consumption levels computed according to either CCPD or ISTAT over the time interval 2019-2020. To match official statistics,[5] we present the aggregate consumption series of CCPD for both online and offline expenditures.

Figure 2-A highlights a reasonable matching between both temporal patterns, with a clearly evident downturn experienced in Q2-2020 at the outbreak of the pandemic. Although the length of the series is short, we still notice a positive and significant relationship between the two series (correlation = 0.800, P-value = 0.017), with transaction data characterized by slightly higher volatility levels. Indeed, the OLS regression of ISTAT Y-o-Y growth rates against CCPD (online plus offline) Y-o-Y growth rates presents an elasticity equal to 0.153 (S.E.: 0.047), thus suggesting that the magnitude of variation is larger in the CCPD sample. Figure 2-A also supports another interesting aspect characterizing the COVID-19 pandemic relating to the diffusion of online consumption: note how data for Q2-2020 indicate the switching into online consumption occurred at the deployment of lockdown restrictions in Italy.

To have a better understanding of the matching across different economic activities, we also repeat the same analysis for some relevant sectors selecting among those that have been shown to be heavily affected by the spread of the pandemic, namely: Retail (Figure 2-B), Accommodation and Restaurants (Figure 2-C) and Welfare (Figure 2-D). Our findings show how in general the two samples exhibit similar temporal trajectories, with CCPD data that seem to be able to properly capture the impact of the pandemic since Q2-2020. Note also that the role of online expenditures in shaping the consumption curves is less evident in those sectors heavily restricted during the first wave of the pandemic, such as Accommodation and Restaurants.

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where $Spending_t$ is the total aggregate spending at national level during quarter t and $Spending_{t-4}$is the total aggregate spending at national level during the corresponding quarter of previous year. In this section, we use quarterly data since the highest temporal frequency at which consumption data are disclosed by ISTAT is three months. The rest of the analysis is rather based on daily transaction data, that is the highest time frequency we observe in the major italian bank dataset.

[5] National Official data are available at the link: http://dati.istat.it/Index.aspx?QueryId= 12586#. We consider edition June 2021 of the dataset.

The Variation of Economic Consumption

Daily Y-o-Y consumption variation is represented by the percentage variation of a rolling average of daily economic consumption over a time window of 7 days between 2020 and 2019. In formula:

$$Y-o-Y_{i,t,k} = \frac{Spending_{i,t,k} - Spending_{i,t-364,k}}{Spending_{i,t-364,k}} \quad (1)$$

where $Spending_{i,t,k}$ is a rolling average of daily economic consumption over a time window of 7 days in province i, in sector k in day t and $Spending_{i,t-364,k}$ is the corresponding value obtained 364 days before (one year before, with correspondence of week days), coherently with Sheridan et al. (2020).[6]

Figure 3 shows the daily Y-o-Y consumption variation for different sectors and provinces with different levels of policy restrictions. Overall, we observe similar trends in the Y-o-Y consumption variation of provinces exposed to low, medium and high restrictions in the three weeks before the start of the differentiated policies across the different sectors. In particular, all sectors display decreasing patterns, suggesting a reduction in consumption connected with a progressive resurgence of the contagion. The only exception is represented by the Welfare sector, where the growth in consumption in the period 23rd October - 6th November 2020 can be explained by a growth in the purchase of private protection equipment such as masks and detergents and other expenditures strongly connected with the severity of the healthcare emergency.[7]

More heterogeneous patterns in the Y-o-Y consumption variation are observed in the period after the start of differentiated restrictions. When we consider all sectors, provinces subject to high restrictions experience on average a consumption reduction by 20.5%, while areas implementing

[6] Through this formulation, we ensure that each day is compared against the same day (e.g. Mondays are compared with Mondays) of the previous year. Furthermore, over the analysed time frame (16th October - 7th December), the italian calendar does not display holidays that may occur on different days across different years, thus our results should be robust to potential confounding coming from alternating holidays.

[7] The Welfare sector includes economic consumption occurred in the healthcare sector. Transaction data in this sector may be able to properly map private spending in the private healthcare, while they may be less representative of consumption in the public healthcare sector, due to alternative more widespread payment systems with respect to credit and debit card.

medium and low containment measures account for an economic loss around 6.1% and 1.5%, respectively (see Table 1). Similar values are obtained when we focus only on the Retail sector. The strongest contraction of economic activities is achieved by the Accommodation sector, with an average drop in consumption ranging between 48.9% and 82.8%, although the main reduction in consumption was already achieved before the start of differentiated restrictions. Such behaviour is probably due to the mobility restrictions and the fear of contagion that significantly penalised tourism activities even before the implementation of differentiated policy interventions. A consistent pattern is displayed by the Restaurant sector that is subject to a strong contraction in Y-o-Y consumption variation in all provinces before the 6th November 2020. Conversely, while provinces with low restrictions keep an almost constant consumption reduction during the period of differentiated containment measures, medium and high restriction territories are subject to a further drop, arriving at −58.8% and −72.1% of average consumption reduction. Such trend can be explained by the heterogeneous restrictions imposed in correspondence of different levels of policy stringency. Indeed, while low restrictions territories had the opportunity to keep restaurants and bars open until 6 p.m., medium and high risk areas were forced to keep closed such activities 7 days per week and only food delivery was allowed until 10 p.m.

The Welfare represents the only sector experiencing positive values of economic variation during the analysed period, with provinces adopting high restrictions subject to higher expenditures. Note how these two patterns suggest that expenditures in this sector are strongly related to the pandemic intensity. Finally, when the Retail sector is excluded, we corroborate the larger drop in consumption in high restrictions provinces displaying an average welfare loss equal to 23.3%. Such result is similar but with a stronger magnitude with respect to the case in which the Retail sector is included into the analysis, confirming how this sector, providing primary need goods, was subject to a lower reduction of economic activities.

The Econometric Specification

Our analysis aims to estimate the impact of differentiated policy restrictions implemented in Italy to face new waves of the COVID-19 pandemic during Autumn 2020. In particular, Italy implemented a risk framework with three levels of progressively increasing limitations at regional level. Starting from the 6th of November 2020 all italian regions were classified as low, medium or high risk areas, and then their risk status was progressively updated with a weekly frequency, based on the pandemic intensity.

To disentangle the economic impact generated by policy interventions with different stringency levels, we decide to rely on a dynamic two ways fixed effects (TWFE) panel event study:

$$Y_{i,t} = \alpha + \sum_{e=-4}^{K} \beta_e * Medium_{i,t}^{e} + \sum_{e=-4}^{K} \gamma_e * High_{i,t}^{e} + \eta X_{i,t} + \delta_i + \delta_t + \mu_{i,t} \quad (2)$$

where index *t* refers to the considered day, subscript *i* denotes the underlying province, δ_i are provinces fixed effects, and δ_t are days fixed effect. Furthermore, $Medium_{i,t}^{e} = 1\{day_t \in week_e \,\&\, Restriction\ level_i = Medium\}$ is an indicator equal to 1 when province *i* is observed in a day *t* belonging to a week which is exactly *e* periods (weeks) away from the start of the medium treatment. Consistently, $High_{i,t}^{e} = 1\{day_t \in week_e \,\&\, Restriction\ level_i = High\}$ is an indicator equal to 1 when province *i* is observed in a day *t* belonging to a week which is exactly *e* periods away from the start of the high treatment. $Y_{i,t}$ is our dependent variable, representing the daily Y-o-Y variation of economic consumption defined as in section 3.4. Finally, $X_{i,t}$ is a vector of time varying control variables and $\mu_{i,t}$ is the idiosyncratic component.

In terms of time varying regressors we consider those factors that may confound the impact of differentiated policy restrictions on the consumption variation. As a consequence, we take into account lagged new daily cases representing the daily number of new infected individuals in each province expressed as a percentage of the local resident population. We lag such variable by 14 days since main policy decisions were based on the contagion patterns observed during the previous two weeks. This regressor helps us to control for the fact that results are robust to the heterogeneity in terms of local pandemic intensity that may significantly affect economic consumption. Furthermore, we consider also lagged total daily cases representing the cumulative amount of infections experienced by each province since the beginning of the pandemic. In this way, we take into account the overall severity of COVID-19, as it may have medium-long term impacts on the economic behaviour of provinces. We plug into the model also squares of such variables in order to properly account for non linearities associated to different COVID-19 waves in late 2020. Furthermore, in line with Guaitoli and Pancrazi (2021), we consider the average temperature experienced by provinces in the decade before the observed day, as seasonality may influence the intensity of the pandemic and consequently the possibility to resume economic activities.[8] Since physical contacts and social interactions simultaneously affect both the spread of the virus and consumption behaviours, we take into consideration the total amount of mobility of provinces, computed as the sum of inner loops (e.g. people moving within the provinces) and people entering or exiting the considered province. Finally, we consider a set of controls for macro regional unobserved time trends obtained by interacting time fixed effects with NUTS 1 dummies.

Under this specification the coefficients β_e and γ_e for values of $e < 0$ allow to test for parallel pre-treatment trends. Conversely, the coefficients β_e and γ_e for values of $e \geq 0$ capture the impact of the medium and high treatment at different exposure lengths, respectively. Observing the values of these coefficients over multiple weeks after the start of the treatment allows us also to assess the persistency of policy effects and to understand whether impacts generated in terms of consumption variation last over the entire period in which the specific level of policy stringency is implemented with no significant variation in the magnitude. Furthermore, it allows us to investigate if it is stronger the immediate impact of the policy that may then tend to reduce its effect over the following weeks

[8] Data related to temperature for italian provinces are collected from the official website of the "Ministry of Agricultural, Food and Forestry Policies" (MiPAAF). Such information is available at the following link: https://www.politicheagricole.it/flex/FixedPages/Common/miepfy700_riferimentiAgro.php/L/IT?parm1=0085&%20parm2=1210&%20parm3=stnd&%20name=P&%20period= 06m&%20nomeParam=Temperatura%20Minima.

or if instead it requires time before the policy generates a significant impact. Within this empirical setting, β_e and γ_e can be interpreted as the percentage by which, on average, the economic consumption was higher or lower in a medium or high risk province, with respect to a low risk province, in a day belonging to a week that is e weeks away from the start of the treatment.

Although differentiated policy restrictions in Italy started on the 6th of November, we analyse italian provinces from the 16th of October in order to have three weeks of observations before the start of tailored containment measures. Furthermore, we stop our period of observation on the 7th of December, thus excluding from our analysis the time frame 8th December 2020 - 31st December 2020 for two main reasons. First, the government implemented on the 8th of December 2020 a policy package providing cash-back for household consumption to stimulate private demand, thus significantly affecting the purchasing behaviour of individuals with respect to the analysed period. Second, during weekends and holiday days of Christmas period, stricter uniform restrictions were implemented across territories, regardless the local severity of the pandemic.

Our control group (not treated units) is represented by all provinces classified as low risk since the 6th of November until the end of our analysed period (7th of December). Units under medium treatment are all provinces classified as medium risk, after having previously been classified as low risk. We exclude weeks in which such provinces may have changed again risk level after having been classified as medium risk (see the right panel in Figure 4 for further details). Finally, units under high treatment are all provinces classified as high risk, after having previously been classified as low risk. We exclude weeks in which such provinces may have changed again risk level after having been classified as high risk. In this way, we ensure that all provinces included into the analysis are subject to the same pre-treatment period (a baseline without differentiated policy restrictions between the 16th of October 2020 and the 6th of November 2020 and a period in which they were classified as low risk areas), thus avoiding the issue that the impact of medium and high restrictions might be affected by different policy interventions implemented before the start of the treatment. Annex F provides a robustness check where we separately estimate the TWFE model described in Equation 2 for medium and high risk provinces with respect to low risk territories.

Overall, Figure 4 (left panel) shows the classification of italian regions according to the three risk tiers framework over the analysed time frame. The right panel shows the evolution of differentiated policy restrictions in the set of provinces that we use in our analysis. Notice how all provinces are subject to a baseline period with no restriction and are initially classified as low risk provinces on the 6th November 2020. Moreover, as previously stated, we stop observing provinces, in case they change risk level a second time, after having been classified as medium or high risk. In this way, we avoid that our estimates are affected by different patterns through which provinces may enter a specific risk status. Figure 5 shows the geographical distribution of provinces classified as low, medium and high risk areas for our empirical analysis.

Finally, we omit the event week -5, corresponding to 5 weeks prior to the start of medium or high treatment, as it represents the furthest lag from the treatment we observe. We start estimating the model described in Equation 2 separately for a set of economic sectors that were significantly affected by interventions with different stringency levels. In particular, we focus on the Retail, Restaurants, Accommodation and Welfare sectors. Furthermore, we consider the case where we account for total consumption across all economic sectors and the case where we exclude only the Retail sector. We estimate also a model with a combined full sample of sectors (rather than split the sample by sectors), including as further controls also interaction effects composed of sector-time dummies (relative to a baseline sector). This gives us the opportunity to statistically test for differences in effect size across sectors.

Table 2 shows sources and descriptive statistics for the dependent variable across different analysed sectors and for time-varying controls.

Assessing the Relevance of Province Specific Socio-economic Variables

In a second step, we investigate whether local pre-existing socio-economic characteristics affect economic and epidemiological performances of italian territories implementing the same level of policy intervention. To do so, we first identify a set of comparable provinces adopting low, medium or high level restrictions. Low risk provinces are composed by territories adopting low restrictions over the whole analysed period of differentiated policy interventions (6^{th} of November - 7^{th} of December) with no subsequent changes in the level of containment measures. Medium risk provinces are territories either immediately classified as medium risk provinces, or provinces implementing medium risk restrictions after having been classified as low risk areas on the 6^{th} of November 2020. Similarly, high risk provinces are territories either immediately classified as high risk provinces, or provinces implementing high risk restrictions after having been classified as low risk areas on the 6^{th} of November 2020. Moreover, we restrict the analysis to the period in which provinces are classified as low, medium or high level risk territories, thus excluding the baseline period before the 6^{th} of November, where differentiated policy interventions were not applied yet, and other following weeks where such provinces may have switched to a different risk status with respect to the one employed in our analysis. In this way, we ensure to compare territories implementing similar levels of restrictions over a period in which they were subject to the same treatment. Then, we compute for each province the average performances in terms of daily contagion ($Cont_{i,r}$) expressed as a percentage of local population and consumption variation ($Cons_{i,r}$). In formula:

$$Cont_{i,r} = \frac{\sum_{t=1}^{T_r} Lagged\ new\ daily\ cases_{i,t}\ \ as\ a\ percentage\ of\ local\ population}{T_{i,r}} \quad (3)$$

$$Cons_{i,r} = \frac{\sum_{t=1}^{T_r} Y - o - Y_{i,t}}{T_{i,r}} \quad (4)$$

where $Lagged\ new\ daily\ cases_{i,t}\ as\ a\ percentage\ of\ local\ population$ are daily COVID-19 positive cases observed in province *i* in day *t* divided by the number of local residents, $Y - o - Y_{i,t}$ is the daily consumption variation observed in province *i* in day *t*, defined as in Equation 1, and $T_{i,r}$ is the total number of days that province *i* is subject to the level of restriction *r*.

Finally, for each risk group *r* (low, medium, high) we define two different categories of territories. The former ($Positive\ Performance_r$) is composed by provinces with performances below the median in terms of contagion and above the median in terms of consumption variation. They represent territories experiencing positive performances both under the healthcare and economic dimensions. The latter ($Negative\ Performance_r$) includes provinces with performances above the median in terms of contagion and below the median in terms of consumption variation. They represent territories experiencing negative performances both under the healthcare and economic dimensions. More in detail:

$$Positive\ Performance_r = \{prov_i :\ Cont_{i,r} \leq M(Cont_{i,r})\ \&\ Cons_{i,r} \geq M(Cons_{i,r})\} \quad (5)$$

$$Negative\ Performance_r = \{prov_i :\ Cont_{i,r} \geq M(Cont_{i,r})\ \&\ Cons_{i,r} \leq M(Cons_{i,r})\} \quad (6)$$

where $M(Cont_{i,r})$ is the median of average contagions observed in provinces *i* over the period where they implement the restriction level *r* and $M(Cons_{i,r})$ is the median of average consumption observed in provinces *i* over the period where they implement the restriction level *r*.

Finally, through a set of t-tests we check whether within each group of provinces with the same level of restrictions, the two categories are characterized by statistically different socio-economic factors. Figure 6 shows the set of provinces classified as low, medium and high risk areas for the analysis described in this section. Annex G shows the results of a robustness check, where from the medium and high risk provinces we exclude territories that were immediately classified as medium (Sicily and Apulia) or high (Aosta Valley, Lombardy, Piedmont, Calabria) risk areas on the 6th of November. In this case, the set of provinces included into the analysis in the low, medium and high level of restrictions is exactly the same defined in section 3.5 and shown in Figure 5.

In the following, we motivate the set of province specific socio-economic characteristics that we consider in our analysis as potential drivers of the heterogeneous epidemiological and economic behaviour of territories implementing the same level of policy restrictions. Specifically, since restrictions might have been associated with the exacerbation of socio-economic disparities (Bonaccorsi et al., 2020, 2021; Polyakova et al., 2020), we consider Income per capita and Inequality[9]

[9] Inequality in the distribution of income at province level is computed as the Gini index of the income per capita of municipalities belonging to the corresponding province.

in the distribution of income as drivers potentially affecting the outcome of the policy. Moreover, as the severity of the pandemic might have been influenced by demographic characteristics, we include in the analysis Population and Population Density (Sheridan et al., 2020).

Since the level of economic consumption might have been affected by the extent to which workers could work from remote limiting contacts with other individuals, we consider a Telework index representing for each province a proxy of the portion of individuals that could work with a telework approach.[10]

In addition, we consider the percentage of citizens with fast Internet Connection[11] and Accessibility[12] as two additional factors representing the capability of each province to be connected with other territories from a digital and physical perspective.

Some economic behaviors and processes have an intimate spatial nature, generating path-dependent patterns of geographical concentration of economic activity at local level. For instance, firms may tend to agglomerate in specific locations, since spatial clustering of business activities is connected to the existence of multiple benefits such as increasing returns, reduced coordination costs, lower information asymmetries, easier knowledge spillovers and technology transfer (Storper and Venables, 2004; Iammarino and McCann, 2006). However, the geographical concentration of specific economic sectors may require stronger face-to-face interactions and direct contacts among people, thus affecting the diffusion of the virus across areas implementing similar containment measures. As a consequence, in line with Ascani et al. (2020), we consider an indicator of economic specialization

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[10] We compute the Telework index as the weighted sum of the percentage of workers employed in each sector k ($Employees_{i,k}$) in each province i and a coefficient representing the share of workers that might work from remote in sector k ($Telework\ share_k$) estimated by Espinoza and Reznikova (2020). In formula:

$$Telework\ Index_i = \sum_k Employees_{i,k} * Telework\ share_k$$

Information on the number of employees in specific sectors at province level are obtained by aggregating firm level data collected from the ORBIS Bureau Van Dijk database. Specifically, we consider the average number of employees in the years 2018-2020 at firm level. Overall, our estimates of the telework index are in line with those of Dingel and Neiman (2020).

[11] Internet Connection represents the percentage of individuals reached by Internet Connection with a speed higher or equal to 100 Mbps disclosed by national authority guaranteeing communication (AGCOM).

[12] Accessibility is disclosed by the national statistical office (ISTAT) and provides information on the travel times, expressed in minutes, from the centroid of each municipality to the three closest infrastructures for four categories: ports, airports, railway stations and motorway toll booths. The indicator is then aggregated at province level.

to understand whether the level of concentration of economic activities may have significantly affected contagion and consumption variation of provinces even in presence of policy measures with the same stringency level. In particular, for each province *i*, we define a measure of sectoral specialization computed as the ratio between the relevance of the considered sector *k* in the underlying province and the relevance of such sector in the overall national economy. In formula:

$$Specialization_{i,k} = \frac{\frac{Number\ of\ employees\ in\ sector\ k\ in\ province\ i}{Number\ of\ employees\ in\ province\ i}}{\frac{Number\ of\ employees\ in\ sector\ k\ at\ national\ level}{Number\ of\ employees\ at\ national\ level}} \quad (7)$$

We compute a synthetic measure of economic specialization for each province as the median value of the specialization index computed at sectoral level:

$$Specialization_i = median\left(Specialization_{i,k}\right) \quad (8)$$

Nonetheless, even territories characterized by similar specialization profiles, may hide significant differences in terms of the local economic structure, depending on the economic sector mix. In this sense, one key distinction may be related to the relevance of manufacturing and service activities due to the different resilience of such sectors to contagion and economic losses associated to restrictions. For instance, manufacturing activities may require long term exposition contacts among a limited number of co-workers with frequent close contacts, while service activities may lead to time limited interactions with a higher number of consumers (Ascani et al., 2020). For this reason, we consider in our analysis the share of workers employed in the Primary, Manufacturing and Service sectors in each province.[13]

Finally, one important aspect that may drive epidemiological and economic performances of territories is connected to the nature of the economic activity characterizing local jobs. In fact, on the 22nd of March 2020 the italian government implemented a prime minister decree (DPCM) defining the set of essential sectors that may stay open during the lockdown, while freezing all economic

[13] We compute the share of workers employed in the Primary, Manufacturing and Service sectors in each province as the ratio between the total number of employees in the Primary, Manufacturing and Service sectors in each province and the total corresponding values computed at national level.

activities not considered as essential. For this reason, we consider the portion of individuals employed in essential sectors with respect to the total number of employees at province level. For the identification of the essential sectors, we rely on the DPCM of the 22nd of March 2020.[14] For information on the number of individuals employed in specific sectors at a level of detail of 4 ATECO digits (coherently with the most granular level of detail at which essential sectors were defined), we rely on the ORBIS Bureau Van Dijk database, where we consider the average number of employees in the years 2018-2020 at firm level.

Figure 7 shows the geographical distribution of the specialization index, the share of Manufacturing and Service employees and the portion of labour force in essential sectors at province level. Overall, the highest specialization level is achieved by the province of Milan. Other high values of this variable are achieved in specific provinces of Lombardy, Piedmont, Tuscany, Lazio, Campania and Sicily. Manufacturing and Service sectors tend to be more widespread in the North of Italy with some exceptions in the provinces of Rome and Naples. Essential sectors tend to be more widespread in the South of Italy, with some exceptions in Piedmont and Veneto in the North.

Table 3 shows sources and descriptive statistics for the set of above-mentioned specific socio-economic characteristics of italian provinces.

Results

The Economic Impact of Restrictions

This section shows the impact of differentiated policies introducing heterogeneous levels of restrictions in Italian provinces, based on the local intensity of the pandemic. Table 4 and Figure 8 display the results of the panel event study TWFE described in Equation 2.

Overall, we obtain heterogeneous impacts of alternative containment measures across sectors.

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[14] The detailed list of essential sectors defined by the DPCM n.76 published by the Italian Government on the 22nd of March 2020 is available at the following link: https://www.gazzettaufficiale.it/eli/ id/2020/03/26/20A01877/sg. We use the final version of essential sectors updated on the 25th of March.

When we take into account all sectors of local economy, we find evidence of a significant welfare loss in terms of reduction of economic consumption in high risk provinces with respect to territories implementing low restrictions, with an average treatment effect ranging between −9.0% and −21.2%. This means that on average, in a day belonging to the first week of treatment, a high risk province experiences a variation of economic consumption (computed considering consumption across all sectors) that is 9.0% lower with respect to a low risk province. Such effect is lower after the immediate implementation of the high stringency policy (week 0), while it is higher over weeks 1-3.

