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Globalisation and Trade:
A "New Economic Geography"
Perspective

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1. Introduction

This paper surveys some recent contributions in the area of economic geography. Particular emphasis is given to the 'arm wrestling' between forces that boost industrial concentration and others that contrast it in order to understand why economic activities tend to cluster in a global economy. I aim at providing some intuitive argument that may help to explain large-scale agglomerations across integrated country/regions and by doing so I will mainly refer to the European Union (EU). Will economic integration lead to a higher or lower degree of industrial concentration? That is, will this relocation take form of the movement of particular industries, a process of regional specialisation, or a shift in the entire economic centre of gravity of the Continent? To what extent the lack of international labour migration across EU countries can both postpone and weaken the process of agglomeration?

Economic activities are unevenly distributed across space. The analysis of the determinants of the spatial differences in the patterns of production can be posed at a number of different levels. Basically, scale agglomerations can take form of finely defined sector concentrations (such as highly specialised industrial districts) or of large phenomena (that cut across state and country boundaries). I will focus our attention on the latter mainly for two reasons. First, the main evidence of industrial concentration involves such agglomerations (Brulhart, 1998). These include the US 'Manufacturing Belt' (approximately contained in the

parallelogram Green Bay – Saint Louis – Baltimore – Portland) and the European manufacturing core (represented by the area between South East England, Ruhr Valley, South East France, Southern Germany and Northern Italy). Second, because such large scale agglomerations have strong political implications for the development of the global economy and they will gain further importance as world trade agreements will move countries from their actual regime toward a deeper trade liberalisation.

The location of production strictly depends on the contrast between centripetal and centrifugal forces, which in turn determines whether a country/region can experience industrial agglomeration.

Centripetal forces come from the classical Marshallian sources of external economies. By that I refer to pecuniary externalities, that is, externalities that depend on market interactions rather than on physical proximity, the latter being technological ones. To make the point clear, I use a classical example. A single producer moving towards a new region increases the local supply of manufactures which, in turn, reduces the price of that final good with an evident benefit for the whole community. According to this reasoning, the home-market size will become larger because of new customers' entry (due to the above-mentioned benefit) and by a chain effect, a larger domestic market will tend to make the manufacturing sector more concentrated in that location. This 'circular and cumulative causation' (Myrdal, 1957) creates demand (or backward) linkages and it may be even reinforced by cost (or forward) linkages, both sustaining agglomeration. The latter refer to the fact that being close to the core makes less expensive to buy the (intermediate) goods locally supplied. The dichotomy backward-forward linkages was formulated by Hirschman (1958)[2]. Obviously, to trigger off a chain-effect of the kind described above, it is needed to model no price-taker agents which rules out perfect competition and constant returns to scale from our set up.

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[2] More precisely, backward linkages (or demand linkages) stand for the incentive for producers of final or intermediate goods to locate close to their customers. Forward linkages (or cost linkages) refer to the incentive for economic agents demanding final or intermediate goods to locate close to the firms supplying those products.

Centrifugal forces resist agglomeration; such immobile factors include land and natural resources, but, in an international setting, even people. On the supply side, the lack of international labour migration constrains some producers to locate close to workers; on the demand side, spatially-dispersed factors create dispersed markets encouraging firms to establish the production near their customers. The concentration of economic activities expands the input-demand, increases the cost of factors relative to other locations and consequently worsens their returns.

The NEG models an imperfectly competitive market structure with product differentiation and increasing returns to scale (IRS). Location and market-size (initially assumed to be uniform across regions) become completely endogenous since factors of production and firms are freely mobile. The modelling of this approach is usually characterised by a two- or three- dimension framework with labour and products at early stages evenly spread in space. The market structure is the one of monopolistic competition in Dixit and Stiglitz (1977) and transport costs enter models in the form of the so-called Samuelson's iceberg (1954). This can be explained in the following way. Each product contains a part that during transport is lost, or to use the original definition, melts away just like an iceberg. This part, considered by the NEG to be proportional to the distance covered in transit, represents transport costs.

The results of NEG literature are strictly dependent on the attitude of workers to move across national borders as well as on other key-parameters such as the share of expenditure in manufactures, the elasticity of substitution among differentiated goods and the trade costs level. In the presence of interregional mobility of goods and factors (especially labour), the process of location develops a two-stage pattern. As long as transportation costs remain high, entrepreneurs organise production in different countries/regions in order to service dispersed local markets. As economic integration is intensified the world experiences pecuniary externalities and both workers and firms

tend to agglomerate. In this scenario the prices of factors and local goods rise where geographic concentration occurs. If most goods and factors of production are importable from other regions, the above-mentioned price-rises represent a further centripetal force encouraging the phenomena of immigration. Conversely, if workers are adverse to interregional movements, or some non-tradable goods, like houses, are important for consumers, the agglomeration process experiences a 'third-stage'. A further reduction in trade costs (i.e. a deeper stage of economic integration) increases the importance of spatial wage and price differences in deciding on a firm's location whilst the weight of pecuniary externalities decreases. The conclusion is a new dispersion toward the less-developed and more peripheral regions that once again makes manufacturing sectors spatially dispersed.

On the basis of a pioneering framework in *'Geography and Trade'* (Paul Krugman, 1991b), one of the main evolutions in the way of thinking out economic geography has consisted in a new approach to economic geography that is, actually, the object of this work. The aim is that of moving from a local setting to a global one in order to employ the NEG specifications to renew the analytical approach towards international trade, laying the bases on interregional exchange[2].

Sections 2 and 3 review the main results of the New Trade Theory (NTT) and the NEG: namely, section 3 deals with the issue of labour mobility assuming workers to be at first inclined and later on adverse to interregional migration. In the fourth part, several shortcomings of the NEG literature are discussed in order to point out new directions for further research and for studies applied to the EU.

