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IS INSULARITY A LOCATIONAL DISADVANTAGE? INSIGHTS FROM THE NEW ECONOMIC GEOGRAPHY

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WORKING PAPERS

2015/21

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Title: IS INSULARITY A LOCATIONAL DISADVANTAGE? INSIGHTS FROM THE NEW ECONOMIC GEOGRAPHY

First Edition: December 2015

Is insularity a locational disadvantage? Insights from the New Economic Geography

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Abstract

This paper investigates the economic implications of being an island from the perspective of the *New Economic Geography* (NEG) literature. We review and discuss some existing NEG models which can be useful to generate empirical predictions for the insular territories and we outline a theoretical framework aiming at explicitly modeling the problem of insularity. We propose answers to the following research questions: Is insularity a threat for economic performances? In which cases and why does it represent a disadvantage? Which are, if any, the optimal policies able to compensate for this disadvantage?

JEL Classification: R12, R23, R40.
Key words: Insularity, New Economic Geography, Industry Location, Trade.

*The research leading to this paper has been conducted under the project funded by the Regional Government of Sardinia under LR 7 "Analisi dei costi economici addizionali attribuibili allo stato di insularità, con particolare riferimento alla differenza rispetto a casi di "geographic remoteness" riconosciuti nell'ambito della politica regionale europea". Address: Fabio Cerina, Viale Sant'Ignazio 78 - 09123 - Cagliari (Italy). E-mail: fcerina@unica.it

1 Introduction

Insular territories, especially when are small and remote, are characterized by depopulation, poor economic performances and low attractiveness for firms (EUROISLANDS, 2013). Moreover, it is widely perceived that insularity often implies some form of additional monetary and psychological costs for residents. Are these stylized facts and perceptions confirmed by economic theory? The aim of this paper is to investigate the economic implications of being an island from the viewpoint of the *New Economic Geography* (NEG) literature.

The birth of the NEG is commonly associated to the seminal work of Krugman (1991) where he presented the *Core-Periphery* model. The main aim of this strand of literature is to provide an economic explanation for the spatial location patters of economic agents and activities. What are the economic forces that can explain the birth of a metropolis? Why economic activities are usually concentrated in space and why economic geography is characterized by the existence of cores and peripheries? Why some areas suffer from depopulation while some others are characterized by a strong urbanization process? These are some of the questions that the NEG tries to answers using the tools of microeconomic and trade theory.

The same economic tools will be used in this paper to provide an answer to the following questions: what is the economic effect of insularity? Is insularity a threat for economic performances? In which cases and why does it represent a disadvantage? Which are, if any, the optimal policies able to compensate for this disadvantage? We anticipate that, albeit interesting, the answers for the previous questions are only partially satisfactory for two main reasons.

First, despite representing a geographical state, insularity has not inspired any explicit economic study: to our knowledge there is no work where NEG tools are used in order to investigate the economic effects of insularity. As we will see, some empirical predictions and policy implications can be provided by existing works once re-interpreted from the point of view of the insularity problem. However, to fully capture the features of the state of insularity, a more specific and detailed representation is needed. To our knowledge, such a representation does exist so far and therefore in the final part of the paper we outline a model able to fill this gap.

Second, due to the one-dimensional way in which transport costs are defined in the NEG (i.e. in monetary terms), it is intrinsically impossible to distinguish between the effects of insularity and the effects of *remoteness* in traditional NEG models. In other words, a quantitative assessment of the additional costs stemming from insularity with respect to mere remoteness from financial and economic cores, is not feasible with the economic tools provided by NEG. Hence insularity can only be interpreted as ?additional remoteness, and so not qualitatively different from remoteness itself, which, unlike insularity, does not imply land discontinuity. The results predicted by those models are nevertheless interesting for our purposes because insularity necessarily implies a restriction in feasible means of transport[1] which leads to higher costs per distance unit. While insularity implies additional remoteness, the opposite is not necessarily true.

