EU Enlargement and the Internal Geography of Countries*

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Abstract

This paper focuses on the relation between economic integration and the location of economic activity in a country. We extend a new economic geography model in which trade liberalization affects both the agglomeration and dispersion forces that shape the spatial equilibrium. We show that integration generally fosters spatial concentration in the region which has a pronounced advantage in terms of its access to international markets, unless competition pressure from foreign firms is too high. Our results have policy implications that shed light on the Optimal Currency Area debate concerning the enlarged European union. The last section provides empirical evidence on Romanian data.

J.E.L. Classification: F12, F15, R12

1 Introduction

Questions concerning the viability of the enlarged European Union are numerous, relating to production and income issues as well as to monetary matters. The issue raised by the literature on Optimal Currency Areas - OCA (Mundell, 1961), for instance, highlights that a set of countries will be able to draw more benefits than costs to participating in a monetary union if they bear some important characteristics such as high factor mobility and high openness to trade.

In this paper, we propose to shed some light on the openness to trade criteria, by providing a reflection from the point of vue of the trade and new economic geography literature. Indeed, now that enlargement has been launched, it appears relevant to investigate the impact of the integration process on the degree of trade openness of the accessing countries and thus on the intensity of their trade relations with the current EU member. While economic integration is known as augmenting trade between two countries, trade and new economic geography models show that it also has an impact on the spatial distribution of economic activity inside the country that opens to trade. In turn, the influence that this spatial reallocation process can have on the intensity of trade flows between two countries is an element that may contribute to the OCA debate.

The relation between trade and the location of production inside countries has been explicitly studied by recent models of the new economic geography literature, based on the original model of Krugman (1991). Indeed, Krugman and Livas (1996), in a two countries three-region framework, suggest that a decrease in international transaction costs between two countries may foster the dispersion of economic activity inside the home country. Conversely, Alonso-Villar (2001), Monfort and Nicolini (2000), and Paluzie (2001), respectively in a three-country, two-country four-region, and in a two-country three-region framework, show that trade liberalization is more likely to enhance agglomeration of economic activity inside the country opening to trade.

Henderson (1996), in commenting Krugman and Livas's model, suggests to bring one more element to the framework. He underlines that the impact of an increase in trade depends on the internal geography of the country: "The impact of trade on national space is situation-specific, depending on the precise geography of the country. (...) In thinking about urban concentration, we may want a more generic or general framework". Our focus in this paper is threefold: first, using the original new economic geography framework (Krugman, 1991), we develop a theoretical model containing two countries and three regions (domestic regions 1 and 2 and foreign region 0). We analyze the impact of trade liberalization on the internal geography of the domestic country, using a domestic country in which both regions are equidistant from the border. We observe that, in a model in which both the dispersion and agglomeration of economic activity are driven by endogenous elements, trade liberalization leads to the concentration of activity inside the domestic country[1].

Our second focus in this paper concerns the configuration in which both domestic regions do not have the same access to the foreign market. Coming up to Henderson's expectations, we generalize the model exposed in sections (2) and (3) to look at how the result is altered by having a heterogeneous domestic country opening to trade: in this case, we show that trade liberalization is likely to favor the development of border regions. We also highlight the conditions allowing for an enforcement of industrial agglomeration in regions offering the smallest access to foreign markets.

Finally, we develop an empirical application on Romanian data. By estimating the reduced form of our motion law, we will try to assess whether some agglomeration pattern has taken place inside the country during the 1991-98 period. We expect to see the consequences, inside Romania, of the trade liberalization between the EU countries and the CEECs either as a shift of economic activity towards the western border or as a reinforcement of the localization in the inner remote regions.

2 The model

This section exposes a model previewed by Paluzie (2001), which is a simple extension of Krugman's (1991) model to a two-country framework; a domestic country, containing two regions, opens to trade with an exogenous foreign country. We want to focus on the evolution of the economic geography inside the domestic country during the process of trade liberalization.

Consider two countries: a domestic country, containing two regions, labeled 1 and 2, and a foreign country, labeled 0. There are two sectors: one is a monopolistically competitive manufacturing sector, which produces a differentiated good and stands for all increasing to scale production activities in the economy. The other is the constant return to scale, perfectly competitive sector, which produces a homogeneous good. We will assimilate it to the agricultural sector. Factors are specific to each sector. The agricultural and the manufacturing goods are traded both interregionally and internationally.

The foreign country is totally exogenous: it contains L_{A0} agricultural workers and L_0 manufacturing workers, which are all immobile. In the domestic country, regional supply of A labor is fixed: the two domestic regions contain respectively L_{A1} and L_{A2} workers, which are immobile. In the domestic manufacturing sector, only the total amount of manufacturing labor is fixed: the country has L manufacturing workers, distributed among regions: $L = L_1 + L_2$. The interregional distribution of industrial workers is endogenous: workers are mobile and migrate between the regions 1 and 2 according to the interregional real wage difference. For the rest of the paper, we normalize the total number of industrial workers in the domestic country: $L = 1$. We set the share of industrial workers in region 1 equal to λ: $L_1 = \lambda$, $L_2 = 1 - \lambda$.