Conversely, we find weakly welfare losses from spending decrease for areas implementing medium level restrictions, with a significant effect only in the second week after the start of the treatment (week 1). The absence of significant coefficients in the weeks before the start of differentiated policies suggests the presence of pre-treatment parallel trends, thus providing robustness to our result.

Such evidence is confirmed when we focus only on the Retail sector. This result highlights the relevance of this sector for local economy. Indeed, we obtain still negative and significant average treatment effects for provinces adopting high level containment measures, with a contraction of economic consumption between 10.1% and 27.2%. We confirm a lower immediate effect of the policy in week 0, with the magnitude of the consumption reduction that is higher during week 1 and 2. Differently from the previous case, we find that also territories implementing medium restrictions are characterized by an economic loss between 6.1% and 7.1% (excluding week 0 for which we do not find a significant contraction of economic consumption). Notice how the magnitude of the reduction of economic activity is statistically different also between areas with medium and high restrictions. This result is coherent with the type of restrictions adopted in these provinces. Indeed, the former were forced to close not essential sectors only in the weekend, while the latter had to close such business activities for 7 days per week.

Different patterns are observed when we take into account the Accommodation sector. Interestingly, we do not find evidence of significant reduction of economic activities in areas characterized by high restrictions. On the other hand, we show that territories adopting medium restrictions experience significant reduction of economic consumption with welfare losses ranging between 17.0% and 28.7%. Such evidence may be explained by the mobility restrictions in medium risk provinces that allow individuals only to flow within the municipality for work and health emergency reasons, while in low risk territories people could move even across regions, thus providing less stringent constraints to tourism activities. However, similar mobility restrictions hold also for high risk provinces, for which we do not find significant reduction of the economic consumption. As low, medium and high restrictions territories had the same containment measures for the Accommodation sector, and different restrictions concerning mobility could only partially support the empirical evidence, such result may suggest the presence of other relevant factors at local level that may drive the policy outcome.

Significant welfare losses in all weeks of treatment are displayed by the Restaurants sector with an average treatment effect between −15.3% and −31.9% for medium restrictions areas and in the range −16.0% - −26.8% for high containment measures provinces. This evidence is consistent with the fact that both medium and high risk provinces adopted the same containment measure for this sector, with restaurants and bars closed 7 days per week and food delivery allowed until 10 p.m. On the other hand, low risk provinces had the opportunity to keep open bars and restaurants until 6 p.m. In addition, notice how the same type of policy intervention produced a similar contraction of the economic activity in medium and high risk territories, with average treatment coefficients that are not statistically different for the two groups of provinces. We provide also evidence of a lower immediate impact with policy restrictions that display a stronger magnitude of economic consumption reduction in the following periods with effects that tend to remain stable over weeks 1-3 since the start of the treatment, thus suggesting that the regulation is not reducing its effectiveness over time.

The Welfare sector is subject to weakly significant contraction of consumption in high restriction areas, while we do not find evidence of welfare losses in medium risk areas. This might be due to a more significant reduction of the healthcare emergency in areas characterized by higher policy stringency, consequently inducing lower consumption in the Welfare sector.

Finally, when we exclude the Retail sector, we confirm a significant welfare loss in high restriction provinces, with a contraction of consumption between 7.3% and 15.5%. However, as strong differences between high and low risk areas were related to the Retail sector, notice how the magnitude of the consumption reduction is lower when we exclude the Retail sector with respect to the case in which we consider all sectors or we just focus on the Retail sector. On the other hand, we do not show relevant welfare losses for medium restriction territories. Considering that low and medium risk provinces mainly differ for restrictions concerning restaurants, local mobility and retail activities during the weekend, it is reasonable to obtain significant average treatment effects for medium risk provinces in the Accommodation, Restaurants and Retail sectors, with lower evidence of welfare loss when consumption aggregates across larger group of sectors are considered.

Overall, the absence of significant coefficients in the weeks before the start of the treatment confirms the robustness of our findings, due to not significantly different behaviours of treated and control territories in the period before the start of differentiated policies.

These results suggest that high restrictions tend to generate welfare losses that are significant with respect to provinces characterized by low levels of restrictions, consistently with the different stringency of interventions across sectors. Similarly, we find evidence of significant consumption reduction in medium risk areas in those sectors where the level of policy stringency is different with respect to low risk provinces. Furthermore, we show that differentiated policy restrictions tend to display a lower immediate impact, with an increase in the reduction of economic consumption over the following weeks, suggesting persistency of the effects. Although it seems that differentiated policy interventions are able to limit economic activities consistently with the stringency level of restrictions, some exceptions still hold in the Accommodation sector, where the results cannot be completely explained by the intensity of restrictions. Such evidence may suggest that additional factors connected with local socio-economic characteristics may still drive the policy outcome.

To check the robustness of our results, we estimate Equation 2 by combining the full sample of sectors (results are reported in Annex D). In particular, by including within the same model the economic variation of the Retail, Restaurants, Accommodation and Welfare sectors, we have the possibility to study the significance of the different economic behaviours of the underlying sectors. Overall, we confirm that a stronger welfare loss is achieved by provinces subject to high restrictions with a contraction of consumption between 22.3% and 31.3% (see Table D1 and Figure D1). Notice how the reduction of economic activities tends to be persistent over the whole period of high level policy interventions, with the magnitude of the welfare loss that is not decreasing over time. Furthermore, a negative and significant consumption reduction is experienced also by territories with medium level restrictions, with an average treatment effect between −8.6% and −15.9%. Sectoral dummy variables suggest that welfare losses in the Restaurant and Accommodation sector are significantly higher than in the Retail sector, while the Welfare sector experiences larger consumption, confirming that the pandemic contributed to extra consumption in this sector. Such result tends to be confirmed also over time for the different analysed weeks, with interactions between weeks and sectors remaining significant and confirming a persistent contraction of economic activities in the Restaurant and Accommodation sectors with respect to the Retail sector, and a stable higher consumption variation in the Welfare sector. Notice how our results are confirmed also when we estimate separate models comparing economic performances of medium and high risk provinces with respect to low risk territories (see Annex F).

The Heterogeneous Epidemiological and Economic Performances of Provinces with Similar Policy Stringency

In this section we analyse whether the differentiated policy measures adopted by the italian government during Autumn 2020 were able to produce homogeneous results in terms of contagion containment and consumption variation across provinces implementing the same level of restrictions. We do this, by dividing italian provinces in three different classes (low, medium and high risk provinces), based on restrictions adopted after the 6th of November as explained in section 3.6.

Within each class we identify provinces with positive epidemiological and economic performances (e.g. displaying above the median consumption variation and below the median contagion) and provinces with negative epidemiological and economic performances (e.g. displaying below the median consumption variation and above the median contagion). We then compare through a set of t-tests the socio-economic characteristics of these two groups of provinces.

When we consider territories experiencing low restrictions, we identify a strong concentration of provinces with negative healthcare and economic performances in Veneto, while areas with positive results are spread in Sardinia and the Centre of Italy (see Figure 9). These territories tend to display significantly different socio-economic features, with provinces characterized by negative economic and epidemiological performances experiencing significantly higher levels of income per capita, population, opportunity to implement a telework approach and larger concentration of manufacturing and service activities (see Table 5. Furthermore, refer to Annex E to see the distribution of socio-economic characteristics of the two groups of provinces). Such result suggests that specific local socio-economic factors still drive contagion and economic patterns, even in case of differentiated tailored policy interventions. Furthermore, it highlights the key role of the local labour market structure in explaining the epidemiological and economic behaviour of territories.

Focusing on the concentration of manufacturing activities, our result is coherent with Ascani et al. (2021) who show how industrial districts may experience higher excess mortality rates due to systematic interdependencies, direct face-to-face contacts and coordinated interactions among workers. Furthermore, given that manufacturing firms are usually characterized by business linkages that cross local administrative boundaries, with intense trading relationships across markets located in different geographical areas within the same country or even at the global level (Boschma and Iammarino, 2009; Cainelli et al., 2014; Kemeny and Storper, 2015), such evidence is consistent with Ferraresi et al. (2021) who highlight that export and investment oriented value chains may be more penalised by restrictions during the pandemic.

As far as the service sector is concerned, we find results in line with Guaitoli and Pancrazi

(2021) who show that in Italy during Autumn 2020, policy restrictions with the same level of stringency generated significantly higher contagion in provinces with a larger share of population employed in service sectors. This might be justified by physical vicinity of workers with a large number of customers. Furthermore, our empirical evidence corroborates findings from a rich stream of literature highlighting the vulnerability and low resilience of service sectors to the pandemic (Bounie et al., 2020; Carvalho et al., 2020; Chetty et al., 2020; Hacıoglu- Hoke et al., 2021; Alexander and Karger, 2020).

Interestingly, the results are very stable across sectors, confirming how the local economic structure is a key driver to affect economic consumption and contagion. Limited exceptions are the Accommodation and the Restaurant sectors where provinces with simultaneously positive or negative economic and epidemiological performances display significant difference also in terms of Accessibility, Population density and presence of Essential Sectors employees. Differently from Ascani et al. (2020), who show how, during the lockdown period, territories with higher concentration of essential sectors were subject to a stronger pandemic intensity, we do not find significant evidence of stronger contribution of essential sectors to the resurgence of the contagion. Indeed, areas characterized by higher levels of essential sectors tend to experience higher economic consumption, but better performances also in terms of pandemic intensity. Our finding is more in line with Ferraresi et al. (2021) who show the absence of a significant trade-off between contagion and economic losses in the re-opening of essential sectors. Furthermore, this result might be explained by the fact that differently from the lockdown period, the resumption of economic activities was not limited to essential sectors in low restriction areas, thus reducing the relevance of such sectors in explaining infections dynamics, since also other business activities may have significantly contributed to the severity of the contagion.

Although restriction policies should define a trade-off between healthcare and contagion performances, we find even a higher number of provinces in the two categories of territories characterized at the same time by both positive or negative healthcare and economic performances for the case of medium restrictions (see Figure 10). Territories characterized by negative results in both the two dimensions are widespread across Emilia-Romagna, Tuscany and Veneto, with some exceptions in the South of Italy with the provinces of Bari, Foggia and Ragusa. Areas with positive performances are mainly concentrated in Abruzzo, Apulia, Marche, Sicily and Tuscany. Although in this case socio-economic differences across the two categories are slightly less marked, we confirm that areas with better performances display significantly lower income per capita, population, accessibility, population density and concentration of manufacturing and service sectors (see Table 6). Furthermore, we confirm that socio-economic differences are stronger between the two groups when we focus on economic consumption in the Accommodation and Restaurants sectors, while they are less relevant in case we exclude the Retail sector.

We finally show the results for the group with high restrictions. Interestingly, we still find a strong geographical separation of provinces with positive and negative performances in terms of contagion and consumption variation (see Figure 11). The former are concentrated in the North of Italy, especially in Lombardy, Piedmont and Trentino Alto Adige. The latter are mainly localized in the South of Italy in Calabria and Campania, with some exceptions in Lombardy, depending on the considered sector. Again, the two categories display significantly different socio-economic characteristics, corroborating the idea that across all levels of restrictions territories displaying negative economic and epidemiological performances feature higher income per capita (see Table 7). In this case the set of other relevant factors are slightly different with respect to the cases of low and medium restrictions provinces. Indeed, the two groups are characterized by different levels of internet connection and telework opportunities, with better performing territories experiencing wider access to a fast broadband and lower opportunities of remote work. Although telework was suggested as a potential non pharmaceutical intervention able to mitigate economic losses and reduce the contagion during the lockdown (Boeri et al., 2020; Dingel and Neiman, 2020; Jones et al., 2021; Barbieri et al., 2022), our evidence suggests that areas with lower possibility to implement work from remote solutions may have experienced higher economic consumption, but without being exposed to significant growth of the pandemic intensity during Autumn 2020. Finally, in this case the concentration of manufacturing and service activities are relevant drivers of epidemiological and economic patterns only when we focus on the Accommodation and Restaurants sectors. Our findings are stable also in case we restrict the analysis to the set of provinces described in section 3.5, where from the medium and high risk provinces we exclude territories that were immediately classified as medium (Apulia and Sicily) or high (Aosta Valley, Calabria, Lombardy, Piedmont) risk areas on the 6th of November (see Annex G for further details).

Overall, these results suggest that differentiated policy measures continue to produce heterogeneous results in terms of infections and economic contraction, with results mainly driven by the local economic structure. We further analyse this aspect, by repeating the same analysis on the whole set of italian provinces, to understand whether territories with positive and negative performances in terms of infections and consumption variation belong to a specific containment stringency level. Theoretically, different policy interventions should significantly diversify results in terms of contagion and economic consumption, thus we may expect not to find areas with positive or negative performances at the same time in the healthcare and economic dimension.

Differently from our expectations, we obtain a rich set of provinces in the two groups, with territories displaying negative performances again concentrated in the North of Italy and areas with positive results widespread in the Centre and South of the peninsula (see Figure 12). We confirm that territories with negative economic and epidemiological performances are characterized by lower income per capita, population density and higher concentration of manufacturing and service sectors (see Table 8). Furthermore, also accessibility, telework opportunities and the portion of employees in essential sectors are relevant drivers of the different epidemiological and economic behaviours of italian territories. Interestingly, these provinces implement different types of policies measures. Although in the majority of cases most negative performances are associated to provinces with high restrictions, there are some exceptions (e.g. provinces implementing high restrictions in the group of positive performances and areas adopting low restrictions in the category of negative results).

Overall, our results suggest that similarly to generalized lockdown, differentiated policy restrictions continued to produce uneven and heterogeneous economic and epidemiological impacts across territories. In particular, we highlight that areas characterized by negative economic and epidemiological performances were concentrated in the North of Italy, and display higher income per capita and presence of manufacturing and service activities. This evidence confirms the pivotal role of the local economic structure in driving contagion and economic consumption. Our findings suggest that policy maker should further refine and fine tune extant policy interventions, taking into account more explicitly the local socio-economic context in order to produce equal results across italian territories.

Conclusions

This paper analyses the economic impact of differentiated policy restrictions, constituting the main strategy adopted to tackle new waves of contagion during Autumn 2020. In this way, we contribute to study to what extent new policies implement lessons learned from past experience supported by real evidence. In particular, we investigate the capability of alternative restrictions to impose carefully tailored stringency levels that avoid to disproportionately affect territories characterized by lower pandemic intensity. Furthermore, we study the extent to which such differentiated interventions were able to produce equal and homogeneous results in terms of epidemiological and economic results across territories adopting policies with similar levels of stringency.

We show that economic consumption was reactive to different policy measures. Specifically, we observe that high level restrictions induced a stronger welfare loss in terms of economic consumption across almost all sectors of local economy, due to more stringent measures limiting business activities more than in low risk territories. In particular, we estimate that the economic contraction induced by more stringent policy interventions ranges between 9.0% and 21.2% when we consider consumption across all sectors, while it reaches even larger drops in the Restaurants sector

(−16.0% - −26.8%).

Conversely, medium level restrictions produce a significant contraction of economic consumption, only in those sectors where they introduce more stringent measures, with respect to low risk territories. More in detail, a significant economic impact is generated in the Retail, Accommodation and Restaurants sectors, with welfare losses ranging between 6.1% and 31.9% across the different sectors.

Furthermore, we show that differentiated policy measures tend to have a lower immediate impact, progressively increasing the magnitude of consumption reduction over the following weeks, providing evidence of persistency of policy effects.

Such results point out that differentiated policy restrictions tend to be able to diversify the magnitude of contraction of economic activities in coherence with the local level of pandemic intensity and with the stringency of imposed restrictions, avoiding to produce indiscriminate and generalized contraction of business activities. The main implication is that differentiated policy restrictions can thus be a valid alternative to national lockdowns, with one-size fits all approaches risking to disrupt local socio-economic systems.

Nonetheless, when we compare epidemiological and economic performances of provinces implementing similar policy interventions, we still find that results are driven by local socio-economic characteristics. In this direction, we demonstrate that comparing provinces adopting the same level of restrictions, it is possible to identify two groups of territories displaying at the same time positive or negative performances in terms of contagion and economic consumption. These areas feature significantly different socio-economic characteristics, with provinces characterized by negative results, showing higher income per capita, and larger concentration of manufacturing and service sectors. These results are robust across different sectors and for different levels of restrictions measures.

The significant spatial dimension of COVID-19 pandemic, producing uneven contagion and contraction of economic activities across territories adopting similar restrictions, suggests how the local epidemiological and economic resilience and vulnerability of territories is still heterogeneous despite the implementation of differentiated policy interventions. As a consequence, specific socio-economic factors related to the local economic structure such as the concentration of business activities across different sectors should be properly accounted in the design of containment measures to increase the homogeneity of healthcare and economic performances of italian territories, and avoid the exacerbation of differences across areas.

These findings can be useful also for other countries implementing similar differentiated policy restrictions against the pandemic to understand the potential impact of their measures in terms of welfare loss. Indeed, in Europe the majority of countries adopted different levels of policy stringency to face the resurgence of the contagion during Autumn 2020, avoiding a generalized national lockdown.

Although France, Germany, Spain and UK adopted policy packages that may be comparable to the italian approach, still relevant differences exist among these countries and should be carefully considered before to attempt to generalize the results to a broader context. Indeed, such countries have different levels of penetration of online sales. While in Italy and Spain such value accounts for only 8% of overall transactions, it reaches about 15% in France and Germany and even 23% in UK.[15] As a consequence, it should be taken into account the diverse possibility for individuals to shift towards online spending during the pandemic across the different countries and specifically across single sectors.

Furthermore, it should be considered the difference in terms of intensity and severity of the pandemic across such countries that may have lead central governments to design policies with heterogeneous levels of stringency, thus with potentially different impacts in terms of welfare loss. For instance, as of the end of 2020, Italy accounted for more than 2.1 million of official cases and 74

[15] Information about the penetration rate of online sales across countries are obtained from a study performed by the Ministry of Foreign Affairs of Netherlands, available at the following link:https://www.rvo.nl/sites/default/files/2022/02/E-commerce-Italy-2021-The-most-promising-online-sectors-and-eye-catching-developments. pdf.

k deaths corresponding to 3.5% and 0.12% of national population. Such figures are similar in France (3.9% and 0.10%) and Spain (4.3% and 0.12%), while they tend to be lower in Germany (2.1% and 0.06%).[16]

Finally, differences in the geographical distribution of socio-economic characteristics across countries could contribute to explain different patterns in terms of welfare losses and contagion. For instance, while Italy is characterized by a North-South territorial divide, in UK and France the main differences in terms of development are observed between the province capital and neighbour areas with respect to more periphery territories in the rest of the country (Rodrıguez-Pose, 2018).

On the other hand, we would expect lower possibility to extend such findings to Asian countries, as their policy approach made a larger use of available technologies such as contact tracing apps that contributed to design alternative policy measures with respect to the european context (Akinbi et al., 2021; Zhou et al., 2021).

Overall, our paper can support policy makers to further refine and fine tune differentiated policy restrictions, by identifying the relevant drivers that still affect the different policy outcome in terms of contagion and economic effects across territories.

Despite the relevance of our results, we acknowledge that our analysis presents some limitations. First, due to restrictions to human mobility, online expenditures may constitute a relevant source of information to study consumption dynamics during the COVID-19 pandemic. Although physical consumption significantly correlates with consumption data disclosed by the national statistical office, and despite the limited penetration rate and high homogeneity of online transactions across territories, we believe that future research works might try to include online transactions in the empirical analysis to further refine the precision of results. Such analyses may be particularly useful especially in specific business activities such as the Accommodation, Retail or Healthcare public

[16] Official statistics about the daily number of positive cases and deaths for European countries are available at the following link: https://www.ecdc.europa.eu/en/publications-data/ data-daily-new-cases-covid-19-eueea-country.

sectors, where the portion of physical transaction is lower and probably less representative of consumption behaviour.

Second, although the major italian bank has a good presence over the italian territory, some provinces are characterized by a lower market share, with the risk that our transaction data are less representative of the real consumption dynamics. Possible extensions of our work might be related to the combination of data coming from different banks in order to have higher capability to represent transaction flows over the italian territory. In addition, official data disclosed by national statistical offices might be employed to assess the robustness of our analysis as soon as they will be disclosed.

Finally, our analysed time frame is short, focusing on a narrow time window (16th of October - 7th of December 2020), where the Italian government started to implement differentiated policy restrictions across territories. Additional relevant insights for policy makers may come from similar analyses taking into account additional available instruments to tackle the pandemic such as the vaccine, starting from the first term of 2021. This type of studies may complement our findings, providing evidence on the effectiveness of combined and integrated policy measures against the COVID-19 pandemic.

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Tables

Table 1: Descriptive statistics for the daily Y-o-Y variation of economic consumption across different sectors and for different levels of policy stringency over the period 16th of October – 7th of December 2020. The set of provinces classified in low, medium and high risk level is shown in Figures 4 and 5. Consumption data are sourced from the major italian bank dataset.

Sector	Restriction	Min	Q1	Median	Q3	max	mean	std.dev
All sectors	Low	-0.315	-0.059	-0.007	0.043	0.199	-0.015	0.077
	Medium	-0.373	-0.139	-0.047	0.021	0.157	-0.061	0.104
	High	-0.576	-0.335	-0.207	-0.047	0.134	-0.205	0.170
Retail sector	Low	-0.156	-0.010	0.037	0.084	0.272	0.034	0.071
	Medium	-0.481	-0.079	0.013	0.086	0.233	-0.004	0.119
	High	-0.533	-0.288	-0.221	-0.030	0.191	-0.180	0.166
Accommodation sector	Low	-0.915	-0.679	-0.508	-0.372	0.513	-0.489	0.256
	Medium	-0.962	-0.762	-0.677	-0.568	0.670	-0.643	0.193
	High	-0.981	-0.925	-0.878	-0.772	-0.331	-0.828	0.137
Restaurants sector	Low	-0.774	-0.441	-0.358	-0.258	0.029	-0.343	0.137
	Medium	-0.858	-0.759	-0.645	-0.432	-0.062	-0.588	0.196
	High	-0.907	-0.856	-0.762	-0.615	-0.434	-0.721	0.146
Welfare sector	Low	-0.170	0.217	0.374	0.601	1.914	0.452	0.317
	Medium	0.001	0.315	0.460	0.627	1.688	0.502	0.275
	High	-0.069	0.445	0.722	0.855	1.462	0.666	0.325
No retail sector	Low	-0.570	-0.157	-0.092	-0.031	0.153	-0.101	0.104
	Medium	-0.433	-0.230	-0.150	-0.066	0.134	-0.151	0.107
	High	-0.761	-0.289	-0.192	-0.085	0.052	-0.233	0.211

Table 2: Source and descriptive statistics for the dependent variable and time varying controls during the period 16th October 2020 – 7th December 2020. Data related to daily cases in Italy at province level are disclosed by the Italian Civil Protection Department. The database is freely accessible at the link: https://github.com/pcm-dpc/COVID-19. Data related to human mobility are available to researchers by application to the Facebook Data for Good Partner Program available at the link: https://dataforgood.fb.com/ tools/disease-prevention-maps/.