[1]One can drive by car only all the way down from Milan to Reggio Calabria. One can't do the same from Milan to Cagliari.

The paper proceeds as follows. In the next section we sum-up the main messages of the NEG literature. In section 3 we review those models which provides insights to assess the cost of insularity and we derive empirical predictions. Section 4 concludes.

2 The main messages of the NEG

As already anticipated, it is common to locate the birth of the NEG in the 1991, with the work of Paul Krugman. Krugman's seminal paper, "Increasing returns and Economic Geography" - commonly known as the "Core-Periphery Model" - gave rise to a series of models aiming to explain systematically the location patterns of workers and businesses according on micro-founded grounds.

Two are the main ingredients of this theory: increasing returns (i.e. decreasing average costs and then strong convenience for a firms to increase its size) and the fact that exchanging goods located in different areas entails several kinds of costs (administrative, transport, etc.). It is possible to show that without one of these two ingredients, the observed spatial concentration of economic activities can be explained only through the so-called "first-nature geography" (climate, natural resources, proximity to geographically attractive locations for firms and so on). NEG investigates whether two areas sharing the same ?first nature geography? show different dynamic processes of agglomeration.

Increasing returns and transport costs leads to the existence of two sets of forces: **agglomeration** forces and **dispersion** forces. An equilibrium allocation of economic activities in space is considered one in which these two forces balance each other. But what are these forces about?

In most NEG models, dispersion forces belong to a single typology, that of the so-called **Market Crowding**. The latter aims at capturing the idea that firms tend to locate far from other firms to protect themselves from the reciprocal competitive pressure. In other words, dispersion forces are justified by the fact that firms are damaged by other firms' competition and therefore - by exploiting positive transport costs - they tend to isolate themselves from other firms in order to create a spatial range where they can be local monopolists thus keeping an acceptable local market share.

By contrasts, there exist several kinds of agglomeration forces. Here we only focus on two[2].

- **Home market effect** (Krugman 1980): firms prefer to be larger and move closer to big markets (ie with larger expenditure capacity) in order to exploit increasing returns to scale. An important implication is that suppliers tend to follow the movements of agents' expenditure (workers as final consumers, businesses as intermediate consumers).

- **Expenditure/demand effect:** (Krugman 1991): when firms relocate, some mobile factors (generally skilled workers or entrepreneurs) spend their income locally contributing to an increase local demand and therefore market size.

It's easy to see how these two forces jointly generate a circular causality which can lead to the so-called *catastrophic agglomeration* (in case they are stronger than dispersion forces). Suppose that a

[2]There is actually another kind of agglomeration force which might be important for our purposes, associated to the so-called *knowledge spillovers*: the spatial concentration of innovating firms enables the exchange of ideas, thereby reducing the cost of introducing new innovations. This reduction in innovation costs generates a further incentive fo for firms to locate close to industrial agglomerations.

firm decide to relocate in a different area. By doing so, some mobile factors (workers or entrepreneurs) will relocate too and this relocation will increases the market size of the area where the firm moved, increasing its expenditure capacity and boosting the incentives for another firm to move in the same area.

As already anticipated, economic geography (i.e. the spatial allocation of firms) at a given date is considered as an equilibrium outcome in which agglomeration and dispersion forces balance each other. It's easy to show that, when two identical regions are considered, the symmetric allocation (that in which the distribution of workers and firms is even) is always an equilibrium. However, this symmetric equilibrium can be stable or unstable.

The symmetric equilibrium is *stable* if a firm or a worker moving from region A to region B leads to a reduction in the payoff of the mobile factors (firms' profits or workers' wages) relocated in region B, thus leading to a reduction of the incentives for another firm to relocate in region B. Put it differently, following a perturbation of the symmetric equilibrium, the latter is stable if dispersion forces are stronger than agglomeration forces.

