Internal Labor Mobility and Transition in Central and Eastern Europe

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Abstract

In this paper we present a 2-country, 3-region New Economic Geography model with limited interregional and no international (East-West) labor mobility. Our aim is reproducing the most salient stylized facts experienced by transition economies during the 1990s, emphasizing trade openness and factor mobility as crucial driving forces. Liberalizing trade with a larger Western bloc leads to an initial deindustrialization and welfare loss for the East, followed by a final recovery. Freedom to migrate within the East is also found to be key in both the final international and interregional convergence processes. If permanent East-West migration is shut down, internal labor mobility within the East proves to be detrimental to overall efficiency.

1 Introduction

Why was the transitional period so painful for Central and Eastern Europe (henceforth CEE)? Can we assess positively the contribution of trade openness and labor mobility to the eventual recovery of these countries? It is widely recognized by the literature the existence of a U-shaped pattern of GDP levels and growth rates within transition economies. What is not so clear is which are the main causes of the initial slump and the late recovery, and the determinants of their intensity and duration.
Boldrin and Canova (2003)’s arguments suggest that technological obsolescence and sectorial misallocations are common features of autarchic economies, which generates an initial period of intense unemployment and factor reallocations once trade openness is introduced. In their opinion, going through that pain is unavoidable, and it should be done quickly to provide the agents with the right incentives from the beginning.

In the line of these authors, Cociuba (2006) highlights how different public policies (redistributive transfers and collective wage-bargaining) induced diverse forms of technology adoption by East German and Polish firms, which is useful to account for the GDP trajectories of both countries during the 1990s. Keller (1997) also stresses the role played by East German technology adoption to close the productivity gap with the West. Finally, Sinn and Westermann (2001) emphasize the incidence of redistributive public policies to prevent full East-West convergence in the unified Germany.\footnote{Another suggestive explanation for the crisis suffered right after the demise of communism links the slump to microeconomic "disorganization" (see Blanchard (1996) and Blanchard and Kremer (1997)): the collapse of the state sector was precipitated by traditional input suppliers, who found attractive opportunities outside the state sector and broke the established productive chains. According to Blanchard and Kremer (1997), international trade was - if at all - beneficial to stabilize those economies, since it provided them with abundant new input suppliers, capable of replacing the previously destroyed economic relationships. Here our paper suggests that an immediate exposure to international trade might have been damaging to CEE countries in the short run.}

In short, the previous literature puts the emphasis on the intensity of reallocations that were needed to adapt to a superior Western technology, followed by a remarkable catch-up process that was conditioned (and sometimes threatened) by redistributive policies.

Our work tries to shed some light on basic CEE macroeconomic evolutions (its most salient transitional stylized facts, which are traced back to the 1990s) from the point of view of international trade theory. We show that a trade-related crisis could have arisen even when our transition economies were neither technologically nor economically backward. They could have been simply subject to the competitive
pressure coming from a larger market (the EU), and their firms escaped in search for proximity to the new bulk of customers and input suppliers. In particular, we focus on the following stylized facts:

- Higher concentration of economic activity in those CEE countries located closer to the EU.

- Initial deindustrialization and welfare loss in the CEE.

- U-shaped ratio of CEE real wages relative to those of the EU.

- Deepening of internal imbalances between CEE countries, followed by a slight convergence.

In this paper we have deliberately disregarded any interference of public-policy factors or technological disparities across regions. Our chain of causality will be exclusively related to economic geography, trade openness and freedom to migrate, as significant factors to account for the real income profile of CEE countries. We use a 2-country (East and West), 3-region (Border and Hinterland within the East) model that features growing international trade openness under two different labor-mobility regimes. Manufacturing coexists in our model with a primary sector that features constant returns to scale, and there is perfect intersectoral labor mobility, which allows us to analyze industrialization and deindustrialization processes. In our analytical work we rule out migrations between the CEE countries and the EU, in order to preserve a centrifugal force in our model, and focus on internal labor mobility within the East. That may look a strong assumption in our times - when East-West migrations are gaining momentum - though it was an acceptable description of reality during the 1990s. With this framework we try to reflect as closely as possible both the institutional and the induced macroeconomic evolutions in CEE countries during that period.