	Q1	Median	Mean	Q3	Source
All	−0.028	0.294	0.331	0.571	Italian bank dataset
Retail	−0.047	0.259	0.283	0.526	Italian bank dataset
Transport	−0.057	0.263	0.309	0.550	Italian bank dataset
Accommodation	−0.042	0.270	0.320	0.556	Italian bank dataset
Restaurants	−0.047	0.269	0.318	0.557	Italian bank dataset
Welfare	−0.055	0.242	0.287	0.498	Italian bank dataset
No Retail	−0.050	0.268	0.314	0.554	Italian bank dataset
Lagged new daily cases	$5.421*10^{-5}$	$1.762*10^{-4}$	$2.808*10^{-4}$	$4.258*10^{-4}$	Italian civil protection
Total Lagged new daily cases	0.0046	0.0082	0.0096	0.0389	Italian civil protection
Lagged new daily cases^2	$6.780*10^{-9}$	5.051^{-8}	$1.945*10^{-7}$	$2.035*10^{-7}$	Italian civil protection
Total lagged new daily cases^2	$2.139*10^{-5}$	6.752^{-5}	$1.350*10^{-4}$	$1.670*10^{-4}$	Italian civil protection
Temperature	7.50	10.25	9.89	12.50	MiPAAF
Mobility	0.2624	0.2939	0.2947	0.3326	Facebook

Table 3: Sources and descriptive statistics for the time fixed socio-economic characteristics of italian provinces.

	Q1	Median	Mean	Q3	Source
Income per capita	16393	19176	18865	20938	MEF
Population	234715	385588	562073	610694	ISTAT
Income Inequality	0.1862	0.1911	0.1920	0.1973	MEF
Internet Connection	0.1042	0.12518	0.1299	0.1464	AGCOM
Accessibility	41.42	49.78	51.38	57.92	ISTAT
Telework	0.2282	0.2361	0.2370	0.2419	OECD & ISTAT
Population Density	106.03	176.09	270.26	280.00	ISTAT
Specialization Index	0.6529	0.7021	0.6962	0.7335	ORBIS
Primary Sector Share	0.0040	0.0072	0.0093	0.012	ORBIS
Manufacturing Sector Share	0.0027	0.0048	0.0093	0.0102	ORBIS
Service Sector Share	0.0029	0.0048	0.0093	0.0095	ORBIS
Essential Employees	0.4422	0.4890	0.4836	0.5331	ORBIS

Table 4: Panel Event study TWFE estimates based on Equation 2. "Medium Week" coefficients refer to coefficients β_e of Equation 2. "High Week" coefficients refer to coefficients γ_e of Equation 2. Standard errors are reported in parentheses. Full results with all estimated coefficients also for NUTS 1 and week dummies interactions are available in Appendix D.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
Medium Week −4	0.013	0.005	−0.018	0.033	−0.033	0.027
	(0.010)	(0.009)	(0.056)	(0.021)	(0.031)	(0.016)
Medium Week −3	0.011	−0.002	−0.0003	0.040	0.001	0.033
	(0.016)	(0.015)	(0.054)	(0.025)	(0.042)	(0.024)
Medium Week −2	0.002	−0.003	−0.067	0.006	−0.045	0.011
	(0.023)	(0.020)	(0.073)	(0.033)	(0.050)	(0.034)
Medium Week −1	0.004	0.006	-0.152^{*}	−0.031	−0.025	0.006
	(0.022)	(0.021)	(0.090)	(0.039)	(0.045)	(0.031)
Medium Week 0	0.003	0.006	-0.170^{**}	-0.153^{***}	−0.005	0.001
	(0.021)	(0.023)	(0.086)	(0.038)	(0.050)	(0.029)
Medium Week 1	-0.052^{**}	-0.061^{**}	-0.287^{***}	-0.319^{***}	−0.016	−0.036
	(0.024)	(0.025)	(0.095)	(0.038)	(0.050)	(0.032)
Medium Week 2	−0.036	-0.064^{***}	-0.270^{**}	-0.292^{***}	0.004	0.002
	(0.026)	(0.024)	(0.111)	(0.036)	(0.047)	(0.036)
Medium Week 3	−0.040	-0.071^{***}	-0.241^{**}	-0.251^{***}	−0.047	0.005
	(0.027)	(0.023)	(0.114)	(0.041)	(0.097)	(0.043)
High Week −4	0.027	0.012	0.019	−0.028	−0.134	0.043
	(0.021)	(0.014)	(0.107)	(0.047)	(0.103)	(0.040)
High Week −3	0.016	0.014	−0.116	−0.046	-0.312^{**}	0.010
	(0.030)	(0.025)	(0.208)	(0.074)	(0.146)	(0.052)
High Week −2	−0.008	−0.026	−0.036	0.038	−0.164	0.023
	(0.035)	(0.034)	(0.216)	(0.078)	(0.140)	(0.046)
High Week −1	−0.049	-0.055^{**}	−0.071	−0.048	−0.232	−0.022
	(0.031)	(0.028)	(0.248)	(0.083)	(0.146)	(0.043)
High Week 0	-0.090^{**}	-0.101^{**}	−0.184	-0.160^{**}	-0.247^{*}	−0.073
	(0.042)	(0.045)	(0.237)	(0.078)	(0.130)	(0.048)
High Week 1	-0.212^{***}	-0.256^{***}	−0.281	-0.259^{***}	-0.285^{*}	-0.135^{***}
	(0.024)	(0.029)	(0.228)	(0.070)	(0.161)	(0.038)
High Week 2	-0.208^{***}	-0.272^{***}	−0.243	-0.268^{***}	-0.385^{*}	-0.098^{**}
	(0.026)	(0.024)	(0.237)	(0.077)	(0.202)	(0.047)
High Week 3	-0.174^{***}	-0.166^{***}	−0.314	-0.261^{***}	-0.453^{**}	-0.155^{*}
	(0.042)	(0.034)	(0.248)	(0.086)	(0.181)	(0.082)
Total Mobility	0.043^{*}	0.037^{**}	0.077	0.067	-0.069^{*}	0.050
	(0.024)	(0.016)	(0.066)	(0.041)	(0.041)	(0.046)
Temperature	0.010	0.0001	0.141^{**}	0.058^{**}	−0.011	0.036
	(0.017)	(0.019)	(0.062)	(0.024)	(0.040)	(0.023)
Daily Cases	−0.002	−0.0004	0.007	−0.002	0.005	−0.004
	(0.010)	(0.005)	(0.048)	(0.011)	(0.010)	(0.020)
Total Cases	0.016	−0.007	−0.098	0.027	-0.130^{**}	0.056
	(0.021)	(0.020)	(0.110)	(0.036)	(0.056)	(0.037)
Daily Cases^2	0.002	0.0003	0.007	0.004	−0.002	0.005
	(0.003)	(0.003)	(0.009)	(0.004)	(0.003)	(0.005)
Total Cases^2	−0.014	0.003	0.021	−0.011	0.062^{*}	−0.042
	(0.012)	(0.012)	(0.056)	(0.020)	(0.037)	(0.026)
R^2	0.447	0.503	0.228	0.588	0.158	0.274
R^2 adjusted	0.415	0.475	0.184	0.563	0.110	0.232
N. Observations	3,094	3,094	3,094	3,094	3,094	3,094
Time-NUTS 1 Interactions	Yes	Yes	Yes	Yes	Yes	Yes

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 5: P-values of t-tests for a set of socio-economic characteristics of low risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.005	0.007	0.000	0.000	0.010	0.015
Population	0.029	0.044	0.004	0.004	0.026	0.115
Income Inequality	0.373	0.327	0.026	0.211	0.561	0.880
Internet Connection	0.468	0.160	0.287	0.328	0.592	0.660
Accessibility	0.121	0.083	0.035	0.060	0.135	0.262
Telework	0.001	0.002	0.000	0.000	0.000	0.005
Population Density	0.097	0.083	0.021	0.023	0.165	0.193
Specialization Index	0.499	0.312	0.160	0.233	0.738	0.895
Essential Employees	0.182	0.136	0.080	0.091	0.181	0.443
Primary Sector	0.535	0.190	0.365	0.380	0.600	0.855
Manufacturing Sector	0.019	0.028	0.006	0.006	0.011	0.076
Service Sector	0.020	0.034	0.002	0.002	0.016	0.088

Table 6: P-values of t-tests for a set of socio-economic characteristics of medium risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.044	0.100	0.000	0.000	0.010	0.247
Population	0.094	0.103	0.015	0.044	0.080	0.298
Income Inequality	0.513	0.315	0.141	0.254	0.640	0.964
Internet Connection	0.281	0.246	0.089	0.096	0.382	0.708
Accessibility	0.041	0.062	0.001	0.011	0.034	0.165
Telework	0.123	0.257	0.000	0.0001	0.071	0.643
Population Density	0.061	0.035	0.031	0.038	0.060	0.127
Specialization Index	0.363	0.227	0.073	0.180	0.550	0.611
Essential Employees	0.309	0.306	0.043	0.109	0.430	0.843
Primary Sector	0.462	0.353	0.003	0.177	0.763	0.827
Manufacturing Sector	0.010	0.016	0.001	0.001	0.011	0.040
Service Sector	0.011	0.006	0.004	0.008	0.015	0.019

Table 7: P-values of t-tests for a set of socio-economic characteristics of high risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.014	0.023	0.000	0.001	0.013	0.059
Population	0.368	0.327	0.144	0.182	0.440	0.974
Income Inequality	0.602	0.238	0.242	0.482	0.797	0.858
Internet Connection	0.016	0.013	0.002	0.008	0.024	0.037
Accessibility	0.866	0.126	0.635	0.842	0.958	0.965
Telework	0.035	0.054	0.003	0.007	0.033	0.143
Population Density	0.381	0.223	0.127	0.188	0.534	0.675
Specialization Index	0.809	0.293	0.224	0.851	0.976	0.992
Essential Employees	0.711	0.174	0.480	0.591	0.826	0.943
Primary Sector	0.636	0.187	0.420	0.496	0.724	0.924
Manufacturing Sector	0.183	0.265	0.026	0.039	0.179	0.705
Service Sector	0.245	0.291	0.075	0.095	0.240	0.816

Table 8: P-values of t-tests for a set of socio-economic characteristics across all italian provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.000	0.000	0.000	0.000	0.000	0.000
Population	0.171	0.138	0.015	0.052	0.285	0.337
Income Inequality	0.652	0.387	0.135	0.330	0.958	0.972
Internet Connection	0.682	0.354	0.136	0.508	0.982	0.998
Accessibility	0.031	0.044	0.007	0.012	0.018	0.120
Telework	0.001	0.002	0.000	0.000	0.000	0.006
Population Density	0.024	0.021	0.005	0.012	0.028	0.064
Specialization Index	0.659	0.097	0.562	0.574	0.731	0.788
Essential Employees	0.058	0.121	0.001	0.003	0.024	0.304
Primary Sector	0.364	0.274	0.016	0.191	0.559	0.726
Manufacturing Sector	0.004	0.008	0.000	0.000	0.004	0.020
Service Sector	0.040	0.045	0.002	0.007	0.077	0.098

Figures

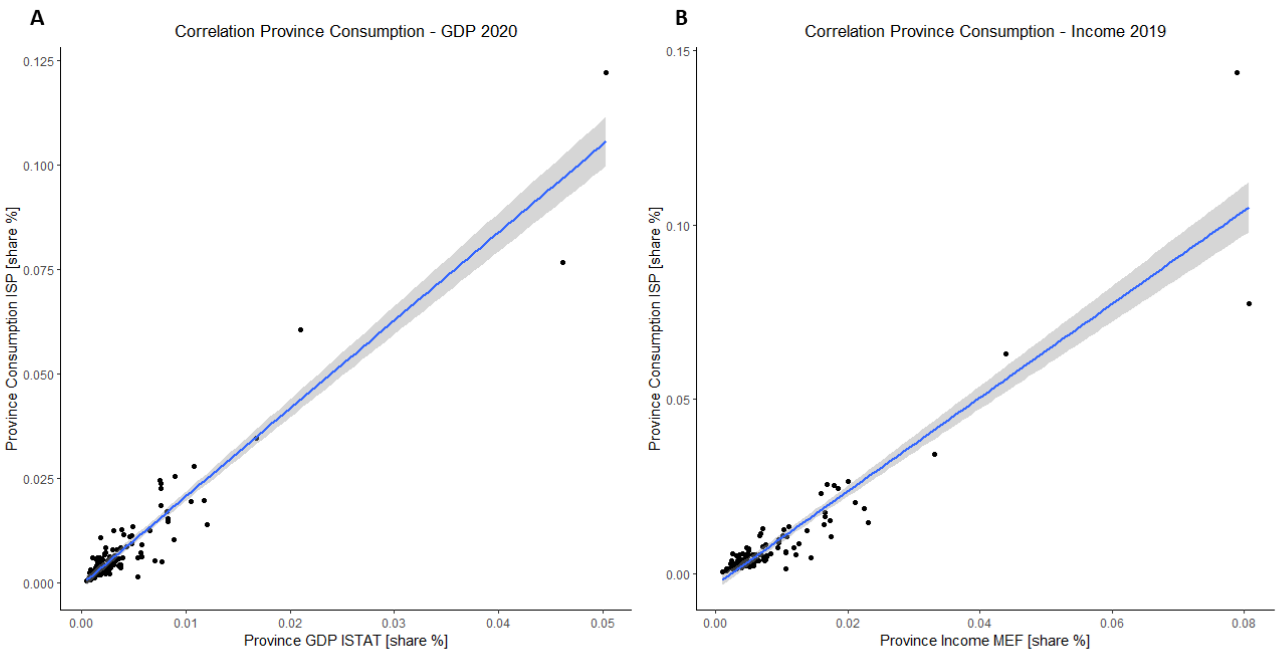

Figure 1: A: correlation between the share of CCPD total yearly consumption and GDP at province level in year 2020. Correlation is 0.955 (P-value $\simeq$ 0). B: Correlation between the share of CCPD total yearly consumption and Income (MEF) at province level in year 2019. Correlation is 0.934 (P-value $\simeq$ 0).

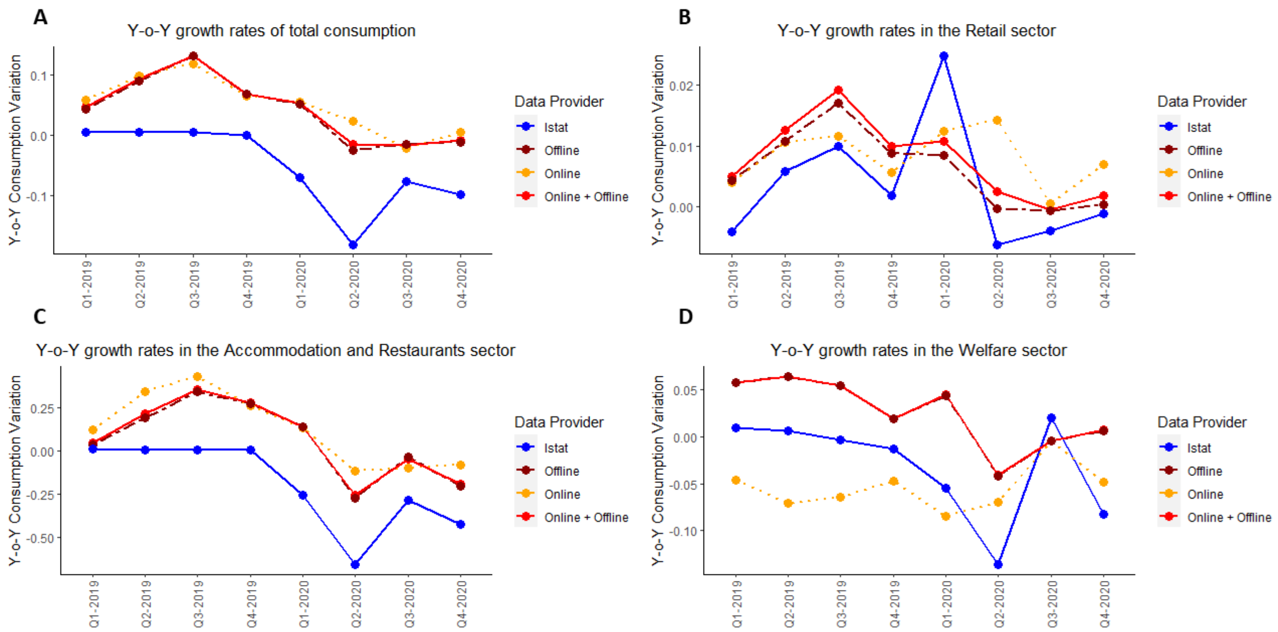

Figure 2 A: Correlation between the year-on-year (Y-o-Y) growth rates of total national quarterly consumption levels computed according to either CCPD or ISTAT over the time interval 2019-2020. For CCPD we show the offline (dark orange), online (orange), and offline plus online (red) time series. Correlation is 0.821 (P-value = 0.012), 0.683 (P-value = 0.061), and 0.800 (P-value = 0.017), respectively. We scale each CCPD curve multiplying it by the elasticity of CCPD consumption variation with respect to ISTAT consumption variation. This estimated elasticity is 0.159 (S.E.: 0.045), 0.116 (S.E.: 0.050), 0.153 (S.E.: 0.047) for offline, online, and offline plus online time series, respectively. Panels **B-C-D:** Correlation between the year-on-year growth rates of sectoral quarterly consumption levels computed according to CCPD and ISTAT, namely: Retail (panel B), Accommodation and Restaurants (panel C), Welfare (panel D). For each sector, we scale the CCPD curve multiplying it by the elasticity of CCPD consumption variation with respect to ISTAT consumption variation. We report the corresponding values of elasticity and correlation for the offline, online, and offline plus online time series, respectively. Retail sector elasticity is 0.021 (S.E.: 0.011), 0.012 (S.E.: 0.009), 0.023 (S.E.: 0.011), while correlation is 0.616, 0.463, 0.647 (P-values = 0.103, 0.247, 0.083); Accommodation and Restaurants sector elasticity is 0.390 (S.E.: 0.088), 0.230 (S.E.: 0.061), 0.379 (S.E.: 0.085), while correlation is 0.875, 0.839, 0.876 (P-values = 0.004, 0.009, 0.004). Welfare sector elasticity is 0.103 (S.E.: 0.046), -0.077 (S.E.: 0.064), 0.103 (S.E.: 0.047), while correlation is 0.673, -0.443, 0.667 (P-values = 0.067, 0.271, 0.071).

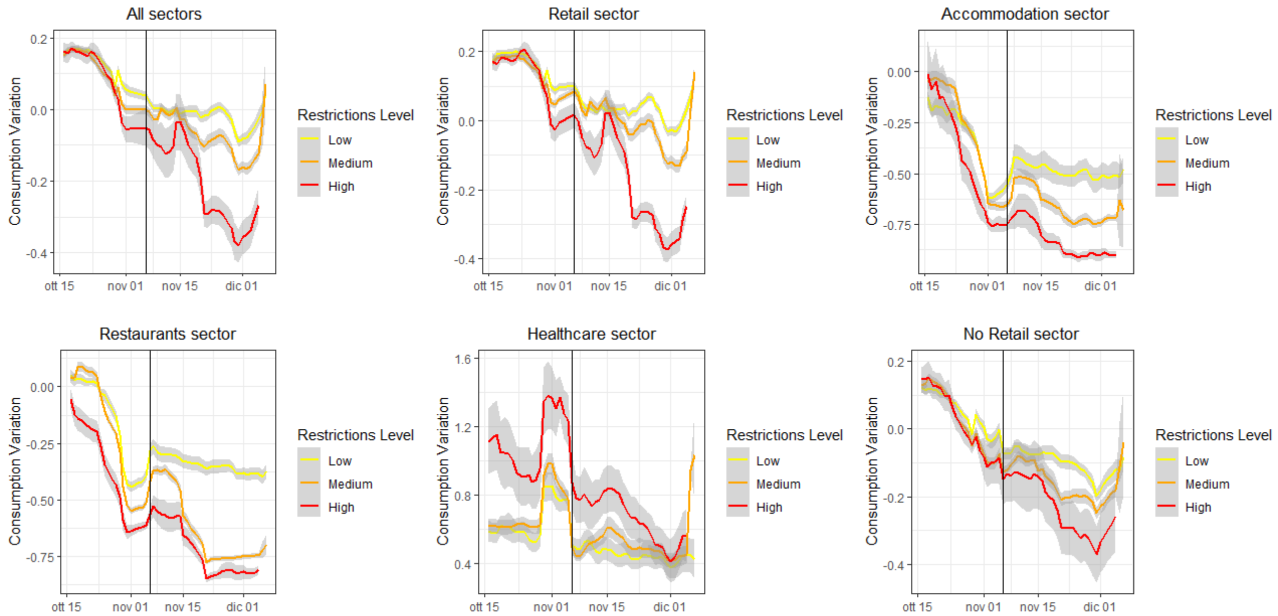

Figure 3: Daily Y-o-Y variation of economic consumption across different sectors over the period 16th of October - 7th of December 2020. The yellow line represents the average daily Y-o-Y variation of economic consumption of all provinces classified as low risk since the 6th of November until the end of our analysed period (7th of December). The orange line represents the average daily Y-o-Y variation of economic consumption of all provinces classified as medium risk, after having previously been classified as low risk. We exclude weeks in which such provinces may have changed again risk level after having been classified as medium risk. Finally, the red line represents the average daily Y-o-Y variation of economic consumption of all provinces classified as high risk, after having previously been classified as low risk. We exclude weeks in which such provinces may have changed again risk level after having been classified as high risk. Grey areas refer to 95% confidence intervals. The set of provinces classified in low, medium and high risk level is shown in Figures 4 and 5. Further details about the approach we use to classify provinces as low, medium and high risk are provided in section 3.5. Consumption data are sourced from the major italian bank dataset.

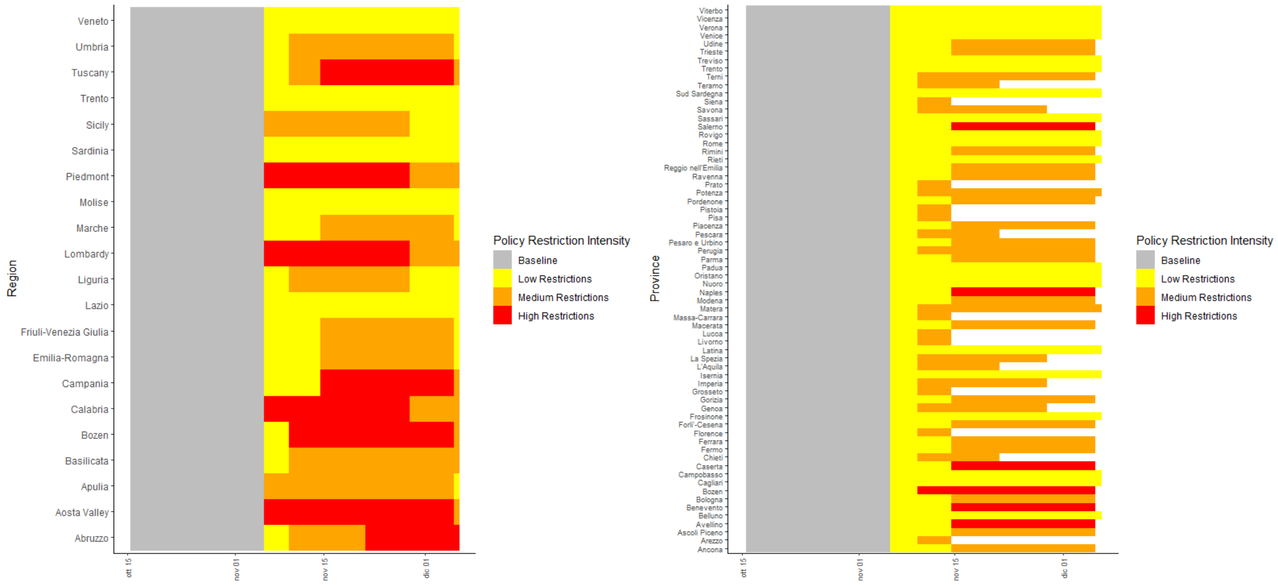

Figure 4: The time evolution of differentiated policy restrictions in Italy over the period 16th October - 7th December 2020.

