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TRANSITION WITHOUT ACCESSION: THE EFFECTS OF DIFFERENTIAL INTEGRATION ON TRADE AND WELFARE IN EUROPE

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Abstract

In the past decade we observed an acceleration of Western European integration, while the transition countries of Central Eastern Europe have not yet become members of the EU. In this paper, we conduct numerical simulations of the consequences of such differential integration within the European economic area using a spatial model of endogenous growth. Three main aspects are analysed: first, we look at the impact of inclusion in, or exclusion from, the EU on the location of "advanced" industries. Second, we consider the consequences for trade and capital flows (foreign direct investment) of the re-location of enterprises due to differential integration. Third, we analyse the welfare effects for insiders and outsiders from a dynamic viewpoint (that is, accounting for different growth regimes and the transition process). We find that, while outsiders always lose in welfare terms relative to insiders if transition is not accounted for, when transition is explicitly introduced it is possible for an outsider to perform better than the insiders. Hence, the model suggests that successful transition might provide a remedy against delayed accession to an integrated area.

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1. Introduction

In the past decade we observed an acceleration of Western European integration, while the transition countries of Central Eastern Europe have remained outside of an ever more integrated European Union (EU). Hence, a natural question to ask is whether the process leading, first, to the Internal Market and second, to the Economic and Monetary Union (EMU) has yielded an increase or a fall in inequality between the insiders and the outsiders (in our case, the countries of Central Eastern Europe). A related issue is whether a successful transition process can provide relief against the possible costs of exclusion for the outsiders.

In this paper, we use a spatial model of endogenous growth to run numerical simulations on the consequences of such differential integration within the European economic area. Three main aspects are analysed: first, we look at the impact of inclusion in, or exclusion from, the EU on the location of "advanced" industries in the European area. Second, we consider the consequences for trade and capital flows (foreign direct investment) of the re-location of enterprises due to differential integration. Third, we consider the welfare consequences for insiders and outsiders from a dynamic viewpoint (that is, also accounting for different growth regimes) and we simulate the effects of transition on welfare. We find that, while outsiders always lose in welfare terms *relative* to insiders if transition is not accounted for, when transition is explicitly introduced the results crucially depend on the growth regime. More precisely, if R&D spillovers are global and hence are not affected by the geographical location of firms, then it is possible for a transition outsider to perform better than the insiders are.

In the first step, we look at the composition of production (specialisation) and the location of firms in the integrated and the isolated regions. As a result of a re-phasing of trade barriers, new configurations of the economic space emerge with associated patterns of trade and investment flows. The movement of firms (and the associated pattern of capital flows) depend on the initial configuration of trade costs: we show that the percentage change in the share of firms located in the insiders is an inverse function of the initial degree of asymmetry, namely there are limits to spatial concentration due to the need to supply the outsider's market.

In the final step, we move to a dynamic set-up where income and welfare measures can be sensibly defined (over an infinite horizon). This step allows us to calculate real per capita income and welfare under several scenarios implying different rates of agglomeration, intertemporal preference and growth. Interestingly, we find that excluded countries can gain in absolute terms from a deepening of integration, but this does not prevent income divergence vis-à-vis the Single Market region when the transition process is not accounted for. We then look at the rate of growth implicit in different scenarios and at the impact of "transition" modelled as an improvement in overall productivity on localisation, trade and investment. Although the adopted definition of the transition process is naive, the simulations yield interesting results such as the possibility that the outsider's welfare gains outweigh those of the insiders.

Section 2 briefly describes the analytical structure, derived with a number of variations from a model by Manzocchi and Ottaviano (2001). This is a stylised model that does not claim to provide an adequate description of the complexity of actual economies; rather, it must be viewed as a heuristic device that can shed light on basic connections among economic variables. Within this framework, numerical simulations are useful to clarify some of the qualitative implications of policy changes, especially when we move towards a more complex underlying model featuring asymmetry across regions and the process of transition. Section 3 presents selected simulations run within a three-region framework. The exercises concern the composition of production (specialisation) and the location of firms under a re-phasing of trade barriers, with the emerging patterns of trade and investment flows; income and welfare comparisons under alternative scenarios and growth regimes; and finally the impact of transition on localisation, trade and welfare. Section 4 relates this paper to other strands of the literature on current European developments.

2. A stylised description of the underlying analytical model

The model is derived, with some variations, from Manzocchi and Ottaviano (2001). It builds on the results of 'new trade theory' (Helpman and Krugman, 1985) which allows for increasing returns to scale and imperfect competition. In particular, it relates to the literature on 'new economic geography' (Krugman 1991a, 1991b) which formalises the intuitive argument that, as frictional trade barriers due to the existence of protected national markets go down, one should expect firms in increasing-returns-to-scale sectors to relocate in the biggest national markets. Most results in this literature are derived in a simple setting in which firms can choose where to locate between only two countries or regions.

Drawing on the work by Martin and Ottaviano (1999), Manzocchi and Ottaviano (2001) address this issue in different terms. First, a three-country framework is adopted to study the effects of preferential integration on the international allocation of resources. Second, there is a step towards a dynamic setting in which resources are endogenously accumulated, rather than given forever: this is relevant when making welfare comparisons both for insiders and outsiders. Two main departures from the framework of Manzocchi and Ottaviano (2001) are examined here, which in our view add more reality to the model although at the price of more complexity. First, we perform numerical simulations of the welfare impact of integration starting from an initial *asymmetric* situation, where two regions are already more integrated relative to the third one: this is different from Manzocchi and Ottaviano (2001) where the effects of a process of preferential integration are evaluated starting from an initial symmetric situation. Second, we explicitly model the impact of "transition" on productivity, localisation and welfare, and perform a numerical analysis of the consequences of transition on discounted income levels in insiders and outsiders.

The model by Manzocchi and Ottaviano (2001) consists of two sectors, three countries (or regions) and two factors, internationally immobile labour and freely mobile capital, which is employed where its return is higher. The general result is that, when regional integration occurs, returns to capital become higher within the integrated area with respect to the isolated country (the 'outsider'). This will cause capital to leave the outsider to be invested in the insiders. This flow of investment will increase (reduce) the number of factories in the insiders (outsider). The outsider will therefore suffer from 'delocalisation'. In the presence of local (or national) technological spillovers, this short-term location effect can also have relevant effects on the long-run rate of growth (as well as on welfare).

Here is a list of the main assumptions underlying the model, more specific details are provided in the technical appendixes to this paper: a) there exist only two sectors, characterised respectively by perfect and monopolistic competition; b) trade costs and frictions only pertain to the monopolistic sector; c) capital only enters the production of the monopolistic sector, while the competitive good only requires labour; d) analytical results are derived under the assumption of initially symmetric countries, though this is clearly unrealistic in the case of West-East European relations; e) preferences are nested, with a higher level Cobb-Douglas function incorporating a lower level Dixit-Stiglitz function; f) saving decisions are not explicitly modelled, and capital accumulation is driven by the decision of firms to invest in innovation and the production of new blueprints (new varieties of the monopolistic good). Concerning the geographical allocation of production factors, Manzocchi and Ottaviano (2001) assume three identical countries with the same endowments of labour (L) and capital (N/3). Labour supply is fixed, while the process of capital accumulation is briefly reviewed in Section 1.3 and in the Appendix (A.2). The supply side consists of two highly stylised sectors, where entry and exit are free.

2.1 The 'traditional' sector

The first sector produces a homogeneous 'traditional' good with constant returns to scale (CRS) and perfect competition, using labour as the only input with a unit labour requirement equal to one. Furthermore, for analytical convenience, we assume no transaction costs of international trade in the traditional sector. This is clearly an oversimplification, but one that is commonly adopted in economic geography models; moreover, introducing trade costs in the traditional sector does not generally lead to qualitatively different results provided they are lower than in the advanced sector (see, Fujita et al., 1999, chapters 5 and 7).

Under these assumptions the traditional good will be priced at marginal cost. Given that only labour is used in its production and the unit input requirement is one, in each country the traditional good price will be equal to local wages. However free trade will ensure that the wage will be the same across countries as long as each country produces the traditional good. This will be the case if global demand of the traditional good cannot be satisfied by a single country alone that is henceforth assumed. Finally, by choosing labour as the numeraire, the price of the traditional good and wages will be equal to one in every country.

Of course, the last result is generally counterfactual and removes one of the relevant factors affecting firms' choice of location (wage differentials across regions). However, this simplification is useful in order to focus on other factors, namely transaction costs and economies of scale, that seem more relevant in those capital-intensive industries that attract the bulk of international direct investment.

2.2 The 'advanced' sector

The second sector supplies a horizontally differentiated 'advanced' good with increasing returns to scale (IRS) and monopolistic competition, using both labour and capital. Each variety of the differentiated good has a linear cost function (for further details, see Martin and Ottaviano, 1999, pp.285): variable costs are paid in terms of labour with a unit-input requirement equal to β. Fixed costs are paid in terms of capital whose unit-input requirement is set to one so that the number of active firms in a given location is equal to the capital endowment. Since a unit of capital is required to produce each variety, but the scale of production is determined by the input of labour, we have increasing returns to scale in the production of each variety. Assuming zero costs of product differentiation is enough to ensure a one-to-one relation between varieties and firms (hence capital) in each country, namely all scale effects work through the number of available varieties as in most of the 'new geography' models (see for instance Fujita et al., 1999, pp. 52).

The costs of undertaking international trade in the 'advanced' sector are modelled following Samuelson (1954) as 'iceberg' costs: to sell a unit of the differentiated good from one country to another more than one unit has to be sent. This 'erosion' is due to the resources absorbed by tariffs, transport and other transaction costs (for instance, insurance and foreign exchange costs). Let $\tau > 1$ be the number of units that has to be sent for one unit to arrive from one insider to another insider, and $\tau' > 1$ for trade from (to) an insider to (from) the outsider. It is as if $\tau - 1$ ($\tau' - 1$) units of the good melt away because of frictions: this is equivalent to assuming that trade costs are paid in terms of the transported good.

2.3 The working of the model: a non-technical exposition

Consumers in each of the three regions behave identically and spend constant shares of their income on the traditional and the advanced good. Moreover, their utility is enhanced if they consume the largest possible number of varieties of the IRS good. Over time, capital accumulation is driven by the introduction of new varieties of the differentiated good, invented in an R&D sector. R&D is a costly, perfectly competitive activity that produces new capital using labour as the only input: as there exists a one-to-one correspondence between the units of capital and number of available varieties of the differentiated good, capital accumulation and innovation coincide. The unit cost of innovation depends on a constant (η) but is decreasing in the number of existing varieties in the whole economy (global spillovers) or in each region (local spillovers). As the total cost of innovation must be equal to the discounted flow of operating profits from the introduction of new varieties, operating profits in equilibrium are proportional to η, but also to the share of capital in the innovating regions under local spillovers. Welfare is defined as discounted per capita income, in real terms. Nominal per capita income consists of labour income and dividends due to the ownership of capital (all operating profits are distributed): as we will see, what is relevant in the model is the evolution of the deflator of nominal income in the different regions (the "exact" price index), which crucially depends on the location of advanced firms and the associated configuration of trade costs.

The working of the model is centered on the idea of preferential, or discriminatory, integration. This means that two of the three regions (the insiders) decide to mutually lower the trade costs (τ) between them (including tariffs, non-tariff barriers, foreign exchange costs, and others) while the costs of trade from the excluded to the integrated area, and viceversa, (τ') remain constant or decline less than τ. In our view this simple parameter adjustment summarises, although in a rough way, the developments in the European region during the last decade, when the integration process between the members of the European Union has deepened with the completion of the Internal Market and the creation of the Monetary Union, while the transition countries of Central Eastern Europe have been excluded.

The consequences of preferential integration are far-reaching in this model. First, the localisation of advanced firms is affected: recall that trade costs only pertain to the advanced good, which is an extreme assumption but captures the idea that trade in oligopolistic, capital- and R&D-intensive sectors is overall affected more by trade barriers than is trade in traditional manufactures (we neglect agricultural goods). When trade costs between two regions decrease (at least in relative terms), it becomes more convenient for advanced enterprises to locate in those regions because the costs of exporting to any of the two declines while the costs of exporting to the excluded region (the outsider) stay constant (or decline to a lesser extent). This amounts to saying that returns to capital will be higher in the integrating regions, as capital is only employed in the advanced sector; it is also internationally mobile at zero cost, hence capital will flow out of the outsider towards the insiders, and a new geographical distribution of the advanced firms will prevail with a higher share of firms in the insiders than before. As we will see, however, there are limits to this process of agglomeration, as part of the output of the advanced sector must be sold in the outsider's market (recall that workers are immobile, hence nominal income and demand stay constant in the three areas) hence it will always be convenient for a number of firms to remain located in the outside region.