\footnote{The Border plays the role of a "port", through which all trade between the West and the Hinterland must pass.}
Concerning the results, our simulations yield an outcome of both international (East-West) and interregional (Border-Hinterland) convergence after divergence in terms of real wages. The model also suggests that both final phenomena would have been impossible in the absence of freer labor mobility, since the divergence processes would have been perpetuated up to very low levels of trade costs. The initial international divergence result is due to the demand shift towards the West and the flow of Eastern firms towards the larger market. Once international trade costs are lower, being close to the huge Western market becomes more important for consumers and drives also a wedge between the standards of living of Border and Hinterland.

Furthermore, since the Border is closer to the large Western market, it attracts a higher fraction of the Eastern population as soon as migrations are allowed. This fact enhances the home-market in the East and drives a higher global manufacturing share to that country, which finally weakens agglomeration economies in the better integrated West, lowers manufacturing diversity in the global economy and reduces the standards of living in the West and the Border.

That effect creates a tension between those who gain from the migratory reform (migrants and people who remain in the Hinterland) and those who lose (Westerners and people who were in the Border from the beginning). This point may account for the severe restrictions to foreign migratory flows enacted in border-countries like Poland (e.g. Aliens Act approved in 1998), with the support and cooperation of the Westerners. Moreover, our results resemble another application of the second best principle: if East-West migrations are shut down, adding internal labor mobility within the East proves to be detrimental to overall efficiency.

Since Krugman and Venables (1995)'s early contribution, the literature on economic geography has long emphasized the possibility that the early stages of trade openness bring about lower real wages and deindustrialization for the smallest - or simply the most unfortunate - countries. The reason for the congregation of manufac-
tures in some of the countries are bigger home-markets and, in the presence of vertical linkages, also cheaper input suppliers in the largest economies. Our results confirm this intuition in a three-location setting - in which Krugman and Venables (1995)’s model is just a special case\(^3\) - which allows us to focus on within-CEE patterns of internal disparities and geography.

Our model is even closer in spirit to Puga and Venables (1997), with the qualification that we explore asymmetric country sizes. That practice is also undertaken by Forslid (2004), although his model does not permit the study of labor mobility, and the absence of vertical linkages prevents a detailed welfare analysis. Finally, Venables (2000) presents a similar three-location model where he focuses on the internal geography of a developing country that is hardly industrialized for high levels of trade costs. Our starting point is different: under low trade openness, both the larger West (EU) and the smaller East (CEE) are quite industrialized in equilibrium. Moreover, we introduce labor mobility within the East in the midst of the trade liberalization process - as it took place in the real world - in order to draw some welfare conclusions and replicate some stylized facts.\(^4\)

Next section describes in detail the stylized facts we intend to approach. Section 3 presents the analytical framework we work with and section 4 interprets our numerical simulations. Section 5 concludes.

\(^3\)Krugman and Venables (1995)’s model is characterized - within our framework - by no internal trade costs and free labor mobility within the East.

\(^4\)Brakman and Garretsen (1993) and Ross (2001) are two interesting applications of economic-geography models to the understanding of internal disparities in the unified Germany. Nevertheless, they do not introduce a third location (the larger EU) as a significant element to explain those evolutions. They just portray a lowering of internal trade barriers between both German regions. Their models resemble Krugman (1991) and Forslid and Ottaviano (1999), which prevents a study of deindustrialization.
2 Assumptions and Stylized Facts

2.1 Main Assumptions

We will try to justify here empirically our main premises: increasing East-West international trade openness (while internal trade costs did not experience a similar decline within CEE); severe restrictions to East-West migration during the decade, whereas internal labor mobility was also restricted up to the mid-nineties.

**Increasing East-West international trade freeness**

From the beginning of the integration process there has been a huge increase in trade flows between the EU-15 and Central and Eastern Europe. In particular, in 1999 the exports to (imports from) the EU-15 multiplied by six (seven) the figures registered ten years earlier. Finally, in the late 1990s it was possible to talk about predominance of intra-industry trade in the relationships between both country blocs (Petrakos, Fotopoulos and Kallioras (2005)).

