AN EMPIRICAL TAKE ON THE ECONOMIC EFFECTS OF INSULARITY: THE ITALIAN REGIONAL CASE [1]

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1. Introduction

The development of a territory depends on various factors such as competitive capacity, the degree of schooling, centrality with respect to developed contexts, and territorial positioning. What happens when all these factors interact in an 'island' context?

This issue is still under debate and the extant literature reports mixed evidence with pros and cons of insularity. For example, Fellmann (2020) highlights how insularity is potentially an advantageous factor. However, the potential benefits may depend heavily on the territorial positioning in a fairly developed context in terms of competitiveness and socio-economic development. Such aspects should be taken into account when comparing the islands she mentions such as Gotland or Bormon, in Denmark, with, for example, the two largest Italian islands: Sicily and Sardinia. Indeed, it has already been pointed out in the literature how insularity can be considered a phenomenon of permanent economic and social peripherality that structurally hinders the development and the achievement of specific objectives that are more easily attainable by benefiting from territorial continuity.

Deidda (2014) highlights how insularity, as a condition of distance from the nodes or pivots of the development of commercial interactions, determines an increase in costs - including, but not limited to, those related to distance - with a consequent decrease in economic competitiveness with negative effects also on overall productivity. Cocco *et al.* (2018) point out the importance for those who run a business to be located in a networked territorial environment on the mainland by taking advantage of the proximity of their customers or distribution centers; in addition, their analysis shows how in some instances insularity is a condition of

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peripherality and remoteness that restrains the development of the production system and negatively affects the welfare of consumers.

The debate arising from the comparison of the various contributions, therefore, highlights the strengths and weaknesses of the effect of insularity on economic performance. Building upon this debate, this contribution aims to analyze the spatial uneven effects of trade Italian regions controlling for their competitiveness and (the costs of) their distance.

The analysis fails to detect such a generalised insularity effect. Though, a negative and statistically significant impact of insularity is detected specially for Sicily. We interpret this result in the sense that potentially negative effects of insularity depend on place-specific characteristics.

2. Distance and competitiveness

This analysis refers to the EU regions (268 at NUTS2 level) for which the transportation costs are considered based on the prevalence of the method. More precisely, road transport, followed by rail and finally waterways[2].

Eurostat calculates the average Generalized Transport Costs (GTC) of all recipients for each region as an inverse measure of accessibility. As shown, geographically central regions have the lowest transport costs due to their central location within the road network, while peripheral regions generally suffer from higher transportation costs.

When analyzing the breakdown of the cost of transport, 60% can be attributed to time and fuel. The cost of time is composed of the value of wages and the value of rest time. While distance costs are determined by fuel prices and fuel consumption. Other relevant cost components are related to maintenance, insurance, financing, depreciation, and indirect costs, which count for around 40%. Eurostat calculates even the breakdown into the two main components of 'distance' and 'time' shows a marked heterogeneity between regions (*Distance and time related costs of GTC for each NUTS 2 region distance-related costs and time-related costs)*.

An alternative cost estimation strategy to the one considered so far is to weight the cost measures between regions *i* and *j* by the bilateral trade flow between regions *i* and *j* using the data provided by Thissen et al. (2019). In reports those weighted transportation costs. It makes the marginality of some regions more apparent.

[2] The figures recorded in 2016 were 76.4 percent and 23.6 percent of total freight by road and rail and waterways, respectively. European Commission (2019) Estimating road transport costs between EU regions in JRC Working Papers on Territorial Modelling and Analysis No 04/2019.

Even from a more general perspective than focusing on transport costs, it emerges that the competitive capacity of regions shows similar patterns. This is evident from the Regional Competitiveness Index (RCI).

Hence, we can affirm that the two islands on which this work focuses (Sicily and Sardinia (Biagi *et al.*, 2019), from a descriptive point of view, are characterised by a marginal position not only from a merely geographic point of view, but also from the point of view of transport costs and, more generally, of territorial competitiveness. A more detailed analysis will be offered below to verify the effects of this marginality on their economic performance.

3. Data and empirical strategy

As aforementioned, we consider transportation costs for EU regions (268 at NUTS2 level) calculated according to the criterion of the prevalence of the type of transport recorded. The dataset reports estimates of the different distance measures between the EU regions at NUTS2 level calculated considering both distance (road and geodetic (line segment)), road time (truck), and cost estimates. More specifically, averages of distance measures between centroids were calculated for each pair of regions in relation to variables such as total fuel consumption, tolls, wages, and taxes[3].