How does this affect the process of capital accumulation and welfare? Capital accumulation is unaffected if spillovers are *global*, as in this case the cost of innovation is invariant with the geographical distribution of advanced firms. On the contrary, if spillovers are *local* the cost of innovation declines in the insiders, all R&D activities move there (just a simplifying assumption) and capital accumulation and growth are fostered. As for welfare, one has to distinguish between residents in different regions. Residents in the insiders are positively affected in static terms, as their trade costs are reduced for two reasons: they pay less for their imports from the integration partner, and they import a large share of the advanced goods from the partner as more firms have relocated there. For this last reason, the outsider is damaged (it imports more than before from the insiders, and we assume for simplicity that τ' stays constant). The nature of the dynamic effects on welfare is the same for residents in each region: if spillovers are local, there is a negative effect on the value of outstanding capital and a positive effect on the rate of growth. With global spillovers, no dynamic effect of localisation on welfare occurs. Hence, welfare variations always benefit the insiders in *relative terms*: they either gain more or lose less than the outsider. Note that this amounts to *divergence* in real per capita discounted income between insiders and outsiders.

How can transition affect these findings? If successful transition is modelled as a "neutral" increase in labour productivity across sectors, it amounts to an increase in the efficiency units associated with the labour force of the outsider. This has two effects: first, welfare rises in the outsider because workers are becoming more productive. Second, the dimension of the outsider's domestic market rises along the transition path, hence some of the re-location effect described above works in the opposite direction as more firms will find it convenient to move to the excluded region. If one combines the impact of transition with that of exclusion, the number of possible outcomes increases, and even more so if one distinguishes between global and local R&D spillovers: in the first case, transition has no effect on the growth rate through the re-location process; in the second case, the specific impact of transition on the growth rate is negative, as the cost of innovation increases when part of the advanced industry moves to the outside region. Hence, transition has a two-fold effect on welfare in the outsider. In static terms it unambiguously increases per-capita incomes and in this sense the outsider can gain in *relative* terms with respect to the insiders (see Section 2.2). In dynamic terms, however, transition may either leave the growth rate unaffected (global spillovers) or may lower it (local spillovers). We now proceed to discuss in more detail the simulation of various integration scenarios.

3. Numerical simulations in a three-region set-up

3.1 Localisation of advanced-sector firms under initial symmetry or asymmetry: trade and foreign investment patterns

In this stylised economy the impact of regional integration is modelled as a one-off reduction in the frictional costs of trade between the insiders. Starting from the initial situation where all countries face the same obstacles to trade, one can show that regional integration between the two insiders induces a capital flow from the outsider to the insiders, so that the number of advanced-sector firms increases in each of the insiders and falls in the outsider. The intuition is the following. As transaction costs fall inside the integrating area, consumers there demand more of the now cheaper insider products and less of the now more expensive outsider products. As a result, at the initial symmetric situation, an insider's firms start enjoying higher returns to capital than outsider's firms. This triggers capital flows towards the integrated area that cause firms' death in the outsider and birth in the insiders.

As far as the impact of trade costs on localisation of "advanced" enterprises is concerned, the message of the model is then straightforward: a reduction in trade costs within the integrated area leads to an increase in the share of firms located there. As mentioned above, this is due to a *home market* effect that is to the advantage incurred by firms in operating within the integrated market once internal trade costs are reduced. In terms of European dynamics, this means that the speeding up of EU integration in the late eighties and the nineties has made it more convenient for firms in the IRS sectors to locate in the EU rather than in CEECs.

We now proceed with the stylised numerical simulations starting from an initial symmetric scenario in which trade costs are the same across the three regions ($\tau = \tau' = 1.15$). Under this assumption, γ, reflecting the location of firms, is initially one third in each of the three regions but one can check that the derivative of γ to δ (an inverse function of trade costs in the integrated area) is positive, meaning that a reduction of exchange obstacles inside the EU leads to a rise in the share of firms which choose to localise there. For instance, if the elasticity of substitution among varieties equals 5, the elasticity of γ with respect to δ is 1.78, meaning that a 2 percent reduction in trade costs approximately leads to a 1.78 percent increase in the share of firms in the integrated region (Table 1).

Patterns of trade and capital flows (or, which is equivalent here, direct investment) are consequentely affected. The above findings also provide a measure of the capital outflow away from the isolated region implicit in a reduction of trade costs within the EU: as the stock of capital is equivalent to the number of firms in this setting (one unit of capital is required in order to start a firm: see section 1.2), there is an outflow of capital of 1.78 percent of the initial stock from the CEECs in response to a reduction of 2 percent in trade costs within the EU. As trade patterns are concerned, the EU becomes a net exporter of the advanced good to the CEECs, while the latter become a net exporter of the traditional constant-return-to-scale good. Let us now turn to a more detailed description of the results of sensitivity analysis conducted on the two scenarios. Table 1 shows the value of γ, of its derivative and of ε, the elasticity of γ with respect to δ, for different values of σ under the symmetric scenario.

Table 1. Symmetric scenario

	γ	$\partial\gamma/\partial\delta$	ε
$\sigma = 5$	0.333	1.039	1.782
$\sigma = 8$	0.333	0.322	0.363
$\sigma = 10$	0.333	0.185	0.158

Looking at the effects of different values of σ entails analysing how the results in terms of the distribution of firms and capital endowments are affected by a change in the monopolistic power of enterprises (more or less substitutability across varieties of the advanced good), which is equivalent to a change in the degree of economies of scale. Our results show that the consequences of preferential integration on the geographic allocation of firms are weaker when σ is larger, hence when more competition across varieties occurs. When σ equals 10, a 2 percent reduction in transaction costs among partners only leads to a change in the share of firms located in the integrated area of 0.158 percent.

However, the larger the initial asymmetry in trade costs the lower the additional effect of preferential integration on γ. This will be confirmed by the simulations run under the *asymmetric* scenario. Assuming that initial trade costs equal 5 percent of value added across partners but 25 percent of value added between partners and the outsider, the elasticity of γ with respect to δ falls to 0.26

instead of 1.78 under symmetry. Why is this? The answer is that there are limits to the geographical concentration of advanced firms, since selling to the outsider from abroad can become very costly. In other words, there is a force that pushes in the direction of locating some firms in the outsider's market. Tables 2 and 3 look at the asymmetric scenario.[1]

Table 2. Asymmetric scenario: Case 1

$\tau = 1.05$ $\tau' = 1.1$	γ	Ää	ε
$\sigma = 5$	0.553	66.075%	1.624
$\sigma = 8$	0.435	30.553%	0.597
$\sigma = 10$	0.401	20.51%	0.358

Table 3. Asymmetric scenario: Case 2

$\tau = 1.05$ $\tau' = 1.25$	γ	Ää	ε
$\sigma = 5$	0.429	28.688%	0.26
$\sigma = 8$	0.368	10.406%	0.081
$\sigma = 10$	0.352	5.855%	0.043

One can check that γ always starts from values larger than one third: increasing returns in the advanced sector lead to agglomeration and move firms and capital toward the integrated area. Comparing Tables 2 and 3 one can note that, for a given σ, greater initial asymmetry weakens the *additional* impact of preferential integration on γ. When initial trade costs equal 5 percent of value added among partners and 25 percent between the integrated area and the outsider (case 2), the elasticity å of ã with respect to ä declines to 0.26 from 1.782 in the symmetric case, and from 1.624 in conditions of less pronounced asymmetry (case 1).

Moreover, beyond the effect of the *degree* of asymmetry in trade barriers between insiders and outsider, a key role is played by the *absolute* level of transaction costs among regions. One can check in Table 4 that for a given *degree* of asymmetry (the same difference between ô and ô'), the geographic concentration of advanced firms in the integrated region is a negative function of ô'. The economic intuition is that rising costs of exchange from the integrated to the isolated region lead more firms to remain in the outsider, hence to a lower ã.

Table 4. Localisation and the level of transaction costs

	ã	Ä ã

[1] In Tables 2, 3 and 4, Ää equals (ã-0.333)/0.333 and is a measure of capital outflows from the isolated region relative to the symmetric situation.

ô	1.01	ô’	1.21	0.474	42.205%
ô	1.05	ô’	1.25	0.429	28.688%
ô	1.1	ô’	1.3	0.394	18.368%

Moving back to Table 3, one can see that for ó equal to 10 our measure of capital outflow from the isolated region (i.e. Äã) is much lower than in Table 2: we move from 20.5 to 5.8 percent. Despite the gap in trade costs being very high (20 percentage points), the outflow of firms is reduced to about one quarter: such a large ô’ limits market access in the outsider for those firms located in the integrated area. Hence, agglomeration of advanced activities finds an endogenous limit in our simulations. Note that Table 2 has a peculiar feature: when ó equals 5, ã is larger than 0.5. As ã is the share of firms localised in each of the two identical partners, ã should range from 0 to 0.5. This apparently abnormal result only means that all advanced firms move to the integrated area: any value of ã exceeding 0.5 simply denotes the approaching of the upper bound.

The main insights of this section are:

i) the creation, or deepening, of an integrated area pushes some firms of the advanced sector to localise in the included regions, and to move out of the excluded areas. This re-location is equivalent to a capital outflow from the excluded region;

ii) the phenomenon of firm re-location is more intense the stronger are economies of scale or – which is equivalent – the greater the degree of market power in the advanced sector;

iii) nonetheless, there are limits to the concentration of firms in the integrated region due to the mere existence of trade barriers, which make it convenient for some firms to locate within the excluded area.

What does this tell us about EU-CEECs patterns? First, opening to trade and capital flows with a large region which has become more integrated during the eighties and nineties means that a share of advanced firms moved out of CEECs at the beginning of transition, or in other words that some capital flowed out of Central Eastern Europe. Notice that firms do not have to “physically” move, but they can be shut down in CEECs while their domestic markets are increasingly supplied by EU-located producers. In terms of trade patterns, this is consistent with the increasing specialisation of CEECs in “traditional” CRS manufacturing, which is usually labour intensive (see Ferragina, 2000). Next section looks at the impact of differential integration on income and welfare in both regions.

3.2 Welfare effects, growth regimes and the impact of transition

The parameter values adopted in this Section are chosen according to two criteria, to preserve the general balance of the simulations and to keep some parameters within a "realistic" range. First, we show the welfare simulations relative to initial *asymmetric* scenarios, as this is more realistic when compared with the European stage at the beginning of the 1990s (relatively less trade barriers within the EU). Second, we ensure that the interplay of the parameter values yields: a) a realistic value of the real growth rate, ranging from zero to seven percent; b) some consistency between the shares of national income accruing to wages and operating profits (about five to one, and including the returns to human capital – not explicitly modelled - into the wage share); c) a proportion γ of firms localised in each of the two insiders below 0.5. The elasticity of substitution among varieties of the differentiated good ranges from 2.5 to about 3, a value associated with strong market power but needed to keep the profit share reasonably high. A consumption share of about 0.3 for the IRS good is often suggested in the "new economic geography" literature (see for instance Fujita et al., 1999). Moreover, ### $\leq$ 1/3 is a sufficient condition to avoid *complete* specialisation in the advanced sector of any of the three regions: this is a useful parameterisation to adopt, as complete specialisation in the advanced sector would mean that the wage rate in the specialising region is no longer tied to its level in the traditional sector (which is fixed and set equal to one for simplicity).

The rate of intertemporal preference (ρ) ranges between 0.06 and 0.15. A value of 0.06 is considered a benchmark reference both in the growth literature (see Barro and Sala-i-Martin, 1995) and in the literature on the welfare consequences of transition in Eastern Europe (see, for instance, Piazolo, 1999), while the upper bound of 0.15 can be considered realistic especially for transition countries starting from low levels of per capita income. Exchange costs range from 15 to 45 percent of the f.o.b. value of the merchandise traded and are slightly biased towards the upper bound of the range reported in the literature (Fujita et al., 1999; Martin and Ottaviano, 1999). More information on trade costs in *different industries* can be found for instance in Forslid et al., 1999: here all we need to assume here is that labour intensive CRS industries are associated with *lower* trade barriers than capital intensive IRS sectors, where "barriers" include both tariff and non-tariff ones (technical regulations being an important item under the last heading: see Brenton et al., 2000). As far as the values of η, the cost of expenditure in R&D, and L are concerned we found no clear references in the literature; hence, they are set in order to obtain a balanced outcome from the simulations. In particular, η ranges from 12 to 18 (approximately, as in Martin and Ottaviano, 1999) and L from 8 to 11.