The spatial framework of the model is introduced through the use of a transaction cost variable, representing distance between cities and barriers to trade. As in similar models, a variety produced in region r is sold by the firm at mill-price and the entire transaction cost is borne by the consumer. We use an "iceberg"-type transaction cost variable, which means that a fraction of the shipped good melts away during the journey. When 1 unit is shipped, priced p, only $1/T$ actually arrives at destination. Therefore, in order for 1 unit to arrive, T units have to be shipped, increasing the price of the unit received to pT. Trade in the industrial good bears transaction costs, which differ across regions: T_{12} is the internal transaction cost, which applies to interregional domestic trade (with $T_{12} = T_{21}$). T_{01} and T_{02} are respectively the external transaction costs applying to each domestic region's trade with the foreign country. We assume the agricultural good's trade is costless, both interregionally and internationally. Therefore, its price equalizes everywhere: $p_{A1} = p_{A2} = p_{A0}$. The agricultural good is produced under perfect competition, and we choose technical coefficients equal to 1. As a result in each region $p_A = w_A$. Finally, we use the agricultural good as a numéraire, therefore $w_A = 1$ in each region.

2.1 Consumers and Price Indices

Every consumer has the same Cobb-Douglas utility function:

$$U = M^{\mu} A^{1-\mu}, \quad \text{with} \quad 0 < \mu < 1 \tag{1}$$

M is a composite index of the consumption of the manufactured good, A is the consumption of the agricultural good. A share μ of expenditures goes to manufactured goods, and $1 - \mu$ to the agricultural good. The composite index M is the following CES function:

$$M = \left[\sum_{i=1}^{n} c_i^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} \tag{2}$$

where c_i represents the consumption of a variety i of the manufactured good, and σ is the elasticity of substitution between two varieties ($\sigma > 1$). Given income Y, each consumer maximizes his utility under the budget constraint $Y = p_A A + \sum_{i=1}^{n} c_i p_i$. We get the following demand function, representing demand emanating from consumers of region s, addressed to a producer i located in region r:

$$c_{i,rs} = \frac{p_{irs}^{-\sigma}}{\sum_{r=0}^{R}\sum_{i=1}^{n_r}(p_{irs})^{1-\sigma}}\mu Y_s, \qquad r,s = 0,1,2. \tag{3}$$

Equation (3) contains the spatial framework: there are R regions, each of them producing n_r varieties of the manufacturing good. The iceberg transport technology implies that the price of each variety i produced in r and sold in s contains the mill price and the transaction cost: $p_{irs} = p_r T_{rs}$ (because of the symmetry of all varieties produced in the same region, from now on we omit the variety index). We use T_{rs} as a general expression which represents either T_{12}, T_{01} or T_{02}, assuming that $T_{rr} = 1$ and (until section 4) that $T_{01} = T_{02} > T_{12}$. Using (2) and (3), we are thus able to derive the following industrial price index for each region s:

$$G_s = \left[\sum_{r=0}^{R} n_r (p_r T_{rs})^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \tag{4}$$

Individual demand (3) can now be written

$$c_{rs} = \frac{(p_r T_{rs})^{-\sigma}}{{G_s}^{1-\sigma}}\mu Y_s \qquad r,s = 0,1,2. \tag{5}$$

2.2 Producers

Manufactured goods are produced in a monopolistically competitive industry, following the Dixit and Stiglitz (1977) framework. Each producer has the same production function, expressed in terms of manufacturing labor : $l = \alpha + \beta q$, where l is the total cost, in terms of labor, of producing q varieties. It contains a fixed cost α and a marginal cost β per additional unit produced. Each producer maximizes his profits. As usual in the Dixit and Stiglitz (1977) model, we obtain constant mark-up equations:

$$p_r = \left(\frac{\sigma}{\sigma - 1}\right) w_r \beta \tag{6}$$

where p_r is the price of a variety produced in r and w_r is the manufacturing wage in region r. The equilibrium output of a firm producing in region r is derived from the free entry condition:

$$q_r^* = \frac{\alpha(\sigma - 1)}{\beta} \tag{7}$$

and the equilibrium on each region's labor market allows us to obtain the equilibrium number of firms in each region:

$$n_r = \frac{L_r}{\alpha\sigma} \tag{8}$$

where L_r is the total number of manufacturing workers in region r.

2.3 Short-Term Equilibrium

We now want to fully determine the short-term equilibrium. We derive, for a given distribution of labor between regions 1 and 2, the value of w_r that verifies equations (5), (6), (7), (8) and the equilibrium condition on the goods' market. The manufacturing wage equation for each region r is thus:

$$w_r = \frac{1}{\beta}\left(\frac{\sigma - 1}{\sigma}\right)\left[\frac{\mu\beta}{\alpha(\sigma - 1)}\left(\sum_{j=0}^{R} Y_j G_j^{\sigma-1} T_{jr}^{1-\sigma}\right)\right]^{1/\sigma} \tag{9}$$

with $Y_r = w_r L_r + w_{Ar} L_{Ar}$, and $w_{Ar} = 1$. Equation (9) is a typical wage equation in new economic geography models (see Fujita, Krugman and Venables, 1999). It explains that the larger the number of consumers and the lower the number of competitors in regions with low transaction costs to r, the higher the nominal wage that a firm producing in r can pay will be: indeed, the nominal wage in region r tends to be higher if incomes in other regions with low transaction costs to r are high. On the other side, it tends to be lower if other regions with low transaction costs to r contain a large number of firms (the region's industrial price index $G_j^{\sigma-1}$ may be regarded as an index of concentration).