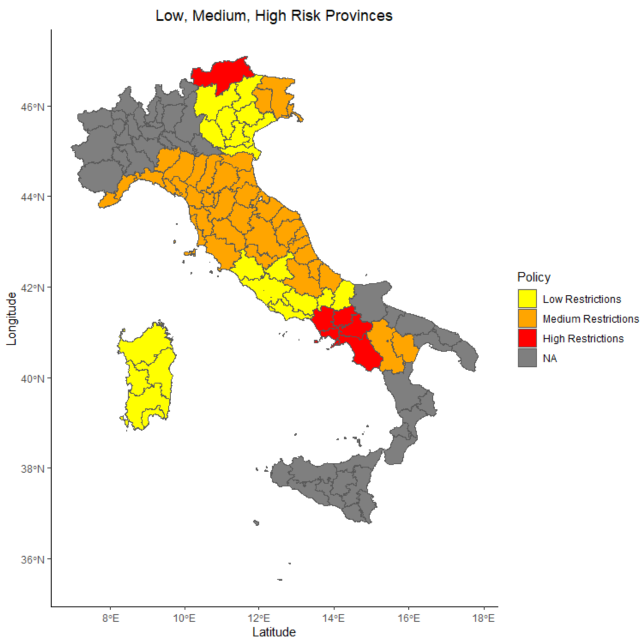

Figure 5: Geographical distribution of provinces classified as "low", "medium" and "high" risk territories in our empirical analysis.

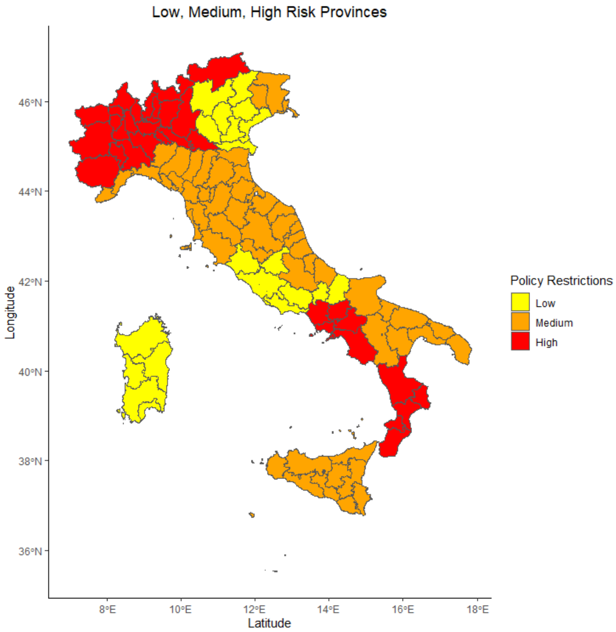

Figure 6: Geographical distribution of provinces classified as “low”, “medium” and “high” risk territories in our empirical analysis to assess the relevance of province specific socio-economic variables based on the methodology described in section 3.6.

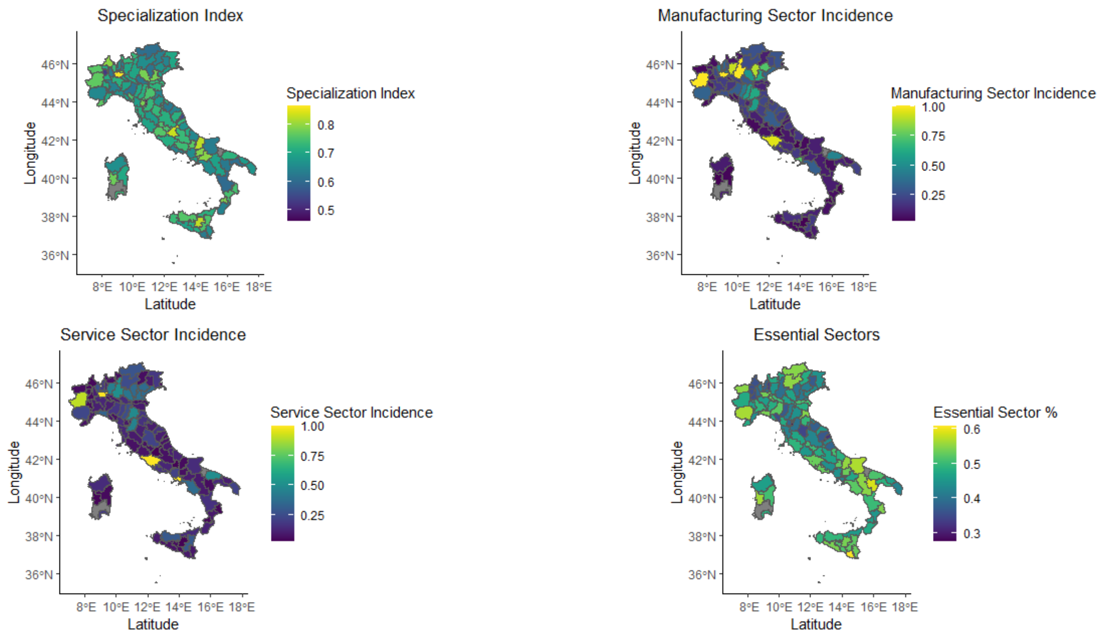

Figure 7: Geographical distribution at province level of the specialization index, share of manufacturing and service sectors employees and of the portion of labour force working in essential sectors. Values of the share of manufacturing and service sectors employees are normalized with respect to the maximum.

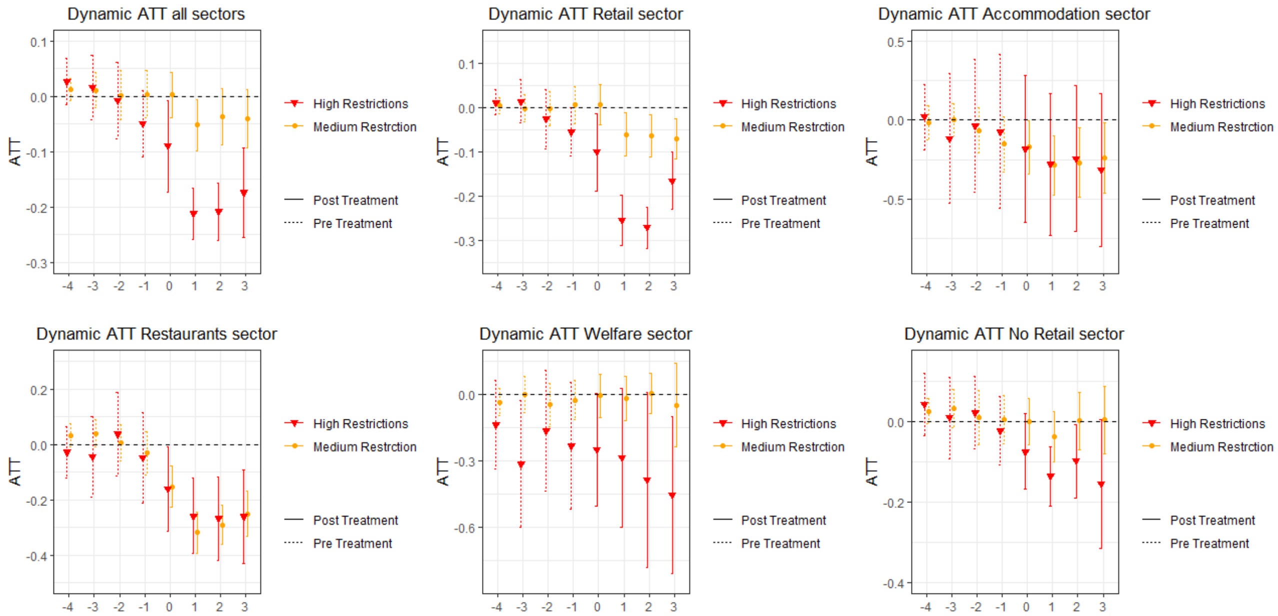

Figure 8: This figure shows the values of coefficients β_e and γ_e estimated through the panel event study TWFE described in Equation 2 with a 95% confidence interval. Models are estimated separately for different sectors.

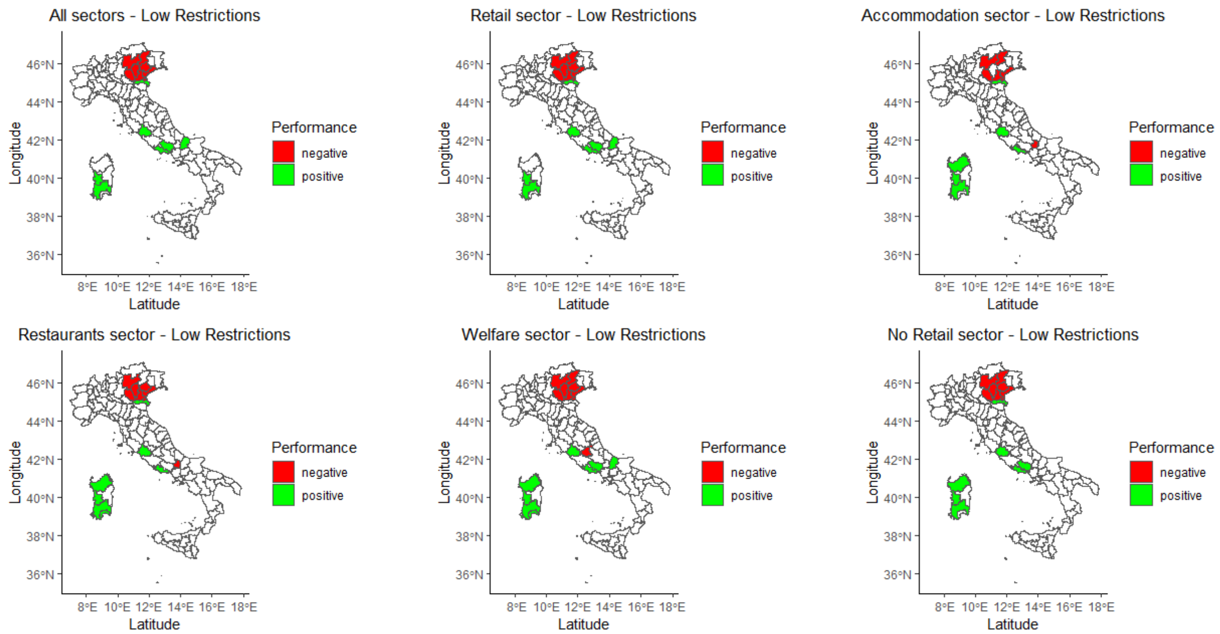

Figure 9: Low risk italian provinces performances in terms of contagion and economic consumption variation.

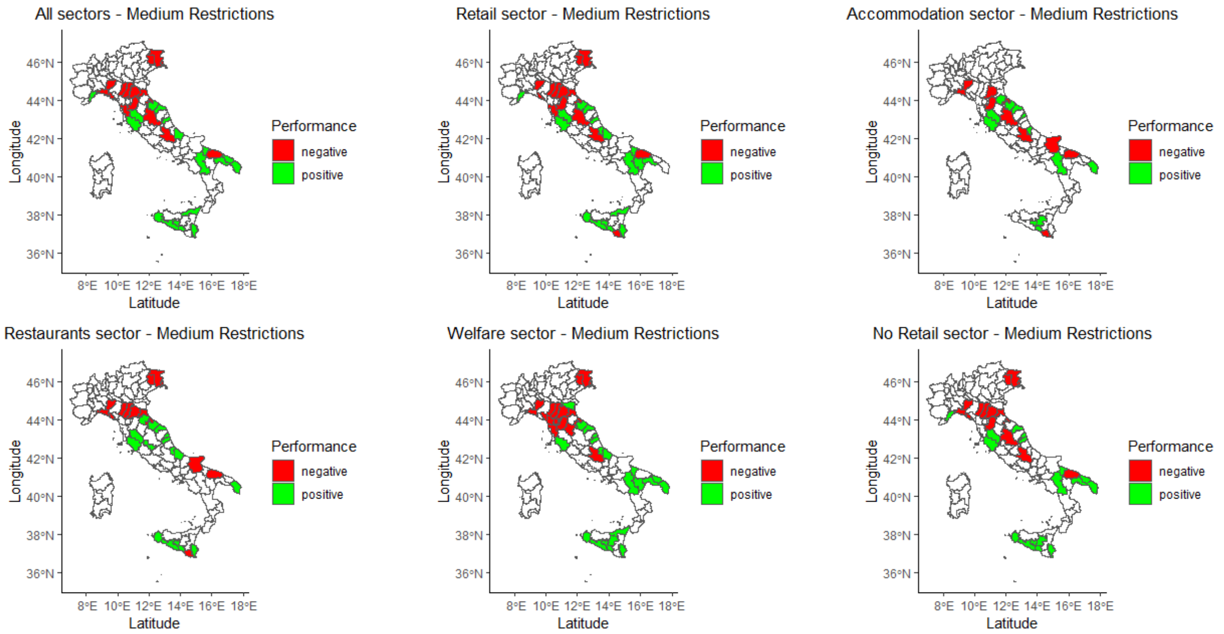

Figure 10: Medium risk italian provinces performances in terms of contagion and economic consumption variation.

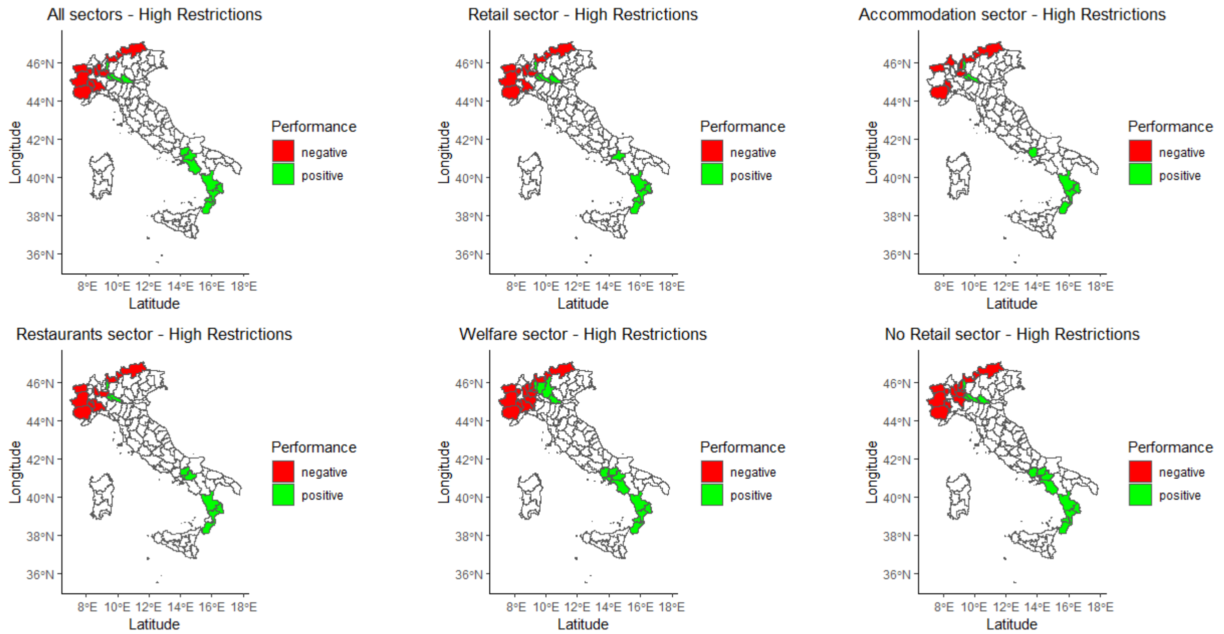

Figure 11: High risk italian provinces performances in terms of contagion and economic consumption variation.

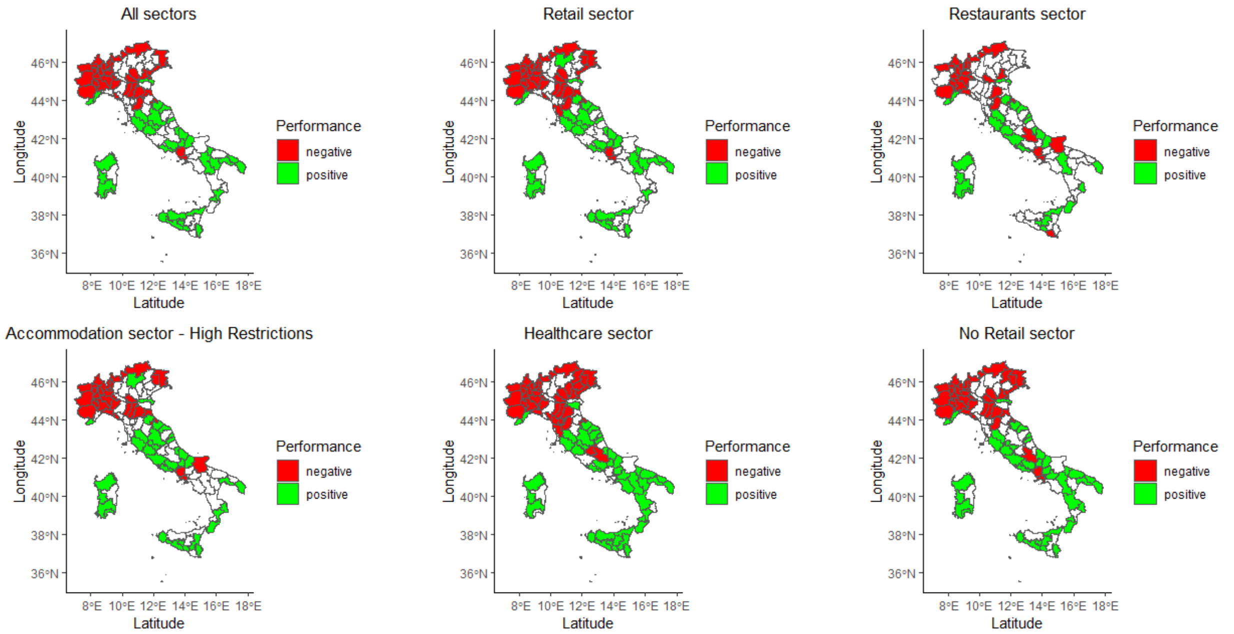

Figure 12: Italian provinces performances in terms of contagion and economic consumption variation.

Appendix A: Geographical Presence of the Major Italian Bank

In this section we provide additional details about the geographical presence of the major italian bank on the Italian territory. Unfortunately, national statistical offices do not disclose information related to the number of customers served by the different italian banks. However, we have information about the number of our major bank clients at province level.

Figure A1 shows the geographical distribution of the bank clients expressed as a percentage of resident population with an age higher or equal to 18 years old at province and regional scale.[17] Overall, we observe a quite good homogeneity in the presence of the major bank over the whole italian territory. At province level, the highest presence is achieved in the province of Verbano-Cusio-Ossola (Piedmont) with a value equal to 52% (see Table A1). The lowest market share is rather accounted by Reggio Emilia, reaching only 5%. However, the average market share at province level is almost 22% with a median equal to 19%, suggesting the high density of the bank across the italian peninsula. At regional level, we find the highest presence of the bank in Aosta Valley (37%), followed by Piedmont, Veneto and Lombardy that account for a market share above 30%. The only region with a presence of the bank below 10% is Trentino Alto-Adige, while for all other regions, the market share is at least 14%, corroborating the capillarity of the bank across italian territories and the capability of our data to provide a representative overview of the whole country. At regional level the average and the median market share are both around 22%.

[17] We normalize the number of clients with respect to the number of citizens older than 18 years old, as in Italy younger people tend not to have a credit or debit card. Thus, this indicator should provide a fair proxy of the market share of the major italian bank across territories.

Appendix B: Sectors Closed for Alternative Policy Restrictions in Italy

This section aims to synthesize the set of sectors closed in correspondence of different levels of policy stringency implemented by the italian government starting from the 6th of November 2020 with the DPCM n. 275.[18] Table B1 summarizes sectors closed in low risk regions. Table B2 summarizes sectors closed in medium risk regions. Tables B3, B4, B5 and B6 summarize sectors closed in high risk regions.

[18]Additional information related to the implementation of differentiated policy restrictions in Italy is included into the DPCM n. 275 and is available at the following link: https://www.gazzettaufficiale. it/eli/gu/2020/11/04/275/so/41/sg/pdf.

Appendix C: Online Consumption Relevance

In the empirical analysis we aggregate the monetary value of daily transactions with respect to the province of vendors. As we have information about the province of vendors only for physical transactions, our study neglects consumption associated with online transactions. Due to the significant restrictions to human mobility, excluding online transaction could represent a limitation of our analysis. In this section, we provide additional details on the incidence of online consumption, showing different reasons why relying on physical transactions should provide an accurate representation of the consumption behaviour of italian territories during the COVID-19 pandemic.

First, as disclosed by a study performed at european level by the Ministry of Foreign Affairs of Netherlands, in Italy online spending accounts for only 8% of overall transactions. Such value is quite low if compared with other european countries such as France, Germany and UK, where the penetration rate of online transaction reaches about 14%, 15% and 23%.[19]

Consistently, the national statistical office discloses the percentage of online sales sustained by italian firms with more than 10 employees aggregated at country level for different sectors.[20] The incidence of online sales is equal to 12.9% when we consider all economic sectors, 9.5% for the Retail sector, 29.9% for the Accommodation sector and 5.6% in the Restaurants sector (information is not available for the Welfare sector). These values suggest how online transactions still represent a limited portion of overall spending.

Furthermore, we check the incidence of online transaction also in our dataset and their geographical distribution, to understand whether a high heterogeneity in the amount of digital consumption across territories may drive our results. As we do not have information on the vendor province, for this check we aggregate consumption data with respect to the client province.

[19] Information about the penetration rate of online sales across countries is obtained from a study performed by the Ministry of Foreign Affairs of Netherlands, and is available at the following link: https://www.rvo.nl/sites/default/files/2022/02/E-commerce-Italy-2021-The-most-promising-online-sectors-and-eye-catching-developments. pdf.

[20] Information about the percentage of online sales sustained by italian firms with more than 10 employees aggregated at country level for different sectors is disclosed by ISTAT and is available at the following link: http://dati.istat.it/?lang=it&SubSessionId=3db5dc01-dd7c-4dd7-9b76-679be21b0fb5.

Table C1 shows that the higher values of the penetration rate of online transactions are achieved when we consider all sectors and in case we focus on the Retail or Accommodation sectors, as they account on average for the 20.7%, 19.3% and 16.7%. For all sectors and the Retail sector, the amount of online transactions is quite homogeneous across provinces (see Figure C1). Differently, for the Accommodation sector, highest values of such indicator are achieved by Sardinia and Sicily, probably due to the relevance of touristic flows in these two regions. A low incidence of online transactions is rather observed in the Restaurants and Welfare sectors and when we exclude the Retail sector. In these cases, the mean penetration rate of online transactions ranges between 1.6% and 5.8%. Overall, we observe that the incidence of online transactions tends to be stable across territories and should be properly accounted by province fixed effects. Furthermore, the differences across sectors should be properly taken into account both when we estimate separate models across sectors and when we estimate the full sample model with all sectors, due to the presence of sectoral dummies. The territorial heterogeneity in the Accommodation sector may be mitigated by the fact that it is likely that the main amount of online transactions is generated during the summer period, whereas our analysed time frame is usually characterized by lower touristic flows.