**Severe restrictions to East-West migration during the 1990s. Eastern countries were also shut down before transition**

According to Kaczmarczyk and Okolski (2005), during the communist era migration in the CEE countries was negligible. Rural-to-urban mobility was also greatly delayed and generally low. In contrast to Western European nations, in many Eastern countries the process of industrialization took place with absence of massive urbanization. It was also during the 1990s when substantial policy reforms were enacted to liberalize labor flows across Eastern European countries. For example, in Hungary a law on emigration was passed in 1989, removing obstacles for Hungarians to leave the country. In 1993 the Czech Republic established a liberal migration policy which turned the country into the home to tens of thousands of migrants from Europe and Asia during the decade (see Drbohlav (2005)). Not until 1993 did Russia abolish the internal passport and allowed for freedom of movement (see Heleniak (2002)).
It is true that migration of East European citizens to Germany grew considerably in the beginning of the nineties. Although the majority of migrants from Eastern Europe were ethnic Germans and asylum seekers, there was also a further group of different types of labor migrants, most of whom were allowed temporarily in Germany on the basis of bilateral agreements. In short, net migration to Germany between 1989 and 1999 included 1.13 million East Europeans: 678,000 were ethnic Germans and approximately 458,000 were foreign national from East European countries (see Dietz (2002)). However, whereas ethnic German immigration from Poland and Romania decreased continuously since 1990, the net migration of foreign nationals from Eastern Europe experienced a sharp decline between 1992 and 1993, to the extent that net migration in the mid nineties was close to zero. These developments are closely linked to the tightening of admission regulations, which were immediately successful and made of the German migration policy an apparent showcase in the era of globalization (see Rotte (1998; 2000)). Nevertheless, the share of Eastern European migrants has risen from five percent to one third in 1992, with Poles alone making up about 10% of all migrants (see Honekopp (1997)).

2.2 Main stylized facts

Higher concentration of economic activity in those CEE countries located closer to the EU

In the words of Iglicka (2001a), "migration pressure from the East induced by the collapse of the system, combined with the restrictive migration policy of Western Europe towards former USSR countries, were conducive to the formation of the Central European buffer zone. Poland\(^5\) is probably the best example of a buffer zone country." In 1989, fewer than 3 million visitors entered Poland from the Soviet Union, but their number more than doubled the next year and continued to grow to more than 14 million in the peak year 1997 (right before the introduction of the new Aliens

\(^5\)Poland, the Czech Republic or Hungary will be an example of a Border country in the model we will present later.
Act). These movements were initially a side effect of a sick post-Soviet economy and took the form of "shuttle" mobility: a survey conducted in Ukraine and Poland in 1995 suggests that there may be more than 500,000 Ukrainians who work illegally during their travels to Poland, mostly as petty traders who also undertake very short work contracts.

They were encouraged by the economic crisis (shortages of products for basic living) in the countries of the former Soviet Union; the overvalued rouble; the easy access to the countries of Central Europe, especially Poland; and a much more difficult access to the Western European countries (Iglicka (2001b)). The results of a survey conducted in the Polish-Belorussian, Polish-Russian and Polish-Ukranian boundaries reveal that - at least initially - Poland was not perceived by respondents as a destination area, but rather as a very good place for "learning about being abroad", conducting and building up businesses and - perhaps more importantly - building up networks which in the future might let them infiltrate the grey economic zones of Western Europe.

Nevertheless, as the decade went by, many respondents in a different Warsaw survey added that "working in the West was not possible because of the difficulties in obtaining a visa". Many of them, specially those with established networks in Poland, then turned to consider the possibility of long-term or permanent emigration to this country. Therefore, "in the second half of the 1990s, some part of the primitive mobility [...] converted into more permanent immigration into the Central European 'buffer zone'". According to the official Polish data compiled since the early 1990s, there has been a growing trend in applications for a permanent residence permit, and much more people have become a Polish resident by marrying a Polish citizen.

It is noticeable that this migration seemed to reveal some positive aspects for the host economy in Poland. According to Iglicka (2001b), foreign demand for textile and leather products was one of the factors behind the boom in the small private business. Almost 60% of the customers and 50% of the workers at the Warsaw Bazaar
were foreigners (citizens from the former Soviet Union and Asians), and with their participation it turned into one of the biggest Polish enterprises with a turnover of cash of more than $500 million. This fact implies that immigration enlarged the Polish home-market and provided both cheaper labor force and input suppliers, which explains the heavy lobbying by Polish traders and manufacturers to make the government reconsider its drastic immigration reform in 1998.

Apart from the previous anecdotal evidence, we can provide data on CEE employment concentration in three border countries: Czech Republic, Hungary and Poland. The figure below captures the proportion of CEE employment in these three countries along the 90’s, which shows a clear increasing trend until 2000.