Using the above distance cost data, the impact of exports on the GDP of Italian regions was estimated using a Random Coefficients Model (RCM). However, the original (export-based) model, based on well-established literature dating back to the 1950s (see, among others, the important contributions of North (1955) and Tiebout (1956)) was augmented control for the specific effect of distance (i.e., its cost). In formula (1)

$$GDP_i = \beta_{0i} + \beta_{1i}Export + \beta_2 Distance + \beta_3 Export * Distance + u \qquad (1)$$

In which the variable 'GDP' refers to regional GDP, the variable 'Export' represents the total exports of the Italian regions, the variable 'Distance' represents the total cost of the distance between each Italian region and its trading partner, and the variable 'Export*Distance' their interaction. Note, how the estimation of a random coefficient model allows for the identification of possible variations in the impact of exports - controlling for distance - at the level regional level (Singh and Ullah, 1974).

[3] For the details about the methodological aspects the reader is addressed to European Commission, 2019.

The GDP variable is reported in millions of euros and transformed into a logarithm; exports are reported in tens of millions of euros. Further, to estimate the model with reference to the Italian regions (NUTS 2), it was necessary to calculate the average at the same level of geographical aggregation (NUTS 2) of the costs of the relative distances to the destination regions. This was done for all export destination regions of the Italian regions.

Moreover, to make the estimates more readily interpretable, all distance measures have been centered with respect to the average. In fact, as is well known, when the interaction term is added to an estimate, in the terms of our model, a one-unit increase in exports will not produce an average change in GDP equal to the value of its coefficient. Indeed, the marginal effect of exports on GDP now varies according to the level of the 'distance' variable. More precisely, the marginal effect of exports will be equal to their coefficient plus the coefficient of the interaction term times its interaction with the distance variable.

Table 1 – *Export-based model*

VARIABLE	GDP	*p-value*
Export	0.256***	(0.00780)
Distance	-4.88e-07	(1.25e-06)
Distance x *Export*	3.56e-05*	(2.03e-05)
Obs.	4,760	
No. of Groups	20	

Source: authors' elaboration. Notes: * denotes statistical significance at 10%, ** denotes statistical significance at 5%, *** denotes statistical significance at 1%. The variable 'Distance' refers to total distance costs centred on the mean value. The variable 'Export' was reported in tens of millions of euros; The variable 'GDP' was reported in logarithm.

Thus, the only case in which the variable 'distance' does not affect the marginal effect of exports on GDP is when the value of the distance is zero. However, this result is not relevant due to its economic interpretation. For this reason, as mentioned, the distance variable has been centered on its mean value. By doing so, the coefficient of exports will provide their marginal effect on GDP for the average level (of cost) of the distance between each Italian region and its trading partner.

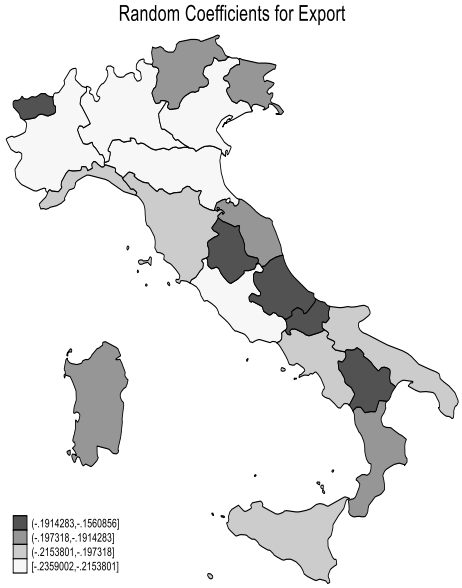
The results of the above model estimation are shown in table 1. Thus, the preliminary estimates in table 1 confirm a statistically positive impact of exports on economic performance. More precisely, the coefficient reported (0.256) shows that a unit increase in export w.r.t. the mean value has a 25.6 unit effect on GDP. Put another way, a one-million deviation of exports from the mean has an estimated effect on GDP of 2.56 million. Although this is a preliminary estimate, this result - which, as mentioned, controls for the distance between the regions involved in the trade in question - confirms the crucial role that exports play in the economic

performance of the Italian regions. Likewise, the interaction term between exports and distance shows a positive and statistically significant coefficient. Although of a negligible magnitude. Distance per se, however, is not statistically significant.