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[2] Henceforth, the word *region* refers to a transnational economic area. More generally, the criterion separating regional economics and international economics is the mobility of factors. International trade theory analyses the dynamics of integrated goods markets in the presence of segmented factors markets, whereas regional economics models deal with the connected effect of goods and factors mobility. Therefore, the mobility of factors is traditionally considered lower across countries than across regions of the same country

2. The New Trade Theory

Before presenting the main core-periphery endogenous models, I consider it worthwhile to discuss the conclusions of Krugman and Venables' paper (1990) which exogeneously formalises the core-periphery pattern. Its results represent the paradigm of NTT literature and are the starting point of the NEG.

Krugman and Venables (1990) model a market structure with two sectors of production. One works in perfect competition, producing homogeneous and costless tradable goods under constant returns to scale; the other is characterised by monopolistic competition, product differentiation and IRS. The world is made up of two regions: a large core (region 1) and a small periphery (region 2). The former has a greater factor endowment than the latter and therefore a better access to markets, even if both regions have identical relative endowments[3]. In this scenario, the diagrammatic relationship between economic integration and geographic concentration is non-monotonic. In fact, firms tend to locate close to large markets for intermediate values of trade costs. Whilst in the presence of poorly integrated countries/regions, the location decisions are mainly determined by the competition in goods markets, when trading becomes cheaper, geographic concentration depends on the competition in factors markets.

This pattern is clearly shown in Figure 1, which describes a process of regional integration gradually moving international trade from autarchy to free trade. On the vertical axis, it is indicated the regional size of the manufacturing sector, S_i (where i=1,2), calculated as the ratio between the number of local firms and the overall number of firms in both regions, whereas on the horizontal axis the level of trade costs is measured (with 0 meaning free trade and 1 autarchy). Region 1 represents the core holding 60% of world endowments of the two factors.

In a situation of autarchy , the value of S_i corresponds to the local share of world endowments; when trade costs are high, firms exclusively

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[3] This specification is made to neutralize the presence of comparative advantages.

Figure 1: **Integration and location in Krugman and Venables (1990).**
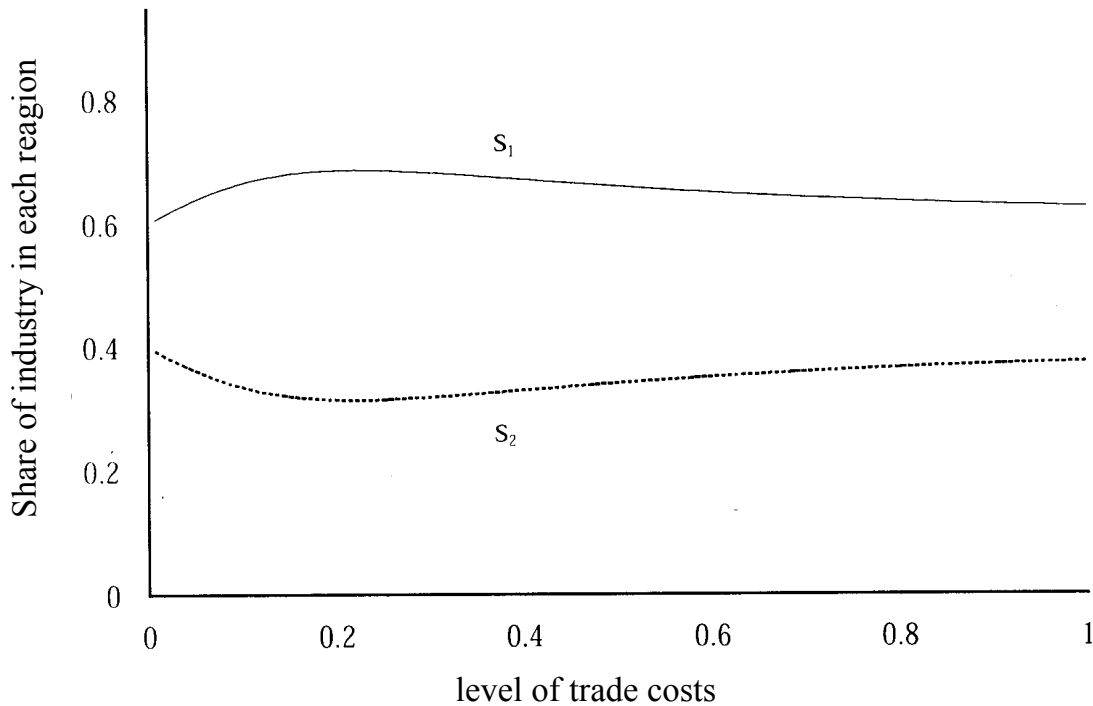
service the home market. If the local industry were over-dimensioned with respect to the market capacity, a stronger competition on the supply side would lead producers to leave the market until an equilibrium between the two locations were achieved.

The deeper the economic integration, the larger is the market-share held by entrepreneurs in the country where they are not located and hence, the local competition due to an increasing number of rivals is softened. The core becomes more attractive as firms established there experience greater sales and, since production exhibits IRS, their profits increase as well. This mechanism leads more economic activities to locate in the region 1, causing the size of local industry to exceed the home-share of world factor endowments (i.e. 60%). In conclusion, the core becomes a net exporter of manufactured products towards the periphery.

However, the presence of more producers implies a rise in the local factor demand, which, in turn, leads the relative prices to go up. In

this scenario, the location decisions strictly depend on the differences in factor cost across regions; in this case some firms will find it convenient to move away from the core, reducing the number of local economic activities. Real and nominal wages tend to converge across locations and the size of regional industry approaches the local share of world endowments. The conclusion is that the manufacturing sector in each country goes back to producing enough goods just to service its own home market.