Finally, we remark that, as disclosed in section 3.3, offline transactions have a significant correlation with consumption data disclosed by the national statistical office across different sectors, suggesting a good capability of the main variable we use in the empirical analysis to properly map consumption dynamics in Italy, without relevant distortions.

For all such reasons, although online transactions may constitute a relevant source of information to study the consumption behaviour of italian provinces during the COVID-19 pandemic, physical transaction should still represent a robust variable to study spending dynamics.

Appendix D: Full Results

In this section we show the full set of coefficients estimated through the panel event study described in Equation 2. Tables D1 and D2 display also coefficients for NUTS 1 - week interactions with respect to Table 4, where we separately estimate Equation 2 for different sectors. Tables D3, D4, D5 and D6 show the full set of coefficients estimated Equation 2 when we combine the full sample of sectors in a single model. We display also coefficients for NUTS 1 - week and sector - week interactions. Figure D1 shows the estimates of the average treatment effects for medium and high risk provinces with respect to low risk territories when we combine the full sample of sectors in a single model.

Appendix E: Socio-economic Characteristics Distribution

In this section we show the distribution of socio-economic characteristics of provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances.

More specifically, Figures E1, E2 and E3 analyse the set of low, medium and high risk provinces, respectively. Figure E4 refers to the case where all italian provinces are taken into account. In all cases, the two groups of territories displaying simultaneously positive or negative economic and epidemiological results are identified considering aggregate consumption across all economic sectors. Similar results hold when we focus on consumption related to single specific sectors (see Tables 5, 6, 7 and 8 for further details).

Appendix F: Robustness Check: The Economic Impact of Restrictions

This section shows the results of a robustness check on the impact of differentiated policies with heterogeneous levels of stringency across italian provinces. In particular, differently from Section 4.1, we separately estimate the impact of medium and high policy stringency with respect to low policy stringency. Tables F1, F2, and Figure F1 show the results of the TWFE model in case we compare low and medium risk provinces. Tables F3, F4, and Figure F2 show the results of the TWFE model in case we compare low and high risk provinces. Results are coherent with the empirical evidence shown in Section 4.1. Furthermore, Tables F5, F6, F7 and Figure F3 show the results of the TWFE model in case we compare low and medium risk provinces with the full combined sample of sectors included into the same model. Finally, Tables F8, F9, F10 and Figure F4 show the results of the TWFE model in case we compare low and high risk provinces with the full combined sample of sectors included into the same model.

Appendix G: Robustness Check: The Heterogeneous Epidemiological and Economic Performances of Provinces with Similar Policy Stringency

In this section we check the robustness of results shown in section 4.2, where we investigate whether local pre-existing socio-economic characteristics affect economic and epidemiological performances of italian territories implementing the same level of policy intervention. In this case from the medium and high risk provinces we exclude territories that were immediately classified as medium (Apulia and Sicily) or high (Aosta Valley, Calabria, Lombardy, Piedmont) risk areas on the 6^{th} of November. In this case, the set of provinces included into the analysis in the low, medium and high level of restrictions is exactly the same defined in section 3.5 and shown in Figure 5.

Overall, results are coherent with those shown in section 4.2. In particular, provinces displaying at the same time better epidemiological and economic performances tend to be characterized by lower income per capita, and concentration of manufacturing and service sectors (see Tables G1, G2, G3 and G4). Moreover, Figures G1, G2, G3 and G4 show the set of provinces displaying at the same positive or negative epidemiological and economic performances.

Appendix Tables

Table A1: Descriptive statistics for the geographical distribution of the italian major bank clients expressed as a percentage of the population with age higher or equal to 18 years old. Data are sourced from the major italian bank dataset.

Geographical Scale	Min	Q1	Median	Q3	max	mean	std.dev
Province	5.0%	13.63%	19.11%	27.3%	52.05%	21.7%	10.2%
Region	8.1%	15.9%	22.3%	26.1%	37.2%	21.8%	7.8%

Table B1: sectors closed in low risk regions.

Macro Sector	**ATECO Sector Code**	**Description**
Information and Communication	5914	Motion picture projection activities
Arts, Entertainment and Recreation	9004	Operation of arts facilities
Arts, Entertainment and Recreation	9101	Library and archives activities
Arts, Entertainment and Recreation	9102	Museums activities
Arts, Entertainment and Recreation	9103	Operation of historical sites and buildings and similar visitor attractions
Arts, Entertainment and Recreation	920002	Management of devices that allow cash winnings operating with coins or tokens
Arts, Entertainment and Recreation	93112	Swimming pools facilities
Arts, Entertainment and Recreation	9313	Fitness facilities
Arts, Entertainment and Recreation	93291	Discos, dance halls, night clubs
Arts, Entertainment and Recreation	93293	Game rooms and billiards
Other personal service activities	9604	Physical well-being activities
Additional Notes:	In addition to the above mentioned restrictions, mobility is forbidden between 10 p.m. and 5 a.m., while inter regional mobility is allowed. Retail activities are closed during the weekend, with the exception of essential sectors. Online education is implemented for high schools and universities. In the Transportation sector, public transport capacity is reduced by 50%. Restaurants and bars are opened until 6 p.m. Food delivery is allowed until 10 p.m.	

Table B2: sectors closed in medium risk regions.

Macro Sector	**ATECO Sector Code**	**Description**
Information and Communication	5914	Motion picture projection activities
Arts, Entertainment and Recreation	9004	Operation of arts facilities
Arts, Entertainment and Recreation	9101	Library and archives activities
Arts, Entertainment and Recreation	9102	Museums activities
Arts, Entertainment and Recreation	9103	Operation of historical sites and buildings and similar visitor attractions
Arts, Entertainment and Recreation	920002	Management of devices that allow cash winnings operating with coins or tokens
Arts, Entertainment and Recreation	93112	Swimming pools facilities
Arts, Entertainment and Recreation	9313	Fitness facilities
Arts, Entertainment and Recreation	93291	Discos, dance halls, night clubs
Arts, Entertainment and Recreation	93293	Game rooms and billiards
Other personal service activities	9604	Physical well-being activities
Additional Notes:	In addition to the above mentioned restrictions, mobility is forbidden between 10 p.m. and 5 a.m. and it is required to limit mobility to work and health reasons within the municipality. Retail activities are closed during the weekend, with the exception of essential sectors. Online education is implemented for high schools and universities. In the Transportation sector, public transport capacity is reduced by 50%. Restaurants and bars are closed 7 days per week. Food delivery is allowed until 10 p.m	

Table B3: sectors closed in high risk regions. Part I.

Macro Sector	**ATECO Sector Code**	**Description**
Wholesale and retail trade	47191	Department stores
Wholesale and retail trade	47199	Other non-specialized shops of various non-food products
Wholesale and retail trade	4751	Retail sale of textiles in specialised stores
Wholesale and retail trade	4753	Retail sale of carpets, rugs, wall in specialized stores
Wholesale and retail trade	4754	Retail sale of electrical appliances in specialised stores
Wholesale and retail trade	47591	Retail sale of furniture for the house
Wholesale and retail trade	47592	Retail sale of tools for the house and tableware
Wholesale and retail trade	47594	Retail sale of sew machines
Wholesale and retail trade	47596	Retail sale of musical instruments
Wholesale and retail trade	47599	Retail sale of other diverse articles for domestic use
Wholesale and retail trade	4763	Retail sale of music and recordings in specialised stores
Wholesale and retail trade	47642	Retail sale of accessories
Wholesale and retail trade	47711	Retail sale of packages for adults
Wholesale and retail trade	47714	Retail sale of clothing in skin
Wholesale and retail trade	47715	Retail sale of hats, umbrellas, gloves and ties
Wholesale and retail trade	47722	Retail sale of articles for trips
Wholesale and retail trade	4777	Retail sale of watches and jewelry in specialised stores
Wholesale and retail trade	47781	Retail sale of furniture for offices
Wholesale and retail trade	477831	Retail sale of art objects (including art galleries)
Wholesale and retail trade	477832	Retail sale of handicraft objects
Wholesale and retail trade	477833	Retail sale of holy furniture and religious articles

Table B4: sectors closed in high risk regions. Part II.

Macro Sector	ATECO Sector Code	Description
Wholesale and retail trade	477835	Retail sale of wedding favors
Wholesale and retail trade	477836	Retail sale of trinkets and costume jewelry
Wholesale and retail trade	477837	Retail sale of articles for the fine arts
Wholesale and retail trade	47785	Retail sale of of weapons and ammunition, military articles
Wholesale and retail trade	477891	Retail sale of of collectibles
Wholesale and retail trade	477892	Retail sale of of twine, ropes, sacks and packaging
Wholesale and retail trade	477894	Retail sale of adult items
Wholesale and retail trade	477899	Retail sale of other no alimentary products
Wholesale and retail trade	4779	Retail sale of second-hand goods in stores
Wholesale and retail trade	478902	Retail trade not in stores of autos, equipment for agriculture and equipment for gardening
Wholesale and retail trade	478904	Retail trade not in stores of costume jewelry
Wholesale and retail trade	478905	Retail trade not in stores of furniture for garden and domestic appliances and electrical equipment
Wholesale and retail trade	478909	Retail trade not in stores of other products
Wholesale and retail trade	47791	Other retail sale not in stores, stalls or markets
Information and Communication	5914	Motion picture projection activities
Arts, Entertainment and Recreation	9004	Operation of arts facilities

Table B5: sectors closed in high risk regions. Part III.

Macro Sector	**ATECO Sector Code**	**Description**
Arts, Entertainment and Recreation	9101	Library and archives activities
Arts, Entertainment and Recreation	9102	Museums activities
Arts, Entertainment and Recreation	9103	Operation of historical sites and buildings and similar visitor attractions
Arts, Entertainment and Recreation	920002	Management of devices that allow cash winnings operating with coins or tokens
Arts, Entertainment and Recreation	93112	Swimming pools facilities
Arts, Entertainment and Recreation	93113	Operation of multipurpose sports facilities
Arts, Entertainment and Recreation	93119	Operation of other sports facilities
Arts, Entertainment and Recreation	9312	Activities of sports clubs
Arts, Entertainment and Recreation	9313	Fitness facilities
Arts, Entertainment and Recreation	93291	Discos, dance halls, night clubs
Arts, Entertainment and Recreation	93293	Game rooms and billiards
Other personal service activities	9604	Physical well-being activities
Other personal service activities	960901	Activities related to clearing of cellars and garages
Other personal service activities	960902	Tattoo and piercing
Other personal service activities	960903	Marriage and meeting agencies
Other personal service activities	960904	Pet care services (excluding veterinary services)
Other personal service activities	960905	Other personal activities

Table B6: sectors closed in high risk regions. Part IV.

Macro Sector	**ATECO Sector Code**	**Description**
Additional Notes:	In addition to the above mentioned restrictions, mobility is forbidden at any hour and it is required to limit to work and health reasons within the municipality. Retail activities are closed 7 days per week, with the exception of essential sectors. Online education is implemented for secondary schools, high schools and universities. In the Transportation sector, public transport capacity is reduced by 50%. Restaurants and bars are closed 7 days per week. Food delivery is allowed until 10 p.m	

Table C1: Descriptive statistics for geographical distribution of the incidence of online transactions at province level across different sectors. Data are sourced from the major italian bank dataset.

Sector	Min	Q1	Median	Q3	max	mean	std.dev
All	12.4%	19.5%	20.3%	21.9%	28.8%	20.7%	2.4%
Retail	10.5%	16.6%	18.5%	19.3%	28.4%	19.3%	2.7%
Accommodation	11.5%	14.7%	16.6%	18.3%	25.5%	16.7%	2.7%
Restaurants	2.4%	3.9%	4.6%	5.6%	11.8%	4.9%	1.7%
Welfare	0.7%	1.2%	1.4%	1.8%	3.4%	1.6%	0.5%
No Retail	3.5%	5.0%	5.5%	6.4%	9.2%	5.8%	1.1%

Table D1: Panel Event study TWFE estimates by different sectors. Standard errors are reported in parentheses. Part I.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
Medium Week −4	0.013	0.005	−0.018	0.033	−0.033	0.027
	(0.010)	(0.009)	(0.056)	(0.021)	(0.031)	(0.016)
Medium Week −3	0.011	−0.002	−0.0003	0.040	0.001	0.033
	(0.016)	(0.015)	(0.054)	(0.025)	(0.042)	(0.024)
Medium Week −2	0.002	−0.003	−0.067	0.006	−0.045	0.011
	(0.023)	(0.020)	(0.073)	(0.033)	(0.050)	(0.034)
Medium Week −1	0.004	0.006	-0.152^{*}	−0.031	−0.025	0.006
	(0.022)	(0.021)	(0.090)	(0.039)	(0.045)	(0.031)
Medium Week 0	0.003	0.006	-0.170^{**}	-0.153^{***}	−0.005	0.001
	(0.021)	(0.023)	(0.086)	(0.038)	(0.050)	(0.029)
Medium Week 1	-0.052^{**}	-0.061^{**}	-0.287^{***}	-0.319^{***}	−0.016	−0.036
	(0.024)	(0.025)	(0.095)	(0.038)	(0.050)	(0.032)
Medium Week 2	−0.036	-0.064^{***}	-0.270^{**}	-0.292^{***}	0.004	0.002
	(0.026)	(0.024)	(0.111)	(0.036)	(0.047)	(0.036)
Medium Week 3	−0.040	-0.071^{***}	-0.241^{**}	-0.251^{***}	−0.047	0.005
	(0.027)	(0.023)	(0.114)	(0.041)	(0.097)	(0.043)
High Week −4	0.027	0.012	0.019	−0.028	−0.134	0.043
	(0.021)	(0.014)	(0.107)	(0.047)	(0.103)	(0.040)
High Week −3	0.016	0.014	−0.116	−0.046	-0.312^{**}	0.010
	(0.030)	(0.025)	(0.208)	(0.074)	(0.146)	(0.052)
High Week −2	−0.008	−0.026	−0.036	0.038	−0.164	0.023
	(0.035)	(0.034)	(0.216)	(0.078)	(0.140)	(0.046)
High Week −1	−0.049	-0.055^{**}	−0.071	−0.048	−0.232	−0.022
	(0.031)	(0.028)	(0.248)	(0.083)	(0.146)	(0.043)
High Week 0	-0.090^{**}	-0.101^{**}	−0.184	-0.160^{**}	-0.247^{*}	−0.073
	(0.042)	(0.045)	(0.237)	(0.078)	(0.130)	(0.048)
High Week 1	-0.212^{***}	-0.256^{***}	−0.281	-0.259^{***}	-0.285^{*}	-0.135^{***}
	(0.024)	(0.029)	(0.228)	(0.070)	(0.161)	(0.038)
High Week 2	-0.208^{***}	-0.272^{***}	−0.243	-0.268^{***}	-0.385^{*}	-0.098^{**}
	(0.026)	(0.024)	(0.237)	(0.077)	(0.202)	(0.047)
High Week 3	-0.174^{***}	-0.166^{***}	−0.314	-0.261^{***}	-0.453^{**}	-0.155^{*}
	(0.042)	(0.034)	(0.248)	(0.086)	(0.181)	(0.082)
Total Mobility	0.043^{*}	0.037^{**}	0.077	0.067	-0.069^{*}	0.050
	(0.024)	(0.016)	(0.066)	(0.041)	(0.041)	(0.046)
Temperature	0.010	0.0001	0.141^{**}	0.058^{**}	−0.011	0.036
	(0.017)	(0.019)	(0.062)	(0.024)	(0.040)	(0.023)
Daily Cases	−0.002	−0.0004	0.007	−0.002	0.005	−0.004
	(0.010)	(0.005)	(0.048)	(0.011)	(0.010)	(0.020)
Total Cases	0.016	−0.007	−0.098	0.027	-0.130^{**}	0.056
	(0.021)	(0.020)	(0.110)	(0.036)	(0.056)	(0.037)
Daily Cases^2	0.002	0.0003	0.007	0.004	−0.002	0.005
	(0.003)	(0.003)	(0.009)	(0.004)	(0.003)	(0.005)
Total Cases^2	−0.014	0.003	0.021	−0.011	0.062^{*}	−0.042
	(0.012)	(0.012)	(0.056)	(0.020)	(0.037)	(0.026)

Note: *p<0.1; **p<0.05; ***p<0.01

Table D2: Panel Event study TWFE estimates by different sectors. Standard errors are reported in parentheses. Part II.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
Islands*week2	0.004	−0.015	0.036	0.017	−0.056	0.035*
	(0.010)	(0.009)	(0.068)	(0.030)	(0.055)	(0.019)
North East*week2	0.013	0.005	0.157***	0.042**	0.016	0.029**
	(0.009)	(0.009)	(0.049)	(0.016)	(0.036)	(0.013)
North West*week2	0.027*	0.027	0.234***	0.066**	−0.035	0.028
	(0.016)	(0.016)	(0.080)	(0.030)	(0.067)	(0.022)
South*week2	−0.006	0.002	−0.113*	−0.058*	0.020	−0.019
	(0.014)	(0.011)	(0.060)	(0.032)	(0.070)	(0.028)
Islands*week3	0.014	−0.023	0.100	0.166***	−0.256*	0.076***
	(0.018)	(0.016)	(0.079)	(0.031)	(0.136)	(0.028)
North East*week3	0.025	0.018	0.149***	0.077***	0.031	0.044*
	(0.015)	(0.015)	(0.054)	(0.023)	(0.054)	(0.023)
North West*week3	−0.044**	−0.010	0.014	−0.174***	−0.078	−0.103***
	(0.019)	(0.023)	(0.134)	(0.065)	(0.058)	(0.031)
South*week3	−0.016	−0.026	−0.114*	−0.019	0.134*	−0.002
	(0.022)	(0.017)	(0.061)	(0.044)	(0.069)	(0.037)
Islands*week4	0.019	−0.025	0.134	0.157***	−0.097	0.088**
	(0.021)	(0.020)	(0.117)	(0.052)	(0.107)	(0.035)
North East*week4	0.013	0.007	0.176**	0.023	0.052	0.037
	(0.023)	(0.019)	(0.072)	(0.030)	(0.062)	(0.035)
North West*week4	−0.017	−0.0001	0.115	−0.145**	0.068	−0.058**
	(0.020)	(0.023)	(0.164)	(0.069)	(0.047)	(0.027)
South*week4	−0.023	−0.036**	−0.123	−0.038	0.049	−0.008
	(0.024)	(0.018)	(0.080)	(0.053)	(0.076)	(0.040)
Islands*week5	−0.040*	−0.091***	0.087	0.026	−0.0002	0.062*
	(0.022)	(0.023)	(0.160)	(0.059)	(0.095)	(0.033)
North East*week5	−0.030	−0.027	0.103	−0.085**	0.032	−0.022
	(0.026)	(0.025)	(0.094)	(0.039)	(0.063)	(0.033)
North West*week5	−0.036	−0.002	0.045	−0.221***	0.052	−0.104***
	(0.022)	(0.032)	(0.119)	(0.068)	(0.116)	(0.028)
South*week5	−0.017	−0.019	−0.302***	−0.101	−0.013	−0.021
	(0.022)	(0.017)	(0.091)	(0.065)	(0.086)	(0.038)
Islands*week6	0.010	−0.033	0.121	0.065	−0.094	0.088**
	(0.024)	(0.024)	(0.210)	(0.056)	(0.105)	(0.038)
North East*week6	−0.046	−0.050*	0.078	−0.065	0.014	−0.026
	(0.028)	(0.027)	(0.092)	(0.040)	(0.070)	(0.039)
North West*week6	−0.002	0.022	0.204	−0.253***	−0.046	−0.053
	(0.025)	(0.032)	(0.153)	(0.066)	(0.091)	(0.033)
South*week6	−0.026	−0.025	−0.291***	−0.104**	−0.023	−0.030
	(0.025)	(0.021)	(0.094)	(0.051)	(0.073)	(0.042)
Islands*week7	0.035	0.006	−0.054	0.017	0.060	0.077**
	(0.024)	(0.027)	(0.174)	(0.062)	(0.111)	(0.036)
North East*week7	−0.030	−0.042	0.081	−0.055	0.027	0.003
	(0.031)	(0.029)	(0.111)	(0.042)	(0.077)	(0.040)
North West*week7	0.049	0.084*	0.125	−0.230***	0.026	−0.018
	(0.040)	(0.043)	(0.135)	(0.059)	(0.052)	(0.046)
South*week7	−0.047**	−0.060***	−0.261**	−0.092	−0.140	−0.024
	(0.018)	(0.021)	(0.119)	(0.058)	(0.085)	(0.038)
Islands*week8	0.051*	0.019	−0.142	0.036	−0.033	0.095**
	(0.030)	(0.032)	(0.195)	(0.069)	(0.094)	(0.041)
North East*week8	−0.026	−0.045	0.089	−0.051	−0.011	0.013
	(0.033)	(0.031)	(0.128)	(0.046)	(0.080)	(0.043)
South*week8	−0.031	−0.035**	−0.318**	−0.048	−0.074	−0.024
	(0.022)	(0.017)	(0.143)	(0.065)	(0.157)	(0.043)
R^2	0.447	0.503	0.228	0.588	0.158	0.274
R^2 adjusted	0.415	0.475	0.184	0.563	0.110	0.232
N. Observations	3,094	3,094	3,094	3,094	3,094	3,094

Note: *p<0.1; **p<0.05***p<0.01

Table D3: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. Part I.

	Dependent Variable: Daily Y-o-Y consumption variation
Medium Week −4	−0.001
	(0.014)
Medium Week −3	0.007
	(0.015)
Medium Week −2	−0.033*
	(0.017)
Medium Week −1	−0.059***
	(0.022)
Medium Week 0	−0.086***
	(0.025)
Medium Week 1	−0.159***
	(0.028)
Medium Week 2	−0.131***
	(0.031)
Medium Week 3	−0.098**
	(0.038)
High Week −4	−0.039
	(0.042)
High Week −3	−0.134*
	(0.072)
High Week −2	−0.066
	(0.075)
High Week −1	−0.148*
	(0.082)
High Week 0	−0.223**
	(0.089)
High Week 1	−0.291***
	(0.099)
High Week 2	−0.313***
	(0.104)
High Week 3	−0.292***
	(0.104)
Total Mobility	−0.00000
	(0.00000)
Temperature	0.005*
	(0.002)
Daily Cases	0.002
	(0.001)

Table D4: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. Part II.