By contrast, the symmetric equilibrium is *unstable* if, following a relocation of a firm from region A to region B, profits and/or wages increase in region B then creating further incentives for firms and/or workers to relocate in region B. Since in this case agglomeration forces are stronger than dispersion forces and agglomeration forces reinforce each other, a process of catastrophic agglomeration can be triggered so that eventually (at least in such a very stylized environment) all firms move from region A to region B.

An important result of New Economic Geography, and of Krugman (1991), is that both forces are reduced following a reduction in transport costs. The reason why dispersion forces decrease quickly as transport costs decreases sheds light on a possible adverse effect of trade integration for insular territories. For any given locational pattern, a reduction in transport costs makes local competition less aggressive because local firms can export their goods at a lower cost so that the market-crowding effect of an newly relocated firm gets lower when transport costs are lower. For this reason, insular firms are less protected from competition of firms located in the mainland.

Also agglomeration forces are less intense when transport costs are decreased: other things equal, when local firms can export more easily, the incentive to locate closer to the bigger market is smaller (reduction in the home market effect) and therefore therefore fewer mobile agents will relocate and spend their income in the region with the bigger market.

Now, a quite robust result of NEG theory is that dispersion forces diminish more quickly. Hence, when transport costs are high (i.e. when the degree of market integration is small), dispersion forces are stronger than agglomeration forces, making the initial allocation (for instance the symmetric one) stable. The opposite happens when transport costs decrease below a certain threshold, which is usually called the *break-point*. Hence, NEG models usually imply the existence of a level of transport costs below which firms and workers tend to concentrate in space and this tendency is reinforced as the agglomerated region (the *core*) gets bigger and bigger.

It is through this simple and intuitive mechanism that Krugman and other NEG fellows aim at explaining (or contributing to explain) the formation of a metropolis, the urbanization process and

the creation of core-periphery patterns. In the next section we investigate to which extent such mechanism can be helpful to evaluate the attractiveness of insular economies for firms and workers aiming at maximizing their profits and welfare.

3 Insularity and remoteness in the NEG literature

3.1 Is remoteness a geographical disadvantage?

The first study we focus on is the one by Behrens et al. (2006) which investigates the impact of changes in *inter* and *intra*-national transport costs on the internal geography of countries in the presence of asymmetric transport costs. The authors propose an analytical framework with 2 countries (H and F) and 4 regions (2 in each country) in which one region is characterized by a geographical disadvantage.

Geographical asymmetries are modeled in terms of existence of a gated region in country H: they assume that region 1 of country H accesses the two regional markets of country F at the same unit trade cost t, whereas shipping the differentiated good from region 2 of country H to any region of country F is more expensive as it requires going through region 1 of country H (which is hence an export gate).

Authors call the disadvantaged region $H1$ *landlocked* . A possible way to bring this assumption to reality is to associate landlocked regions to those regions without a sea port, like Umbria or Lombardia in Italy. The idea is that while regions with sea port can ship and receive their goods without using the road network (only through ferries), landlocked regions cannot do the same because they are forced to cover a certain distance on land before reaching a sea port. And of course, ceteris paribus, this additional distance represents an additional cost.

However, if we adopt a different perspective, we can easily interpret region $H1$ as an island. Just as for a landlocked region, even goods imported by and exported from an island must often (especially if the island is small and port infrastructures are limited) pass through a gate. For instance, a ferry from Sardinia bringing goods must transit to Genova, Livorno or Civitavecchia port before reaching North and East-Europe.

This argument is even more appropriate for movements of people: it is often necessary for residents of an island to pass across a large port or airport in the mainland before reaching any other destination by road. Moreover, so as landlocked regions doesn't have a direct access to one of the possible means of transport (ferries), insular regions have no direct access to highway and railway network in the mainland.

We can then conclude that being landlocked and being insular are two states of (first) nature that can well be represented in NEG models by the same modeling strategy: larger and asymmetric transport costs with respect to other regions. This observation supports an argument which has been developed elsewhere (Licio and Pinna, 2013) according to which, ceteris paribus, the relationship between the ratio of sea coast over the total length of borders of a territory and its locational disadvantage might be non-linear: being landlocked and being an island would then represent two local maxima of this relationship.