Krugman and Venables' model (1990) is a useful characterisation of the assumptions and of the implications of NTT about the effects of integration on location. Factors of production are immobile and, unlike firms, they are prevented from moving across regions in response to price shocks. Introducing endogenous shifts of factors, like in NEG models, triggers a process of cumulative causation, since now input can relocate where they are offered higher current real returns owing to changes in prices due to the migration of firms. This represents another centripetal force boosting industrial agglomeration.

3. The New Economic Geography

The NEG formalises the process of cumulative and circular causation (see introduction) in order to show that regions with similar or even identical economies may endogenously differentiate in a prosperous core and a poor periphery. This section deals with different mechanisms able to generate the above-mentioned circular causation.

Krugman (1991a) argues that a labour market characterised by a high enough level of interregional migration encourages firms and workers to cluster together during a process of integration and in the presence of IRS and trade costs. However, this mechanism only seems to fit a scenario with regions belonging to one single country; with reference to the EU, it appears to be barely notable since the readiness of continental workers to move away is very low (see Eichengreen, 1993).

Venables (1996) finds that vertical links among industries can lead to geographic concentration. His paper employs a monopolistic competition market structure with upstream and downstream sectors and shows that the interaction of firms belonging to vertically linked industries can play an equivalent role to labour migration in Krugman (1991a) in determining endogenously the pattern of location.

Puga (1999) confirms these results, combining in a general framework the interregional migration à la Krugman (1991a) and the vertical links among industries à la Venables (1996), and Krugman and Venables (1995); the distribution of workers across sectors enters endogenously into the model. As the assumption of labour mobility is relaxed, the non-monotonic relationship between integration and agglomeration becomes *U-shaped,* implying that firms tend to be newly dispersed for low trade costs. Puga's results are in contrast with most of the literature, which finds a single critical value of trade costs, below which the manufacturing sector develops a core-periphery pattern across the two countries. According to the latter view, the diagrammatic relationship between trade costs and geographic concentration is *bifurcate.*

3.1 Location of firms under the assumption of labour mobility

Krugman (1991a) shows that the mobility of some factors of production (especially labour) can generate a process of circular and cumulative causation able to boost the geographic concentration of economic activities. Such a mobility causes the capital and labour supplies to be elastic enough to develop small differences in the domestic size of the industries. The result is that even countries/regions initially identical can endogenously differentiate in an industrialised core and a non-industrialised periphery.

This work employs a framework similar to that of Krugman and Venables' (see section 1) apart from a few differences: each sector uses a specific factor, meaning that intersectorial reallocation of input is hampered; the industrial factor (workers) and the agricultural one

(farmers) are distinguishable by the spatial mobility of the former; the two regions have initially symmetrical economies even in their immobile factor endowments. Centripetal forces take place in the form of the usual backward and forward linkages, whereas the immobile factor, farmers, moves in the opposite direction.

The basic insight of the model can be seized in the following way. The location of a new firm increases local competition on both goods and labour markets; the effect is a reduction of local profits that discourages the choice of that country/region to organise production. At the same time, wider product differentiation[4], greater labour demand and a higher level of wages experienced 'in loco' attract new workers. This migration causes the local expenditure (demand linkages) to rise, reduces the competition in the labour market and makes local profits scale up, encouraging new firms to locate there.

All in all, one small change in the share of manufacturing in a country/region sets off a chain reaction boosting agglomeration. In this case, regions with an initial scale advantage in a specific sector would see their advantage reinforced in those sectors.

For a high level of trade costs, a single firm finds it convenient to service only the home-market. It implies that the wages depend much more on the level of local competition (which decreases as the number of workers nation-wide increases) than on the size of labour demand, since producers are still not able to sustain goods market competition, and, thus, the pattern of industry location maintains an even spatial distribution. As countries/regions become sufficiently integrated, a given firm may be present in both domestic and foreign markets.

Since production will be established in only one place in order to take advantage from IRS, the economic activities will locate where a better access to markets exists (i.e. where there are a greater number of firms-cost linkages and inhabitants-demand linkages). This decision

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[4] Each firm belonging to a specific industry is assumed to produce a different variety of its sector's main product.

allows firms to compete in the labour market with higher wages, meaning that the purchasing power of salaries goes up, even because workers can choose among a wider range of goods and have easier access to them; consequently, the advantages of choosing that location are boosted. In conclusion real wages rise as long as local population increases by means of a self-reinforcing mechanism that strengthens the core-periphery gradient, with the core specialised in industrial and the periphery in agricultural production .

Since workers are free to migrate towards locations that offer higher real returns, for low levels of economic integration there exists a single equilibrium (point A in *Figure 2*) with the factor labour evenly distributed across regions. As trade costs get lower, three equilibria take place in the pattern of industrial location: one unstable, with workers equally spread out, and two stable, with employees concentrated in one single country/region.