We are now able to characterize entirely the equilibrium variables in our two country-three region setting, for a given spatial distribution of workers. Regional incomes are:

$$Y_1 = w_1 \lambda + L_{A1} \tag{10}$$

$$Y_2 = w_2 (1 - \lambda) + L_{A2} \tag{11}$$

$$Y_0 = w_0 L_0 + L_{A0} \tag{12}$$

Nominal wages are the solution of the following system, where G and Y have to be substituted for as functions of wages using (4), (6), (8) and $Y_r = w_r L_r + L_{Ar} w_{Ar}$ [2]:

$$w_1 = \frac{1}{\beta}\left(\frac{\sigma-1}{\sigma}\right)\left[\frac{\mu\beta}{\alpha(\sigma-1)}\left(Y_0 G_0^{\sigma-1} T_0^{1-\sigma} + Y_1 G_1^{\sigma-1} + Y_2 G_2^{\sigma-1} T_{12}^{1-\sigma}\right)\right]^{1/\sigma} \tag{13}$$

$$w_2 = \frac{1}{\beta}\left(\frac{\sigma-1}{\sigma}\right)\left[\frac{\mu\beta}{\alpha(\sigma-1)}\left(Y_0 G_0^{\sigma-1} T_0^{1-\sigma} + Y_1 G_1^{\sigma-1} T_{12}^{1-\sigma} + Y_2 G_2^{\sigma-1}\right)\right]^{1/\sigma} \tag{14}$$

$$w_0 = \frac{1}{\beta}\left(\frac{\sigma-1}{\sigma}\right)\left[\frac{\mu\beta}{\alpha(\sigma-1)}\left(Y_0 G_0^{\sigma-1} + Y_1 G_1^{\sigma-1} T_0^{1-\sigma} + Y_2 G_2^{\sigma-1} T_0^{1-\sigma}\right)\right]^{1/\sigma} \tag{15}$$

The industrial price indices are then given by:

$$G_1 = \left(\frac{\sigma\beta}{\sigma-1}\right)\left(\frac{1}{\alpha\sigma}\right)^{1/1-\sigma}\left[L_0(w_0T_0)^{1-\sigma}+\lambda w_1^{1-\sigma}+(1-\lambda)(w_2T_{12})^{1-\sigma}\right]^{1/1-\sigma} \quad (16)$$

$$G_2 = \left(\frac{\sigma\beta}{\sigma-1}\right)\left(\frac{1}{\alpha\sigma}\right)^{1/1-\sigma}\left[L_0(w_0T_0)^{1-\sigma}+\lambda(w_1T_{12})^{1-\sigma}+(1-\lambda)w_2^{1-\sigma}\right]^{1/1-\sigma} \quad (17)$$

$$G_0 = \left(\frac{\sigma\beta}{\sigma-1}\right)\left(\frac{1}{\alpha\sigma}\right)^{1/1-\sigma}\left[L_0w_0^{1-\sigma}+\lambda(w_1T_0)^{1-\sigma}+(1-\lambda)(w_2T_0)^{1-\sigma}\right]^{1/1-\sigma} \quad (18)$$

We finally derive the real wage of each domestic region, which is made of the nominal wage deflated by the price index:

$$\omega_1 = \frac{w_1}{G_1^{\mu}}$$
$$\omega_2 = \frac{w_2}{G_2^{\mu}}$$

2.4 Long-Term Equilibrium

One can see that if $\lambda = 1/2$ (and if $L_{A1} = L_{A2}$), $\omega_1 = \omega_2$: when the industrial workforce is equally distributed between domestic regions, the real wages are equalized and there is no incentive for workers to move. But what happens if we move one worker from region 2 to region 1? This move will create a real wage differential that may either incite more people to move, or on the contrary it may lower the real wage in the destination region, in which case the equally distributed configuration would be a stable equilibrium. We assume that industrial workers move between the two regions according to the following migration dynamics:

$$\frac{d\lambda}{dt} = \omega_1 - \omega_2 \quad (19)$$

We want to study the relationship between the real wage differential and the fraction of industrial workers living in region 1. We want to identify the spatial equilibria of the model, thus the distributions of workers for which no worker may get a higher real wage by changing location. The equilibrium distributions of the workforce thus consist of the values of $(\lambda, 1-\lambda)$ for which either $\omega_1 - \omega_2 = 0$ and $\lambda \in [0, 1]$, or $\omega_1 - \omega_2 \geq 0$ and $\lambda = 1$, or $\omega_1 - \omega_2 \leq 0$ and $\lambda = 0$.

Unfortunately, as typically in new economic geography models based on the original Krugman (1991) framework, $\omega_1 - \omega_2$ is not a simple function of λ: we are unable to tell precisely for what values of the parameters of the model the spatial equilibria are reached. In the next section we will thus use numerical simulations in order to look at the shape of the real wage differential function.

The evolution of the real wage differential $\omega_1 - \omega_2$ and the equilibrium spatial distribution inside the domestic country depend on the interaction of agglomeration and dispersion forces appearing in the equations we derived above. On the one side, agglomeration forces express the fact that firms and consumers are interested in locating in the same region, because of cost and demand externalities: in equations (13) and (14), the demand externality emphasizes that a large number of consumers in a region r represents high local expenditure, allowing firms to pay higher wages and thus attracting more firms. The cost externality appears in equations (16), (17) and (18): a high number of firms implies a lot of locally produced varieties, thus a lower price index and more consumers.

On the other side, the dispersion force emanates from the high competition on the good and the factor markets when industrial activity is concentrated in one location: equations (13) and (14) point that the nominal wage of a region diminishes with the increase in competition, and this leads firms to delocate towards the remote market in order to benefit from lower competition on that market.

Which equilibrium configuration is finally reached depends on the parameters of the models, and specifically on the level of interregional and international transaction costs. In the next section we will consider an economic integration between the domestic and the foreign country, illustrated through a decrease of T_{01} and T_{02}. We will focus on determining how the presence of a foreign country impacts the internal geography of the domestic country.