	Dependent Variable:
	Daily Y-o-Y consumption variation
week2	0.014
	(0.013)
week3	0.059***
	(0.020)
week4	0.094***
	(0.024)
week5	0.117***
	(0.034)
week6	0.151***
	(0.042)
week7	0.220***
	(0.048)
week8	0.243***
	(0.051)
Accommodation	−0.236***
	(0.033)
Restaurants	−0.150***
	(0.022)
Welfare	0.469***
	(0.044)
Islands*week2	−0.003
	(0.028)
North East*week2	0.040***
	(0.015)
North West*week2	0.068**
	(0.027)
South*week2	−0.035
	(0.032)
Islands*week3	0.024
	(0.020)
North East*week3	0.064***
	(0.019)
North West*week3	−0.078
	(0.059)
South*week3	−0.032
	(0.032)
Islands*week4	0.081**
	(0.033)
North East*week4	0.059**
	(0.024)
North West*week4	−0.030
	(0.061)
South*week4	−0.100**
	(0.044)
Islands*week5	0.094
	(0.061)
North East*week5	0.018
	(0.035)
North West*week5	−0.054
	(0.071)
South*week5	−0.160***
	(0.056)

Table D5: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. Part III.

	Dependent Variable:
	Daily Y-o-Y consumption variation
Islands*week6	0.112*
	(0.066)
North East*week6	−0.005
	(0.042)
North West*week6	−0.079
	(0.098)
South*week6	−0.176***
	(0.062)
Islands*week7	0.092
	(0.081)
North East*week7	−0.027
	(0.050)
North West*week7	−0.079
	(0.107)
South*week7	−0.294***
	(0.077)
Islands*week8	0.070
	(0.082)
North East*week8	−0.034
	(0.052)
South*week8	−0.278***
	(0.083)
week 2*Accommodation	−0.050**
	(0.023)
week 3*Accommodation	−0.322***
	(0.033)
week 4*Accommodation	−0.464***
	(0.035)
week 5*Accommodation	−0.320***
	(0.040)
week 6*Accommodation	−0.343***
	(0.045)
week 7*Accommodation	−0.387***
	(0.045)
week 8*Accommodation	−0.357***
	(0.046)
week 2*Restaurants	−0.038***
	(0.014)
week 3*Restaurants	−0.330***
	(0.020)
week 4*Restaurants	−0.369***
	(0.026)
week 5*Restaurants	−0.300***
	(0.030)
week 6*Restaurants	−0.413***
	(0.033)
week 7*Restaurants	−0.421***
	(0.032)
week 8*Restaurants	−0.424***
	(0.033)

Table D6: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. Part IV.

	Dependent Variable: Daily Y-o-Y consumption variation
week 2*Welfare	0.032
	(0.023)
week 3*Welfare	0.178***
	(0.046)
week 4*Welfare	0.174***
	(0.051)
week 5*Welfare	0.054
	(0.050)
week 6*Welfare	0.088
	(0.057)
week 7*Welfare	0.029
	(0.057)
week 8*Welfare	−0.002
	(0.058)
R^2	0.831
R^2 adjusted	0.825
N. Observations	12,376

Note: *p<0.1; **p<0.05; ***p<0.01

Table F1: Panel Event study TWFE estimates. Standard errors are reported in parentheses. Comparison of medium and low risk provinces. Part I.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
Medium Week −4	0.008	0.004	−0.038	0.027	−0.019	0.016
	(0.009)	(0.009)	(0.055)	(0.021)	(0.030)	(0.013)
Medium Week −3	0.007	0.0004	−0.032	0.031	0.012	0.018
	(0.015)	(0.015)	(0.053)	(0.023)	(0.044)	(0.019)
Medium Week −2	−0.010	−0.006	−0.115	−0.007	−0.037	−0.013
	(0.021)	(0.020)	(0.073)	(0.030)	(0.048)	(0.029)
Medium Week −1	−0.007	0.0002	−0.204**	−0.045	−0.022	−0.013
	(0.020)	(0.021)	(0.089)	(0.037)	(0.045)	(0.027)
Medium Week 0	0.004	0.014	−0.199**	−0.154***	0.001	−0.009
	(0.021)	(0.023)	(0.087)	(0.038)	(0.050)	(0.029)
Medium Week 1	−0.056**	−0.061**	−0.318***	−0.318***	−0.007	−0.048
	(0.025)	(0.025)	(0.098)	(0.038)	(0.050)	(0.032)
Medium Week 2	−0.042	−0.064***	−0.309***	−0.292***	0.010	−0.010
	(0.026)	(0.025)	(0.112)	(0.036)	(0.047)	(0.036)
Medium Week 3	−0.042	−0.071***	−0.252**	−0.267***	−0.051	0.007
	(0.026)	(0.023)	(0.110)	(0.041)	(0.121)	(0.040)
Total Mobility	0.024	0.027*	0.051	0.028	−0.045	0.013
	(0.017)	(0.015)	(0.076)	(0.029)	(0.040)	(0.028)
Temperature	0.007	0.0001	0.102*	0.059**	−0.032	0.025
	(0.018)	(0.021)	(0.060)	(0.027)	(0.040)	(0.021)
Daily Cases	−0.003	−0.002	0.005	−0.003	0.004	−0.004
	(0.004)	(0.005)	(0.007)	(0.003)	(0.008)	(0.003)
Total Cases	0.024	0.006	−0.194*	0.053	−0.151**	0.053
	(0.022)	(0.023)	(0.110)	(0.034)	(0.059)	(0.037)
Daily Cases^2	0.0004	0.001	0.008	0.001	0.001	−0.0003
	(0.003)	(0.004)	(0.013)	(0.003)	(0.005)	(0.002)
Total Cases^2	−0.016	−0.001	0.056	−0.017	0.068*	−0.036
	(0.013)	(0.012)	(0.054)	(0.021)	(0.036)	(0.027)

Note: *p<0.1; **p<0.05; ***p<0.01

Table F2: Panel Event study TWFE estimates. Standard errors are reported in parentheses. Comparison of medium and low risk provinces. Part II.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
Islands*week2	0.004	−0.014	0.036	0.013	−0.051	0.033*
	(0.010)	(0.009)	(0.068)	(0.031)	(0.055)	(0.019)
North East*week2	0.016*	0.008	0.151***	0.045***	0.004	0.032**
	(0.010)	(0.010)	(0.050)	(0.017)	(0.036)	(0.013)
North West*week2	0.024	0.024	0.231***	0.062**	−0.031	0.024
	(0.016)	(0.016)	(0.080)	(0.031)	(0.069)	(0.023)
South*week2	−0.009	−0.002	−0.115*	−0.062	0.057	−0.018
	(0.017)	(0.013)	(0.069)	(0.039)	(0.083)	(0.034)
Islands*week3	0.010	−0.024	0.091	0.161***	−0.252*	0.070**
	(0.018)	(0.016)	(0.081)	(0.031)	(0.135)	(0.028)
North East*week3	0.024	0.015	0.131**	0.081***	0.009	0.043*
	(0.016)	(0.015)	(0.053)	(0.024)	(0.055)	(0.024)
North West*week3	−0.044**	−0.010	0.016	−0.177***	−0.073	−0.105***
	(0.019)	(0.023)	(0.133)	(0.064)	(0.059)	(0.030)
South*week3	−0.010	−0.022	−0.104*	−0.017	0.180**	0.008
	(0.024)	(0.019)	(0.061)	(0.049)	(0.071)	(0.041)
Islands*week4	0.015	−0.028	0.119	0.151***	−0.096	0.082**
	(0.019)	(0.019)	(0.116)	(0.054)	(0.105)	(0.035)
North East*week4	0.019	0.008	0.157**	0.037	0.018	0.046
	(0.024)	(0.020)	(0.071)	(0.032)	(0.065)	(0.036)
North West*week4	−0.018	0.0002	0.119	−0.148**	0.075	−0.062**
	(0.019)	(0.024)	(0.162)	(0.069)	(0.046)	(0.027)
South*week4	−0.028	−0.035*	−0.118	−0.046	0.089	−0.016
	(0.026)	(0.020)	(0.082)	(0.059)	(0.082)	(0.045)
Islands*week5	−0.036*	−0.085***	0.068	0.033	−0.002	0.063*
	(0.021)	(0.022)	(0.157)	(0.061)	(0.094)	(0.033)
North East*week5	−0.013	−0.010	0.086	−0.055	0.003	−0.009
	(0.025)	(0.025)	(0.091)	(0.039)	(0.064)	(0.034)
North West*week5	−0.041*	−0.006	0.035	−0.228***	0.055	−0.111***
	(0.021)	(0.032)	(0.115)	(0.068)	(0.116)	(0.027)
South*week5	−0.036*	−0.031*	−0.358***	−0.123*	0.026	−0.043
	(0.021)	(0.017)	(0.089)	(0.070)	(0.090)	(0.039)
Islands*week6	0.015	−0.026	0.097	0.075	−0.094	0.089**
	(0.025)	(0.024)	(0.209)	(0.059)	(0.105)	(0.040)
North East*week6	−0.044	−0.049*	0.036	−0.050	−0.021	−0.025
	(0.030)	(0.029)	(0.097)	(0.042)	(0.070)	(0.040)
North West*week6	−0.005	0.022	0.193	−0.263***	−0.046	−0.060*
	(0.024)	(0.032)	(0.152)	(0.063)	(0.095)	(0.033)
South*week6	−0.032	−0.025	−0.340***	−0.126***	0.010	−0.046
	(0.023)	(0.018)	(0.087)	(0.048)	(0.075)	(0.042)
Islands*week7	0.040	0.011	−0.084	0.032	0.061	0.082**
	(0.025)	(0.027)	(0.182)	(0.065)	(0.114)	(0.038)
North East*week7	−0.024	−0.037	0.032	−0.040	−0.016	0.005
	(0.033)	(0.032)	(0.116)	(0.045)	(0.079)	(0.042)
North West*week7	0.047	0.084*	0.116	−0.240***	0.027	−0.027
	(0.039)	(0.043)	(0.135)	(0.056)	(0.052)	(0.045)
South*week7	−0.041**	−0.048**	−0.282**	−0.101	−0.112	−0.033
	(0.020)	(0.020)	(0.116)	(0.064)	(0.091)	(0.044)
Islands*week8	0.058*	0.026	−0.164	0.048	−0.031	0.104***
	(0.030)	(0.032)	(0.204)	(0.072)	(0.097)	(0.039)
North East*week8	−0.021	−0.040	0.044	−0.040	−0.052	0.013
	(0.035)	(0.035)	(0.130)	(0.050)	(0.080)	(0.045)
South*week8	−0.040	−0.036*	−0.363**	−0.041	−0.011	−0.052
	(0.026)	(0.020)	(0.141)	(0.076)	(0.205)	(0.050)
R^2	0.211	0.295	0.236	0.604	0.101	0.211
R^2 adjusted	0.165	0.254	0.191	0.581	0.048	0.165
N. Observations	2,788	2,788	2,788	2,788	2,788	2,788

Note: *p<0.1; **p<0.05; ***p<0.01

Table F3: Panel Event study TWFE estimates. Standard errors are reported in parentheses. Comparison of high and low risk provinces. Part I.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
High Week −4	0.007	−0.006	−0.029	0.005	−0.142	0.024
	(0.028)	(0.021)	(0.081)	(0.031)	(0.140)	(0.048)
High Week −3	−0.017	−0.001	−0.189	−0.018	-0.368^{***}	−0.044
	(0.037)	(0.029)	(0.174)	(0.033)	(0.132)	(0.059)
High Week −2	−0.040	−0.037	−0.028	0.065^{*}	-0.272^{*}	−0.030
	(0.039)	(0.039)	(0.196)	(0.033)	(0.144)	(0.049)
High Week −1	-0.078^{*}	-0.058^{**}	−0.110	0.002	-0.354^{**}	−0.076
	(0.042)	(0.029)	(0.232)	(0.033)	(0.140)	(0.067)
High Week 0	-0.108^{**}	-0.092^{*}	−0.248	-0.116^{***}	-0.277^{**}	-0.123^{*}
	(0.054)	(0.048)	(0.243)	(0.034)	(0.109)	(0.067)
High Week 1	-0.218^{***}	-0.237^{***}	−0.267	-0.184^{***}	-0.404^{***}	-0.173^{***}
	(0.026)	(0.029)	(0.240)	(0.034)	(0.132)	(0.052)
High Week 2	-0.214^{***}	-0.261^{***}	−0.167	-0.192^{***}	-0.520^{***}	-0.121^{**}
	(0.027)	(0.021)	(0.239)	(0.035)	(0.184)	(0.052)
High Week 3	-0.114^{**}	-0.128^{***}	−0.120	-0.095^{*}	-0.469^{**}	−0.053
	(0.045)	(0.033)	(0.225)	(0.049)	(0.189)	(0.072)
Total Mobility	0.077^{**}	0.082^{***}	0.201^{*}	0.154^{***}	-0.131^{*}	0.075
	(0.035)	(0.028)	(0.112)	(0.024)	(0.071)	(0.065)
Temperature	−0.018	−0.010	0.044	0.001	0.053	−0.018
	(0.027)	(0.025)	(0.128)	(0.015)	(0.067)	(0.039)
Daily Cases	−0.002	0.001	0.008	−0.003	0.005	−0.007
	(0.003)	(0.021)	(0.175)	(0.002)	(0.058)	(0.030)
Total Cases	0.067^{**}	0.008	0.011	0.077^{***}	−0.013	0.159^{***}
	(0.029)	(0.023)	(0.221)	(0.018)	(0.091)	(0.046)
Daily Cases^2	0.004^{***}	0.001	0.014	0.006^{***}	−0.001	0.009
	(0.001)	(0.005)	(0.038)	(0.002)	(0.015)	(0.010)
Total Cases^2	-0.056^{***}	−0.011	−0.063	-0.058^{***}	−0.008	-0.125^{***}
	(0.016)	(0.012)	(0.113)	(0.012)	(0.066)	(0.025)

Note: *p<0.1; **p<0.05; ***p<0.01

Table F4: Panel Event study TWFE estimates. Standard errors are reported in parentheses. Comparison of high and low risk provinces. Part II.

	Dependent variable: Daily Y-o-Y consumption variation					
	(All)	(Retail)	(Accommodation)	(Restaurants)	(Welfare)	(No Retail)
Islands*week2	0.003	−0.009	0.035	0.006	−0.038	0.024*
	(0.007)	(0.007)	(0.070)	(0.029)	(0.070)	(0.014)
North East*week2	0.007	0.013	0.106	0.020	0.073	0.007
	(0.016)	(0.014)	(0.066)	(0.025)	(0.070)	(0.020)
South*week2	0.012	0.025	−0.065	−0.098***	0.043	−0.016
	(0.027)	(0.020)	(0.063)	(0.029)	(0.159)	(0.047)
Islands*week3	−0.018	−0.038**	0.012	0.091***	−0.158	0.018
	(0.011)	(0.016)	(0.077)	(0.029)	(0.141)	(0.021)
North East*week3	−0.022	0.002	−0.011	−0.016	0.179**	−0.050
	(0.023)	(0.019)	(0.119)	(0.027)	(0.080)	(0.037)
South*week3	−0.024	−0.031	−0.155	−0.135***	0.295***	−0.020
	(0.036)	(0.029)	(0.095)	(0.031)	(0.112)	(0.057)
Islands*week4	−0.029	−0.051***	−0.046	0.050*	−0.013	0.005
	(0.018)	(0.015)	(0.151)	(0.029)	(0.111)	(0.046)
North East*week4	−0.077*	−0.034	−0.161	−0.165***	0.260**	−0.130*
	(0.041)	(0.024)	(0.224)	(0.031)	(0.102)	(0.069)
South*week4	−0.048	−0.055	−0.349**	−0.179***	0.263*	−0.054
	(0.039)	(0.035)	(0.171)	(0.031)	(0.145)	(0.065)
Islands*week5	−0.040**	−0.079***	0.025	0.018	0.030	0.038
	(0.018)	(0.021)	(0.208)	(0.029)	(0.117)	(0.038)
North East*week5	−0.097**	−0.047	−0.150	−0.222***	0.128	−0.165**
	(0.045)	(0.037)	(0.261)	(0.034)	(0.139)	(0.066)
South*week5	0.010	−0.001	−0.312	−0.141***	0.097	−0.001
	(0.042)	(0.026)	(0.206)	(0.031)	(0.158)	(0.072)
Islands*week6	−0.019	−0.049**	0.020	0.006	−0.047	0.034
	(0.019)	(0.022)	(0.233)	(0.029)	(0.104)	(0.038)
North East*week6	−0.126***	−0.077**	−0.255	−0.206***	0.141	−0.189**
	(0.047)	(0.031)	(0.265)	(0.036)	(0.128)	(0.074)
South*week6	−0.052	−0.056*	−0.350	−0.205***	−0.002	−0.062
	(0.041)	(0.031)	(0.217)	(0.031)	(0.099)	(0.068)
Islands*week7	0.025	−0.0004	−0.181	−0.033	0.119	0.058
	(0.017)	(0.024)	(0.197)	(0.029)	(0.110)	(0.035)
North East*week7	−0.091*	−0.057	−0.306	−0.189***	0.215	−0.129*
	(0.054)	(0.039)	(0.317)	(0.038)	(0.144)	(0.076)
South*week7	−0.064**	−0.086***	−0.434*	−0.217***	0.007	−0.034
	(0.025)	(0.025)	(0.234)	(0.031)	(0.120)	(0.053)
Islands*week8	0.050**	0.007	−0.256	0.010	0.048	0.114***
	(0.024)	(0.029)	(0.220)	(0.030)	(0.102)	(0.037)
North East*week8	−0.077	−0.070	−0.283	−0.172***	0.194	−0.070
	(0.064)	(0.047)	(0.357)	(0.040)	(0.156)	(0.085)
South*week8	−0.030	−0.054***	−0.538**	−0.138***	0.111	0.002
	(0.024)	(0.019)	(0.252)	(0.032)	(0.183)	(0.047)
R^2	0.658	0.668	0.319	0.554	0.243	0.534
R^2 adjusted	0.627	0.637	0.256	0.513	0.173	0.490
N. Observations	1,346	1,346	1,346	1,346	1,346	1,346

Note: *p<0.1; **p<0.05; ***p<0.01

Table F5: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. We compare medium and low risk provinces. Part I.

	Dependent Variable:
	Daily Y-o-Y consumption variation
Medium Week −4	0.001
	(0.014)
Medium Week −3	0.005
	(0.016)
Medium Week −2	−0.043**
	(0.018)
Medium Week −1	−0.069***
	(0.021)
Medium Week 0	−0.094***
	(0.025)
Medium Week 1	−0.173***
	(0.028)
Medium Week 2	−0.148***
	(0.030)
Medium Week 3	−0.116***
	(0.041)
Total Mobility	−0.00000
	(0.00000)
Temperature	0.003
	(0.003)
Daily Cases	0.002*
	(0.001)
week2	0.011
	(0.012)
week3	0.045**
	(0.019)
week4	0.095***
	(0.023)
week5	0.105***
	(0.032)
week6	0.144***
	(0.040)
week7	0.195***
	(0.046)
week8	0.210***
	(0.049)
Accommodation	−0.244***
	(0.032)
Restaurants	−0.139***
	(0.020)
Welfare	0.377***
	(0.036)

Table F6: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. We compare medium and low risk provinces. Part II.

	Dependent Variable:
	Daily Y-o-Y consumption variation
Islands*week2	−0.004
	(0.028)
North East*week2	0.037**
	(0.015)
North West*week2	0.069**
	(0.027)
South*week2	−0.026
	(0.039)
Islands*week3	0.020
	(0.020)
North East*week3	0.060***
	(0.019)
North West*week3	−0.077
	(0.059)
South*week3	−0.015
	(0.034)
Islands*week4	0.076**
	(0.033)
North East*week4	0.058**
	(0.024)
North West*week4	−0.031
	(0.061)
South*week4	−0.114**
	(0.047)
Islands*week5	0.093
	(0.061)
North East*week5	0.030
	(0.034)
North West*week5	−0.050
	(0.071)
South*week5	−0.176***
	(0.059)
Islands*week6	0.112*
	(0.066)
North East*week6	−0.00003
	(0.041)
North West*week6	−0.073
	(0.097)
South*week6	−0.183***
	(0.065)
Islands*week7	0.093
	(0.081)
North East*week7	−0.019
	(0.049)
North West*week7	−0.063
	(0.107)
South*week7	−0.248***
	(0.074)
Islands*week8	0.071
	(0.082)
North East*week8	−0.026
	(0.051)
South*week8	−0.233***
	(0.085)

Table F7: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. We compare medium and low risk provinces. Part III.

	Dependent Variable:
	Daily Y-o-Y consumption variation
week 2*Accommodation	−0.040*
	(0.024)
week 3*Accommodation	−0.299***
	(0.031)
week 4*Accommodation	−0.454***
	(0.034)
week 5*Accommodation	−0.320***
	(0.040)
week 6*Accommodation	−0.345***
	(0.045)
week 7*Accommodation	−0.363***
	(0.044)
week 8*Accommodation	−0.330***
	(0.046)
week 2*Restaurants	−0.041***
	(0.014)
week 3*Restaurants	−0.331***
	(0.020)
week 4*Restaurants	−0.399***
	(0.025)
week 5*Restaurants	−0.305***
	(0.028)
week 6*Restaurants	−0.430***
	(0.033)
week 7*Restaurants	−0.432***
	(0.031)
week 8*Restaurants	−0.430***
	(0.030)
week 2*Welfare	0.040*
	(0.021)
week 3*Welfare	0.214***
	(0.042)
week 4*Welfare	0.195***
	(0.045)
week 5*Welfare	0.091**
	(0.043)
week 6*Welfare	0.113**
	(0.049)
week 7*Welfare	0.061
	(0.049)
week 8*Welfare	0.044
	(0.053)
R^2	0.831
R^2 adjusted	0.825
N. Observations	11,152

Note: *$p<0.1$; **$p<0.05$; ***$p<0.01$

Table F8: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. We compare high and low risk provinces. Part I.

	Dependent Variable:
	Daily Y-o-Y consumption variation
High Week −4	−0.040
	(0.063)
High Week −3	−0.137*
	(0.080)
High Week −2	−0.065
	(0.081)
High Week −1	−0.159*
	(0.087)
High Week 0	−0.202**
	(0.095)
High Week 1	−0.271***
	(0.102)
High Week 2	−0.286***
	(0.110)
High Week 3	−0.255**
	(0.110)
Total Mobility	−0.00000
	(0.00000)
Temperature	0.012***
	(0.004)
Daily Cases	0.002
	(0.002)
week2	0.033
	(0.023)
week3	0.035
	(0.031)
week4	0.056
	(0.040)
week5	0.058
	(0.062)
week6	0.109
	(0.074)
week7	0.214***
	(0.080)
week8	0.229***
	(0.086)
Accommodation	−0.362***
	(0.055)
Restaurants	−0.235***
	(0.055)
Welfare	0.758***
	(0.100)

Table F9: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. We compare high and low risk provinces. Part II.

	Dependent Variable:
	Daily Y-o-Y consumption variation
Islands*week2	−0.001
	(0.028)
North East*week2	0.049***
	(0.012)
South*week2	−0.028
	(0.070)
Islands*week3	0.007
	(0.017)
North East*week3	0.045***
	(0.015)
South*week3	−0.049
	(0.062)
Islands*week4	0.035
	(0.034)
North East*week4	−0.004
	(0.025)
South*week4	−0.131*
	(0.070)
Islands*week5	0.050
	(0.074)
North East*week5	−0.049
	(0.061)
South*week5	−0.176**
	(0.086)
Islands*week6	0.033
	(0.079)
North East*week6	−0.082
	(0.069)
South*week6	−0.252***
	(0.093)
Islands*week7	0.013
	(0.095)
North East*week7	−0.095
	(0.077)
South*week7	−0.389***
	(0.121)
Islands*week8	−0.011
	(0.097)
North East*week8	−0.109
	(0.081)
South*week8	−0.370***
	(0.130)

Table F10: Panel Event study TWFE estimates when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors. Standard errors are reported in parentheses. We compare high and low risk provinces. Part III.