For intermediate levels of integration (all points around B in *Figure 2*) centripetal forces are too weak to destabilise the initial symmetrical equilibrium but, in the meanwhile they are not strong enough

Figure 2: **Integration and location in Krugman (1991a).**

level of trade costs
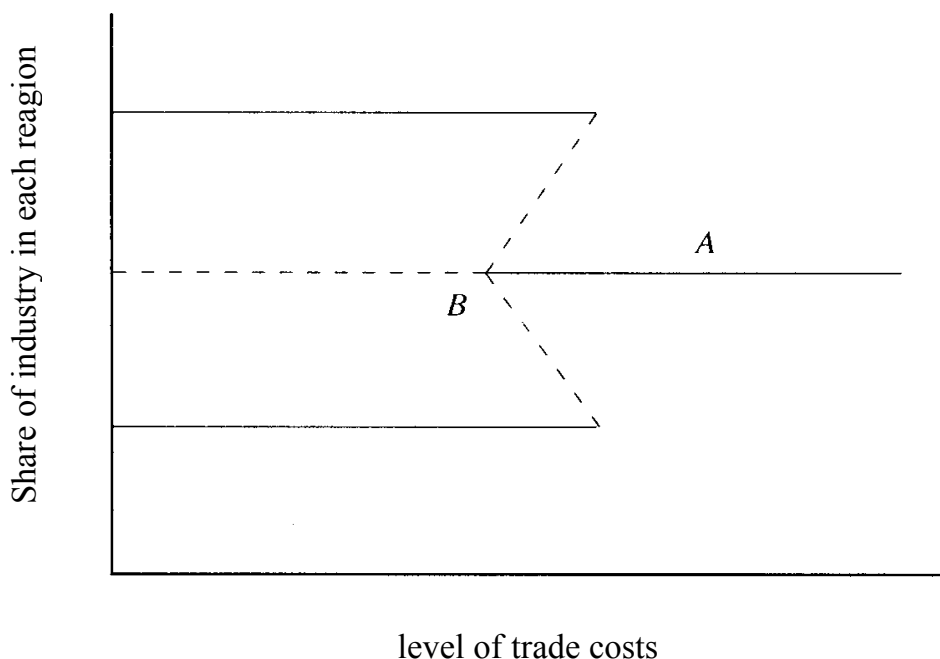
to make agglomeration sustainable (i.e. if all firms were located in one country/region it would not be a stable equilibrium). The more consumers prefer to purchase a wider variety of the same product, the greater will be the speed at which firms will cluster together during a process of regional integration. A lower elasticity of substitution among different brands in the preferences of consumers increases the importance of a wide product differentiation locally available. Each firm strengthens its market-share so as to smooth out local competition; this, in turn, encourages agglomeration.

3. 2. Input-output linkages

Krugman (1991a) assumes a mechanism of cumulative causation at worker level. Basically, when a region experiences a high rate of unemployment in the agricultural sector, people move away to regions employing a greater number of workers; such a shift eliminates the real wage differentials between regions, and economic activities go back to being evenly dispersed across locations.

Venables (1996) deals with the agglomeration issue arguing a mechanism à la Myrdal (1957) at industry level. His two-country, three-

sector model provides an analysis of the effect of vertically-linked sectors on firms' decision of location in terms of input-output linkages. Labour is internationally immobile and beside a perfectly competitive industry the world has upstream and downstream imperfectly competitive sectors with the output of upstream firms that are the input of downstream ones. On the one hand, the local presence of many firms in one industry triggers agglomeration in the corresponding vertically-linked sector, as the latter enjoys a better access to markets (demand linkages); on the other hand, downstream buyers prefer to locate close to upstream suppliers in order to save import costs for their factors (cost linkages). Venables (1996) finds that the above-mentioned centripetal forces can provide an explanation of NEG effects alternative to the one discussed in Krugman (1991a). The results are depicted once again by the diagram in *Figure 2*.

One might also generalise these models to formalise one where firms have 'supply-side linkages': manufacturing firms benefit from locating in a region where they have access to suppliers providing a range of specialised input.

Krugman e Venables (1995) collapse upstream and downstream industries in Venables (1996) to a single imperfectly competitive sector, assuming that the products of each firm are both output to consumers and intermediate input to all other economic activities. Adding one more local entrepreneur generates an expansion of home demand and represents a further incentive to locate in larger markets to save trade costs for intermediate costs. Labour reallocation across regions is hampered (in order to avoid the presence of demand linkages) and, thus, new workers can be employed exclusively from the other home-sector.

When agglomeration does not open interregional wage differentials, the relationship between economic integration and geographic concentration will be identical to Krugman's finding (1991a) drawn in *Figure 2*. Since countries have identical economies and trade costs are lowered, the pattern of industry location moves from an initial situation where there is an even division of manufacturing between

regions, with each region servicing its own demand, to a situation in which trade costs are sufficiently low firstly to make agglomeration sustainable and then to destabilise the previous symmetrical equilibrium. Concluding, the world can be distinguished in an industrialised core and a de-industrialised periphery.

This result is based on the key-assumption that the elasticity of labour supply in the industrial sector with respect to agricultural wages is infinite. However, when this hypothesis is relaxed, interregional wage differentials can occur. According to this scenario, fully integrated regions are expected to experience a gradual process of agglomeration rather than a catastrophic collapsing of the manufacturing sector in one location and a complete concentration in another.

3.3. Location of firms under the assumption of labour immobility

Assuming labour mobility, Puga's model (1999) confirms the results of the NEG literature (see figure 2): even if the industrial pattern may be stable for a long period, when agglomeration is triggered, it changes very quickly.

Conversely, I would now like to consider the case of workers adverse to spatial migration (this hypothesis seems to be consistent with the process of industrial concentration at an international level). In this section I provide an alternative version of the scenario of agglomeration gradually developing in each country/region industrial sectors of different sizes (Puga, 1999). I assume countries to be a priori identical, with labour endowments kept fixed. The absence of interregional labour migration does not allow real wage equilibrium across locations.

When trade costs are high, the symmetrical equilibrium is globally stable. As countries become economically integrated, the industrial pattern can achieve both locally stable equilibria (namely, one symmetrical and two semi-agglomerative) and locally unstable ones. In the latter case, cost and demand linkages are still too weak (with respect to labour and goods market competition) to destabilise the symmetrical equilibrium but they

are strong enough to make agglomeration sustainable. As trade costs fall, even the symmetrical equilibrium becomes so unstable as to lead to the concentration of the manufacturing sector in one region.