In addition to the indications of the significance of the coefficients, the previous model provides insights into the potential spatial differences in the effects of export at the regional level. Indeed, by decomposing the coefficient for export (β_{1i}) into its components ($\beta_{1i} = \beta_1 + \gamma_i$), one can detect the spatial heterogeneity in the effects of exports on GDP. Figure 4 reports the spatial distribution of RCs across the 20 Italian regions.

Figure 1 shows that although we do observe spatial differences in the effects of exports on GDP. More precisely, the negative values for the random coefficients (γ_i) can be interpreted in economic terms as follows. With respect to the overall positive effect of the exports on GDP, each region suffers from a kind of penalty due to local conditions which seem to be generally higher for northern regions than for the southern ones. We conjecture that this penalty is, at least partially, linked to the extent to which the region is engaged in external trade which is generally higher in the North.

Figure 1 – *Random Coefficients for Export***.**



Source: authors' elaboration.

For example, ISTAT (2022)[4] reports that in the first trimester of the current year, on an annual basis, the greatest contributions to the year-on-year growth of national exports come from the increase in sales from Lombardy to Germany (+30.3%), the United States (+38.5%), France (+19.3%) and Spain (+28.2%), and from Emilia-Romagna and Friuli-Venezia Giulia to the United States (+79.5% and +301.8% respectively), the latter being influenced by sales of maritime shipping. Therefore, Northern regions suffer most from this structural gap. In order to further explore this issue, we run an additional regression of estimated RCs against the regional competitiveness factors as captured by the RCI.

The analysis is augmented with a dummy variable for Sicily and Sardinia (D_island) aiming to capture the potential presence of an "island effect". The results are reported in table 2.

Table 2 shows that our empirical analysis fails to detect such a generic island effect. However, by considering two separate dummies for Sicily (D_Sic) and Sardinia (D_Sar), the former is negative and statistically significant at 10%. Results are reported in table 3.

Therefore, although the hypothesis of a generalized negative effect of insularity must be rejected based on the current analysis, a negative effect of isolation is detected for Sicilian Island. Undoubtedly, this result calls for further analysis exploring the causes as well as the main drivers of such evidence. Nonetheless, it is worth stressing how it confirms that it is not the condition of 'isolation' per se that generates negative effects on economic performance, rather, it seems to depend on place-specific characteristics.

Table 2- *Random Coefficients and Regional Competitiveness*.

VARIABLES	RC for Export	*p-value*
RCI	-0.0166	(0.0149)
D_island	-0.00623	(0.0111)
Constant	-0.208***	(0.00815)
Observations	20	
R-squared	0.072	

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. D_Island: dummy variable for main Islands (Sardegna and Sicily).*

[4] Le esportazioni delle regioni italiane - I trimestre 2022 (istat.it). Last retrieved on 11/07/2022.

Table 3 – *Export, competitiveness, and Island effect.*

VARIABLES	RC for Export	*p-value*
RCI	-0.0177	(0.0155)
D_Sar	0.00432	(0.00657)
D_Sic	-0.0174*	(0.00900)
Constant	-0.209***	(0.00845)
Observations	20	
R-squared	0.101	

*Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. D_Sar and D_Sic: dummy variables for Sardegna and Sicily, respectively.*

As for the RCI, the results reported in table 3 show that, overall, the regional competitiveness – as measured by the RCI – is not statistically significant to explain the uneven effects of export at the regional level. Nonetheless, a more granular analysis individually considering the 3 pillars of RCI (i.e., 'basic', 'efficiency', and 'innovation', see Dijkstra et al. (2011)) offers nuanced results and further stimulus for additional research. The empirical results are reported in table 4.

Indeed, as shown in table 4, the efficiency pillar is statistically significant and positive both in the case of a single dummy for the island and in the case of 2 separate dummies for the main islands. Hence, the efficiency dimension of competitiveness confirms its crucial role in allowing the regional economies to exploit the potential benefits of export. Quite interestingly, the pillar related to innovation shows a statistically significant negative sign. The dummy for Sicily confirms the usual sign and statistical significance. Thus, the main result for the case at hand (i.e. the penalizing effect of Sicilian insularity) proves to be robust to a variety of econometric specifications.