Table 5 reports the key findings of our welfare and growth simulations. We believe that the asymmetric case is the most interesting and realistic to investigate, as it corresponds to an initial condition in which the degree of integration of Central Eastern Europe with the EU was much lower than the degree of integration within the EU. The first row of Table 5 provides the benchmark values for six parameters, plus the baseline value for L in both the insiders (Lin) and the outsider (Lte). The other columns provide the simulation model's outcome for global operating profits ($N\pi$), the growth rate under local spillovers (g), the initial share of firms in each insider (γ) (recall that global labour income is given by 3L). Furthermore, Table 5 provides four different measures of welfare change: dV1, the change in per capita welfare in the insiders, and dV2, the change in per capita welfare in the outsider under local spillovers but without the transition effect; dV3, the change in per capita welfare in the outsider under local spillovers but taking account of the *transition* effect; and dV4, the change in per capita welfare in the outsider with the transition effect under *global* spillovers.

The baseline simulation in the first row of Table 5 is consistent with a growth rate of 3 percent (under local spillovers) and with a ratio of the wage to the profit share ($3L/N\pi$) of about 7. In terms of welfare changes it yields the following results: if we assume only a marginal reduction in trade costs within the integrated area, without the transition effect, personal welfare rises in the insiders (dV1 is positive) and in the outsider as well (dV2 is positive), but dV2 is much lower hence the gap between included and excluded regions widens. Therefore, even if it gains in absolute welfare terms from the creation of an integrated area, the outsider loses in *relative* terms with respect to the members of the economic and monetary union. Therefore, in this case we observe *absolute* divergence in per capita discounted income between insiders and outsiders. This could bear potentially heavy consequences in terms of future accession of an outsider into the single-market area, as further enlargements might involve large redistributions of income and welfare between old insiders and newcomers.

In this sense, successful transition might mitigate the drawbacks of exclusion or delayed accession to the integrated area (the EU in our argument). This would be consistent with evidence on Central Eastern Europe in the nineties, which show that the countries that advanced more along the transition path attracted more foreign direct investment on a per capita basis (see EBRD, 1999). Moreover, a significant component of real income convergence under transition is explained in the model by an improvement in the terms of trade, and this is coherent with the data showing that the terms of trade improved along with successful transition in Central Eastern Europe during the 1990s (see Manzocchi and Ottaviano, 2001). However, our simulations show that a positive effect of transition on the outsider's welfare is more likely to occur under *global*, *not local*, spillovers: in fact, while dV3 is almost always lower than dV2, dV4 – the change in outsider's welfare with the transition effect under global spillovers – is larger than dV3. How does this occur? Transition positively affects welfare in the outsider both directly (through a rise in labour productivity) and indirectly (through a re-localisation of firms towards the integrated area); however, under local spillovers, the localisation effect *reduces* the growth rate as this is a positive function of γ, and successful transition lowers γ (see the Appendix). On the other hand, under global spillovers the growth rate is invariant with respect to localisation, hence the outsider unambiguously gains in welfare terms from a successful transition process.

Indeed, one can check that the simultaneous effects of preferential integration and transition always lead to a positive impact on the outsider's welfare under global spillovers (dV4 is always positive), while under local spillovers we find that the outsider can lose in absolute terms when transition has a strong negative impact on the growth rate (a negative dV3). In particular, this occurs if scale economies are extremely relevant (low σ), if innovation costs are modest (low η) and if intertemporal discount is moderate (low ρ); if this holds, transition is an obstacle for even more agglomeration of the advanced sector, hence it raises the cost of innovation and lowers the growth rate in a situation when future income is not so heavily discounted. As a matter of fact, negative values of dV3 are often associated with high growth rates under local spillovers, therefore transition exerts a strong negative effect on accumulation and welfare.

Not surprisingly, a reduction in trade costs in the integrated area produces larger positive effects on welfare in the insiders (dV1) and the outsider (dV2) when trade costs are initially higher within the area (see the second and third rows from the bottom of Table 5): this is due to the diminishing marginal effect of trade integration on γ, already described above. Strong welfare effects also correspond to the situations where increasing returns to scale are more powerful (low σ).

Finally, the last row of the table illustrates an interesting case. First, preferential integration *reduces* welfare in all regions under local spillovers, as the growth rate is very low (0.3 percent) and does not compensate for the negative firm's value effect (see the Appendix). Second, under this parameterisation we find that transition under local spillovers makes it possible for an outsider to reduce the relative income gap vis-à-vis the insiders: although negative, dV3 is close to zero in this case while dV1 has a larger negative value, therefore the relative welfare situation of the outsider improves.

4. Conclusions and comparisons with the existing literature

The purpose of this study is to analyse by numerical simulations the impact of preferential integration and transition on the localisation of economic activities, trade specialisation, capital flows and welfare in those regions included in, and those excluded from, a trade and monetary agreement. As Europe has undergone a decade of intense integration on its Western side, while at the same time the Central Eastern transition economies have remained excluded from the EU, a natural question to ask is whether these phenomena have led to more or less regional inequality.

Following Manzocchi and Ottaviano (2001), we find that preferential integration leads to a re-location of advanced enterprises and of capital from the outsider region (Central Eastern Europe) to the EU, and that trade specialisation in the excluded area shifts towards "traditional" CRS products that are relatively labour intensive. In the presence of local innovation spillovers, agglomeration is however conducive to economic growth, and this effect is greater the more intense is market power in the IRS sector and the more important is the "advanced" good in regional consumption baskets. As the dynamic growth effect also benefits the outsider, welfare might increase in CEECs as a consequence of EU integration, although we provide a number of simulations where the opposite happens.

Notice however that, even if it gains in absolute welfare terms from the creation of an integrated area, the outsider often loses in *relative* terms with respect to the members of the economic and monetary union. This is true both in welfare and in real-income terms, and has potentially heavy consequences as it suggests that piece-wise integration generates divergence between insiders and outsiders: this in turn makes the future accession of an outsider more problematic, as further enlargements could involve large redistributions of income and welfare between old insiders and newcomers.

We also look at the rate of growth implicit in the different scenarios, and at the impact of "transition" modelled as an improvement in overall productivity on localisation, trade and investment. Although the adopted definition of the transition process is naive, the simulations yield interesting results such as the possibility that the outsider reduces its *relative* welfare gap vis-à-vis the insiders. Moreover, transition unambiguously benefits the outsider in *absolute* terms when R&D spillovers are global, namely when the growth rate is not affected by the spatial allocation of advanced firms: if this is the case, successful transition drives a higher share of firms towards the outsider, but this does not raise the cost of innovation.

Being centered on "exclusion" from the EU, our contribution differs both from the analytical studies on the consequences of the Eastern enlargement (see for instance Baldwin et al., 1997; Piazolo, 1999; Paramithiotti, 1999), and from the descriptive literature on the transition progress in CEECs (Stern, 1998; Nsouli, 1999; EBRD, 1999) or their path towards EU accession (Temprano-Arroyo and Feldman, 1999). We use a peculiar instrument (a simulation model of spatial endogenous growth) that allows us to draw some insights on the consequences of exclusion and successful transition for the countries of Central Eastern Europe. In this sense, our analysis is complementary with respect to the above-mentioned strands in the literature, as it does not stress either the effects of enlargement or the compliance with accession requirements. On the one hand, it underlines the costs of exclusion for CEECs in terms of income divergence from the EU, and the potential dangers of a delayed (or "sequential") enlargement process associated with relative income redistribution among European regions. On the other hand, it suggests that successful transition can provide a remedy against exclusion from the EU as it can narrow the income gap of an outsider vis-à-vis the insiders.

Table 5. Welfare and growth simulations with or without transition effects: Base-line asymmetric case and alternative scenarios

τ	τ’	σ	α	η	ρ	Lin=Lte	Nπ	dV1	DV2	dV3	dV4	g	γ
1.25	1.45	2.5	0.32	16	0.10	11	4.684	2.388	0.191	0.013	0.140	0.030	0.445
-	-	2.2	-	-	-	-	5.279	5.538	2.459	-0.067	0.176	0.060	0.486
-	-	2.5	-	12	-	-	4.569	3.995	1.798	-0.039	0.140	0.070	0.445
-	-	-	-	-	0.15	-	4.741	1.187	-0.287	0.02	0.094	0.026	0.445
-	-	-	-	-	0.10	9	3.801	2.853	0.656	-0.039	0.164	0.041	
													0.445
-	-	-	0.325	15	-	11	4.728	2.863	0.632	-0.0006	0.143	0.040	0.445
-	-	-	0.3	-	-	-	4.364	2.222	0.162	0.012	0.132	0.030	0.445
-	1.35	-	0.32	16	-	-	4.692	3.694	0.356	-0.02	0.140	0.028	0.437
-	1.45	2.6	0.325	18	-	-	4.642	1.467	-0.564	0.038	0.134	0.012	0.435
1.40	-	2.9	-	15	0.06	10	3.647	6.169	1.460	-0.052	0.202	0.026	0.354
1.35	1.45	2	-	-	0.10	8	4.456	9.637	2.949	-0.278	0.271	0.030	0.438
1.15	1.2	2.9	0.32	-	0.09	-	2.966	-0.448	-4.131	-0.038	0.156	0.003	0.469

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Technical Appendix

A.1 Preferences, pricing and the equilibrium location of firms

The building blocs of the simulation model are derived from Manzocchi and Ottaviano (2001). Consumers' preferences are nested C.E.S. (Dixit and Stiglitz, 1977):$U = D^{a} Y^{1-a}$

$$D = \left[\sum_{i=1}^{N(t)} D_i^{\frac{s-1}{s}} \right]^{\frac{s}{s-1}} \qquad (1)$$

where σ > 1 is the elasticity of substitution between any two varieties and the elasticity of demand for each variety of the advanced good, D_i is the consumption of the i^{th} variety, D is the C.E.S. quantity index or aggregator, Y is the consumption of the traditional good and 0 < α <1 is the share of expenditure devoted to the differentiated good.

Because of monopolistic competition the varieties of the differentiated good will be priced according to the standard mark-up rule over marginal costs:

$$p = \frac{bs}{s-1} \qquad (2)$$

where p is the domestic price of any variety and we have used the fact that, as stated before, the price of the traditional good (and, thus, the wage rate) is constant and equal to one in each country. With free entry and exit, profits have to be zero in equilibrium. Together with free international capital mobility, this determines the worldwide return to capital, say π, as the residual value of sales after labour costs (i.e. operating profits):

$$p = \frac{bx}{s-1} \qquad (3)$$

where x is the scale of production, i.e., the output of each variety, which is therefore the same for all firms no matter where they are located.

In equilibrium the supply of each variety must equal its demand (inclusive of trade costs). For an insider this means:

$$x = \frac{a(s-1)}{bsN} \left[\frac{(1+d)EL}{(1+d)g + d'(1-2g)} + \frac{d'EL}{2d'g + (1-2g)} \right] \qquad (4)$$

where the two terms inside the brackets come respectively from insiders' and outsider's demand, $\delta \equiv \tau^{1-\sigma}$ and $\delta' = \tau'^{(1-\sigma)}$ are inverse functions of the trade costs, and $\gamma \equiv n/N$ is the share of advanced firms located in one of the identical insider countries. A similar condition holds for the ousider:

$$x = \frac{\alpha(\sigma - 1)}{\beta \sigma N}\left[\frac{2\delta' EL}{(1+\delta)\gamma + \delta'(1-2\gamma)} + \frac{EL}{2\delta'\gamma + (1-2\gamma)}\right] \qquad (4)'$$

Equations (4) and (4)' can be solved together for x and γ to find their equilibrium values. As to the scale of production (x) , this yields:

$$x = \alpha L \frac{\sigma - 1}{\beta \sigma}\frac{3E}{N} \qquad (5)$$

which, given (2), shows that global 'advanced' revenues (Npx) equal the 'advanced' share, α, of total world expenditures, 3LE: that is $Npx=3\alpha LE$. Moreover, given (3), it implies that the world rate of return on capital is $\pi = 3\alpha LE/(\sigma N)$. As to the equilibrium location of firms, the analytical solution of equations (4) and (4') yields:

$$\gamma = \frac{(1-2\delta'+\delta) - \delta'(1-\delta')}{3(1-2\delta'+\delta)(1-\delta')} \qquad (6)$$

A.2 The dynamics of the model and the transition effects

To analyse the implications for long-run growth, the analytical framework must be enriched to allow for ongoing capital accumulation. Manzocchi and Ottaviano (2001) assume that the typical consumer maximises an intertemporal utility function, which is equal to the discounted flow of instantaneous utility. Such instantaneous utility is modelled as a monotone transformation of that in equation (1). Assuming unit elasticity of intertemporal substitution, the intertemporal utility function is:

$$U = \int_0^{\infty} \log D(t)^{\alpha}\, Y(t)^{1-\alpha}\, e^{-\rho t}\, dt \qquad D(t) = \left[\sum_{i=1}^{N(t)} D_i(t)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \qquad (7)$$

where, apart from the introduction of the time variable t and the rate of time preference ρ, the definitions of the other variables and parameters are the same as before.