These results show that the input-output linkages can play a role equivalent to that of labour interregional migration, concluding that the former represents, similarly to the latter in the above-sketched model, a centripetal force in the process of agglomeration. However, I consider it useful to point out two important differences. Firstly, if there is no labour mobility, workers can be exclusively drawn from the other local sectors. This drives up local wages and would tend to deter firms from choosing that location. In this scenario, agglomeration can still be possible if producers find facing higher wage costs due to an increased number of local competitors, more than offset by the trade costs saving on intermediate goods due to clustering together.

Secondly, the lack of interregional migration causes the above-mentioned wage rises to have consequent effects that become dominant at low values of trade costs. The conclusion is that a potential two-way shift between core and periphery exists with an inverse core-periphery path following the initial periphery-core one. As trade costs fall at intermediate levels, Puga (1999) finds again locally stable equilibria, with either firms concentrated in one single region or firms fairly spread across locations. In the latter case, a small deviation of the industrial regional size from the even distribution would generate a rise in wages such as to discourage the choice of one location with respect to the others. This is because, as regional integration occurs, the cost saving from locally purchasing intermediate goods rather than importing them decreases with trade costs, whilst the opened wage differentials remain; the latter thus acquires greater weight with respect to the former in the cost function of a typical firm. As trade costs tend to vanish, with the industrial sector concentrated in one single region, producers find it convenient to organise their economic activities in the non-industrialised region where lower wage costs more than offset the decreased costs of importing

intermediates. This process will last as long as the symmetrical equilibrium between locations is re-established, representing a global stability point.

Figure 3 depicts this pattern, considering economic integration as a gradual process rather than a discontinuous one as in *Figures 1* and *2*. The fall of trade costs below the critical threshold at which the symmetrical equilibrium becomes unstable leads the industry in one country/region to full agglomeration. However, a further decrease in these costs generates new industrial dispersion since the manufacturing sector returns, at least partially, to locate in the periphery. The movement of firms continues until the recovery of symmetry is re-established. The qualitative trend describing the relationship between agglomeration and economic integration (assuming lack of labour international migration) in Puga (1999) remains the same both for discontinuous and for gradual change. Namely, at high levels of trade costs, firms organise production close to their purchasers and distribute symmetrically across regions. As integration reaches a deeper stage, cost and demand linkages lead economic activities to cluster into the core but, because of labour immobility, agglomeration opens up wage differentials. Lastly, when trade costs fall to low values, the entrepreneurs prefer to organise production where immobile factors are cheaper. This process generates an inverse core-periphery shift, leading firms to a new industrial dispersion across regions such as to make the pattern of industrial location inverted *U-shaped* (see *Figure 3*). Puga's conclusion contrasts with most of the literature which, even assuming lack of interregional labour migration (e.g. Krugman and Venables, 1995), finds a single critical value of trade costs below which the symmetrical equilibrium is not stable any longer and centrifugal forces dominate centripetal ones in the process of location.

Figure 3:**Economic integration and location of firms in absence of labour mobility (Puga, 1999).**

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S_1

0.6

$S_1=S_2$ $S_1=S_2$

0.4

S_2

0   0.4   0.6   1

level of trade costs
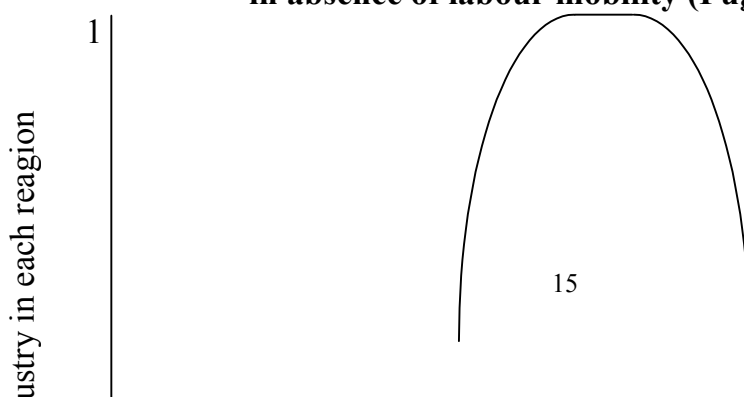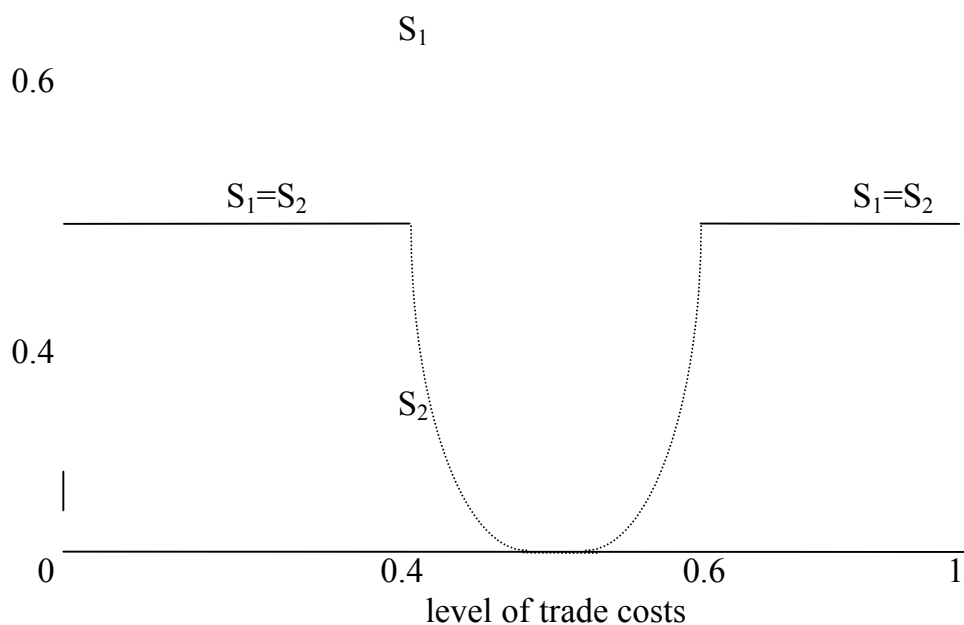
The key to this model is the spatial wage differentials, which represent an incentive/disincentive for firms and workers to relocate from one another. On the one hand, if workers are inclined to interregional movements, their shift annuls the above-mentioned differentials, and a high level of economic integration causes prices of manufactured goods to equalise across places and consequently real wages to converge. Firms prefer to cluster together to take advantage of backward and forward linkages and at worst (i.e. in the case of free and costless trade) they are indifferent as to whether it is best to remain in the core or to migrate to the periphery.