Table 4 – *Export, pillars of competitiveness, and island effect*

VARIABLES	(1) RC for export	*p-value*	(2) RC for export	*p-value*
Basic	0.0756	(0.0443)	0.0835	(0.0494)
Innovation	-0.106***	(0.0265)	-0.104***	(0.0278)
Efficiency	0.0286**	(0.0107)	0.0259*	(0.0121)
D_Sar			-0.00634	(0.00663)
D_Sic			-0.0262*	(0.0135)
D_island	-0.0161			
	(0.0111)			
Constant	-0.201***		-0.198***	
	(0.0118)		(0.0129)	
Observations	20		20	
R-squared	0.344		0.366	

Note: Robust standard errors in parentheses.
**** p<0.01, ** p<0.05, * p<0.1. D_Sar and D_Sic: dummy variables for Sardegna and Sicily, respectively.*

In conclusion, the analysis revealed the spatial heterogeneity in the effects of foreign trade between the Italian regions.

The determinants of such a heterogeneous effect seem to be based on innovation and efficiency, and on these it is necessary to act promptly to fill the economic and social gaps. Furthermore, the robust evidence that the "island" effect plays as a limiting factor in the Sicilian case calls for specific policies. Put differently, our empirical analysis offers a twofold result and, in turn, an additional stimulus for research at different spatial levels. First, at the system level, in order to foster the positive effect of external trade both policymakers and practitioners should place a clear focus on measures aiming to improve the level of efficiency. Second, the datum related to the negative effect of insularity in the Sicilian case only, on the one hand, somehow signals the existence of case-specific structural limiting factors and, on the other hand, challenges the public policy discourse to design and implement place-based policies to address the issue by targeting the main drivers for such negative effect.

4. Policy discussion

Compared to remoteness, insularity poses specific challenges to public policies. Generally speaking, public interventions to counter situations of remoteness and geographical marginalization should mainly aim at eliminating the causes of peripheriCity. However, in the specific case of islands, physical disconnection from the mainland cannot be eliminated. It is, thus, necessary to act coordinately at different decision-making levels (supranational, national and regional) to promote tailor-made financial and fiscal interventions to compensate island areas for their development disadvantages. Whatever the situation to be faced (i.e., remoteness or insularity), the ultimate objective of public policies is the same: to equalize opportunities and rights between citizens of the same region, state or continent.

To ensure that the adopted measures effectively respond to an equalization objective and are not the mere result of arbitrary decisions, discretion and/or political (e.g., vote-seeking) logics, it is necessary that they are undertaken within a legislative framework that recognizes the economic disadvantages resulting from the island status, attributes differential autonomy to the governments of the insular areas and establishes the responsibilities for public policy interventions (Cerina *et al.*, 2015).

To date, however, the legislation and policies implemented at European level have proved inadequate to deal with the real problems that come from the island condition (among others, Haase and Maier, 2021).

From a legal point of view, attention to insularity has grown over time at European level, going hand in hand with the strengthening of the objectives and

policies to promote economic and social cohesion (Spilanis et al., 2011) and finding full legal protection in art. 174 of the Treaty on the Functioning of the European Union (TFEU). The latter recognizes that island regions face permanent geographical handicaps that require particular attention. However, the principles laid down in Article 174 TFEU have not yet been translated into island-specific budgetary provisions. Indeed, in Cohesion Policy provisions, islands are usually considered within the broader category of "less developed regions", rather than being entitled to specific financial aids. Accordingly, in the 2021-2027 programming period, islands are not expected to receive any dedicated funding, but only have the possibility to modulate the co-financing rates pursuant to Article 121 of Regulation (EU) No 1303/2013.

This inconsistent approach to insularity results in islands in different Member States receiving from "*Cohesion Policy"* amounts that vary considerably, depending on their classification, their situation, and the existence of specific inter-state agreements, responding to general macro-economic considerations rather than territorial specificities.