This argument allows us to apply some results of Behrens et al. (2006) to the case of insular territories. But what are the main predictions of this model? The main conclusion - somewhat counterintuitive - is that, under certain conditions, *the remote region may attract the largest share of firms*. Why is it so? We have to think that remoteness has two different and opposite effects on firms' profits:

1. **It makes import and export more expensive**, then reducing the attractiveness of the remote region for firms and workers;

2. **It protect the local market from foreign firms competition** then augmenting the attractiveness of remote regions.

It is shown that the first effect dominates if *intranational* costs are large enough and then the less integrated is the remote region (the island) with the rest of the nation. If this is the case, national firms located in the mainland can profit from the remoteness of insular territories to protect themselves from international competitors, the gate being not particularly attractive because it is subject to tough competition.

More precisely, the model predicts - under certain conditions - the existence of a level of transport costs above (below) which a process of catastrophic agglomeration towards the island (the gate) takes place. We sum-up here the main

Result 1. *Being insular does not necessarily represents* per se *an economic disadvantage. Other things being equal, the higher the cost of exporting and importing goods by and to the island, the more attractive the island is for national firms because the island can shelter them from foreign competition*

The expression "other things being equal" should not be underestimated. The model assumes away any ex-ante regional difference in market size (and then expenditure capacity). Hence, firms who decide to relocate in the island can then enjoy a local market which is able to purchase a significant fraction of their products. This would not be the case if - as in the case of Sardinia - the local market is significantly smaller than the average region in Italian mainland: the "shelter from competition" effect would then be much weaker.

This important result suggests a possible empirical predictions for this model: since the strength of the market crowding effect is not homogenous among sectors, and since (for a given level of transport costs) a firm located in the mainland is more likely to relocate in the remote region (the island) if local competition is too tight in the mainland, then - for a given strength of the agglomeration forces - we should observe that firms operating in sectors where market-crowding effect is relatively stronger should exhibit in a remote region a share of the value added or employment which is larger than the same share computed at the national level. But what are the sectors where the market-crowding effect is expected to be relatively larger? A common result of the class of NEG models which Behrens et al. (2006) belongs to is that local market competition is relatively higher in those sectors whose products are less differentiated and then more substitutable. Broda and Weinstein (2006) and Moro and Stucchi (2015) provide some estimations of the intrasectoral elasticity of substitution for several sectors at different level of aggregation for the US economy so an intriguing future line of empirical research,

suggested by this interpretation of the model, would be that of identify whether less differentiated (and then more competitive!) sectors are relatively more present in Sardinia than in the average region in the Italian mainland. If this is the case, then the model prediction would not be rejected and this will support the claim according to which the previous mechanism described in the theory is empirically relevant.

It is also crucial to emphasize an important and to some extent paradoxical policy implication of the previous result: *policies aiming at reducing the transport and commuting costs from the island of moving goods and commuting from the island to the mainland and viceversa may actually reduce the attractiveness of the island for national firms.* This is because, as already argued, such policies would reduce the ability of the island to represent a "shelter" from foreign competition while they boost the incentive to locate close to international markets in order to enjoy scale economies. This implication is a variant of a well-known result in the literature having also important empirical supports. For instance, Faini (1983) shows that part of the increase in regional disparities between North and South Italy from 1970 onwards can be explained by the construction of the Autostrada del Sole (operative from 4th October 1964) thanks to which northern firms could have penetrate southern market without relocating in the South. As we will see below, this mechanism is crucial in many other NEG models with asymmetric transport costs.