3 Trade Liberalization

Insert figure (1) here

This section considers the effect of lowering the international transaction cost on the spatial distribution of activity, in the case of a homogeneous country: the two domestic regions have the same access to foreign markets (T_{01} and T_{02} are set equal to T_0). We explain how we draw the real wage differential curves. For a given value[3] of T_0, we numerically solve w_1 and w_2 for a range of values of $\lambda \in [0,1]$. We then substitute the obtained w_1 and w_2 into $\omega_1 - \omega_2$ in order to plot one of the above curves. As shown in figure (1), this is done for three different values of T_0.

Let us analyze figure (1) by starting where workers are symmetrically distributed among regions: $\lambda = 0.5$. This configuration is an equilibrium, but it will only be stable if, for a marginal increase in λ, the real wage difference becomes negative. The migration of workers will then bring the distribution of workers back to the symmetrical configuration.

The situation in which the domestic country is closest to autarky is illustrated by the dotted curve, drawn for $T_0 = 2.1$ (which means that only $1/2.1 = 0.47$ of the shipped quantity arrives at the final destination, corresponding to a transaction cost of 53 %). For this level of transaction costs, the dispersed configuration is the only stable equilibrium[4]. The dashed curve illustrates the situation when the economy opens slightly. There are now five equilibria, of which three are stable, and two unstable. While the symmetric equilibrium is still stable, the agglomerated configuration (in either region) has become stable as well. Finally, the more trade barriers are decreased, the more the curve turns upwards; when it comes to cross the x axis with a positive slope (the level $T_0 = 1.5$ corresponds to a transaction cost of 40 %), the only stable outcome are the two agglomerated configurations. We thus highlight this interesting result: according to our simulations, an economic integration is most likely to lead the domestic industrial sector to be spatially concentrated.

The forces at stake

What mechanisms explain this outcome? The decrease of the external transaction cost allows two additional elements to impact on the domestic economy: foreign demand and foreign supply. On the one side, having an access to a large exterior market lowers the incentive for domestic firms to locate near domestic consumers, which represent a smaller share of their sales. Thus the domestic demand externality is weakened by the presence of the foreign demand (in equations (13) and (14), income from the foreign country becomes a more important part of total demand). For similar reasons, the domestic cost externality is weakened by the presence of the foreign supply: the foreign firms now represent a much more important share of the total supply available to domestic consumers (in equations (16), (17) and (18), the presence of the foreign firms now constitutes the main elements that drives the price indices down).

On the other side, trade liberalization also affects the competition effects within the domestic country. The competition exerted by foreign firms on the domestic market is large compared to the competition of other domestic firms. Therefore, the presence of the foreign supply lowers the need for domestic firms to locate far from domestic competitors, and thus lowers the need to disperse economic activity (in equations (16), (17) and (18), as stated before, the presence of foreign firms lowers both price indices, which then diminish w_1 and w_2).

It finally appears that while foreign demand and foreign supply decrease both the agglomeration and the dispersion forces, the simulations show that in the end, a strong economic integration has more effect on the dispersion force: as a result the domestic economy becomes concentrated in only one location.

4 Border regions

Insert figure (2) here

We now ask the same question, but in a slightly different framework: by letting the two external transaction costs differ, we suppose that one of the domestic cities has a better access to the foreign market (region 2 for example). We specify a functional form for T_{rs}. T_{rs} represents all the transaction costs and consists of a cost related to distance and, for international trade, an ad-valorem tariff. In this section we also adopt a specific and simplified representation of space *à la* Hotelling in which country 0 and region 1 are located at both extremes. Region 2 is the border region. The segment thus has a length equal to d_{01}, and the distance between 1 and 2 is $d_{01}-d_{02}$. We assume that transaction costs are a linear function of distance: $T_{12} = 1+(d_{01}-d_{02})$ and $T_{01} = 1 + \text{tariff} + d_{01}$.

In order to understand how the economic geography of the country evolves with trade openness, as in section (3) we use numerical simulations to display the shape of the interregional real wage difference as a function of the workers distribution λ.

Theoretically, the forces impacting on the domestic economy are modified since the country now contains two heterogeneous regions. Two changes are noticeable: first, as observed in section (3), foreign demand lowers the domestic agglomeration force. However, an additional effect appears, because domestic firms may now choose to locate in the location closest to the foreign market, which is region 2. We thus highlight one of the potential effects of trade liberalization, which is to *pull* domestic firms towards the border in order for them to benefit from the best access to foreign demand. Then, foreign supply lowers the domestic dispersion force. There is also an additional effect due to the heterogeneity of the regions: region 1, at the end of the segment, allows firms to locate as far as possible from the foreign competitors. Hence, trade liberalization may *push* domestic firms towards the remote regions, as a reaction of protection against the large foreign competition.

Figure (2), which is drawn in a similar way as figure (1), illustrates the impact of these forces according to the degree of trade liberalization. As observed in section (3), the symmetric distribution of workers is a stable equilibrium for high values of T_0. When T_0 decreases, the curve comes to cross the x axis with a positive slope, meaning that only agglomerated configurations are stable equilibria. However, the curves are not symmetric anymore with respect to the value $\lambda = 0.5$. The push effect of firms towards the interior region is to be seen through the shift of the dotted curve to the right: when the domestic economy is still relatively closed, the increase of the degree of competition driven by foreign supply dominates the pull effect. Economic activities are dispersed but there is an asymmetry leading to the location of more than 50% of the industries in region 1.