	Dependent Variable: Daily Y-o-Y consumption variation
week 2*Accommodation	−0.068**
	(0.028)
week 3*Accommodation	−0.266***
	(0.047)
week 4*Accommodation	−0.354***
	(0.051)
week 5*Accommodation	−0.145**
	(0.060)
week 6*Accommodation	−0.167**
	(0.065)
week 7*Accommodation	−0.273***
	(0.063)
week 8*Accommodation	−0.274***
	(0.069)
week 2*Restaurants	−0.051**
	(0.021)
week 3*Restaurants	−0.226***
	(0.028)
week 4*Restaurants	−0.223***
	(0.047)
week 5*Restaurants	−0.184***
	(0.042)
week 6*Restaurants	−0.245***
	(0.047)
week 7*Restaurants	−0.295***
	(0.041)
week 8*Restaurants	−0.309***
	(0.048)
week 2*Welfare	−0.010
	(0.040)
week 3*Welfare	0.097
	(0.084)
week 4*Welfare	0.142
	(0.102)
week 5*Welfare	−0.018
	(0.098)
week 6*Welfare	−0.032
	(0.104)
week 7*Welfare	−0.136
	(0.097)
week 8*Welfare	−0.143
	(0.102)
R^2	0.776
R^2 adjusted	0.766
N. Observations	5,384

Note: $*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table G1: P-values of t-tests for a set of socio-economic characteristics of low risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.005	0.007	0.000	0.000	0.010	0.015
Population	0.029	0.044	0.004	0.004	0.026	0.115
Income Inequality	0.373	0.327	0.026	0.211	0.561	0.880
Internet Connection	0.468	0.160	0.287	0.328	0.592	0.660
Accessibility	0.121	0.083	0.035	0.060	0.135	0.262
Telework	0.001	0.002	0.000	0.000	0.000	0.005
Population Density	0.097	0.083	0.021	0.023	0.165	0.193
Specialization Index	0.499	0.312	0.160	0.233	0.738	0.895
Essential Employees	0.182	0.136	0.080	0.091	0.181	0.443
Primary Sector	0.535	0.190	0.365	0.380	0.600	0.855
Manufacturing Sector	0.019	0.028	0.006	0.006	0.011	0.076
Service Sector	0.020	0.034	0.002	0.002	0.016	0.088

Table G2: P-values of t-tests for a set of socio-economic characteristics of medium risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. In this case from the medium risk provinces we exclude territories that were immediately classified as medium (Apulia and Sicily) risk areas on the 6th of November. In this case, the set of provinces included into the analysis in the medium level of restrictions is exactly the same defined in section 3.5.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.004	0.008	0.000	0.001	0.002	0.021
Population	0.040	0.015	0.013	0.034	0.050	0.051
Income Inequality	0.596	0.305	0.190	0.404	0.836	0.977
Internet Connection	0.555	0.212	0.265	0.435	0.703	0.832
Accessibility	0.027	0.017	0.001	0.023	0.030	0.054
Telework	0.015	0.011	0.002	0.008	0.025	0.028
Population Density	0.089	0.058	0.018	0.051	0.119	0.177
Specialization Index	0.528	0.189	0.269	0.403	0.643	0.773
Essential Employees	0.449	0.373	0.052	0.140	0.779	0.873
Primary Sector	0.620	0.309	0.035	0.587	0.800	0.884
Manufacturing Sector	0.018	0.014	0.005	0.007	0.029	0.036
Service Sector	0.027	0.009	0.009	0.025	0.033	0.035

Table G3: P-values of t-tests for a set of socio-economic characteristics of high risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. In this case from the high risk provinces we exclude territories that were immediately classified as high (Aosta Valley, Calabria, Lombardy, Piedmont) risk areas on the 6th of November. In this case, the set of provinces included into the analysis in the high level of restrictions is exactly the same defined in section 3.5.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.219	0.021	0.209	0.209	0.209	0.256
Population	0.369	0.079	0.334	0.334	0.334	0.510
Income Inequality	0.547	0.219	0.450	0.450	0.450	0.939
Internet Connection	0.859	0.153	0.586	0.927	0.927	0.927
Accessibility	0.924	0.083	0.775	0.961	0.961	0.961
Telework	0.471	0.011	0.450	0.476	0.476	0.476
Population Density	0.375	0.047	0.354	0.354	0.354	0.459
Specialization Index	0.192	0.134	0.132	0.132	0.132	0.431
Essential Employees	0.502	0.201	0.412	0.412	0.412	0.861
Primary Sector	0.616	0.052	0.593	0.593	0.593	0.708
Manufacturing Sector	0.306	0.040	0.288	0.288	0.288	0.378
Service Sector	0.320	0.045	0.299	0.299	0.299	0.401

Table G4: P-values of t-tests for a set of socio-economic characteristics of italian provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. In this case from the medium and high risk provinces we exclude territories that were immediately classified as medium (Apulia and Sicily) and high (Aosta Valley, Calabria, Lombardy, Piedmont) risk areas on the 6th of November. In this case, the set of provinces included into the analysis in the medium level of restrictions is exactly the same defined in section 3.5.

Variable	All	Retail	Accommodation	Restaurants	Welfare	No Retail
Income per capita	0.002	0.003	0.000	0.000	0.003	0.006
Population	0.235	0.358	0.003	0.010	0.426	0.809
Income Inequality	0.390	0.316	0.049	0.125	0.662	0.726
Internet Connection	0.255	0.305	0.086	0.106	0.202	0.870
Accessibility	0.002	0.001	0.000	0.001	0.002	0.003
Telework	0.004	0.007	0.000	0.000	0.003	0.018
Population Density	0.068	0.041	0.001	0.050	0.088	0.120
Specialization Index	0.483	0.158	0.324	0.376	0.524	0.758
Essential Employees	0.152	0.146	0.004	0.024	0.282	0.320
Primary Sector	0.494	0.217	0.226	0.355	0.598	0.833
Manufacturing Sector	0.041	0.076	0.000	0.0001	0.044	0.189
Service Sector	0.091	0.161	0.000	0.002	0.108	0.398

Appendix Figures

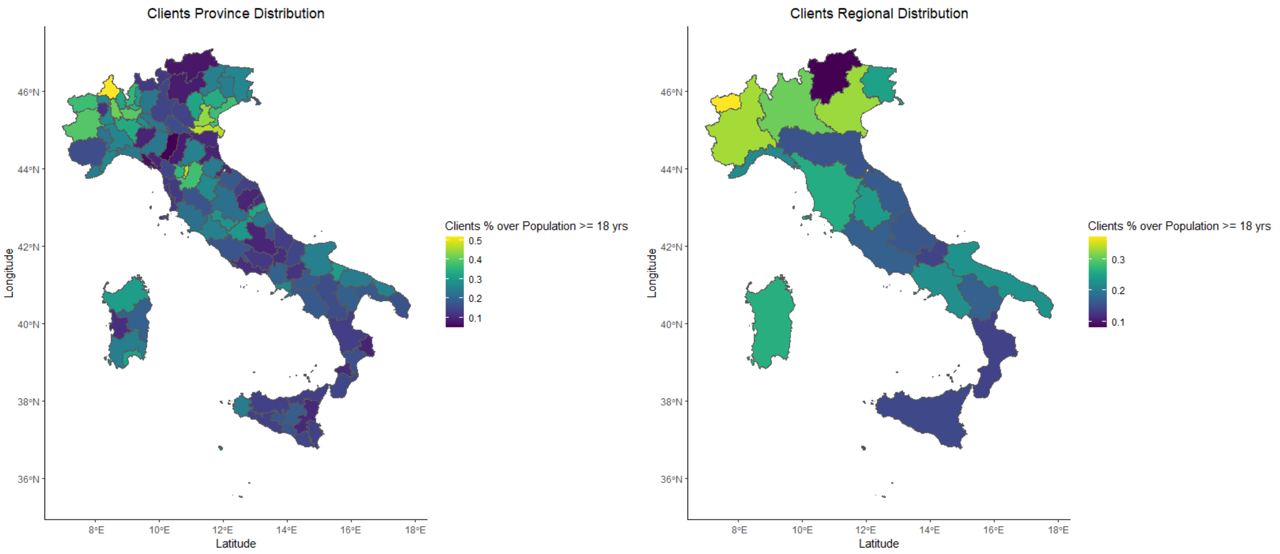

Figure A1: The figure shows the geographical distribution of the italian major bank clients at province and regional level, expressed as a percentage of the local population with age higher or equal to 18 years old.

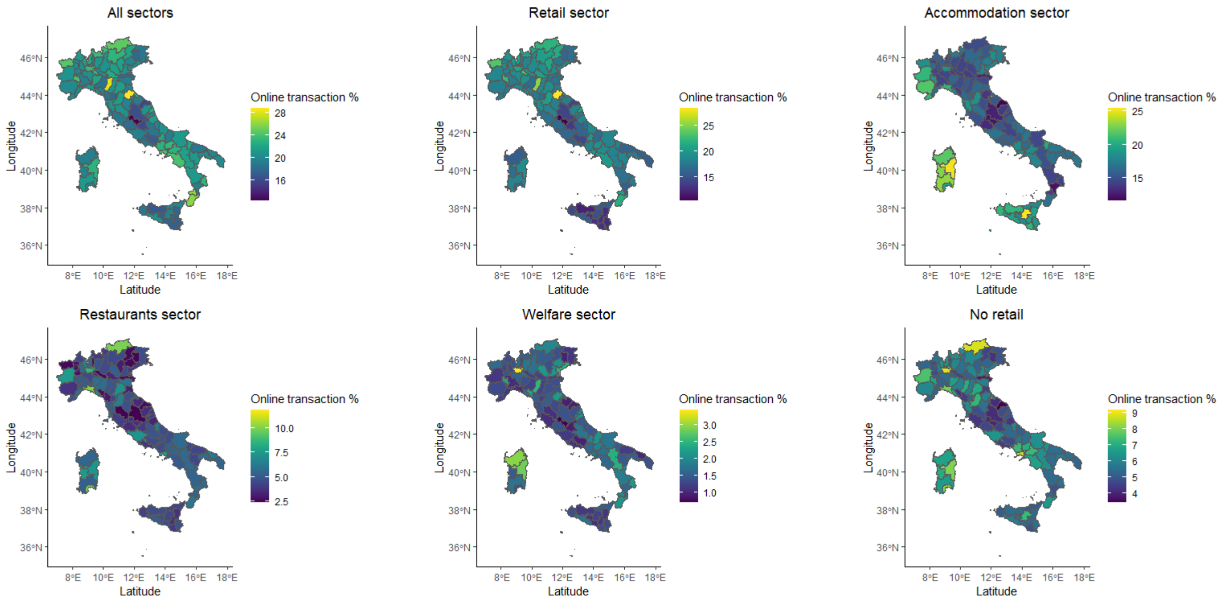

Figure C1: The figure shows the geographical distribution of the incidence of online transactions at province level across different sectors. Data are sourced from the major italian bank dataset.

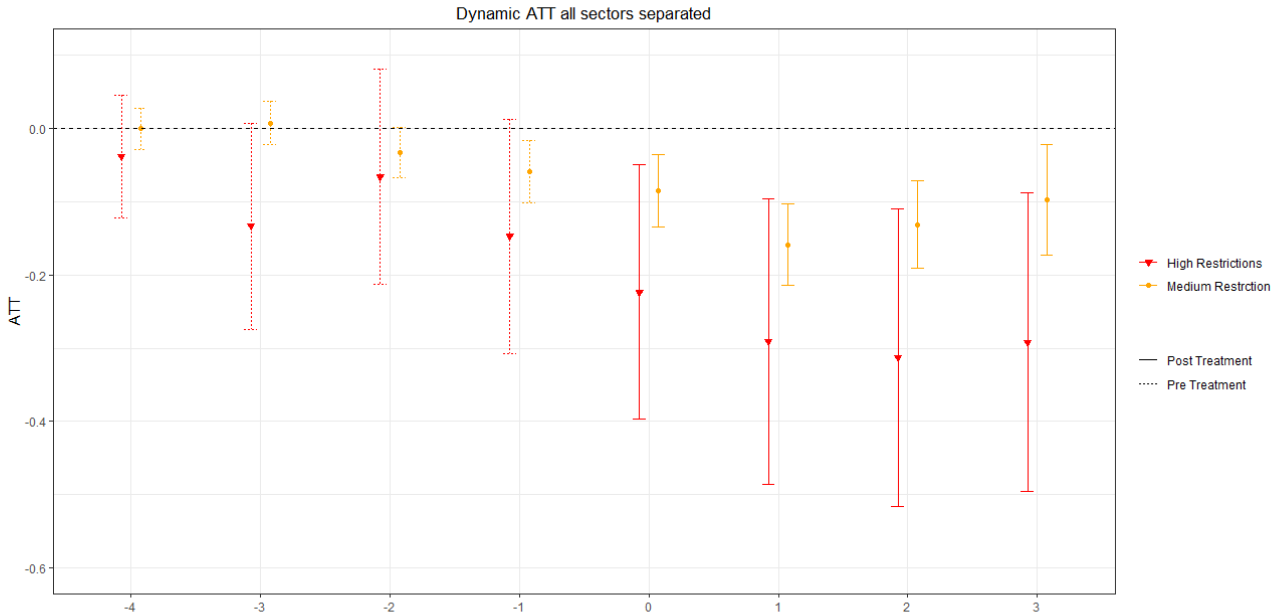

Figure D1: This figure shows the values of coefficients β_e and γ_e estimated through the panel event study TWFE described in Equation 2 with a 95% when the combined full sample of sectors is used. In particular, we include in our analysis the Retail, Accommodation, Restaurants and Welfare sectors.

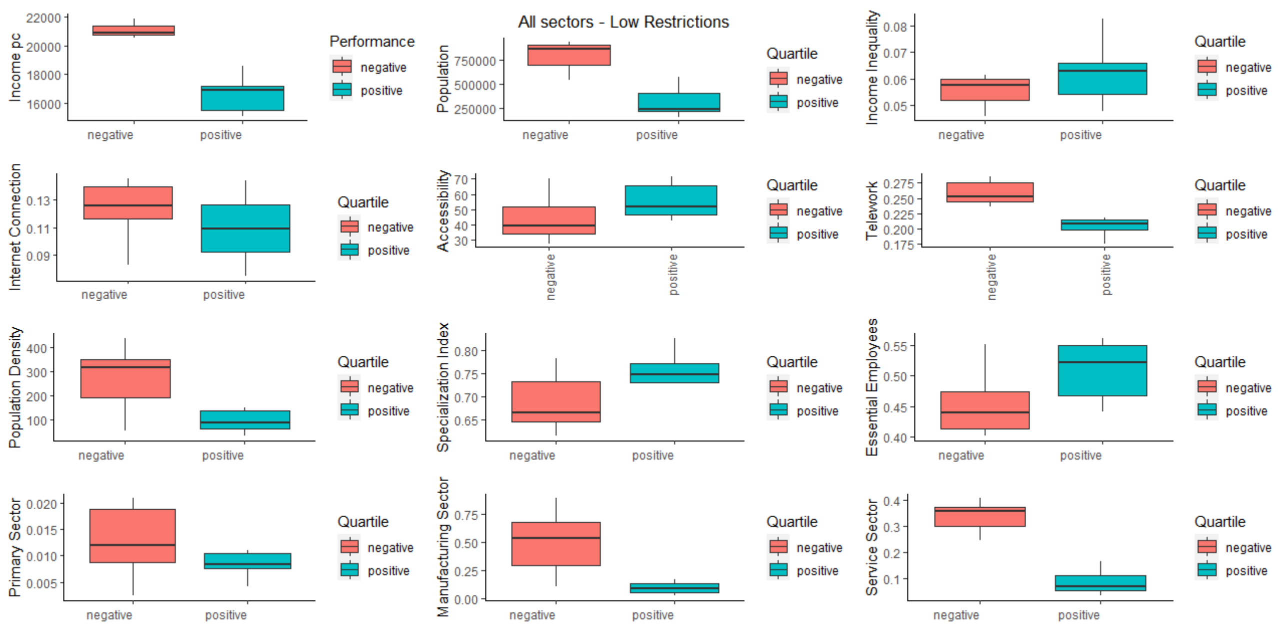

Figure E1: Distribution of socio-economic characteristics of low risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. The two groups of territories displaying simultaneously positive or negative economic and epidemiological results are identified considering aggregate consumption across all economic sectors.

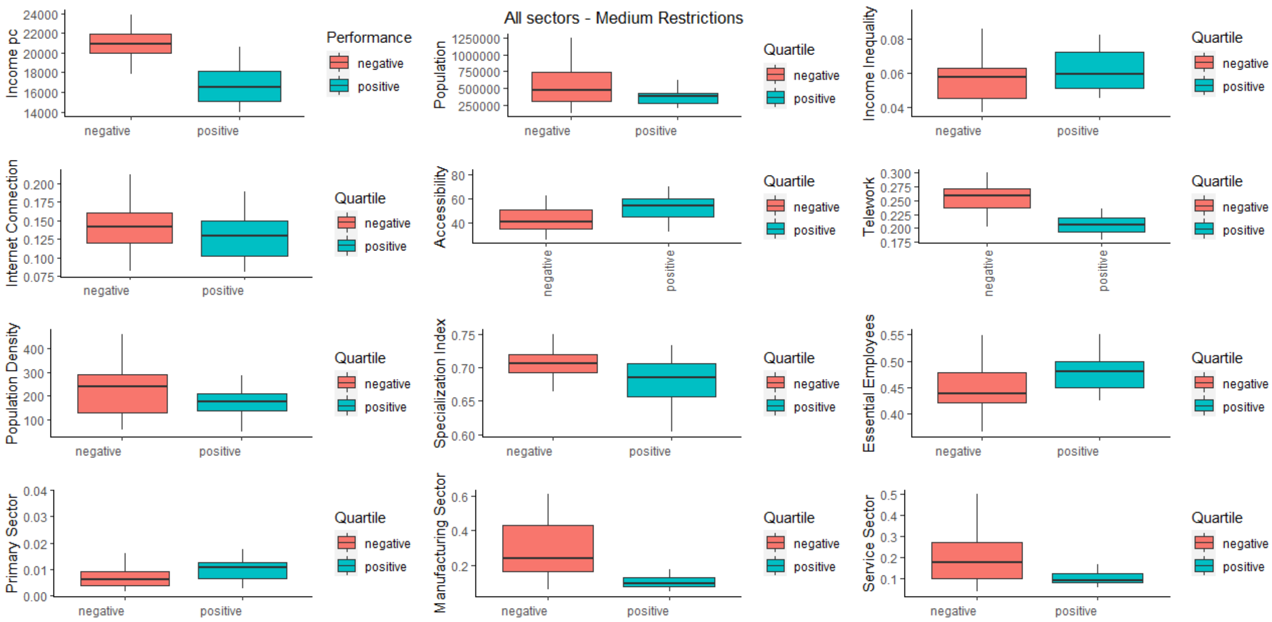

Figure E2: Distribution of socio-economic characteristics of medium risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. The two groups of territories displaying simultaneously positive or negative economic and epidemiological results are identified considering aggregate consumption across all economic sectors.

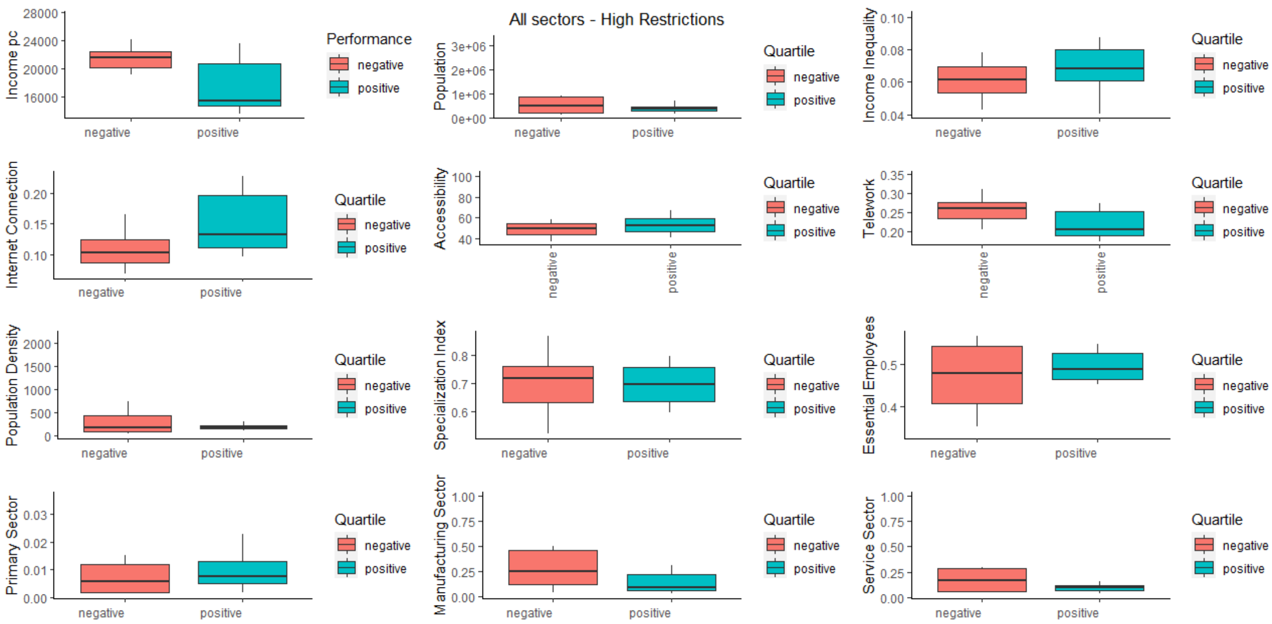

Figure E3: Distribution of socio-economic characteristics of high risk provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. The two groups of territories displaying simultaneously positive or negative economic and epidemiological results are identified considering aggregate consumption across all economic sectors.