3.2 Locational disadvantage of the Hub

The paper by Ago et al. (2006) analyses the implications of a different kind of geographical asymmetries but the conclusions are quite similar. What the authors have in mind is an asymmetric network economy where a central region is linked to two axisymmetrically located peripheral regions as in Krugman (1993b). Region 2 is the central region and its distance from region 1 is equal to its distance from region 3. However, to move a good from region 1 to region 3 (and viceversa) it is necessary to pass through region 2 and therefore transport costs are doubled with respect to a movement of goods from region 2 to either region 1 or 3 (and viceversa)

Notice that this analytical setup, despite interesting, does not optimally fit with the insularity problem we have in mind. An analytical setup with only 1 peripheral region (the island) and two central regions (in the mainland) close to each other would better serve our purposes. Such analytical setup is not present in the literature and we outline and discuss its economic implications it the final part of the paper.

Despite sub-optimal, this paper draws some interesting conclusions. First of all, result 1 is confirmed: being remote does not necessarily represent a disadvantage *per se*, but only under certain conditions. However Ago et al. (2006) makes a step ahead in defining these conditions more precisely. The authors analyze the problem under two different scenarios associated to two different assumptions on consumers preferences.

The first scenario assumes preferences introduced by Dixit-Stiglitz (1977) and from our perspective the main implication of this assumption is that firms impose in equilibrium a constant markup on the price of each product sold in the market. Hence, an increase in the number of firms operating in the market will not reduce this markup.

The second scenario assumes preferences introduced by Ottaviano, Tabuchi e Thisse (OTT) (2002)) and implies that firms' markup is reduced following the entrance of new firms in the market (the so-called *pro-competitive effect*).

It is important to notice that Behrens et al. (2006) only adopt the second analytical scenario. Therefore Ago et al. (2006) allows us to assess to what extent the main and rather optimistic (for islands!) result according to which remote regions may experience a process of (catastrophic) agglomeration when (intranational) transport costs are sufficiently high, is linked to the existence of the pro-competitive effect.

Similarly to what happened in the previous paper, whether the central region is locationally advantageous or not depends, in both scenarios, on a trade-off between two opposing forces.

1. A **centripetal (agglomerative) force** according to which firms have better market access and consumers can enjoy a larger array of varieties in the central region.

2. A **centrifugal (dispersion) force** according to which firms tend to locate in the peripheral regions because of excessive price competition in the central region.

As we already know, the balancing between these two forces changes with the degree of markets integration. The authors show that some important characteristics of the interaction between agglomeration, dispersion forces and markets integration are very sensitive to changes in the analytical scenarios.

The analysis of the variable markup case confirm to some extent the main result of Behrens et. al (2006): when transport costs are sufficiently high, and when firms' markup is sufficiently sensitive to the number of firms, centripetal forces dominates on centrifugal forces in remote regions 1 and 3 so that firms located in the central regions are attracted in the remote regions. If this is the case, remote regions 1 and 3 experience catastrophic agglomeration and the central region experiences deindustrialisation. The intuition for this result is qualitatively identical to that of Behrens et al. (2006): other things equal, the stronger local competition, the more firms are induced to trade-off isolation against the benefits of scale economies which can be fully exploited only close to a large local market. Hence, when competition is strong, the implicit protection stemming from high transport costs is particularly valuable so that isolation is highly valued by firms.

As expected, the constant markup case does not confirm these scenario. In this case, remote regions 1 and 3 never attract industrial firms: as soon as transport costs decrease under a certain threshold, the central region steadily gain manufacturing share from the peripheries. When the transport costs fall down sufficiently, all the manufacturing activities agglomerate in the central region.

This result strengthen our main intuition: when markups are not (negatively) affected by the number of firms, the shield from local competition stemming from being located in the peripheral region is not particularly valuable to firms. This observation delivers another model prediction which might be empirically tested. Since the sensitiveness of markups to the number of competitors differs across sectors, the model predicts that the *firms operating in sectors where markups are more sensitive to the number of competitors should be relatively more present in remote regions while the opposite would happen in central regions.*

It is worth to emphasize that there is a subtle but important difference between the prediction delivered by this model and that of Behrens et al. (2006). The latter suggested that - for any number of firms in the market - the remote regions are more likely to attract sectors producing goods which are not very differentiated. By contrast, this model predicts that the remote regions should attract sectors where, following an increase in the number of firms in the market, the price markup decreases the most. The two categories of sectors do not necessarily coincide.