The pull effect of firms to the border region is illustrated by the shift of the dark curve to the right. When T_0 is low, the increase of demand emanating from the foreign country dominates the competition effect driven by foreign firms, and the country's economic activity is attracted to the border region. The agglomeration is the only stable equilibrium, but it has more chances to occur in the closest region to the foreign market. Figure (2) shows that the concentration of the industry will only occur in region 1 if the latter contains more than 80 % of the industrial activity of the country.

The main outcome arising in this section helps to modulate our previous results. The model shows that trade liberalization may foster two effects: a pull-effect towards border regions and a push-effect inside remote regions. The strength of these phenomena will be shaped by the various elements of the model: a large foreign demand for domestic product will increase the pull of the domestic industrial sector towards low-cost access regions. Conversely, a large amount of foreign firms exporting to the domestic market may favor the development of better protected internal regions.

5 Implications for EU enlargement

The theoretical results highlighted in the preceding section involve non trivial consequences for the issue of the countries meeting the criteria of an optimal currency area. The existing literature emphasizes that the enlargement process should decrease trade costs between the current EU members and the CEECs, through the removals of trade barriers and the stabilization of the exchange rate. Increasing the intensity of trade, these policies are likely to generate higher business cycle synchronization and thus make the enlargement of the European and Monetary Union more relevant (see for instance Frankel and Rose, 1998).

However, our model sheds light on another consequence of the enlargement. Indeed, our results predict that a decrease in trade costs may influence spatial dynamics within each of the CEECs, which is likely to impact on each country's trade with the rest of the EU. It can be shown that a country in which industrial activity is agglomerated in the remote region generates less trade with the foreign market than if economic activity was localized near the foreign country. Indeed, in our model, the pattern of trade is closely related to a gravity-type relation. The basic gravity equation states that, for given economic sizes of regions, exports from remote regions will be inferior to export from border regions. Applied to our issue, the gravity relation thus highlights that an accessing country is likely to trade more with the western countries in the case where its domestic economy is agglomerated in the border region than when it is agglomerated in the remote region.

Hence, depending on the balance between the forces at stake, spatial dynamics may influence positively or negatively the intensity of trade and thus the degree of relevance of a monetary integration. If the pattern of industrialization inside a country opening to trade with the EU shows localization towards inner and remote regions, it is less likely that this country evolves towards meeting the criteria of an optimal currency area. If conversely industrial development occurs in regions that are close to the foreign markets, we may conclude that trade will be enforced and that the country follows the right path towards meeting the criteria.

6 Empirical evidence: Urban development patterns in Romania

This section is devoted to the empirical application of our theoretical model to the integration process taking place between the current members of the EU and the CEECs. According to the theoretical results, the process of trade liberalization at place since the beginning of the 1990's is likely to have some impact on the distribution of economic activity within each of the accessing countries. Our model shows that firms are likely to move to regions that have access to a large demand and workers to migrate to regions that pay high real wages. We propose to estimate the model by looking at urbanization patterns. Our empirical application will be conducted on the case of Romania.

Maurel and Cheikbossian (1997) mention that since the dismantling of the COMECON in 1991, a rapid reorientation of the CEECs' trade has taken place. Romania, for instance, undergoes a significant change in its trade pattern. Figure (3) portrays Romanian imports and exports to and from western European countries in percentage of GDP for the period 1988 to 1999[5]. Romanian imports increased during the whole period. The weight of western European goods in Romanian consumption thus rose significantly during the 1990's. Identically, exports to western Europe augmented consequently in percentage of GDP, highlighting an increased participation of Romania in its commercial relations with the EU.

Insert figure (3) here

Romania is an interesting case in which to study spatial reallocations due to trade liberalization because its economic activity was mostly concentrated in eastern regions[6]. According to the theoretical framework, the Romanian spatial configuration looks therefore closer to the case in which agglomeration in the remote region may occur. Alternatively, observing higher urbanization growth rates towards border regions would tend to mean higher trade relations between Romania and the EU.

6.1 Specification and data

Our purpose is to study whether there are migration flows inside Romania that shed light on some pattern of reallocation of economic activity inside the country. In the theoretical model, workers move from region i to region j if there is a positive real wage difference between region j and region i ($\omega_j > \omega_i$), favoring industrial development in region j. From section (2), the components of the real wage are the nominal wage and the industrial price index. The price index of a region r is the sum of all economic activity generated in each region, weighted by the distance from each region to region r. It shows high similarity with the region's *market potential*, which is a measure of access to markets typically used in the trade and new economic geography literature. The simplest form of the market potential was first enunciated by Harris (1954), as the distance-weighted sum of all other region's GDPs:

$$MP_r = \sum_{j=1}^{N} \frac{GDP_j}{d_{rj}} \tag{20}$$

We use data on regional population, which for each each of the 1993-1997 period is divided among rural and urban population. We calculate regional urban balances, and we express the share of urban population s_r^u of a region as the ratio of urban to total population. Our dependent variable will be the annual growth rate of the share of urban population, which is defined as the difference of the logarithms. We expect urban growth rates to be higher in high market potential regions. Population data is provided by the Romanian Statistical Office. Romanian regions correspond to the *Eurostat* classification at the NUTS 3 level, which divide the country in 41 entities, Bucharest and its suburbs being one region.

The explanatory variables on which we will focus will be twofold: the nominal wage and the market potential of a region. We compute the market potential of each Romanian region, according to Harris's definition, by using GDP and distance data. We use regional data for EU countries (NUTS2 level), national data for the CEECs (NUTS1 level) and regional data for Romanian regions (NUTS3 level). GDP data comes from the Eurostat Regio database. Distances are provided by an electronic road atlas which computes the length of the quickest journey by road between two cities. This measure therefore takes into account the quality of road infrastructure.