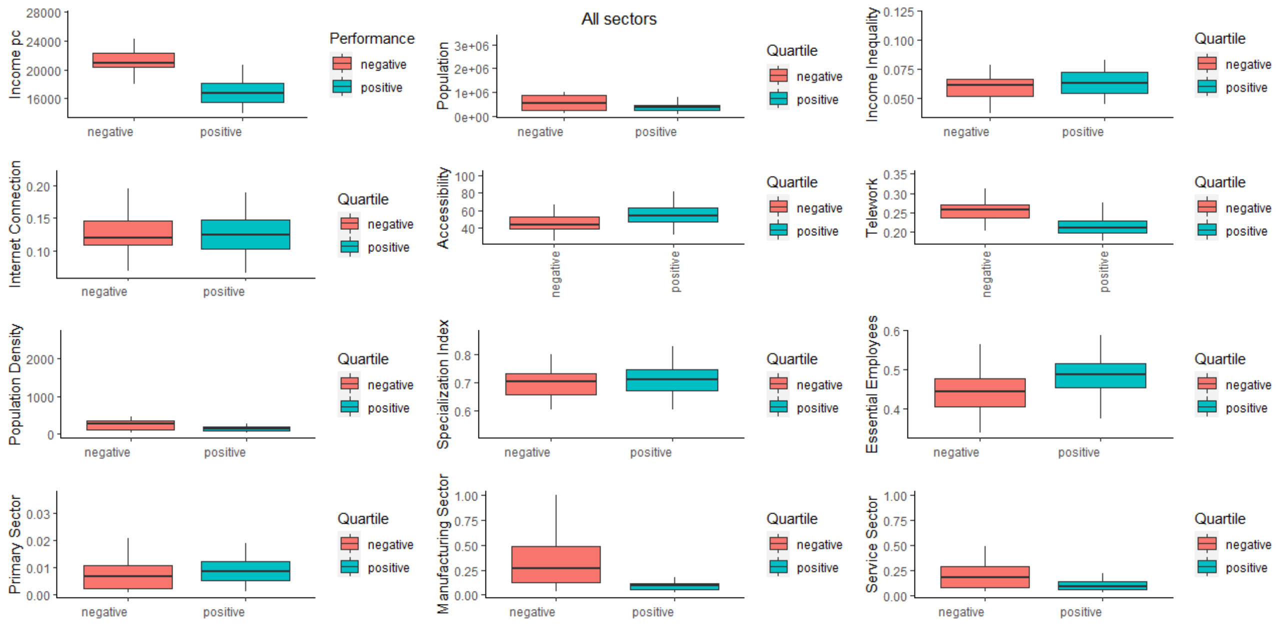

Figure E4: Distribution of socio-economic characteristics of italian provinces experiencing simultaneously positive economic and epidemiological results with respect to provinces displaying at the same time negative economic and epidemiological performances. The two groups of territories displaying simultaneously positive or negative economic and epidemiological results are identified considering aggregate consumption across all economic sectors.

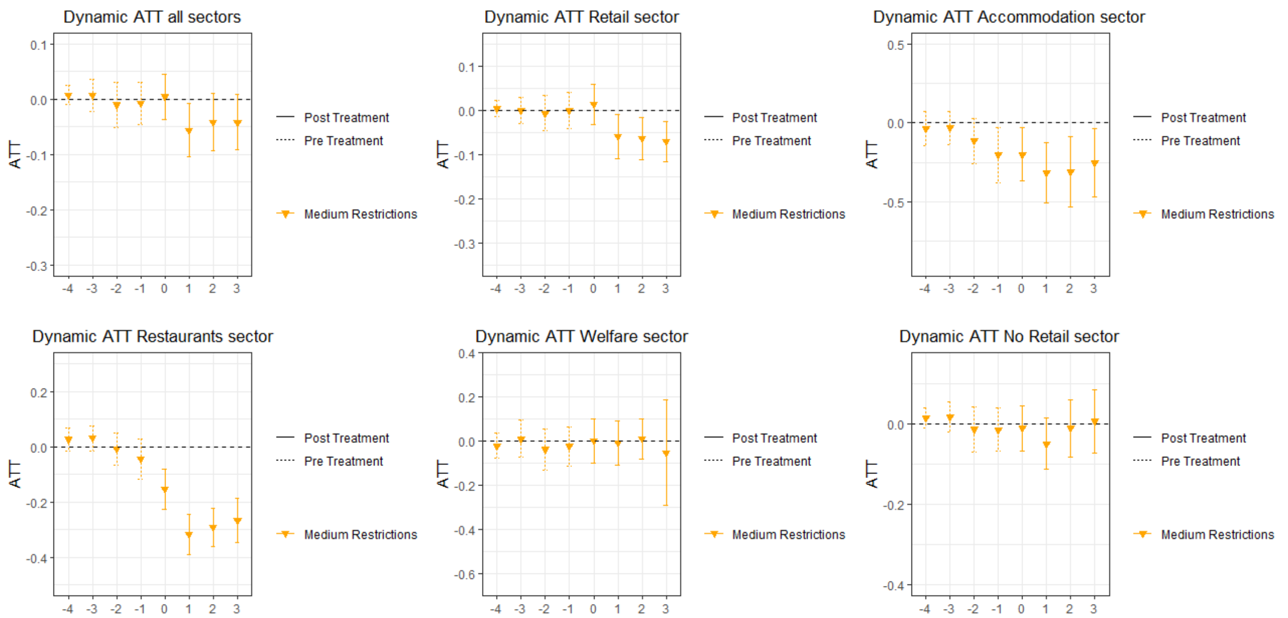

Figure F1: This figure shows values of coefficients β_e and γ_e estimated through the panel event study TWFE described in Equation 2 with a 95% confidence interval. Models are estimated separately for different sectors. We compare medium and low risk provinces.

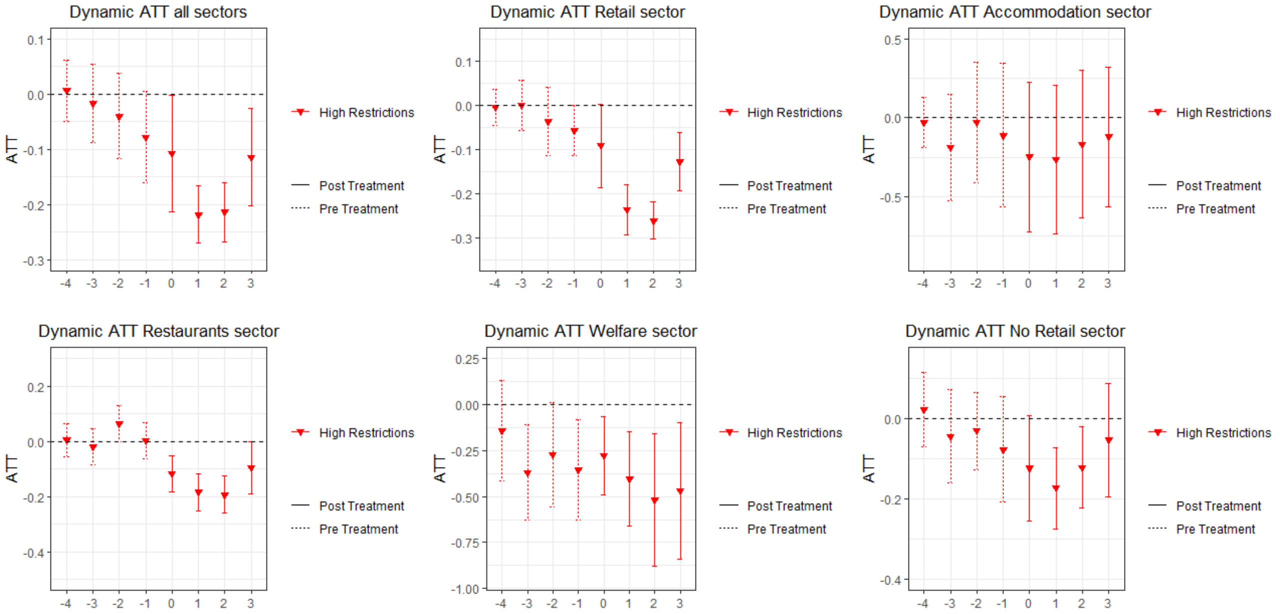

Figure F2: This figure shows values of coefficients β_e and γ_e estimated through the panel event study TWFE described in Equation 2 with a 95% confidence interval. Models are estimated separately for different sectors. We compare high and low risk provinces.

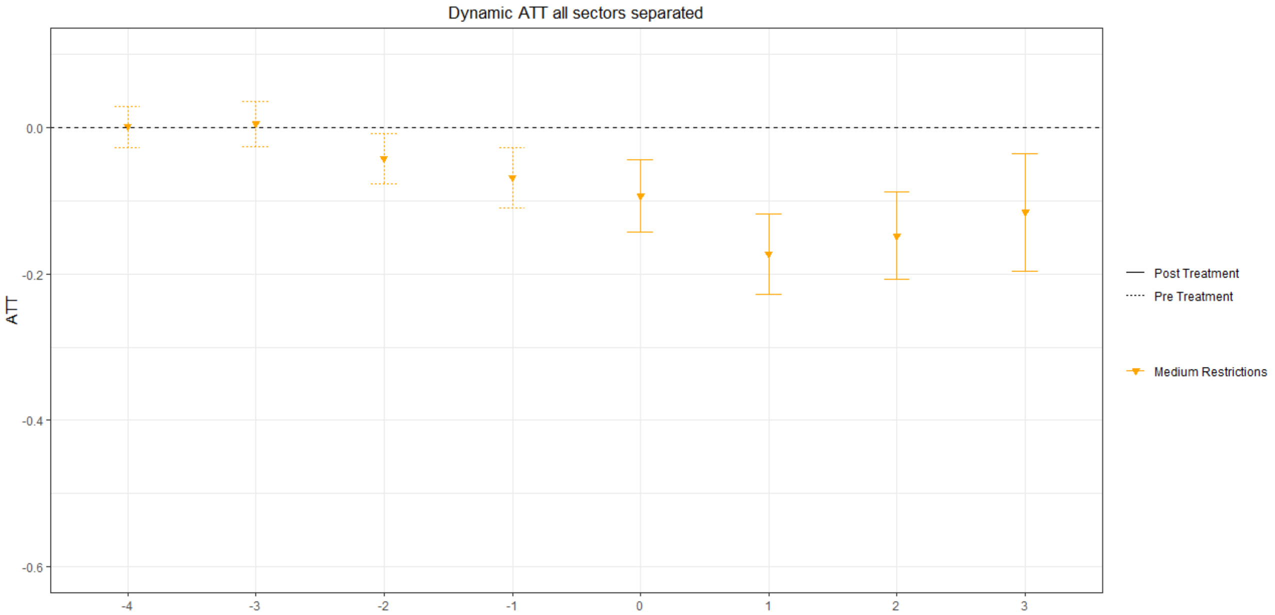

Figure F3: This figure shows values of coefficients β_e and γ_e estimated through the panel event study TWFE described in Equation 2 with a 95% confidence interval. We estimate a single model where we combine the full sample of sectors. We compare medium and low risk provinces.

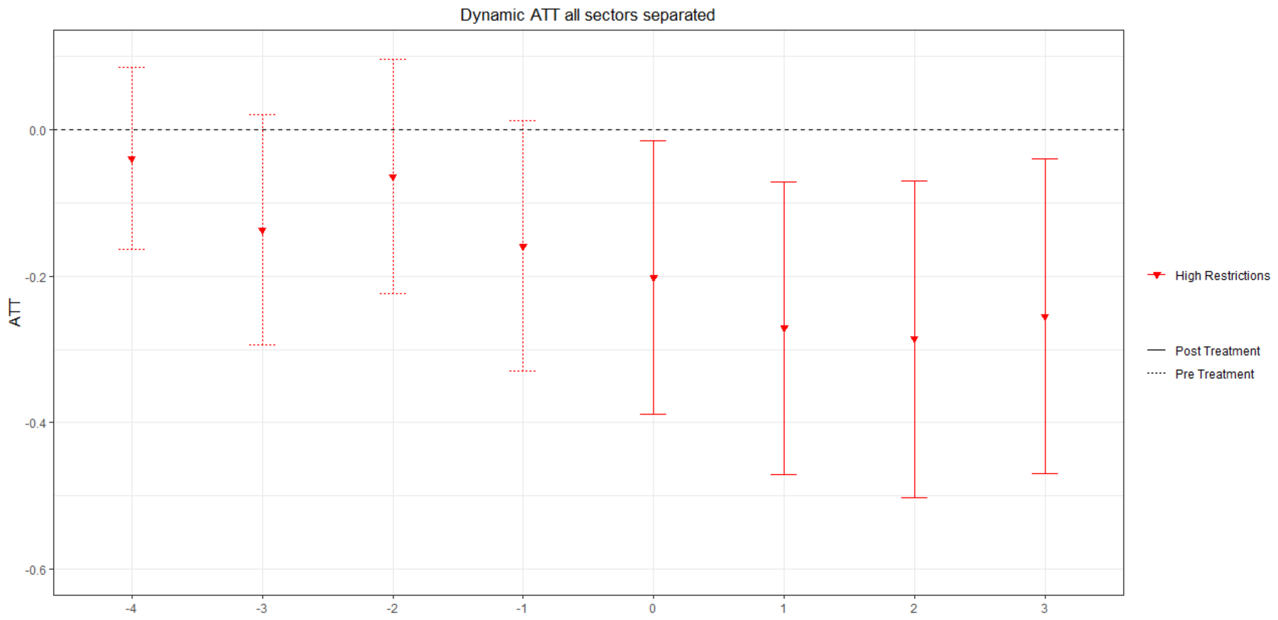

Figure F4: This figure shows values of coefficients β_e and γ_e estimated through the panel event study TWFE described in Equation 2 with a 95% confidence interval. We estimate a single model where we combine the full sample of sectors. We compare high and low risk provinces.

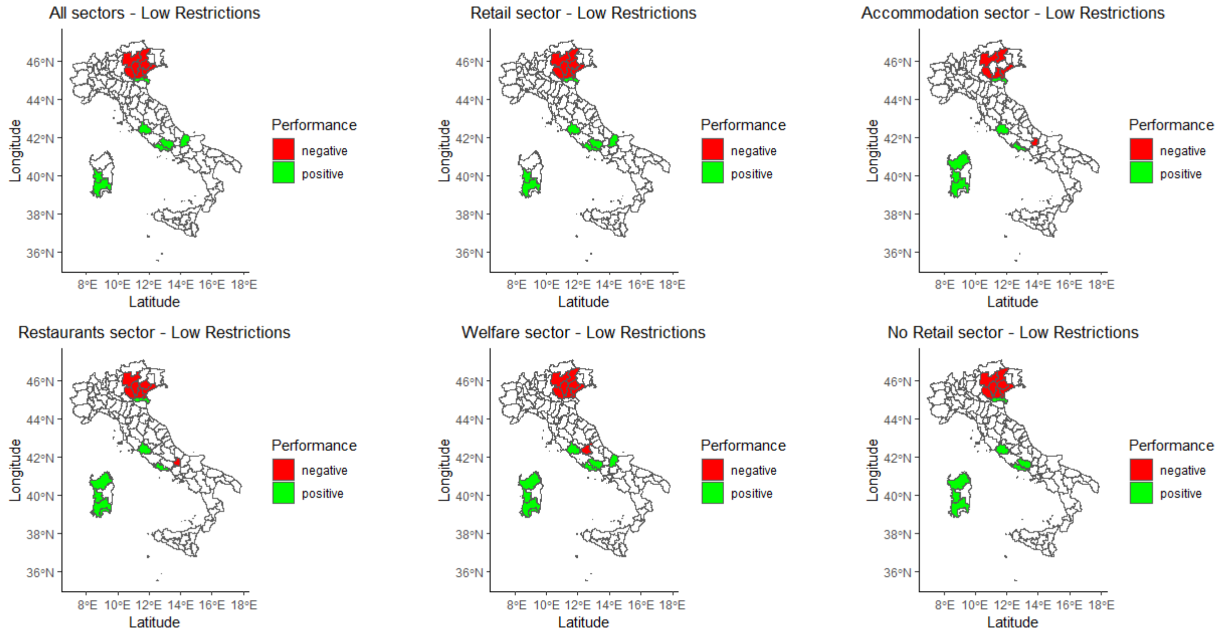

Figure G1: Low risk italian provinces performances in terms of contagion and economic consumption variation.

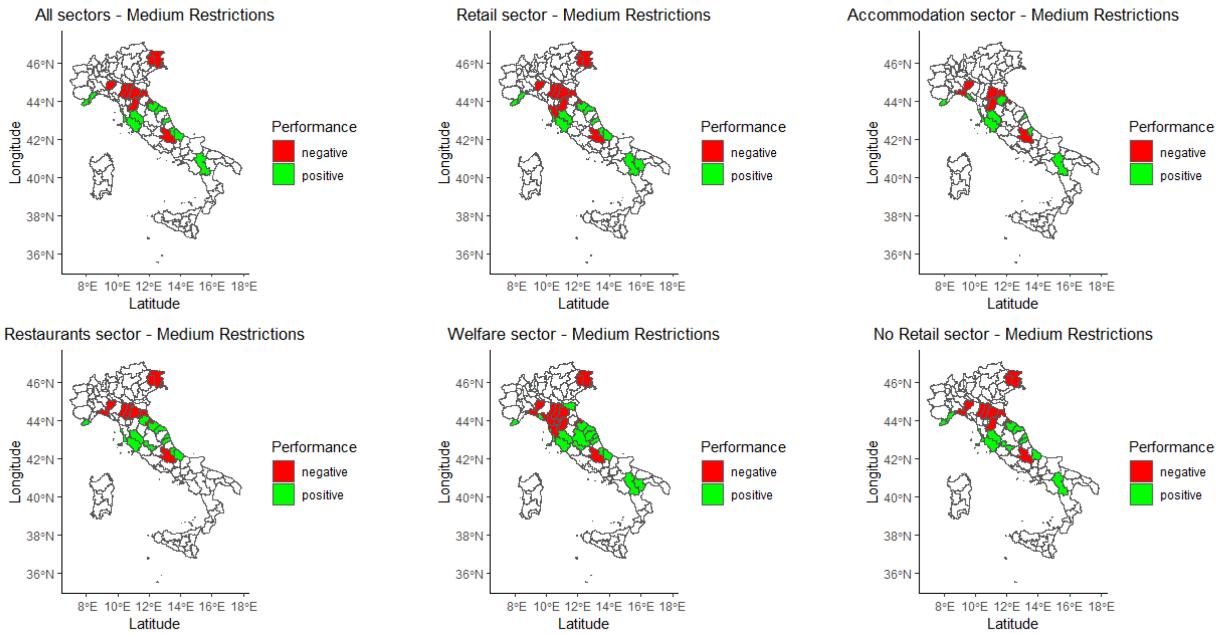

Figure G2: Medium risk italian provinces performances in terms of contagion and economic consumption variation. In this case from the medium risk provinces we exclude territories that were immediately classified as medium (Apulia and Sicily) risk areas on the 6th of November. In this case, the set of provinces included into the analysis in the medium level of restrictions is exactly the same defined in section 3.5.

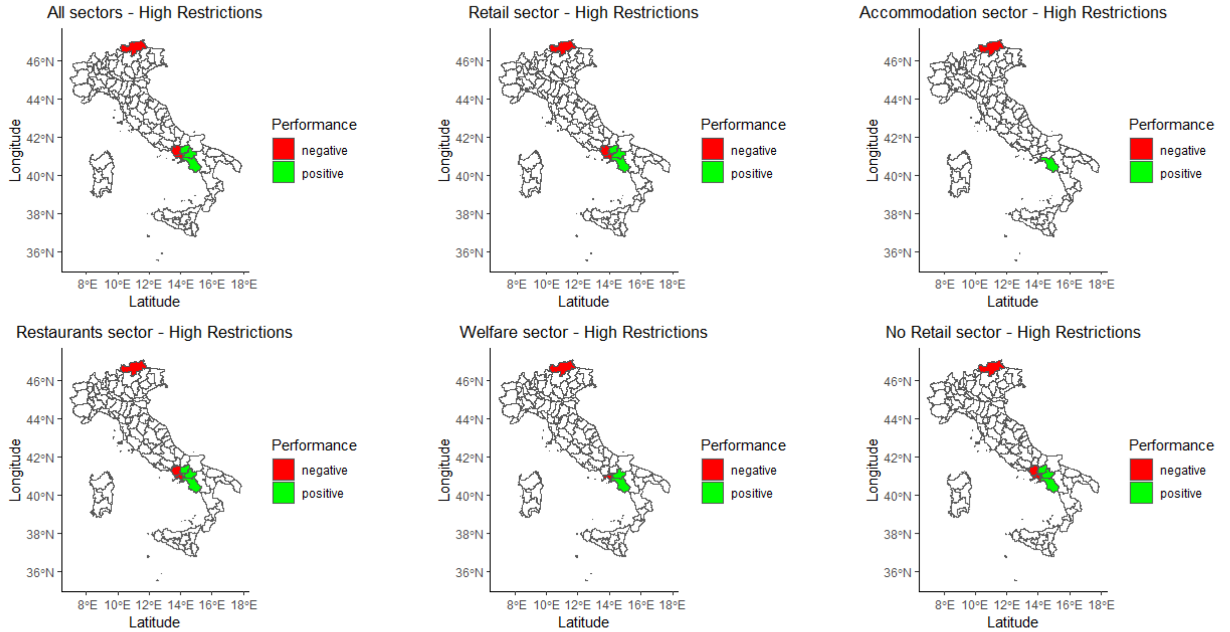

Figure G3: High risk italian provinces performances in terms of contagion and economic consumption variation. In this case from the high risk provinces we exclude territories that were immediately classified as high (Aosta Valley, Calabria Lombardy, Piedmont) risk areas on the 6th of November. In this case, the set of provinces included into the analysis in the high level of restrictions is exactly the same defined in section 3.5.

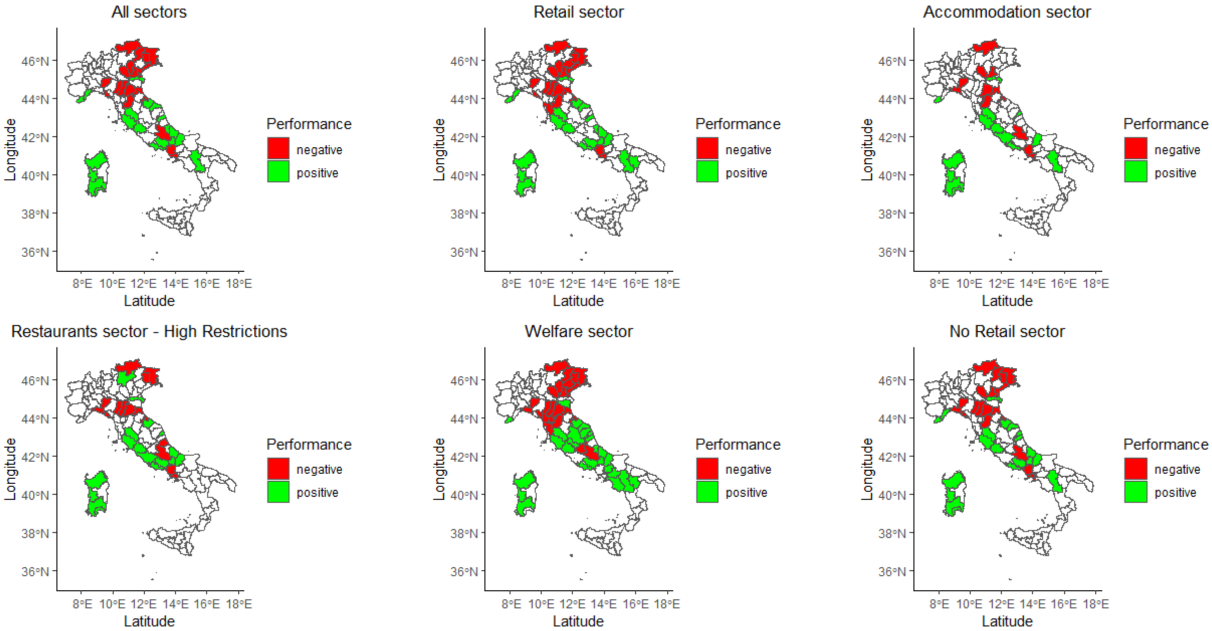

Figure G4: Italian provinces performances in terms of contagion and economic consumption variation. In this case from the medium and high risk provinces we exclude territories that were immediately classified as medium (Sicily and Puglia) and high (Valle d'Aosta, Calabria, Lombardy, Piedmont) risk areas on the 6th of November. In this case, the set of provinces included into the analysis is exactly the same defined in section 3.5.