The welfare implications of the empirical prediction of this model deserves further analysis. If on the one hand, attracting sectors where competition is more harmful seems to be good for residents of remote regions, on the other hand it is likely that - in a context where firms are heterogenous in productivity - firms attracted in the remote regions are probably the less productive. Such a smaller productivity obviously has negative welfare effects on residents in terms of relatively higher prices per unit of quality. For these reasons, extending these class of models with asymmetric trade costs to allow for heterogenous firms represents an intriguing line of future theoretical research for those who are interested in the economic effects of insularity.

3.3 Locational disadvantage, capital mobility and workers immobility

The work by Toru (2008) can be interpreted as a variant of Ago et al. (2006). The geographical structure is the same (three regions in a line, with one central region and two peripheries) but with some important differences concerning the production structure. First of all it is assumed that, beside labour, an additional production factor - capital - exists. Capital is assumed to be freely allocated between regions according to where firms' profits are higher but capital owners are assumed to spend their earnings in their region of origin (Footloose Capital). Second, labour is assumed to be immobile between regions and, at the same time, wages are assumed to be equalized between regions because they are linked to the agricultural wage which is freely traded. The main consequences of these assumption is that catastrophic agglomeration is avoided: that happens because a production shifting (a firm relocating from a region to another) does not lead to an expenditure shifting because of two reasons: 1) firm's profits are spent in the region where the owner resides; 2) the relocated firm does not move with their old workers, but it employs workers in the new region.

However, albeit not catastrophic, agglomeration (i.e. an equilibrium with uneven spatial distribution of firms) can occur because of the home market effect: ceteris paribus, due to scale economies, firms are attracted in the regions where they can increases their sales and the latter are affected by transport costs. Hence expenditure shiftings lead to production shiftings but not otherwise.

The best way to bring this analytical setup to our reality is to think of an entrepreneur living in Milan who decide to open a plant in Sardinia but to spend a major part of its earnings in Milan and not in Sardinia. The case of S.A.R.A.S., one of the biggest oil refinery in Europe based in Sarroch but owned by the Moratti family based in Milan, is not so far from this theoretical description.

In such an analytical setup, the author shows that, following a decrease in transport costs, the central region attracts capital from the other two peripheral regions. That happens because firms in the central regions are subject to lower transport costs in average and since consumers are attracted by lower prices, firms in the central regions are able to sell more and then to better exploit economies

of scale.

It is important to emphasize that the only theoretical scenario analyzed here is the one with constant markup so that the conclusion by Ago et al. (2006) is confirmed. An interesting line of future research would be to investigate the implications of variable markups in this variant of the Footloose Capital.

3.4 Export capacity and remoteness

The purpose of the fourth paper we consider (Hirose and Yoshida, 2012) is a bit different from ours as it aims at assessing how opening to international trade and foreign economic growth affect local economic geography. Nevertheless, the structure of transport costs adopted in this model is probably the most useful for our aims. The analytical setup can be considered as an extension of Behrens et al. (2006) with some relevant differences: 1) firms' markup is assumed to be constant (we already know that in this scenario remote regions are particularly hurt); 2) the foreign country consists of only one region; 3) the home country is made of two regions, one of them being closer to the foreign market and then being subject to lower transport costs which are them asymmetric. More precisely, if region 1 and 2 are located in the home country and region F in the foreign country, then $\tau_{12} < \tau_{1F} < \tau_{2F}$ where $\tau_{ij} > 1$ (for $i, j = 1, 2, F$ and $i \neq j$) represents the iceberg cost of transport, i.e. the amount of good that must be shipped from region i to sell one unit of good in region j

For our purposes, the performance of region 2 (the remote region) is the most interesting. Given the complexity of the model, the authors are not able to provide closed-form solutions and they must rely on numerical simulations. They find that a 20% difference in international transport costs (i.e.: $\tau_{2F} = (1.2)\,\tau_{1F}$) leads to a 30% difference in the share of skilled workers located in the two regions. That is, 65% of skilled workers locate in region 1 and only 35% in region 2, the remote one.