In order to investigate whether Romanian industrial reallocations are mostly driven by access to EU markets, we choose to estimate the separate influence of EU markets, CEECs markets (but Romania) and Romanian markets (see Redding and Venables, 2002). We estimate the following equation on 41 Romanian regions on the 1991-1997 period.

$$\ln\left(\frac{S^u_{i,t}}{S^u_{i,t-1}}\right) = \alpha_1 \ln MP_{i,t} + \alpha_2 \ln w_{i,t} + \alpha_3 \ln u_{i,t} + \alpha_4 \ln S^u_{i,t-1} + \alpha_5 sea + \alpha_6 Buchar + \varepsilon_{i,t}$$

where $S^u_{i,t}$ is the share of urban population in region i at time t. MP is the market potential, w is the regional nominal wage, u is the regional unemployment rate. Sea and $Buchar$ are two dummies which are equal to 1 respectively for maritime regions and Bucharest district.

Because of the small size of the sample, we use instrumental variables for the lagged level of urbanization. This variable is instrumented by the lagged agricultural employment share, dummies on maritime regions, western border regions, Bucharest and the year 1993[7]. Estimations are done using fixed effects on the time dimension. This allows to take into account heterogeneity in urbanization patterns arising from particular years. Thus, our coefficients only reflect heterogeneity in the degree of regional urbanization resulting from spatial characteristics.

6.2 Results

Insert table 1 here

Table (1) presents the estimation results. Each column contains results using different definitions of the market potential. Lagged urban rates have a negative impact on urbanization growth, which suggests a catching-up process between low urbanized and high urbanized regions. As expected, high nominal wages favor urban growth in all specifications. However, the unemployment rate variable is never significant. In column 1, the coefficient on total market potential appears positive and significative, which conforms to the theoretical predictions. Moreover, proximity to the coast has significant positive influence, which emphasizes the importance of access to markets in determining the location of economic activity.

Table 1 further shows that access to the Romanian market has no influence on urban growth. It thus appears that the share of total market potential corresponding to Romanian markets is much less important in driving industrial reallocations than the access to CEECs and, above all, EU markets. This result suggests that the impact of trade liberalization on Romanian economic geography tends to foster an intensification of trade between Romania and the EU.

7 Conclusion

In this paper, we propose to pursue the analysis of the relation between trade liberalization and the location of production inside countries, by deepening two aspects of the issue. First, we generalize a simple extension of a Krugman (1991) model to a two countries three-region framework. In a setting in which both the agglomeration and the dispersion forces are endogenous, trade liberalization fosters spatial concentration. Second, we study the same issue in a spatially heterogeneous country. We show that when the domestic country contains a border region and a remote region, trade liberalization generally favors the development of the border region, when competition pressure from international markets is not too high. Evidence from Romania urbanization patterns supports this result. Moreover, it suggests that the reagglomeration dynamics within this country will encourage trade integration with EU countries.

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Notes

[1]Note that Paluzie (2001) already went through these steps.

[2]The question of the unicity of the solution is difficult to solve when there is more than one equation involved, and we leave it aside for the moment. The procedure for solving numerically for w_1 and w_2 is explained in Crozet and Koenig Soubeyran (2002).

[3]The values of the other parameters are: $\sigma = 6$, $\beta = 4/5$, $\mu = 0.4$, $\alpha = 0.4/5$, $T_{12} = 1.75$, $L_0/L = 10$.

[4]Figure (1) is drawn for a value of T_{12} for which industry is dispersed in autarky ($T_0 = \infty$). Similar results are obtained for lower values of T_{12}, but they are not showed here. The results are not as visible because the economy is already agglomerated.

[5]Trade data comes from the CHELEM-CEPII database.

[6]Bucharest region accounted for 10.3% of the total population in 1991 and 17% of urban population. In 1998, it had declined respectively to 9.0% and 16.3%.

[7]Our data covers the 1991-1997 period, but we have no data for the year 1992. Hence the first lags for the year 1993 correspond to 1991 data.

Titles of the figures

Figure 1: Real wage difference for three different external transaction costs

Figure 2: Real wage difference when the two regions have different external transaction costs

Figure 3: Romania-Western Europe trade

Figure 4: Sustain point for three different external transaction costs

Figure 1:

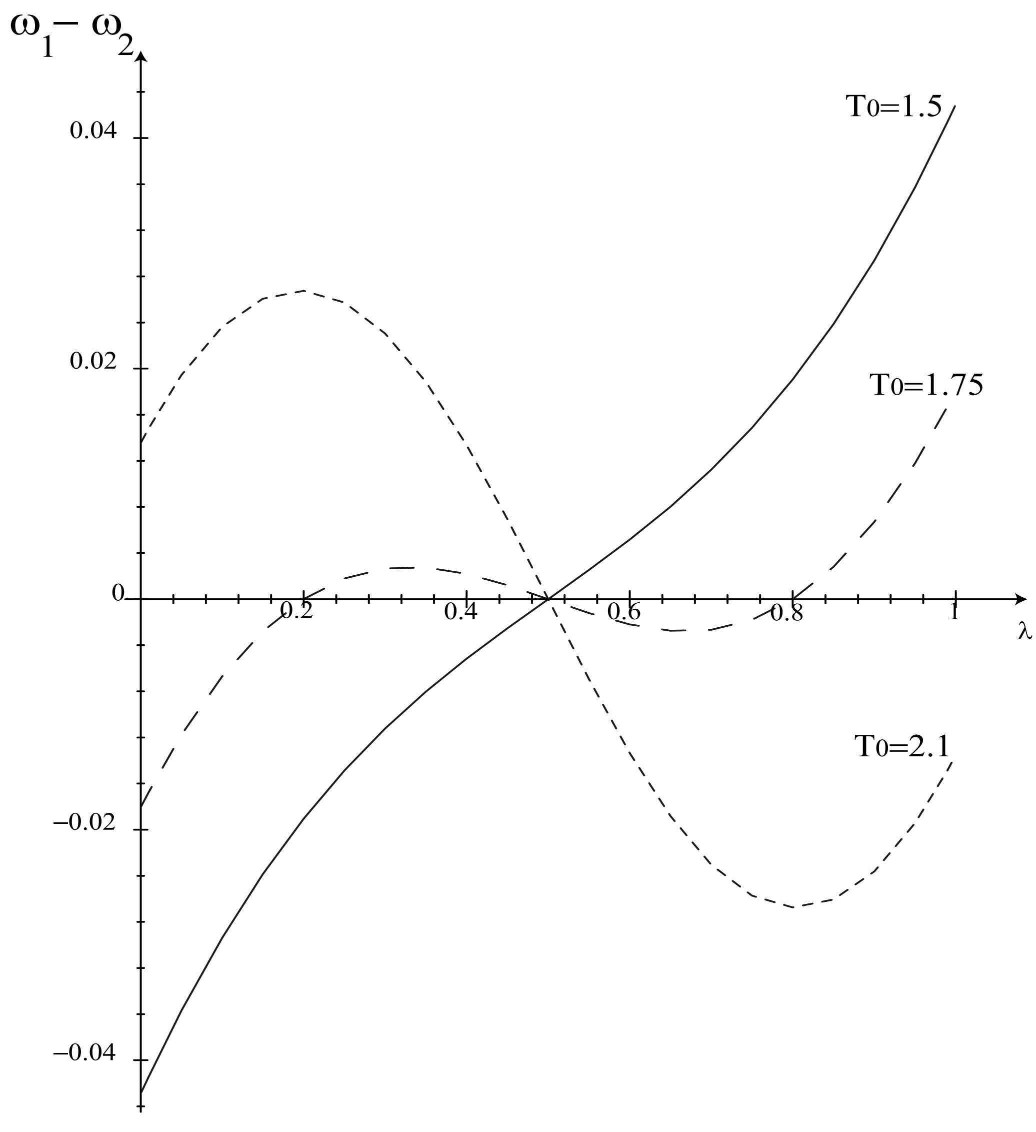


Figure 2:

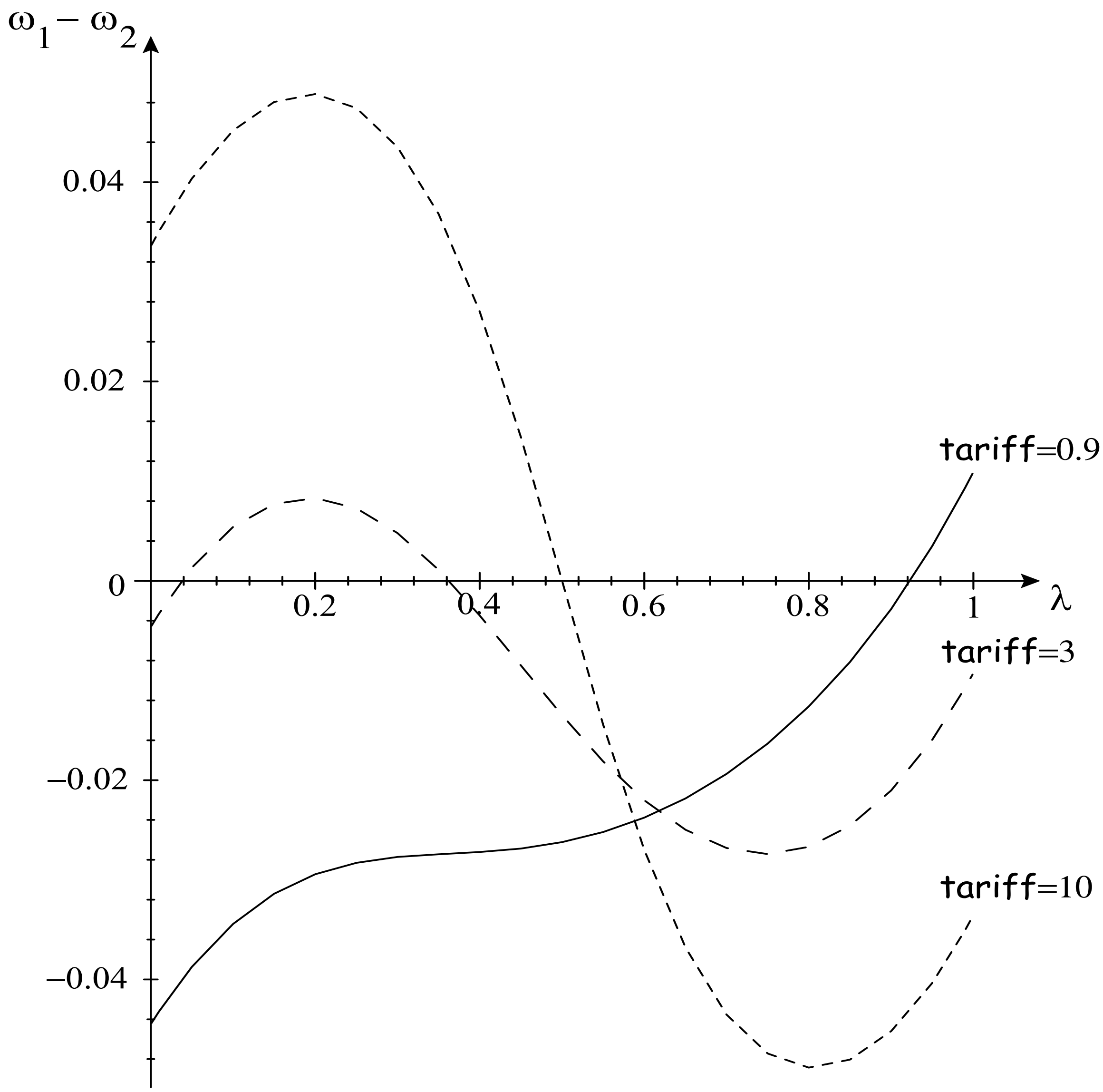
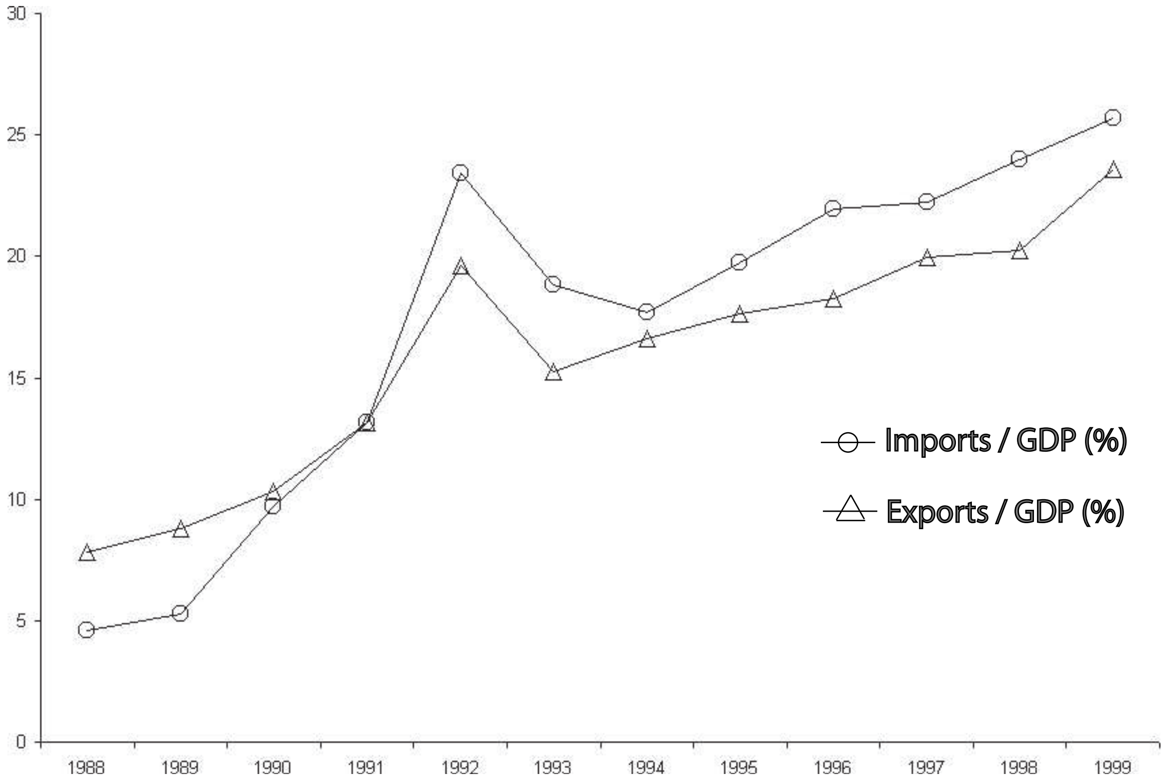

ω1 − ω2
0.04
0.02
0
−0.02
−0.04
0.2
0.4
0.6
0.8
1
λ
tariff=0.9
tariff=3
tariff=10

Figure 3:



30
25
20
15
10
5
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Imports / GDP (%)
Exports / GDP (%)

Table 1: Urban Growth in Romania 1993-1997 - 2 SLS - Fixed Effects

Dep. var.: Annual growth rate of share of urban population				
Model	(1)	(2)	(3)	(4)
log MP	0.0111^a			
	(0.003)			
log MP (Romania)		0.0004		
		(0.002)		
log MP (EU)			0.0107^a	
			(0.003)	
log MP (CEECs)				0.0049^a
				(0.018)
log Wage	0.0137^a	0.0110^a	0.0136^a	0.0138^a
	(0.004)	(0.004)	(0.004)	(0.004)
log Unemp. Rate	0.0008	-0.0004	0.0007	0.0004
	(0.014)	(0.001)	(0.001)	(0.001)
log Urban Rate $_{t-1}$	-0.0129^a	-0.0104^a	-0.0128^a	-0.0123^a
	(0.003)	(0.002)	(0.002)	(0.002)
Sea	0.0053^a	0.0029^c	0.0052^a	0.0044^b
	(0.002)	(0.002)	(0.002)	(0.002)
Bucharest	0.0040^b	0.0015	0.0044^b	0.0039^b
	(0.002)	(0.002)	(0.002)	(0.002)
Nb. obs.	205	205	205	205
R^2	0.4125	0.4276	0.4116	0.4040

Robust Standard Errors in parentheses.

a, b and c indicate significance at the 1, 5 and 10 % level