On the other hand, assuming economies in both countries to be identical in terms of endowments of workers (now considered adverse to interregional migration), the concentration of industry in one location makes the level of employment in the agricultural sector lower and the local wages higher than in other parts of the world. It means, in turn, that as trade costs fall to a given point industrial concentration is unsustainable and the symmetrical equilibrium is globally stable. This happens because the uneven distribution of workers among regions (and then among local industries) in the presence of agglomeration of the manufacturing sector in one location prevents wage differentials from vanishing, making relocation unprofitable. However, once industrial

dispersion occurs, local industries tend[5] to go back to the original sizes, and real wages in the regions converge so far as to make new shifts disadvantageous.

The key-point in Puga (1999) is the role played by the equilibrium wage differentials as a centrifugal force during a process of economic integration. Such differentials negatively influence agglomeration, postponing its effects and weakening its patterns to such an extent as to reverse its direction. Lastly, this mechanism leads to 'non extreme' sustainable equilibria in which all countries/regions have their own local manufacturing sector of a different size with respect to those of other locations. In conclusion, a process of economic integration combined with labour immobility can lead to a regional convergence in terms of both structures of production and real wages. This result is closely dependent on the lack of nominal rigidities in the labour market; any circumstance that were to equalise wages across regions (e.g. pressure from trade unions, wage setting at the national sectorial level) would represent an obstacle to the relocation from the core back to the periphery since it would remove the incentive due to lower wage costs.

The contributions to the NEG literature presented in this section are summarised in Table 1

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[5] It should be noted that the relocation toward the perihpery might be just partial.

Table 1 : **Some Recent Contributions to the NEG Literature**

	Krugman (1991a)	*Venables (1996)*	*Krugman and Venables (1995)*	*Puga (1999)*
Sectors and relative market structures	i)one perfectly competitive agricultural sector ii)one impefectly competitive industrial sector	i)one perfectly competitive industrial sector ii)one imperfectly competitive upstream industrial sector iii)one imperfectly competitive downstream industrial sector	i)one perfectly competitive industrial sector ii)one imperfectly competitive industrial sector	i)one perfectly competitive agricultural sector ii)one impefectly competittive industrial sector
Mobile factors	Industrial one (workers)	Intermediate goods	Labour at intra-regional level	No one
Immobile factors	Agricultural one (farmers)	Labour	Labour at inter-regional level	Labour and land
Factor endowments	Symmetric among countries	Symmetric among countries	Symmetric among countries	Symmetric among countries
Intersectorial reallocation of input (especially labour)	Hampered, since each sector uses a specific factor	Allowed	Allowed	Allowed
Elasticity of labour supply in the industrial sector with respect to agricultural wage	Zero	There is no agricultural sector	Infinite	Finite
*Centripetal forces (forward linkages)**	Lower prices to be paid for manufactures produced where there are relatively many firms	Import costs saving for downstream buyers where there are relatively many upstream firms	Access to suppliers providing a range of specialised inputs (supply-side linkages)	Lower prices to be paid for manufactures produced where there are relatively many firms
*Centripetal forces (backward linkages)**	Increase in the local expenditure due to the migration of workers and firms	Better access to markets for upstream suppliers where there are relatively many dowmstream firms	They do not exist because of the lack of labour reallocation across regions	Increase in the local expenditure due to the migration of firms
Centrifugal forces	Product and factor market competition (especially for farmers)	Product and factor market competition (especially for labour)	Product and factor market competition (especially for labour)	Product and factor market comp. and factor price effects (especially wage differentials)
Forces eliminating interregional wage differentials	Interregional migration of workers	Interregional movements of firms	Intersectoral reallocation of workers within each region	Wages do not equilise across regions, leading in the end the industry to spread out again **
Channels through which forward and backward linkages trigger the 'circular and cumulative causation process'	Interregional labour migration (which dominates spatial wage differentials)	Vertical links among upstream and downstream industries	Intermediate input-output linkages	Intermediate input-output linkages
Speed of agglomeration process	Rapid and 'catastrophic'	Rapid and 'catastrophic'	Rapid and 'catastrophic'	Slow and gradual
Diagrammatic relationship between agglomeration and economic integration	Byfurcate-shaped	Byfurcate-shaped	Byfurcate-shaped	U-shaped

* We recall that the expressions forward- and cost-linkages, on the one hand, and backward- and demand-linkages, on the other hand, are equivalent.

** It shold be noted that the relocation toward the periphery might be just partial, leading interregional wage differentials to reduce rather than to vanish.

4. Some shortcomings of NGE and directions for further research

In this section I focus on some features of the NEG literature that have been over-emphasized even thought they sound, at some length, unrealistic. The goal is to highlight some potential shortcomings to which further research may be interestingly devoted.