The main differences come from the supply side. Drawing on Grossman and Helpman (1991), accumulation of capital is assumed to take place through R&D modelled as a costly, perfectly competitive activity that produces new capital using labour as the only input. Entry and exit are free in the R&D sector. The labour unit input requirement in R&D is η divided by N in the case of global spillovers, or divided by γN in the case of local spillovers.

This specification of the mechanics of accumulation does not affect the instantaneous ('short-run') dimension of the model hence all the above results apply. As to the solution of the dynamics, it can be noticed that this model is essentially a so-called 'AK-model' and therefore jumps immediately to a steady growth path. Along this equilibrium path, both the global and the national capital stocks grow at a constant rate (g) and location (γ) does not change. Since all the future of this economy is embedded in the initial value of a unit of capital (v_0), to find g one has to solve the following system under the assumption of a constant growth rate of N:

$$v_0 = \int_0^\infty p \, e^{-rt} dt \qquad (8)$$

$$v_0 = \frac{h}{g \, N_0} \qquad (9)$$

$$3EL = 3L + \frac{rh}{g} \qquad (10)$$

The first equation states that the value of a unit of capital is equal to the discounted flow of the operating profits of the corresponding firm. The second is the zero-profit condition in the R&D sector: the returns from and the cost of R&D have to be equal in equilibrium. The third equation states that total expenditure is equal to total factor permanent income. Together with (3) and (5), these three equations imply that the equilibrium rate of growth of N is:

$$g = \frac{3L}{h} \frac{a}{s} g - \left(\frac{s - a}{s} \right) r \qquad (11)$$

where γ is the equilibrium location of firms (see equation 6). *Note that equations (9), (10) and (11) hold under local spillovers, while one has to set g equal to 1 under global spillovers.*

Equation (11) re-states a standard result (see Grossman and Helpman, 1991) according to which the equilibrium growth rate is increasing in the world stock of labour (3L), the expenditure share of the differentiated good (α) and the degree of increasing returns to scale (a negative function of σ as already argued), while it is decreasing in the cost of innovation (η) and the rate of time preference ρ.

As far as welfare analysis is concerned, the chosen welfare measure is the present value of indirect utility flows in an insider (V) or in the outsider (V*). Instantaneous indirect utility is equal to the logarithm of factor incomes divided by the relevant ('exact') price indexes that correspond to the instantaneous utility function (equation 1) (more on this in Manzocchi and Ottaviano, 2001). Differentiating V and V* with respect to δ starting from an initial situation of perfect symmetry in which $\tau = \tau'$ so that $\delta = \delta'$, one obtains:

$$\frac{\partial V}{\partial \delta} = \frac{1}{\rho}\left[-\frac{3\rho\eta}{[L+\rho\eta]}\frac{\partial \gamma}{\partial \delta} + \frac{\alpha}{\sigma-1}\frac{1}{1+2\delta} + \frac{\alpha}{\sigma-1}\frac{3(1-\delta)}{1+2\delta}\frac{\partial \gamma}{\partial \delta} + \frac{3\alpha^2 L}{\eta\sigma\rho(\sigma-1)}\frac{\partial \gamma}{\partial \delta}\right] \qquad (12)$$

$$\frac{\partial V^*}{\partial \delta} = \frac{1}{\rho}\left[-\frac{3\rho\eta}{[L+\rho\eta]}\frac{\partial \gamma}{\partial \delta} - \frac{\alpha}{\sigma-1}\frac{6(1-\delta)}{1+2\delta}\frac{\partial \gamma}{\partial \delta} + \frac{3\alpha^2 L}{\eta\sigma\rho(\sigma-1)}\frac{\partial \gamma}{\partial \delta}\right] \qquad (12)'$$

where we substituted for the value of g given by (11). *Equations (12) and (12') hold under local spillovers, while under global spillovers the first and last terms in both equations disappear.*

The four terms on the right hand side of (12) are respectively: (i) the 'firm's value effect' by which relocation in the presence of spillovers negatively affects the value of the initial stock of capital; (ii) the (direct) 'trade cost effect' by which integration reduces the prices of imported varieties from the insider for a given spatial distribution of firms; (iii) a positive 'relocation effect' by which, for given prices, integration shifts firms towards the insiders decreasing their price indexes (while increasing that of the outsider); (iv) the 'growth effect' by which integration through relocation affects the speed of invention. In equation (12'), the terms are respectively: (i) the firm's value effect; (ii) a negative relocation (or 'delocalization') effect; (iii) the growth effect. The outsider is not *directly* affected by a transaction-cost reduction occurring between the insiders.

Equations (12) and (12') are cumbersome. Nonetheless two analytical results can be readily assessed. First, since $\partial V/\partial\delta$ is always larger than $\partial V^*/\partial\delta$, if an integration process is welfare-improving for the outsider a *fortiori* it is has to be welfare-improving for the insiders. In other words, it is always the insider that gains more from integration. Second, all the rest being constant, one can see that the outsider gains if the initial level of trade frictions (τ) is low enough and if returns to scale are strong enough (low σ). Consequently the overall effect of integration on the outsider's welfare can be positive even without the transition effect, but the outsider unambiguously loses in relative terms vis-à-vis the insiders.

Finally, we explore in the simulations the possibility that a successful transition process might mitigate the adverse effect of differential integration for the outsider. The Manzocchi-Ottaviano (2001) model assumes that, because of inefficiencies and rent-seeking activities, unit labour productivity is proportionally smaller in CEECs relative to the market economies of the EU in both productive sectors. Successful transition leads to the progressive removal of these sort of inefficiencies, which is equivalent to assuming that the size of the workforce in the transition economy (L^{TE}) would expand if all distortions were eliminated. This would improve the outsider's welfare directly and also through a locational effect.In analytic terms, the impact of transition on firms' location under an initial symmetric situation (γ=1/3) is given by equation (13):

$$\frac{\partial \gamma}{\partial L^{TE}} = -\frac{1+\delta-2(\delta')^{2}}{(1-\delta')(1+\delta-2\delta')}\left[\frac{L^{INS}}{\left(2L^{INS}+L^{TE}\right)^{2}}\right] < 0 \qquad (13)$$

where L^{INS} is the dimension of the economy of an insider. Successful transition, through its effect on efficiency hence on the size of the labour force leads to a new distribution of firms with more varieties of the differentiated good now produced in the outsider, TE. This in turn implies that per capita real income increases in the outsider *beyond* the rate involved by the pure efficiency gain: in other words, the transition process involves faster convergence of the TE in this model with respect to a 'benchmark' situation of non-increasing-returns-to-scale technologies. This is due to the enlargement of the domestic market that triggers capital inflows and a relocation of firms in the 'advanced' sector. However, as localisation also affects the growth rate under *local* innovation spillovers, one must also consider this dynamic component of welfare change associated with transition. Note that while all these analytic results are derived under initial symmetry (τ equals τ'), we only refer to the simulations run under the initial asymmetric situation in Table 5.

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TRANSITION WITHOUT ACCESSION:
THE EFFECTS OF DIFFERENTIAL INTEGRATION ON TRADE AND WELFARE IN EUROPE

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Transition without Accession: The Effects of Differential Integration on Trade and Welfare in Europe

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Abstract

In the past decade we observed an acceleration of Western European integration, while the transition countries of Central and Eastern Europe have not yet become members of the EU. In this paper, we conduct numerical simulations of the consequences of such differential integration within the European economic area using a spatial model of endogenous growth. Three main aspects are analysed: first, we consider the consequences for trade and capital flows (foreign direct investment) of the re-localisation of "advanced" industries due to differential integration. Second, we simulate the welfare effects of inclusion and exclusion for both insiders and outsiders from a dynamic viewpoint (that is, accounting for different growth regimes associated with local or global R&D spillovers). Third, we measure the impact of transition, modelled as an improvement in labour productivity, in this context. Transition partially counterbalances the effects of exclusion for the outsider, insofar as it provides it with a larger domestic market. However, transition can be detrimental for the integrated area (the EU) as long as Central and Eastern European countries remain excluded. Fully-fledged enlargement is a pre-condition for sharing the benefits of economic reform across all regions.

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Transition without Accession: The Effects of Differential Integration on Trade and Welfare in Europe

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Introduction

In the past decade we observed an acceleration of Western European integration, while the transition countries of Central Eastern Europe have remained outside of an ever more integrated European Union (EU). Hence, a natural question to ask is whether the process leading, first, to the Internal Market and second, to the Economic and Monetary Union (EMU) has yielded an increase or a fall in inequality between the insiders and the outsiders (in our case, the countries of Central Eastern Europe (CEE)). A related issue is whether a successful transition process in CEE can provide relief against the possible costs of exclusion for the outsiders.

In this paper, we use a spatial model of endogenous growth to run numerical simulations on the consequences of such differential integration within the European economic area. Three main aspects are analysed: first, we consider the consequences for trade and capital flows (foreign direct investment) of the re-localisation of "advanced" industries due to differential integration. Second, we simulate the welfare effects of inclusion and exclusion for insiders and outsiders from a dynamic viewpoint (that is, accounting for different growth regimes associated with local or global R&D spillovers). Third, we measure the impact of transition – modelled as an improvement in labour productivity – in this context. Transition counterbalances the effects of exclusion for the outsider, insofar as it provides it with a larger domestic market.

In the first step, we look at the composition of production (specialisation) and the location of firms in the integrated and the isolated regions. As a result of a re-phasing of trade barriers, new configurations of the economic space emerge with associated patterns of trade and investment flows. The movement of firms (and the associated pattern of capital flows) depend on the initial configuration of trade costs: we show that the percentage change in the share of firms located in the insiders is an inverse function of the initial degree of asymmetry, namely there are limits to spatial concentration due to the need to supply the outsider's market.

In the second step, we move to a dynamic set-up where income and welfare measures can be sensibly defined (over an infinite horizon). This allows us to calculate real per capita income and welfare under several scenarios implying different rates of agglomeration and inter-temporal preference, as well as different costs of innovation.

In the final stage, we look at the welfare impact of transition for both outsiders and insiders, providing a joint evaluation of the consequences of differential integration and successful economic reform. "Transition" is modelled as an improvement in overall productivity and, although the adopted definition of the reform process in CEE is perhaps naive, the simulations yield a number of interesting results. Transition always improves the relative welfare performance of the outsider vis-a-vis the insiders, while as far as absolute welfare changes are concerned, the outsider clearly benefits under global R&D spillovers. Under local spillovers the outsider only gains when the growth effects on welfare, which are negative in this case as transition leads to less agglomeration, are limited. However, transition can be detrimental for the integrated area (the EU) as long as CEE remains excluded: fully-fledged enlargement is a pre-condition for sharing the benefits of economic reform across all regions.

The paper is organised as follows. Section 2 briefly describes the analytical structure, derived with a number of variations from a model by Manzocchi and Ottaviano (2001). This is a stylised model that does not claim to provide an adequate description of the complexity of actual economies; rather, it must be viewed as a heuristic device that can shed light on basic connections among economic variables. Within this framework, numerical simulations are useful to clarify some of the qualitative implications of policy changes, especially when we move towards a more complex underlying model featuring asymmetry across regions and the process of transition in CEE. Section 3 presents selected simulations run within a three-region framework. The exercises concern the composition of production (specialisation) and the location of firms under a re-phasing of trade barriers and the emerging patterns of trade and investment flows; income and welfare comparisons under alternative parameter sets and growth regimes; and finally the impact of transition on localisation, trade and welfare. Section 4 relates this paper to other strands of the literature on current European developments.