**Slump and recovery in terms of GDP per capita. Patterns of external and internal convergence**

The figures below reveal some of the most relevant stylized facts of the CEE-EU relationship during the integration process. Figure 1 presents the recent evolutions of the real GDP per capita of CEE countries, whereas figures 2 and 3 show the convergence / divergence patterns between both blocs and among the CEE countries,
respectively. Our model aims at an approximation to those figures in order to obtain some qualitative insights about the forces at work.⁶

In the case of East Germany, the literature (see Akerlof et al. (1991)) usually identified both extremely high wages (price-cost squeezing due to collective wage bargaining) and a diversion of expenditure away from East German goods as the main causes of the initial depression. They argued that technological obsolescence itself could not be the crucial factor: if that were the case, "output and employment should expand in some sectors and contract in others. Unemployment should rise as workers leave contracting industries, but vacancies should also rise as new jobs are created in the expanding sectors." Nevertheless, they reported that output and employment had contracted in all sectors, and not just in some of them. Vacancies were generally absent from those economies.

Moreover, during the crisis the Deutsche Bank (1992) conducted a survey among East German firms, trying to uncover their main problems. "Only one-eighth of the firms questioned complained about unreasonably high labor costs. Firms in the survey identified lack of demand as the dominant problem (67%), followed by financing (39%). Therefore, it seems that a permanent shift of demand out of its domestic products was the main issue confronted by CEE firms, which adds historical relevance to the mechanisms emphasized in this paper.

⁶Data are collected at the country level from the Penn World Tables. The CEE countries include Albania, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Macedonia, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia and Uzbekistan. These profiles may be sensitive to the inclusion / exclusion of different countries.
3 The Model

Consider a world consisting of just two countries - or wide areas - the East (with two regions, Border and Hinterland) and the West. These countries can produce both
agricultural and industrial output, using two factors of production: labor and land. Both areas have identical technology and absolute endowments, although the West is better integrated due to the absence of an internal divide that generates trade costs. In practice, this fact turns the West into a larger market.

Each region of the East owns the same amount of land, and labor is potentially mobile between Border and Hinterland in response to real-wage differentials. Labor is used by agriculture and by industry, and is perfectly mobile between sectors within each region. Some graphs in section 4 take as fixed the labor endowment in each region, while in the other simulations we consider the case of free worker-mobility between Border and Hinterland, but never between East and West.

Arable land is used only by the agricultural sector, and is immobile between regions. The agricultural sector uses land and labor to produce a perfectly tradeable output under constant returns to scale. Since land is a fixed factor, there are decreasing returns to labor in agriculture. This entails that agriculture endogenously takes place in all locations, since no matter how high manufacturing wages are, they can always be reached by agricultural wages.

Industry

Manufacturing has the usual characteristics of increasing returns to scale (at the firm level), product differentiation and monopolistic competition. Firms use both labor and intermediate goods as inputs, which gives rise to forward and backward linkages. Moreover, trade in manufactures is subject to the classical iceberg-notion of transport costs. For internal trade between the two regions of the East, the number of units shipped per unit consumed is denoted by $T \geq 1$. With respect to external trade, the Border’s trade costs with the West (represented by $\tau_B \geq 1$) are always lower, keeping a constant proportion with respect to the trade costs of the Hinterland ($\tau_H \geq 1$): $\frac{\tau_H}{\tau_B} = T$. In other words, the Border plays the role of a ‘port’, through which all trade between the West and the Hinterland must pass.
The Eastern regions are denoted by B (Border) and H (Hinterland), whereas the West is henceforth called location W.

There is a continuum of manufacturing varieties whose available mass in each location is an endogenous variable. Following Dixit and Stiglitz (1977), production of a quantity $x(k)$ of any variety $k$ requires the same fixed ($\alpha$) and variable ($\beta x(k)$) quantities of the production input in any location. This combined with symmetry and increasing returns ensures that in equilibrium no variety is produced by more than one firm in more than one country.

The production input in manufacturing is a Cobb-Douglas composite of labor and an aggregate of intermediates. Following Ethier (1982), all industrial goods enter symmetrically into the intermediate aggregate, with a constant elasticity of substitution across varieties ($\sigma > 1$). The price index of the aggregate industrial goods used by firms is region specific, and in the case of location B it is defined by

$$q_B = \left[ \int_{h' \in W} p_B^{1-\sigma}(h) dh + \int_{h' \in H} p_B^{1-\sigma}(h') \tau_B^{1-\sigma} dh' + \int_{h' \in W} p_H^{1-\sigma}(h') T^{1-\sigma} dh' \right]^{\frac{1}{1-\sigma}} \tag{1}$$

where $p_i$ represents the local manufacturing price in region i. We have also denoted by $n_i$ the available mass of manufacturing varieties produced in region i. The same can be done for locations H and W. Let also the cost function of any manufacturing firm $h$ located in region B (producing output level $x_B(h)$) be denoted by

$$C_{Bh} = (\alpha + \beta x_B(h)) q_B^\mu w_B^{1-\mu} \tag{2}$$

where $w_B$ stands for the local wage in region B, and $\mu (0 \leq \mu \leq 1)$ is the share of intermediates in firms’ costs.