The authors also compute the effect on regional exports. The same 20% difference in international transport costs leads to an export value of region 1 which is 60% larger than that of region 2.

These results confirm the conclusions of the previous works according to which in a scenario where competition is not particularly strong, remote regions are quite disadvantaged. This paper provide an additional insight for an island: remoteness from international market can damage significantly the island export capacity.

3.5 Insularity and new economic geography: an original contribution

To the best of our knowledge there is no NEG model explicitly dealing with the economic implications of insularity. Standard economic models do not enable insularity to be distinguished from remoteness, but existing literature could be extended to create an analytical setup that would deal explicitly with insularity. This is the purpose of this section where we outline the implication of a model which is analyzed elsewhere in detail (see Cerina, 2016).

The framework we present here can be considered as a mix of the last two presented works (Toru 2008 and Hirose and Yoshida 2012). The analysis looks at three regions belonging to the same country: north N , south S and island I. As one may expect, we assume N and S to be located in the mainland

their transport costs being τ: in order to deliver a unit value commodity from N to S (or viceversa) firms need to send $\tau > 1$ units because $\tau - 1$ units are assumed to melt during the transport.

It is assumed that moving goods to and from Region I, the island, is more expensive: in order to deliver a unit value commodity from I to either N or S insular firms must send $z\tau > \tau > 1$ units. In other words, we can consider $z > 1$ the additional transport costs due to insularity (i.e. remoteness). Introducing this parameter represents a novelty and allows us to isolate the effects of a policy which reduces transport costs from and to the island only (decrease in z) from that of a policy aiming at the reduction national and general transport costs (decrease in τ).

In terms of firms' market power, the scenario adopted is the one with constant markup which we know delivers the worst output for islands, other things equal.

As for the mobility of production factors, we adopt a variant of the Footloose Capital model so that labor is interregionally immobile while capital is freely mobile between regions but its owners spend capital earnings (profits) in the region where they reside.

What are the economic implications of such an analytical setup? We focus on two sets of implications regarding: 1) the share of firms located in the island; 2) the relative welfare of the islanders, which in this model corresponds to their purchasing power. As we'll see, the sign of the correlation between these two elements is not obvious. These are the main results:

1. *For any given value of transport costs, the island attracts a smaller share of firms and its inhabitants experience a lower purchasing power and thus a relatively lower welfare level.*

2. *As general transport costs decreases (τ), the island becomes even less attractive for firms and more leave the island to relocate to the mainland. In doing so, they can profit from the lower transport costs ito continue to sell in the island and, at the same time, enjoy scale economies stemming from their proximity to the bigger market (regions N and S in the mainland). As for islanders' welfare, we see two effects: they have to import more goods which are subject to transport costs, but transport costs are generally lower. It turns out that the second effect always dominates, so that islanders' welfare increases after a reduction in τ.*

3. *As insular transport costs decreases (z), there is an ambiguous effect on the share of firms in the island. The latter increases (decreases) if: 1) general transport costs τ are sufficiently high (low); 2) insular transport costs z are sufficiently low (high). At the same time, the welfare effect on island residents is positive for a wide range of parameters while the opposite happens to residents in the mainland.*

These results deserve some comments. The first result is simply confirms that, in a world where the profits of incumbent firms are not significantly damaged by the entrance of new firms (constant markup), then insularity represents an economic disadvantage.

Even the second result is in line with our previous insights. In a constant markup scenario, the island becomes less attractive for firms after a reduction of (general) transport costs. However, our model emphasizes that there can be a conflict of interests between islands entrepreneurs (who are

forced to leave the island because their profits are falling) and island consumers (who they can buy goods at a lower price).