1. A stylised description of the underlying analytical model

The model is derived, with some variations, from Manzocchi and Ottaviano (2001). It builds upon the results of 'new trade theory' (Helpman and Krugman, 1985) which allows for increasing returns to scale and imperfect competition. In particular, it relates to the literature on 'new economic geography' (Krugman 1991a, 1991b) which formalises the intuitive argument that, as frictional trade barriers due to the existence of protected national markets go down, one should expect firms in increasing-returns-to-scale sectors to relocate in the biggest national markets. Most results in this literature are derived in a simple setting in which firms can choose where to locate between only two countries or regions.

Manzocchi and Ottaviano (2001) adopt a three-country framework to study the effects of preferential integration on the international allocation of resources. Moreover, they make a step towards a dynamic setting in which resources are endogenously accumulated, rather than given forever: this is relevant when making welfare comparisons both for insiders and outsiders. Two main departures from the framework of Manzocchi and Ottaviano (2001) are developed here, which in our view add more reality to the model although at the price of more complexity. First, we perform numerical simulations starting from an initial *asymmetric* situation, where two regions are already more integrated relative to the third one: this differs from Manzocchi and Ottaviano (2001) where the effects of preferential integration are evaluated starting from an initial *symmetric* situation. Second, we perform a numerical analysis of the consequences of *transition* on discounted income levels in insiders and outsiders.

The model of Manzocchi and Ottaviano (2001) consists of two sectors, three countries (or regions) and two factors, internationally immobile labour and freely mobile capital, which is employed where its return is highest. The general result is that, when regional integration occurs, returns to capital become higher within the integrated area with respect to the isolated country (the 'outsider'). This will cause capital to leave the outsider to be invested in the insiders. This flow of investment will increase (reduce) the number of factories in the insiders (outsider). The outsider will therefore suffer from 'delocalisation'. In the presence of local (or national) technological spillovers, this short-term location effect can also have relevant effects on the long-run rate of growth (as well as on welfare).

Here is a list of the main assumptions underlying the model, more specific details are provided in the technical appendixes to this paper: a) there exist only two sectors, characterised respectively by perfect and monopolistic competition; b) trade costs and frictions only pertain to the monopolistic sector; c) capital only enters the production of the monopolistic sector, while the competitive good only requires labour; d) analytical results are derived under the assumption of initially symmetric countries, though this is clearly unrealistic in the case of West-East European relations; e) preferences are nested, with a higher level Cobb-Douglas function incorporating a lower level Dixit-Stiglitz function; f) capital accumulation is driven by the decision of firms to invest in innovation and the production of new blueprints (new varieties of the monopolistic good). Concerning the geographical allocation of production factors, Manzocchi and Ottaviano (2001) assume three identical countries with the same endowments of labour (L) and capital (N/3). Labour supply is fixed, while the process of capital accumulation is briefly reviewed in Section 1.3 and in the Appendix (A.2). The supply side consists of two highly stylised sectors, where entry and exit are free.

1.1 Production and trade costs

The first sector produces a homogeneous 'traditional' good with constant returns to scale (CRS) and perfect competition, using labour as the only input with a unit labour requirement equal to one. Furthermore, for analytical convenience, we assume no transaction costs of international trade in the traditional sector. This is clearly an oversimplification, but one that is commonly adopted in economic geography models; moreover, introducing trade costs in the traditional sector does not generally lead to qualitatively different results provided they are lower than in the advanced sector (see, Fujita et al., 1999, chapters 5 and 7).

Under these assumptions the traditional good will be priced at marginal cost. Given that only labour is used in its production and the unit input requirement is one, in each country the price of the traditional good will be equal to local wages. However, free trade will ensure that the wage will be the same across countries as long as each country produces the traditional good. This will be the case if global demand for the traditional good cannot be satisfied by a single country alone, which we henceforth assume. Finally, by choosing labour as the numeraire, the price of the traditional good and wages will be equal to one in every country.

Of course, the last result is generally counterfactual and removes one of the relevant factors affecting firms' choice of location (wage differentials across regions). However, this simplification is useful in order to focus on other factors, namely transaction costs and economies of scale, that seem more relevant in those capital-intensive industries that attract the bulk of international direct investment.

The second sector supplies a horizontally differentiated 'advanced' good with increasing returns to scale (IRS) and monopolistic competition, using both labour and capital. Each variety of the differentiated good has a linear cost function (for further details, see Martin and Ottaviano, 1999, pp.285): variable costs are paid in terms of labour with a unit-input requirement equal to β. Fixed costs are paid in terms of capital whose unit-input requirement is set to one so that the number of active firms in a given location is equal to the capital endowment. Since a unit of capital is required to produce each variety, but the scale of production is determined by the input of labour, we have increasing returns to scale in the production of each variety. Assuming zero costs of product differentiation is enough to ensure a one-to-one relation between varieties and firms (hence capital) in each country, namely all scale effects work through the number of available varieties as in most of the 'new geography' models (see for instance Fujita et al., 1999, pp. 52).

The costs of undertaking international trade in the 'advanced' sector are modelled following Samuelson (1954) as 'iceberg' costs: to sell a unit of the differentiated good from one country to another more than one unit has to be sent. This 'erosion' is due to the resources absorbed by tariffs, technical barrier to trade, transport and other transaction costs (for instance, insurance and foreign exchange costs). Let $\tau > 1$ be the number of units that has to be sent for one unit to arrive from one insider to another insider, and $\tau' > 1$ the number of units for trade from (to) an insider to (from) the outsider. It is as if $\tau - 1$ ($\tau' - 1$) units of the good melt away because of frictions: this is equivalent to assuming that trade costs are paid in terms of the transported good.

1.2 The economic consequences of preferential integration and transition

Consumers in each of the three regions behave identically and spend constant shares of their income on the traditional and the advanced good. Moreover, their utility is enhanced if they consume the largest possible number of varieties of the IRS good. Over time, capital accumulation is driven by the introduction of new varieties of the differentiated good, invented in an R&D sector. R&D is a costly, perfectly competitive activity that produces new capital using labour as the only input: as there exists a one-to-one correspondence between the units of capital and number of available varieties of the differentiated good, capital accumulation and innovation coincide. The unit cost of innovation depends on a constant (η) but is decreasing in the number of existing varieties in the whole economy (global spillovers) or in each region (local spillovers). As the total cost of innovation must be equal to the discounted flow of operating profits from the introduction of new varieties, operating profits in equilibrium are proportional to η, but also to the share of capital in the innovating regions under *local* spillovers. Welfare is defined as discounted per capita income, in real terms. Nominal per capita income consists of labour income and dividends due to the ownership of capital (all operating profits are distributed): as we will see, what is relevant in the model is the evolution of the deflator of nominal income in the different regions (the "exact" price index), which crucially depends on the location of advanced firms and the associated configuration of trade costs.

The working of the model is centred on the idea of preferential, or discriminatory, integration. This means that two of the three regions (the insiders) decide to mutually lower the trade costs (τ) between them (including tariffs, non-tariff barriers, technical barriers to trade, and foreign exchange costs) while the costs of trade between the excluded and the integrated area, (τ'), remain constant or decline less than τ. In our view this simple parameter adjustment summarises, although in a rough way, the developments in the European region during the last decade, when the integration process between the members of the European Union has deepened with the completion of the Internal Market and the creation of the Monetary Union, while the transition countries of Central Eastern Europe have been excluded.

The consequences of preferential integration are far-reaching in this model. First, the localisation of advanced firms is affected: recall that trade costs only pertain to the advanced good, which is an extreme assumption but captures the idea that trade in oligopolistic, capital- and R&D-intensive sectors is overall affected more by trade barriers than is trade in traditional manufactures (we neglect agricultural goods). When trade costs between two regions decrease (at least in relative terms), it becomes more convenient for advanced enterprises to locate in those regions because the costs of exporting to any of the two declines while the costs of exporting to the excluded region (the outsider) stay constant (or decline to a lesser extent). This amounts to saying that returns to capital will be higher in the integrating regions, as capital is only employed in the advanced sector; capital is also internationally mobile at zero cost, hence capital will flow out of the outsider towards the insiders, and a new geographical distribution of the advanced firms will prevail with a higher share of firms in the insiders than before. As we will see, however, there are limits to this process of agglomeration, as part of the output of the advanced sector must be sold in the outsider's market (recall that workers are immobile, hence nominal income and demand stay constant in the three areas) hence it will always be convenient for a number of firms to remain located in the outside region.

How does this affect the process of capital accumulation and welfare? Capital accumulation is unaffected if spillovers are *global*, as in this case the cost of innovation is invariant to the geographical distribution of advanced firms. On the contrary, if spillovers are *local* the cost of innovation declines in the insiders, all R&D activities move there (just a simplifying assumption) and capital accumulation and growth are fostered. As for welfare, one has to distinguish between residents in different regions. Residents in the insiders are positively affected in static terms, as their trade costs are reduced for two reasons: they pay less for their imports from the integration partner, and they import a large share of the advanced goods from the partner as more firms have relocated there. For this last reason, the outsider is damaged (it imports more than before from the insiders, and we assume for simplicity that τ' stays constant). The nature of the dynamic effects on welfare is the same for residents in each region: if spillovers are local, there is a negative effect on the value of outstanding capital and a positive effect on the rate of growth. With global spillovers, no dynamic effect of localisation on welfare occurs. Hence, welfare variations always benefit the insiders in *relative terms*: they either gain more or lose less than the outsider. Note that this amounts to *divergence* in real per capita discounted income between insiders and outsiders.

How can transition affect these findings? If successful transition is modelled as a "neutral" increase in labour productivity across sectors, it amounts to an increase in the efficiency units associated with the labour force of the outsider. This has two effects: first, welfare rises in the outsider because workers are becoming more productive. Second, the size of the outsider's domestic market rises along the transition path, hence some of the re-location effect described above works in the opposite direction, as more firms will find it convenient to move to the excluded region. If one combines the impact of transition with that of exclusion, the number of possible outcomes increases, and even more so if one distinguishes between global and local R&D spillovers: in the first case, transition has no effect on the growth rate through the re-location process; in the second case, the specific impact of transition on the growth rate is negative, as the cost of innovation increases when part of the advanced industry moves to the outside region. Hence, transition has a two-fold effect on welfare in the outsider. In static terms it unambiguously increases per-capita incomes as import costs decline and in this sense the outsider can gain in *relative* terms with respect to the insiders. In dynamic terms, however, transition may either leave the growth rate unaffected (global spillovers) or may lower it (local spillovers) (see Section 2.2). We now proceed to discuss in more detail the simulation of various integration scenarios.

2. Numerical simulations in a three-region set-up

2.1 Preferential integration: localisation, trade and capital flows

In this stylised economy the impact of regional integration is modelled as a one-off reduction in the frictional costs of trade between the insiders. Starting from the initial situation where all countries face the same obstacles to trade, one can show that regional integration between the two insiders induces a capital flow from the outsider to the insiders, so that the number of advanced-sector firms increases in each of the insiders and falls in the outsider. The intuition is the following. As transaction costs fall inside the integrating area, consumers there demand more of the now cheaper insider products and less of the now more expensive outsider products. As a result, at the initial symmetric situation, an insider's firms start enjoying higher returns to capital than outsider's firms. This triggers capital flows towards the integrated area that cause firms' death in the outsider and birth in the insiders.

As far as the impact of trade costs on localisation of "advanced" enterprises is concerned, the message of the model is then straightforward: a reduction in trade costs within the integrated area leads to an increase in the share of firms located there. This is due to a *home market* effect, that is, to the advantages obtained by firms in operating within the integrated market once internal trade costs are reduced. In terms of European dynamics, this means that the speeding up of EU integration in the late eighties and the nineties has made it more convenient for firms in the IRS sectors to locate in the EU rather than in Central and Eastern European countries.

We now proceed with the stylised numerical simulations starting from an initial symmetric scenario in which trade costs are the same across the three regions ($\tau = \tau' = 1.15$). Under this assumption, γ, reflecting the location of firms, is initially one third in each of the three regions but one can check that the derivative of γ with respect to δ ($\delta=\tau^{1-\sigma}$) is positive, meaning that a reduction of trade barriers inside the EU leads to a rise in the share of firms which choose to localise there. For instance, if the elasticity of substitution among varieties equals 5, the elasticity of γ with respect to δ is 1.78, meaning that a 2 per cent reduction in trade costs approximately leads to a 1.78 per cent increase in the share of firms in the integrated region (Table 1).