**Agriculture**

Agriculture is perfectly competitive. It produces a homogeneous good - which plays the role of numeraire ($p_i^A = 1 \forall i$) -, using labor and arable land with a constant returns to scale technology described by the production function $y_i = g(L_i^A, K_i)$. $K_i$ is the stock of arable land available in location $i$ and $L_i^A$ denotes agricultural
employment. In our particular case - as in Puga (1999) - , function \( g \) will be a Cobb-Douglas production function: 
\[
g(L^A_i, K_i) = L^A_i \theta K_i^{1-\theta}.
\]
Therefore, from the landowners’ profit maximization we can obtain the following demand for agricultural labor:
\[
L^A_i = K_i \left( \frac{\theta}{w_i} \right)^{\frac{1}{\theta}} \tag{3}
\]

Preferences

Turning to the demand side, consumers have Cobb-Douglas preferences over the agricultural good and a CES composite of industrial goods, with industrial expenditure share \( \gamma (0 \leq \gamma \leq 1) \). For simplicity, all industrial varieties produced are assumed to enter consumers’ utility function with the same constant elasticity of substitution with which they enter firms’ technology. This generates the following indirect utility function - gross of congestion costs - for normal workers living in location \( i \):
\[
V_i = q_i^{-\gamma} w_i \tag{4}
\]

In landowners and entrepreneurs’ indirect utility functions, wages are replaced by land rents and profits, respectively.

Commuting Costs

The existence of congestion in the form of commuting costs adds realism to our model, by introducing a centrifugal force that prevents the full agglomeration of all Eastern manufactures in the Border. To that purpose, we will use the same modelling tool employed by Krugman and Livas Elizondo (1996).

In each of the 3 potential city sites we assume the existence of a Central Business District (CBD) to which the local population must commute in order to supply their available amount of effective labor. That population is distributed along a segment centered at the CBD, and every worker must allocate a fixed unit of time between effective labor and commuting. As can be expected, those commuting costs will be higher the further away every commuter is from the CBD. Moreover, the extra income
that a worker can gain by living closer to the CBD will be exactly compensated by higher rent costs paid to the landowners, in such a way that all local workers enjoy the same utility level.

Consequently, if we denote by \( \delta \) our parameter for commuting time-costs, the local stock of effective labor in \( i \) will be

\[
L_i = 2 \int_{0}^{m_i} (1 - 2\delta x) \, dx = m_i (1 - \delta(m_i/2))
\]

where \( m_i \) denotes the size of the population living in location \( i \). Since the distribution of population across CEE regions turns out to be endogenous, we will consider that \( m_B + m_H = 1 \) in the case of perfect labor-mobility within the East. In the case of perfect labor-mobility restrictions, we will exogenously set \( m_B = m_H = 1/2 \).

When workers are interregionally mobile, migration eliminates instantaneously the real-wage differences - net of commuting costs - between both CEE locations\(^7\):

\[
w_B q_B^{-\gamma}(1 - \delta m_B) = w_H q_H^{-\gamma}(1 - \delta(1 - m_B)) \quad (5)
\]

**General Equilibrium**

We assume that landowners can not migrate and they are tied to their land. Individual demands coming from workers, landowners and entrepreneurs, all of which share the same elasticity of substitution \( \sigma \), are calculated by using Roy’s identity on expression (4) and summed in each region. Demands coming from individual firms, which also share the same elasticity of substitution, are calculated by using Shephard’s lemma and summed in each region. As a result, total demand for a firm in region \( i \) producing variety \( h \), \( x_i(h) \), is

\[
x_i(h) = \sum_{j \in \{B,H,W\}} (p_j(h))^{-\sigma} e_j q_j^{1-\sigma} T_{ij}^{1-\sigma} \quad (6)
\]

\(^7\)This migration pattern is extremely myopic, since people just care about current real wages.
where $T_{ij}$ is the indicator of transport costs from $i$ to $j$, and $e_i$ is the total expenditure on manufactures in region $i$:

$$e_i = \gamma \left( w_i m_i + (1 - \theta) K_i \left( \frac{\theta}{w_i} \right)^{\frac{\sigma}{1-\sigma}} + \pi_i n_i \right) + \mu \int_{h \in n_i} C(h) \, dh \quad (7)$$

The first term in expression (7) is the value of consumer expenditure, since consumers spend a fraction $\gamma$ of their income on manufactures, where consumer income is the sum of workers’ income, landowners’ rents and entrepreneurs’ off-equilibrium profits. The final term is intermediate demand, generated as firms spend fraction $\mu$ of their costs on manufactures.