4.1. A critique to the literature

1) *Sunk costs*

Migration decisions are based on the comparison of location-specific incentives, that is, on the indirect utility differential across sites. Each movement alters, in turn, for all producers, the balance between forward and backward linkages and consequently modifies some of the incentives that have determined that migration. Thus, in the short/medium-run (particularly with workers adverse to regional movements), each entrepreneur constantly faces new and stronger incentives to relocate again before the process of concentration achieves a spatial equilibrium.

According to such reasoning, firms can find a further shift of their structure of production to be newly convenient. This scenario of the short/medium-term highlights one of the limits of NGE modelling. In fact, the relocation of firms takes a very long time and setting production in a new country/region requires notable fixed costs which, by definition, are faced independently from production. Thus, consecutive migrations would make these costs double without any chance of amortisation up to make them unsustainable. Such costs are sometimes identified with the expression "fixed capital" that stress the fact that they are irreversibly employed in the short-medium term (e.g. construction of plants, leasing of equipment, contracts for supplying factors of production) and therefore they cannot be removed (at least not easily and without cost) from their original destination.

This is, in the short/medium run, a source of rigidity (aversion to relocation after shift) in the process of agglomeration that the literature of NEG seems to neglect.

2) *Scale intensities and comparative advantages*

Such effects are invoked to understand phenomena of geographical concentration since they strongly affect the pattern of production structure as well as the direction of trade. However, somehow surprisingly, they are usually modelled as being alternative one with the other and little attention is paid to the possibility that they may coexist rather than being mutually excludable. The models of NEG generally assume that countries/regions present identical relative factor endowments and utilise the same technology in order to avoid comparative advantages. However, this hypothesis seems to be an over-simplification since it neglects the possibility that the advantages coming from scale economies can be counter-weighted by the 'natural' ones that may characterise one site in terms of factor endowments or technologies. In the end, the interaction of such advantages might lead either to partial concentration or to the dispersion of economic activities reversing the pattern of location predicted by NEG. Considering that most EU countries present similar economies, one might imagine that intra-industrial trade is in theory the main form of trade, though the presence of unit labour cost differences in manufacturing production between EU members suggests that even comparative advantages are notable. The empirical evidence confirms this prediction, at least partially (see Brulhart, 1998b; Brulhart and Torstensson 1996). However, within the EU some countries do not show the above-mentioned similarities and their economies are different enough to carry out trade on the basis of comparative advantages. Portugal and Germany, Portugal and France, for instance, exhibit a high volume of bilateral trade at inter-industrial level; Portugal and Greece, in particular, mainly export on the basis of comparative advantages in terms of different relative factor endowments (see Brulhart, 1998b.)

I conclude that while NEG predicts an increasing level of intra-industrial trade as similar countries become more integrated (both countries experience agglomeration in specific sub-industries), when

locations are differently endowed inter-industrial trade is still prevailing and lower trade costs do not significantly increase intra-industrial trade. In this scenario, the world experiences both types of trade that turn out to be complementary rather than alternative.

3) Are goods market really integrated?

A major caveat of NEG models consists in the assumption that goods markets are integrated to such an extent as to create a single market. In practice this is not the case in the EU where some industries (e.g. those producing motor vehicles) still manage to keep markets segmented by means of spatial price discrimination (see Hacker and Hussain, 1998). Furthermore, the lack of harmonisation in product standards contributes to open up price differentials across sites (Baldwin, Francois and Porter, 1997), confirming the simplistic nature of the assumption of fully integrated goods markets made by NEG literature.

4) *Robustness of the conclusions*

The NEG conclusions are strictly dependent on the choice of parameters. Numerical calculations are needed since the system of equilibrium conditions usually employs non-linear functional forms and the spatial outcome is extremely sensitive to the intensity of scale economies as well as to the level of trade costs. Hence, the over-emphasised core-periphery result is not guaranteed for the entire range of reasonable parameter values. Thus, different assumptions in terms of market-size, relative factor endowments, degree of firms' and workers' mobility or elasticity of substitution among goods can lead to different theoretical implications and this, in turn, may cast some doubts on the possibility to draw some lessons for policy actions.

4.2. Empirical tests

Wide margins of development exist in the econometric field where I have found that there is a lack of studies with particular regard to Europe. Along the guidelines in Davis and Weinstein (1996, 1999), I consider it worthwhile to weigh up the role of relative factor endowments (NTT effects) with respect to that of relative home-markets (NEG effects) in determining the trade flow and the pattern of industrial location within the EU.

The economic geography effects seem to be less relevant for the international structure of production than for the regional one. Specifically, Davis and Weinstein find that the factor endowment model with transport costs explains trade patterns across 22 OECD manufacturing sectors reasonably well (1996); whereas, employing regional data, significant relative demand (home market) effects exist in the case of several Japanese industries (1999). The issue is whether one can assume that the above-mentioned effects really capture fundamental demand or supply linkages to the extent that they may be present in similar sectors in the EU, following a greater integration. The main problem would be the collection of industrial data as, for many member states, they are not easily available at a high level of disaggregation; it would be a great help to be able to employ data from national sources or from the OECD data-bank.

Hanson's works (especially, 1998a) points out another direction. His findings are strongly supportive of the result in Krugman (1991a): basically, demand linkages due to larger markets decline fastly with the distance between regions. Future empirical analysis could estimate the parameters of Krugman's model (1991a) for the Europe as has been done for the NAFTA area. In this way, research could go beyond the simplistic specifications of that model in order to estimate even the parameters of the most recent NEG models (e.g. Puga and Venables, 1997a; Puga, 1999) for the EU. Whilst the results would provide further information about how the agglomeration process is taking place on the Continent, a new framework would enable us to develop a formal structure in which to simulate the impact of different shocks on the European regions, in order to draw important indications for political action.