Patterns of trade and capital flows (or, which is equivalent here, direct investment) are consequently affected. The above findings also provide a measure of the capital outflow away from the isolated region implicit in a reduction of trade costs within the EU: as the stock of capital is equivalent to the number of firms in this setting (one unit of capital is required in order to start a firm: see section 1.2), there is an outflow of capital of 1.78 per cent of the initial stock from the CEECs in response to a reduction of 2 per cent in trade costs within the EU. As trade patterns are concerned, the EU becomes a net exporter of the advanced good to the CEECs, while the latter become a net exporter of the traditional constant-return-to-scale good. Let us now turn to a more detailed description of the results of sensitivity analysis conducted on the two scenarios. Table 1 shows the value of γ, of its derivative and of ε, the elasticity of γ with respect to δ, for different values of σ under the symmetric scenario.

Table 1. Symmetric scenario

ô=ô’=1.15	γ	$\partial\gamma/\partial\delta$	ε
ó = 2	0.333	17.037	44.491
ó = 2.5	0.333	7.557	18.401
ó = 2.9	0.333	4.699	10.821
σ = 5	0.333	1.039	1.782
σ = 8	0.333	0.322	0.363
σ = 10	0.333	0.185	0.158

Looking at the effects of different values of σ entails analysing how the results in terms of the distribution of firms and capital endowments are affected by a change in the monopolistic power of enterprises (more or less substitutability across varieties of the advanced good), which is equivalent to a change in the degree of economies of scale (Helpman and Krugman, 1985). Our results show that the consequences of preferential integration on the geographic allocation of firms are weaker when σ is larger, hence when more competition across varieties occurs. When σ equals 10, a 2 per cent reduction in transaction costs among partners only leads to a change in the share of firms located in the integrated area of 0.158 per cent. On the other hand, when ó is lower (that is, returns to scale are higher), the elasticity of γ with respect to δ rises considerably (Table 1).

However, the larger the initial asymmetry in trade costs the lower the additional effect of preferential integration on γ. This will be confirmed by the simulations run under the *asymmetric* scenario. Assuming that initial trade costs equal 5 per cent of value added across partners but 25 per cent of value added between partners and the outsider, the elasticity of γ with respect to δ falls to 0.26

instead of 1.78 under symmetry. Why is this? The answer is that there are limits to the geographical concentration of advanced firms, since selling to the outsider from abroad can become very costly. In other words, there is a force that pushes in the direction of locating some firms in the outsider's market. Tables 2 to 5 look at different asymmetric scenarios.[2]

Table 2. Asymmetric scenario: Case 1

τ = 1.05 τ' = 1.1	γ	Äã	ε
σ = 5	0.553	66.075%	1.624
σ = 8	0.435	30.553%	0.597
σ = 10	0.401	20.51%	0.358

Table 3. Asymmetric scenario: Case 2

τ = 1.05 τ' = 1.25	γ	Äã	ε
σ = 5	0.429	28.688%	0.26
σ = 8	0.368	10.406%	0.081
σ = 10	0.352	5.855%	0.043

Table 4. Asymmetric scenario: Case 3

ô =1.4 ô'=1.45	*ã*	*Äã*	***e***
ó = 2	0.3878	16.36%	3.774
ó = 2.5	0.3635	9.069%	1.510
ó = 2.9	0.3538	6.246%	0.840

Table 5. Asymmetric scenario: Case 4

ô =1.25 ô'=1.3	*ã*	*Äã*	***e***
ó = 2	0.4640	39.21%	6.463
ó = 2.5	0.4105	23.16%	2.922
ó = 2.9	0.3884	16.66%	1.765

One can check that, under initial asymmetry between the two integrated regions and the outsiders, ã always starts from values larger than one third: if two regions already trade at lower costs than the outsider, more firms and capital are located in the integrated area from the outset. Comparing Tables 2 and 3 one can note that, for a given σ, *greater* initial asymmetry weakens the *additional* impact of preferential integration on γ. When initial trade costs equal 5 per cent of value added among partners and 25 per cent between the integrated area and the outsider (case 2), the elasticity å of ã with respect to ä declines to 0.26 from 1.782 in the symmetric case, and from 1.624 in conditions of less

[2] In Tables 2, 3 and 4, Äã equals (ã-0.333)/0.333 and is a measure of capital outflows from the isolated region

pronounced asymmetry (case 1). Tables 4 and 5 report the results of numerical simulations of localisation patterns for the same sets of parameters that we adopt later in our welfare calibrations, which in general lead to a higher elasticity of γ with respect to δ (see Table 7).

Moreover, beyond the effect of the *degree* of asymmetry in trade barriers between insiders and outsider, a key role is played by the *absolute* level of transaction costs among regions. One can check in Table 6 that for a given *degree* of asymmetry (the same difference between ô and ô'), the geographic concentration of advanced firms in the integrated region is a negative function of ô'. The economic intuition is that rising costs of exchange from the integrated to the isolated region lead more firms to remain in the outsider, hence to a lower ã.

Table 6. Localisation and the level of transaction costs

	ã	Ä ã
ô 1.01 ô' 1.21	0.474	42.205%
ô 1.05 ô' 1.25	0.429	28.688%
ô 1.1 ô' 1.3	0.394	18.368%

Moving back to Table 3, one can see that for ó equal to, say 10, our measure of capital outflow from the isolated region (Äã) is much lower than in Table 2: we move from 20.5 to 5.8 per cent. Despite the gap in trade costs being very high (20 percentage points), the outflow of firms is reduced to about one quarter: such a large ô' limits market access in the outsider for those firms located in the integrated area. Hence, agglomeration of advanced activities finds an endogenous limit in our framework.[3]

The main insights of this section are:

iv) the creation, or deepening, of an integrated area pushes some firms of the advanced sector to localise in the included regions, and to move out of the excluded areas. This re-location is equivalent to a capital outflow from the excluded region;

v) the phenomenon of firm re-location is more intense the stronger are economies of scale or – which is equivalent – the greater the degree of market power in the advanced sector;

relative to the symmetric situation.

[3] Note that Table 2 has a peculiar feature: when ó equals 5, ã is larger than 0.5. As ã is the share of firms localised in each of the two identical partners, ã should range from 0 to 0.5. This apparently abnormal result only means that all advanced firms move to the integrated area: any value of ã exceeding 0.5 simply denotes the approaching of the upper bound.

vi) nonetheless, there are limits to the concentration of firms in the integrated region due to the mere existence of trade barriers, which make it convenient for some firms to locate within the excluded area.

What does this tell us about EU-CEE trade and investment patterns? First, opening to trade and capital flows with a large region which has become more integrated during the eighties and nineties means that a share of advanced firms moved out of CEE at the beginning of transition, or in other words that some capital flowed out of Central and Eastern Europe. Notice that firms do not have to "physically" move, but they can be shut down in CEE while their domestic markets are increasingly supplied by EU-located producers. Second, the emerging pattern of trade flows is consistent with the increasing specialisation of CEE in "traditional" CRS manufacturing, which is usually labour rather than capital-intensive. However, we explain this with relative market access and agglomeration, and not with factor endowment differentials as do other authors (see for instance Ferragina, 2000). Third, as long as preferential integration continues between the two insiders, agglomeration of the advanced industries follows, but at a decreasing speed, as the existence of trade barriers vis-a-vis the outsider entails that some firms have an (increasing) advantage in remaining located there. The next section looks at the impact of differential integration on income and welfare in both insiders and outsiders, and the consequences of transition.

2.2 Welfare effects, growth regimes and the impact of transition

The parameter values adopted in this section are chosen according to two criteria, to preserve the general balance of the simulations and to keep some parameters within a "realistic" range. First, with one exception, we show the welfare simulations relative to initial *asymmetric* scenarios, as this is more realistic to the European situation at the beginning of the 1990s (relatively lower trade barriers within the EU). We ensure that the interplay of the parameter values yields: a) a realistic value of the real growth rate, ranging from zero to seven per cent under local R&D spillovers; b) a consistent ratio between the shares of national income accruing to wages and operating profits (the simulations yield a ratio of about five to one, but where the returns to human capital – not explicitly modelled – are included in the wage share); c) the proportion γ of firms localised in each of the two insiders is below 0.5.

The elasticity of substitution among varieties of the differentiated good ranges from 2.5 to about 3, a value associated with strong market power but needed to keep the profit share reasonably high. A consumption share, α, of about 0.3 for the IRS good is often suggested in the "new economic geography" literature (see for instance Fujita et al., 1999). Moreover, $\alpha \leq 1/3$ is a sufficient condition to avoid *complete* specialisation in the advanced sector of any of the three regions. This is a useful parameterisation to adopt, as complete specialisation in the advanced sector would mean that the wage rate in the specialising region is no longer tied to its level in the traditional sector (which is fixed and set equal to one for simplicity).

The rate of intertemporal preference (ρ) ranges between 0.06 and 0.15. A value of 0.06 is considered a benchmark reference both in the growth literature (see Barro and Sala-i-Martin, 1995) and in the literature on the welfare consequences of transition in Eastern Europe (see, for instance, Piazolo, 1999), while the upper bound of 0.15 can be considered realistic especially for transition countries starting from low levels of per capita income. Exchange costs range from 15 to 45 per cent of the f.o.b. value of the merchandise traded and are slightly biased towards the upper bound of the range reported in the literature (Fujita et al., 1999; Martin and Ottaviano, 1999), although recent surveys of trade costs are not inconsistent with such figures (Overman et al., 2001). More information on trade costs in *different industries* can be found for instance in Forslid et al., 1999. Here all we need to assume here is that labour intensive CRS industries are associated with *lower* trade barriers than capital intensive IRS sectors, where "barriers" include both tariff and non-tariff constraints (technical regulations being an important item under the last heading: see Brenton et al., 2001). As far as the values of η, the cost of innovation, and L are concerned we found no clear references in the literature; hence, they are set in order to obtain a balanced outcome from the simulations. In particular, η ranges from 12 to 18 (approximately, as in Martin and Ottaviano, 1999) and L from 8 to 11.

Table 7 reports the key findings of our welfare and growth simulations. We believe that the asymmetric case is the most interesting and realistic to investigate, as it corresponds to an initial condition in which the degree of integration of Central and Eastern Europe with the EU was much lower than the degree of integration *within* the EU. The first row of Table 7 provides the baseline asymmetric case for the six parameters, plus an identical value for the labour force in both the insiders (L) and the outsider (L^{TE}). Other columns provide the simulation model's outcome for the initial share of IRS industries in each insider (g), global operating profits (Np), and the initial growth rate under *local* spillovers (g). The sum of labour incomes in the three regions is given by ($2L+L^{TE}$).

Four measures of welfare change are provided, namely dV and dV* in the case of preferential integration *without* transition, dVL^{TE} and dV^*L^{TE} in the joint case of preferential integration *and* transition. All these measures are computed under the assumption of *local* R&D spillovers; the associated equations are discussed in the Appendix and reported in Table 8. The measures dV and dV* are the derivatives of welfare (that is, logarithmic real discounted income) with respect to a decrease in trade costs within the integrated area, for the insiders and the outsider respectively.[4]

In the first row of Table 7 we can see that the initial growth rate associated with the particular parameter configuration is zero, hence there are no positive dynamic welfare effects associated with initial asymmetry. As trade barriers are further lowered across insiders, static effects tend to prevail and welfare changes are positive for the insiders and negative for the outsider. As we move one row down, we observe that a lower value for the cost of innovation (h=15) raises the growth rate to almost 4 per cent, and this has favourable welfare consequences in all regions. In this case, both insiders and outsiders gain from further integration in, say, Western Europe, and this means that dynamic gains outweigh static losses in the excluded area. Nevertheless, the outsider loses in *relative* terms, as the ratio of dV to dV* is much larger than one: hence, we observe real income divergence as a consequence of preferential integration. A higher rate of intertemporal preference (ρ equal to 15 per cent in row three of the table) reduces the growth rate, as *ceteris paribus* less resources are devoted to innovation: again, the outsider loses in absolute terms from discriminatory integration. A much lower ρ (6 per cent), by contrast, generates a growth rate of 5 per cent and considerably reduces the gap between dV and dV* (from about seven to two and a half times).[5]

If we move to a slightly more competitive scenario for the "advanced" industry (row five of the table), which is associated with a higher elasticity of substitution among varieties (σ) and lower innovation costs (h=10), the growth rate rises to 7 per cent, as less agglomeration (represented by a smaller ã) is more than compensated by the decrease in the costs of innovation. Due to the fall in the value of existing capital, welfare gains are reduced in both region, but their ratio is barely changed at about 2.6. Larger initial trade costs within the integrated area (from 25 to 40 per cent of the f.o.b.