The third result represents a novelty in the literature and, to some extent, reconciles NEG theory with our intuition. Indeed it suggests that once we disentangle insular and general components of transport costs, then a reduction of transport costs in the insular components can be beneficial for the island even in a constant markup scenario. More importantly, this is true both for entrepreneurs (island is more attractive for firms) and for consumers (purchasing power increases).

So, according to the model, if the reduction of transport costs are limited to the insular component (from I to N or S and viceversa) and not even to the mainland component (from N to S and viceversa), then under some conditions (when the geographical disadvantage of the island in terms of transport costs is not too high) it is optimal for firms originally located in the mainland to relocate in the island. The intuition behind this result is that when z decreases and it is not too high, then relocating in the island can ease the pressure of competition on the mainland without a significant reduction in the sales of the relocating firms since insular transport costs are reduced. However, if the locational disadvantage of the island is too large, then a reduction in insular transport costs will not be sufficient to attract firms from the mainland: Therefore, a reduction of z will lead to the same consequences of a reduction in τ: more firms originally based in the island will relocate in the mainland to enjoy scale economies.

These are the preliminary results of our analysis. So far the model is very simple and stylized, so results must be taken *cum grano salis*. Still they looks encouraging as they provides interesting insights and clear empirical predictions. An even more interesting future line of research would be to extend the model to: 1) variable markups (OTT preferences); 2) heterogeneity in market size; 3) heterogeneity of firms' productivity.

4 Conclusions

At the beginning of this paper, we asked some questions concerning the economic effects of insularity from the perspective of NEG theory. Now we can try to provide some answers.

Is insularity detrimental to economic performance?

Not always but in most cases. When the cost for a commodity to reach the island is higher than the cost of moving the same commodity between regions in the mainland, then firms based in the island are able to sell a smaller amount of products with respect to mainland competitors. For the island, this represent a *centrifugal* force which reduces the attractiveness for firms. However there is also a *centripetal* force which acts on the opposite direction and then attracts firms in the island: provided that the market size of the island is sufficiently large, islands can represent a shelter from foreign competition. When the first effects dominates, firms are induced to leave the island and produce in the mainland. That happens, other things equal, when (general) transport costs are sufficiently low.

In which cases and why does insularity represent an economic disadvantage?

That happens either in sectors where goods are very differentiated or in sectors where profits are not particularly sensitive to entrance of new firms in the market. When this is the case, the "shelter effect"

of the island is dominated by the need to locate closer to the bigger market in order to better exploit increasing returns to scale. The model we have analyzed predict by contrast that, other things equal, the island can be attractive for firms operating in sectors which are not particularly differentiated or where the entrance of new firms has a large negative effects on firms' profits. It is important to notice that if the market size of the island is not sufficiently large, then its attractiveness will be low even for the latter categories of firms. Hence insularity is even more harmful when associated to smallness.

Which are, if any, the optimal transport policies able to compensate for this disadvantage?

Reducing overall costs transports (i.e. between every regions) is always bad for the firms operating in the island. Such policy reinforces the incentive for firms based in the island to relocate in the mainland in order to better exploit increasing returns. However, this kind of policy might be beneficial for immobile agents of the island because they can purchase goods at a lower price in average.

On the other hand, a policy which reduces only the insular component of transport costs (leaving the transport costs between regions in the mainland unaffected) might be beneficial for both firms and immobile agents based in the island and it can increase the attractiveness of the island for mobile agents and firms. That happens when the insular component of transport costs start from sufficiently low level while transport costs between regions in the mainland is particularly high.

Finally, it is important to emphasize that, in a context of heterogenous productivity of firms (which is not the case analyzed here), even reducing the insular component of transport costs might negatively affects immobile agents based in the island. This would be the case if the set of firms attracted by the island, because of the "shelter effect", are those who are less able to survive to foreign competition and then the least attractive. We leave the investigation of this topic to future research.

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