What can be noted is a lack of theoretical works to identify the decisive factors for intra-industrial trade. NTT joins comparative advantages with inter-industrial specialisation, whereas NEG combines IRS and access to large markets with intra-industrial specialisation and agglomeration. According to the strategy in Greenway and Torstensson

(1997) I believe it useful to weight, within the EU or between the U.S.A and Mexico, the relative importance of comparative advantages and IRS in determining the intra-industrial since the latter seems to be broadly and increasingly diffused. This approach could stimulate future theoretical speculations about the coexistence of the two above-mentioned effects in 'two-way trade'.

I think it helpful to update the few empirical studies about the EU. Closer analysis of the intra-industrial trade flow in Brulhart and Torstensson (1996) and Brulhart and further measurements of Gini's coefficients for the most recent years on the lines of Brulhart and Torstensson (1996), Brulhart (1998b), Pratten (1998) and Amiti (1998, 1997) would give us the chance to evaluate the impact of the increasing process of integration following the single market (1992) on industrial concentration in the EU. Thus, it might be possible to discover whether there is evidence for some U-shaped location pattern, and to find out at which point on the curve (i.e. at which stage of agglomeration/dispersion) the EU is set.

Furthermore, in the next few years, as soon as data becomes available, new research could deal with the regional impact of the single currency (1999) on the variability of production and consequently on the incentives for firms to relocate, following the approach in Hallet (1998) or in Muscatelli and Trecroci (1999).

At European level, I think it necessary to point out a lack of references for the production data of a large number of industries collected per country (particularly, per cohesion economy). The question could be by-passed, at least at the initial stage of empirical works of NEG, by focusing on local and sectarian analyses , which, by using specific data, would provide information about agglomeration processes at national level. It would be interesting to understand whether the lack of inter-sectorial factor mobility might represent a deterrent to the development of 'cost linkages' in smaller cohesion economies. This scenario acquires particular significance if one considers the perspective

of an eastward enlargement of the EU. Moreover, whilst the benefits of lower wage costs are supposed to encourage producers to move back toward the periphery, the difficulties for local firms in those countries to act as large-scale suppliers could offset the above-mentioned advantages. This in turn would discourage foreign economic activities from locating in the periphery, thus hampering the decongestion of the core and therefore a more even distribution of the manufacturing sector.

4. 3. Model specifications

Now, I would like to focus the attention on model specifications in terms of market structure, technology and transport costs. The monopolistic competition à la Dixit and Stiglitz (1977) could be turned into a different kind of imperfect competition or in a different version of Chamberlain's model (1933) in which, for instance, the number of competitors and their location affect the decision of manufacturer's price (Ottaviano and Thisse, 1998). This would enable us analyse the role and the impact of several price policies (especially spatially-discriminatory ones) on the agglomeration process; this scenario appears to be relevant for the EU since it is experiencing the shift from segmented local markets to a single one.

Transport costs might be specified with other functional forms rather than with that of Samuelson's iceberg, or transport activities might be modelled as a new sector that employs other resources for the freight of goods.

5. Concluding remarks

When labour mobility is low, the reduction of trade costs (due to stronger economic integration) below a critical threshold at which the equilibrium becomes unstable represents a centripetal force encouraging industrial concentration. However, a further fall in trade costs makes economic activities newly dispersed across countries/regions since firms prefer to relocate, at least partially, toward the periphery. Such a

movement goes on until symmetry in the spatial distribution of industries is re-established (see Puga, 1999).

More generally, in the presence of interregional mobility of goods and factors (especially labour), the process of location develops a two-stage pattern. As long as trade costs remain high, entrepreneurs organise production in different countries/regions in order to service dispersed local markets. As economic integration is intensified the world experiences pecuniary externalities, and both workers and firms tend to agglomerate. In this scenario the prices of factors and local goods rise where geographic concentration occurs. If most goods and factors of production are importable from other regions, the above-mentioned price-rises represent a further centripetal force encouraging the phenomena of immigration. Conversely, if workers are adverse to interregional movements, or some non-tradable goods, like houses, are important for consumers, the agglomeration process experiences a 'third-stage'. A further reduction in trade costs (now at low levels) increases the importance of spatial wage and price differences in deciding on a firm's location whilst the weight of pecuniary externalities decreases. The conclusion is a new dispersion toward the less-developed and more peripheral region, generating an inverse shift, the core-periphery way, that once again makes manufacturing sectors spatially dispersed. These conclusions suggest that the diagrammatic relationship between economic integration and agglomeration is U-shaped (see *Figure 3*). The latter result is in contrast with most of the literature (see Krugman, 1991a; Venables, 1996; Krugman and Venables, 1995) that finds a single critical level of trade costs below which the symmetrical equilibrium breaks down and centripetal forces dominate centrifugal ones in the process of concentration. According to this view, the pattern of industries location would take a bifurcate form (see *Figure 2*).

The lesson one might want to draw for the EU has to take into account the low international mobility of continental wokers in order to have a full understanding of how the process of industrial relocation is

taking place in the Union. Moreover, the effectiveness of european institutions to tackle trade costs up to reach a deep economic integration might condition the fall of regional inequalities eventually predicted by the literature. However, even in the case of a successful abatement of trade barriers, it might turn out that several cores exist, with each one of them referring to a different sector or industrial district. According to the latter scenario which contrasts Europe's core with its periphery, some countries (or regions of them) might have to face too high transportation costs to have access to the large markets in the core because of their physical distance from the economic centre of the Union; this seems to be the case of the Spanish Extremadura, Greece, the Italian Mezzogiorno and other regions which look to Mediterranean countries as natural tradepartners. This, in turn, means that Physical Geography might be stronger than Economic Geography as greater distances from Europe's core imply higher transportation costs.

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