[4] The complete expressions for the welfare measures are provided in Table 8 in the Appendix.
[5] Adopting L equal to 9 instead of 11 does not significantly affect the simulation results.

value of merchandise trade: see row six of the table) yield, as expected from Section 2.1, a lower ã and this has a negative impact on the initial growth rate (which is reinforced by higher innovation costs). In this case, lower barriers to trade across the insiders have a strong impact on re-localisation (recall that ε is larger when the initial gap between τ and τ' is smaller), and this severely damages the outsider, as the ratio of dV to dV* rises to more than 12 times.

In general, our simulations show that welfare is promoted in the outsider, and divergence with the insiders is limited, when the conditions for higher growth are fulfilled. This is non-trivial if we consider that they include lower trade costs *within* the integrated area and less competitive conditions in the IRS sector. The final simulation runs explore two limiting cases: row seven of the table shows a *symmetric* initial situation where trade costs are low enough that even a small growth rate of about 1 per cent generates enough dynamic gains to outweigh the static losses for the outsider (recall that these losses are due to an increase in the *volume* of import upon which tariff and other border costs are imposed). As a consequence, the welfare derivative ratio is rather small (less than two). Finally, in row eight of the table we impose a two-fold asymmetry (both in trade costs and economic size L) and get an extreme value for ã, which corresponds to the complete agglomeration of the "advanced" sector in the integrated area. In this case, a reduction in trade costs between the insiders leads to *static* benefits for them, due to lower "iceberg" costs, but does not affect the outsider.

Let us now move to the columns headed with dVL^{TE} and $dV{*}L^{TE}$, which show the sum of the derivatives of welfare with respect to a decrease in trade costs within the integrated area and a simultaneous rise in labour productivity in the outsider, respectively for the insiders and the outsider, still with the assumption of local R&D spillovers. Recall that, under our definition of "transition", a rise in labour productivity in the outsider has two effects. First, it directly affects income and welfare in the outsider. Here we assume that "transition" is also associated with a *catching-up* effect that raises the growth rate in the excluded region. Second, successful economic reform leads to an enlargement of the domestic market in the excluded area.[6] However, the second channel might have a negative impact on welfare under local R&D spillovers, since it leads to a reduction in ã, and hence ceteris paribus a fall in the growth rate.

Our simulations show that welfare changes in the insiders are *always* lower under the joint assumption of preferential integration and transition compared to the simple integration case (compare dV and dVL^{TE} under all parameter sets). This is not surprising, as transition brings no direct benefits to the insiders while it subtracts a share of advanced firms from their territory. As for the outsider, in five out of eight cases transition has a positive impact on welfare relative to the case of just integration (compare dV* and dV^*L^{TE}). This is interesting, as it shows that in the area excluded from regional integration, the *static* benefits of enhanced labour productivity and of a larger share of advanced industries located in the outsider's territory, plus the *catching-up* effect, tend to prevail over the *dynamic* costs of lower agglomeration.

Finally, one has to recall that the trade-off between static benefits and dynamic costs of transition only occurs under local R&D spillovers. Under *global* spillovers, the rates of innovation and growth do not depend on ã, hence the growth rate does not change with agglomeration or transition. Moreover, the model predicts that the growth rate is always larger under global R&D spillovers (see the Appendix). The last column of Table 7 (labelled *diff*) provides the positive differential in welfare levels which has to be added to the discounted utility of both insiders (V) and outsiders (V*) in the case of *global* spillovers, and which is invariant with respect to the hypotheses of deeper integration and transition. Of course the question of whether local or global R&D spillovers are a better approximation to reality is highly debated (see Overman et al., 2001, for a recent update).

We have seen that transition may offer the outsider (CEE, in our case) a partial antidote against exclusion from the integrated area (the EU). This is always the case under global spillovers and occurs rather frequently under local spillovers. However, in our simulations the *absolute* size of the welfare benefits associated with transition appears limited with respect to the impact of preferential integration, whilst the *relative* gains of the outsider (the fall in the extent of *divergence*, compare dVL^{TE}/dV^*L^{TE} with dV/dV*) rely more on the reduction in dVL^{TE} vis-a-vis dV. In other words, transition slightly improves the outcome for the outsider, in terms of the localisation of advanced firms and welfare, but at the price of an income loss for the insiders. This situation is clearly inefficient, as one can check that the "transition loss" incurred by the insiders (dV minus dVL^{TE}) is always equal to or larger than the "transition gain" of the outsiders (dV^*L^{TE} minus dV*). This suggests that the insiders could avoid the negative consequences of firm re-location toward the transition area through a transfer mechanism that compensates the outsider. In other words, the model seems to suggest that the EU should *not* support transition (especially under local spillovers) and should instead implement

[6] The expressions for these welfare measures are provided in the Appendix.

a transfer mechanism that compensates the CEE for the negative consequences of de-localisation and rising trade costs.

This sounds odd, as one would expect the EU to support transition in the excluded regions of Central and Eastern Europe. The reason why the opposite may hold here is that the *exclusion* of CEE generates "perverse" incentives in Western Europe. A superior solution for the outsider's welfare is clearly to enter the preferential trade agreement, which would substantially reduce its trade costs and enhance its welfare especially under global spillovers. Notice that EU enlargement could also be a better strategy for the insiders: with *global* spillovers, a reduction in trade costs τ' to *the same level* of τ slightly increases welfare in the insiders while substantially improving the former outsider's condition. In fact, trade costs vis-a-vis CEE would be reduced in the EU, while CEE would gain both from lower trade costs and from re-localisation of firms.[7] In order to accomplish this, however, requires fully-fledged EU enlargement (and global spillovers). If only *partial integration* of CEE with the EU is implemented (τ' smaller but still larger than τ), we could find that re-localisation to CEE and the rise in the import volume of advanced goods in the EU, increase global trade costs in Western Europe, thus undermining its support for an extension of the integrated area. Once fully-fledged EU enlargement is accomplished, moreover, there are no reasons why the EU should not encourage transition in CEE as economic reform in these countries would bring about a larger domestic market and consumers in each of the three integrated regions would benefit from a wider product variety, regardless of where advanced firms were located.[8]

3. Conclusions and comparisons with the existing literature

This study has analysed, using numerical simulations, the impact of preferential integration and transition on the localisation of economic activities, trade specialisation, capital flows and welfare in those regions included in, and those excluded from, a trade and monetary agreement. As Europe has undergone a decade of intense integration on its Western side, while at the same time the Central Eastern transition economies have remained excluded from the EU, a natural question to ask is whether these phenomena have led to more or less regional inequality.

[7] Under *local* spillovers, re-localisation to CEE would lower the global growth rate hence welfare calculations must take into account such dynamic effects as well.
[8] Again, this occurs under *global* spillovers.

Following Manzocchi and Ottaviano (2001), we find that preferential integration leads to a re-location of advanced enterprises and of capital from the outsider region (Central Eastern Europe) to the EU, and that trade specialisation in the excluded area shifts towards "traditional" CRS products that are relatively labour intensive. Larger import volumes of the advanced good have negative welfare consequences for the outsider, as its trade costs increase (static welfare effect). In the presence of local innovation spillovers, agglomeration is however conducive to economic growth, and this raises welfare in both regions. Adding up the static and dynamic effects, welfare *is likely to* increase in CEE as a consequence of EU integration, although we provide some simulations where the opposite happens.

Notice however that, even if it gains in absolute welfare terms from the creation of an integrated area, the outsider often loses in *relative* terms with respect to the members of the economic and monetary union. This is true both in welfare and in real-income terms, and has potentially heavy consequences as it suggests that piece-wise integration generates divergence between insiders and outsiders: this in turn makes the future accession of an outsider more problematic, as further enlargements could involve large redistributions of income and welfare between old insiders and newcomers.

We also look at the rate of growth implicit in the different scenarios, and at the impact of "transition" - modelled as an improvement in overall productivity - on localisation, trade and investment. Although the adopted definition of the transition process is naive, the simulations yield interesting results, for instance that the outsider reduces its relative welfare gap vis-a-vis the insiders. However, in our simulations the absolute size of the welfare benefits associated with transition appears limited with respect to the impact of preferential integration, while the relative gains of the outsider rely more on the welfare loss of the insiders. Thus, transition slightly improves the outsider's condition in terms of localisation of advanced firms and welfare, but at the price of an income loss for the insiders. This suggests that the insiders could avoid the negative consequences of firm re-localisation toward the transition area through a transfer mechanism that compensates the outsider.

The lack of Western European support for transition in this model is related to the exclusion of CEE from the EU, which generates "perverse" incentives in Western Europe. EU enlargement would be a better strategy for the outsider but also for the insiders. For instance, under global innovation spillovers, a harmonisation of trade costs (τ' *the same* as τ) slightly increases welfare in the insiders while substantially improving the former outsider's condition. However, partial integration (τ' smaller but still larger than τ), could lead to firm re-location to CEE, a rise in the import volume of advanced goods in the EU and an increase global trade costs in Western Europe, thus undermining its support for an extension of the integrated area. With fully-fledged EU enlargement there is no reason why the EU should not encourage transition in CEE, since a larger regional market would be to the benefit of all.

Being focused on the consequences of "exclusion" from the EU, our contribution differs from the descriptive literature on the transition progress in CEE (see for instance Stern, 1998; Nsouli, 1999; EBRD, 1999) or the path towards EU accession (Temprano-Arroyo and Feldman, 1999), and from analytical studies on the consequences of the Eastern enlargement. There are, however, analogies between some of these papers and our work. Baldwin *et al* (1997), Forslid *et al* (1999) and Lejour *et al* (2001) estimate the consequences of a wider EU and agree that the economic benefits of enlargement would be much stronger in CEE than in Western Europe, something our model also suggests when τ' is reduced to the same level of τ. Forslid *et al* (1999) also calibrate the impact of economic reform in CEE, and find that the growth effects of transition are strong in Eastern Europe but modest in the West, thus providing a motivation for our catching-up assumption. Another interesting finding of Forslid *et al* (1999) is that transition draws resources out of the competitive sectors (including agriculture in their model), and that IRS industries are more than proportionally affected by a Hicks-neutral increase in productivity, something that our model also suggests. Most important, perhaps, they also conclude that integration in the EU and improved market access are key prerequisites for successful reform.

Lejour et al (2001) find that industrial relocation is the main engine of gains from trade in an enlarged Europe, while Piazolo (1999), in the context of Polish accession to the EU, highlights the negative implications of large discount rates for welfare in a transition economy (something we stress in Section 2.2). Lejour et al (2001) and Forslid et al (1999) calibrate multi-sector CGE models, while we use a two-sector simulation model of spatial endogenous growth to draw some insights on the consequences of exclusion and successful transition for the countries of Central and Eastern Europe. We also suggest that welfare analysis - based on economic models of localisation, trade and growth - can be used to supplement more traditional political-economy approaches to EU enlargement (see for instance Heinemann, 2000) in order to clarify potential obstacles, and solutions, along the path towards accession. For instance, we underline the costs of exclusion for CEE in terms of income divergence from the EU, hence the potential dangers of a delayed (or "sequential") enlargement process associated with relative income redistribution among the Western and Central and Eastern European regions. Furthermore we argue that, although successful transition can provide a partial remedy against the exclusion of CEE from the EU, it can damage the existing members of the European Union if enlargement is not accomplished and that fully-fledged enlargement looks a better strategy for both the outsider and the insiders.