Islands comprising into the "outermost" regions (ORs) category are an exception to what has been said so far (Perrot, 2021). These belong to France (Saint-Martin, Martinique, Mayotte, Guadeloupe and Réunion), Spain (Canary Islands) and Portugal (Madeira and Azores) but are located in parts of the globe far from Europe, such as the Atlantic or Indian Ocean. For this reason, they are considered to suffer from a double insularity condition, due to their geographical remoteness from 1) the continental lands and from 2) the European Union. ORs benefit from a special status within the EU legislation, being recognized distinctly by Article 349 TFEU, which allows the adoption of specific measures regarding "customs and trade policies, fiscal policy, free zones, agriculture and fisheries policies, conditions for supply of raw materials and essential consumer goods, State aids and conditions of access to structural funds and to horizontal Union programmes".

An important limit to the provision of fiscal compensation and facilitation measures for island regions must be identified in the European legislation on state aid (Article 107(1) TFUE) and in the EU competition policy. The debating issue here is how to reconcile the general prohibition of State aid with the notion of "regional selectivity" (Kurcz, 2007: Moreno González, 2017), and ultimately concerns the relationships between different levels of government. The Court of Justice of the European Community (CJEC) has better clarified the terms of the matter in three different judgments, concerning the reduction of personal and business tax rates applied to the Autonomous Region of the Azores in Portugal (C-88/03) and the legislative autonomy in tax matters of the Basque Autonomous Community in Spain (the joined cases C-428/06 to C-434/06).

Accordingly, to be able to establish tax advantage measures, a region/island must comply with three fundamental requirements: 1) institutional autonomy with respect to the central government; 2) decision-making autonomy; 3) financial autonomy. Based on these principles, the region would become, from a fiscal point of view, a "State within the State": the fiscal measures adopted at national level (e.g., the average tax rate) would no longer be the reference parameter against which to assess the effects of fiscal decisions. Instead, the regional territory and not the national territory would become the reference framework for the assessment of the regionally-implemented advantage measures. However, political and decision-making autonomy alone is not enough but must be accompanied by financial responsibility to prevent the region/island from taking favorable tax decisions, offloading the negative consequences on the central government (a free riding problem).

The aforementioned Community law opens up the possibility for some islands, including Sicily and Sardinia, to adopt "autonomous" subsidy measures, as long as they fully assume the financial consequences, guaranteeing a balanced budget. However, it does not solve the more general problem of public policies to be implemented to compensate for the economic disadvantage suffered by the islands by virtue of their specific status. Recently (June 7, 2022), a further step towards the recognition of the insular dimension in European Union policies and legislation has been made with the approval by the European Parliament of the so-called "Omarjee" resolution on EU islands and cohesion policy (2021/2079(INI))[5]. Among others, with the resolution the European Parliament deplores the lack of EU vision for the European islands and calls for action to be taken to address inequalities between islands and the outermost regions, by reassessing the state aid rules and by adopting a more flexible approach. In addition, it invites the Commission to declare 2024 the European Year of Islands, to request additional financial support and to propose the establishment of a task force on islands.

5. Conclusion

Building upon the theoretical framework of the export-based model this paper explored the presence of an "insularity" effect w.r.t. the contribution of export on GDP at the Italian regional level. A two-step analysis was performed. An RCM was used in the first step and, then, the spatial differences in the estimated RCs were explored in the second step. This procedure fails to detect a generalized island effect

[5] https://oeil.secure.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=2021/2079(INI).

for the Italian case. However, a negative and statistically significant effect is found for Sicily. This confirms that such an effect is place-specific. In other words, from the decomposition of the competitiveness index, further elements of analysis emerge both in the generic vision and in the island condition. In the latter case, innovation and efficiency are also negatively influencing Sicily's exports

Hence, the policy implications of our empirical results are twofold. First, a clear focus on measures aiming to improve the level of efficiency is needed. Second, the negative effect of insularity limited to the Sicilian case only seems to confirm the existence of case-specific structural limiting factors and, therefore, raises the case for place-based policies targeting the main drivers for such negative effects. Undoubtedly, these results at the same time as providing interesting insights, call for further research on its main drivers and, more generally, on the extent and sectors to which it eventually applies.

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SUMMARY

The paper investigates the effects of insularity on economic performance using a Random Coefficient Model (RCM) and the Italian regions as a case study. More in detail, the paper aims to analyse whether a specific 'island effect' can be detected in terms of the economic impact of export on GDP. To this end, building upon the theoretical framework of the export-based model of regional growth, the insularity is considered according to both transportation costs and proper spatial regression models. The very preliminary empirical results fail to detect such an insularity effect and show evidence that the main drivers of the multiplicative effects of export lay in regional efficiency indicators.

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