Table 7. Welfare simulations with or without transition effects

t	t'	s	a	h	r	L	L^{TE}	g	Np	g	dV	dV^*	dV/dV^*	dVL^{TE}	dV^*L^{TE}	dVL^{TE}/dV^*L^{TE}	*Diff*
1.25	1.45	2.5	0.32	20	0.1	11	11	0.445	4.7989	0.00	3.0796	-0.6625	-	2.9352	-0.5521	-	2.4994
-	-	-	-	15	-	-	-	0.445	4.6552	0.038	4.3204	0.5783	7.4709	4.0832	0.6163	6.6253	3.3325
-	-	-	-	-	0.15	-	-	0.445	4.8708	0	1.7428	-0.7519	-	1.6698	-0.6597	-	1.4811
-	-	-	-	-	0.06	9	9	0.445	3.7147	0.05	9.8446	3.6078	2.6766	9.1198	3.5031	2.6033	7.5740
-	-	2.9	-	10	-	-	-	0.411	3.1401	0.07	6.7909	2.5836	2.6285	6.1809	2.4980	2.4743	8.2005
1.4	-	-	-	15	-	-	-	0.354	3.2699	0.017	5.6484	0.4541	12.439	5.2986	0.5380	9.8490	3.2600
1.15	1.15	-	-	-	-	-	-	0.333	3.2772	0.013	27.058	15.0213	1.8013	26.317	14.7073	1.7894	6.1947
-	1.5	-	-	-	-	11	-	0.500	3.620	0.06	3.7973	0.0	-	3.4033	0.1924	17. 7333	5.3257

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Technical Appendix

A.1 Preferences, pricing and the equilibrium location of firms

The building blocs of the simulation model are derived from Manzocchi and Ottaviano (2001). Consumers' preferences are nested C.E.S. (Dixit and Stiglitz, 1977): $U = D^a Y^{1-a}$

$$D = \left[\sum_{i=1}^{N(t)} D_i^{\frac{s-1}{s}} \right]^{\frac{s}{s-1}} \qquad (1)$$

where σ > 1 is the elasticity of substitution between any two varieties and the elasticity of demand for each variety of the advanced good, D_i is the consumption of the i^{th} variety, D is the C.E.S. quantity index or aggregator, Y is the consumption of the traditional good and 0 < α <1 is the share of expenditure devoted to the differentiated good.

Because of monopolistic competition the varieties of the differentiated good will be priced according to the standard mark-up rule over marginal costs:

$$p = \frac{bs}{s-1} \qquad (2)$$

where p is the domestic price of any variety and we have used the fact that, as stated before, the price of the traditional good (and, thus, the wage rate) is constant and equal to one in each country. With free entry and exit, profits have to be zero in equilibrium. Together with free international capital mobility, this determines the worldwide return to capital, say π, as the residual value of sales after labour costs (i.e. operating profits):

$$p = \frac{bx}{s-1} \qquad (3)$$

where x is the scale of production, i.e., the output of each variety, which is therefore the same for all firms no matter where they are located.

In equilibrium the supply of each variety must equal its demand (inclusive of trade costs). For an insider this means:

$$x = \frac{a(s-1)}{bsN} \left[\frac{(1+d)EL}{(1+d)g + d'(1-2g)} + \frac{d'EL}{2d'g + (1-2g)} \right] \qquad (4)$$

where the two terms inside the brackets come respectively from insiders' and outsider's demand, $\delta \equiv \tau^{1-\sigma}$ and $\delta' = \tau'^{(1-\sigma)}$ are inverse functions of the trade costs, and $\gamma \equiv n/N$ is the share of advanced firms located in one of the identical insider countries. A similar condition holds for the outsider:

$$x = \frac{\alpha(\sigma - 1)}{\beta\sigma N}\left[\frac{2\delta' EL}{(1+\delta)\gamma + \delta'(1-2\gamma)} + \frac{EL}{2\delta'\gamma + (1-2\gamma)}\right] \qquad (4)'$$

Equations (4) and (4)' can be solved together for x and γ to find their equilibrium values. As to the scale of production (x) , this yields:

$$x = \alpha L \frac{\sigma - 1}{\beta\sigma}\frac{3E}{N} \qquad (5)$$

which, given (2), shows that global 'advanced' revenues (Npx) equal the 'advanced' share, α, of total world expenditures, 3LE: that is $Npx=3\alpha LE$. Moreover, given (3), it implies that the world rate of return on capital is $\pi = 3\alpha LE/(\sigma N)$. As to the equilibrium location of firms, the analytical solution of equations (4) and (4') yields:

$$\gamma = \frac{(1-2\delta'+\delta) - \delta'(1-\delta')}{3(1-2\delta'+\delta)(1-\delta')} \qquad (6)$$

A.2 Growth regimes, welfare and transition

To analyse the implications for long-run growth, the analytical framework must be enriched to allow for ongoing capital accumulation. Manzocchi and Ottaviano (2001) assume that the typical consumer maximises an intertemporal utility function, which is equal to the discounted flow of instantaneous utility. Such instantaneous utility is modelled as a monotone transformation of that in equation (1). Assuming unit elasticity of intertemporal substitution, the intertemporal utility function is:

$$U = \int_0^{\infty} \log D(t)^{\alpha}\, Y(t)^{1-\alpha}\, e^{-\rho t}\, dt \qquad D(t) = \left[\sum_{i=1}^{N(t)} D_i(t)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \qquad (7)$$

where, apart from the introduction of the time variable t and the rate of time preference ρ, the definitions of the other variables and parameters are the same as before.

The main differences come from the supply side. Drawing on Grossman and Helpman (1991), accumulation of capital is assumed to take place through R&D modelled as a costly, perfectly competitive activity that produces new capital using labour as the only input. Entry and exit are free in the R&D sector. The labour unit input requirement in R&D is η divided by N in the case of global spillovers, or divided by γN in the case of local spillovers.

This specification of the mechanics of accumulation does not affect the instantaneous ('short-run') dimension of the model hence all the above results apply. As to the solution of the dynamics, it can be noticed that this model is essentially a so-called 'AK-model' and therefore jumps immediately to a steady growth path. Along this equilibrium path, both the global and the national capital stocks grow at a constant rate (g) and location (γ) does not change. Since all the future of this economy is embedded in the initial value of a unit of capital (v_0), to find g one has to solve the following system under the assumption of a constant growth rate of N:

$$v_0 = \int_0^{\infty} p \, e^{-rt} dt \qquad (8)$$

$$v_0 = \frac{h}{g \, N_0} \qquad (9)$$

$$3EL = 3L + \frac{rh}{g} \qquad (10)$$

The first equation states that the value of a unit of capital is equal to the discounted flow of the operating profits of the corresponding firm. The second is the zero-profit condition in the R&D sector: the returns from and the cost of R&D have to be equal in equilibrium. The third equation states that total expenditure is equal to total factor permanent income. Together with (3) and (5), these three equations imply that the equilibrium rate of growth of N is:

$$g = \frac{3L}{h} \frac{a}{s} g - \left(\frac{s - a}{s} \right) r \qquad (11)$$

where γ is the equilibrium location of firms (see equation 6). *Note that equations (9), (10) and (11) hold under local spillovers, while one has to set g equal to 1 under global spillovers.*

Equation (11) re-states a standard result (see Grossman and Helpman, 1991) according to which the equilibrium growth rate is increasing in the world stock of labour (3L), the expenditure share of the differentiated good (α) and the degree of increasing returns to scale (a negative function of σ as already argued), while it is decreasing in the cost of innovation (η) and the rate of time preference ρ.

As far as welfare analysis is concerned, the chosen welfare measure is the present value of indirect utility flows in an insider (V) or in the outsider (V^*). Instantaneous indirect utility is equal to the logarithm of factor incomes divided by the relevant ('exact') price indexes that correspond to the instantaneous utility function (equation 1) (more on this in Manzocchi and Ottaviano, 2001). Under *local* spillovers, if we differentiate V and V^* with respect to δ only, or to δ and L^{TE} jointly, four equations for the welfare changes in insiders (13 and 13') and outsiders (14 and 14') can be obtained (Table 8).[9]

The four terms on the right hand side of (13) are respectively: (i) the 'firm's value effect' by which relocation to the insiders in the presence of spillovers negatively affects the value of the initial stock of capital; (ii) a positive 'relocation effect' by which, for given prices, integration shifts firms towards the insiders decreasing their price indexes (while increasing that of the outsider); (iii) the 'growth effect' by which integration through relocation affects the speed of invention; and (iv) the (direct) 'trade cost effect' by which integration reduces the prices of imported varieties from the insider for a given spatial distribution of firms. The four terms have the same meaning in equation (13'), but as "transition" has a negative effect on agglomeration, the derivatives of γ with respect to preferential integration and to economic transition have opposite signs hence their sum can be positive or negative. By contrast, the (direct) 'trade cost effect' is identical to that in equation (13).

In equation (14), showing the welfare effects of exclusion for the outsider, the terms are respectively: (i) the firm's value effect; (ii) a negative relocation (or 'delocalisation') effect; (iii) the growth effect. The outsider is not *directly* affected by a transaction-cost reduction occurring between the insiders. The first three terms in equation (14') are the same as in equation (14), provided one recalls that the derivatives of γ with respect to preferential integration and to economic transition have opposite signs hence their sum can be positive or negative. The fourth term in (14') is a *catching-up effect* that stems directly from economic transition in the outsider: as workers become more productive under successful reform, we assume the excluded region benefits from a positive growth edge vis-a-vis the insiders.

Finally, equation (15) provides the differential impact on welfare of the shift from local to *global* innovation spillovers: as g is larger under global spillovers, welfare is positively affected in the insiders

[9] Equations 13 through 14' have been used to run the simulations reported in Table 7.

as well as in the outsider. Besides, further integration, transition or enlargement have no consequences on the growth rate through γ.

Table 8

Welfare derivatives - insider

Integration effect under local spillovers:

$$dV = \frac{1}{r}\left\{\frac{-rh}{(3Lg+rh)g}\cdot\frac{\partial g}{\partial d}+\frac{a}{s-1}\cdot\frac{(1+d-2d')}{(1+d-2d')g+d'}\cdot\frac{\partial g}{\partial d}+\frac{a^2(2L+L^{TE})}{rsh(s-1)}\cdot\frac{\partial g}{\partial d}+\frac{a}{(s-1)}\cdot\frac{g}{[(1+d-2d')g+d']}\right\} \quad (13)$$

Integration and transition effects under local spillovers:

$$dVL_{TE} = \frac{1}{r}\left\{\frac{-rh}{(3Lg+rh)g}\cdot\left(\frac{\partial g}{\partial d}+\frac{\partial g}{\partial L^{TE}}\right)+\frac{a}{s-1}\cdot\frac{(1+d-2d')}{(1+d-2d')g+d'}\cdot\left(\frac{\partial g}{\partial d}+\frac{\partial g}{\partial L^{TE}}\right)+\frac{a^2}{r(s-1)}\cdot\frac{(2L+L^{TE})}{sh}\cdot\left(\frac{\partial g}{\partial d}+\frac{\partial g}{\partial L^{TE}}\right)+\frac{a}{(s-1)}\cdot\frac{g}{[(1+d-2d')g+d']}\right\}$$

(13')

Welfare derivatives - outsider

Exclusion effect under local spillovers

$$dV^* = \frac{1}{r}\left\{\frac{-rh}{(3L^{TE}g+rh)g}\cdot\frac{\partial g}{\partial d}-\frac{a}{s-1}\cdot\frac{2(1-d')}{2(d'-1)g+1}\cdot\frac{\partial g}{\partial d}+\frac{a^2}{r(s-1)}\frac{(2L+L^{TE})}{sh}\cdot\frac{\partial g}{\partial d}\right\} \quad (14)$$

Exclusion and transition effects under local spillovers

$$dV^*L_{TE} = \frac{1}{r}\left\{\frac{-rh}{(3L^{TE}g+rh)g}\cdot\left(\frac{\partial g}{\partial d}+\frac{\partial g}{\partial L^{TE}}\right)-\frac{a}{s-1}\cdot\frac{2(1-d')}{2(d'-1)g+1}\cdot\left(\frac{\partial g}{\partial d}+\frac{\partial g}{\partial L^{TE}}\right)+\frac{a^2}{r(s-1)}\cdot\frac{(2L+L^{TE})}{sh}\cdot\left(\frac{\partial g}{\partial d}+\frac{\partial g}{\partial L^{TE}}\right)+\frac{a^2}{(s-1)}\cdot\frac{g}{rsh}\right\} \quad (14')$$

Table 8 (cont'd):

Welfare differential moving from local to global innovation spillovers

$$diff = \frac{1}{r} \cdot \frac{a}{r(s-1)} \left[\frac{(2L + L^{TE})}{h} \cdot \frac{a}{s} \cdot (1-g) \right] \qquad (15)$$

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