Differentiating demand with respect to a firm’s own price - after substituting expressions (1), (2) and (7) into (6) - shows that every firm faces a constant price elasticity $\sigma$ in every region. All firms producing in any particular region then have the same profit - maximizing producer price, which is a constant relative mark-up over marginal cost:

$$p_i = \frac{\sigma \beta}{\sigma - 1} q_i^{\sigma} w_i^{1-\mu} = q_i^{\sigma} w_i^{1-\mu} \quad (8)$$

where we have applied the normalization $\frac{\sigma \beta}{\sigma - 1} = 1$.

Even though firms set a unique price for their output regardless of whether it is sold domestically or exported, the consumer price paid per unit received is either $T$, $\tau$ or $T\tau$ times higher in the region where the good has to be imported. The profits of each manufacturing firm in region $B$ are, from expressions (2) and (8),

$$\sigma \pi_B = q_B^{\sigma(1-\sigma)} w_B^{(1-\mu)(1-\sigma)} \left[ q_B^{\sigma} H_B + q_H^{\sigma-1} e_H \Phi + q_w^{\sigma-1} e_w \Phi_I \right] - q_B^{\mu} w_B^{1-\mu} \quad (9)$$

or, equivalently,

$$\pi_i = \frac{p_i}{\sigma} (x_i - 1)$$

where $\Phi = T^{1-\sigma}$, $\Phi_I = \tau_B^{1-\sigma}$ and we have applied the normalization $\alpha = \frac{1}{\sigma}$. This means that $x_i = 1$ is the unique level of output giving firms zero profits. The manufacturing
sector is monopolistically competitive, so at equilibrium profits are exhausted by free entry and exit:

\[ \pi_i n_i = 0, \quad \pi_i \leq 0, \quad n_i \geq 0 \quad (10) \]

On the other hand, given (1) and (8), the price-index equation for region B can be written implicitly as follows:

\[ q_B^{1-\sigma} = (q_B^\mu w_B^{1-\mu})^{1-\sigma} n_B + (q_H^\mu w_H^{1-\mu})^{1-\sigma} n_H \Phi + (q_w^\mu w_w^{1-\mu})^{1-\sigma} n_w \Phi \quad (11) \]

and the same can be done with \( q_H \) and \( q_w \).

Turning to the labor market, from (2) and (3), the labor-market clearing condition can be written as

\[ (1 - \mu) \frac{C(h)_i}{w_i} n_i + K_i \left( \frac{\theta}{w_i} \right)^{1/\eta} = L_i \quad (12) \]

The first term in the left-hand side of (12) is labor demand in manufacturing, obtained by application of Shephard’s lemma to (2).

Rather than supposing that the economy moves immediately to full equilibrium, the measure of firms in every location adjusts slowly, increasing when profits are positive and decreasing when they are negative, according to the following law of motion:

\[ \dot{n}_i = \lambda \pi_i(n_B, n_H, n_w) \quad (13) \]

where \( \lambda \) is a positive constant and \( \pi_i(n_1, n_2, n_3) \) is a function (like (9)) related to the previous equations of the model. In practice, we will focus on a sequence of steady states (given by (13) and (10)) - each of which corresponds to a different level of international trade costs - as if there was no effective intertemporal transition between those long-run situations.

One can think of the economy in the short run as having a predetermined number of firms in each region \( \{n_B, n_H, n_w\} \). When the Eastern labor is interregionally mobile, we have 13 unknowns:
\{w_B, w_H, w_w, q_B, q_H, q_w, \pi_B, \pi_H, \pi_w, m_B, e_B, e_H, e_w\}

and 13 corresponding equations (3 profit equations (like (9)); 3 price-index equations (like (11)); 3 local labor-market-clearing equations (like (12)); 3 expenditure equations (like (7)) and the real-wage equation (5). In the extreme case of perfect labor-mobility restrictions, the system consists of 12 equations and 12 unknowns, since we omit the real-wage equation and impose exogenously the populations of both Eastern regions.

It is useful to think of short-run profits as being related to the number of firms in each region by four forces: product and labor-market competition, and cost and demand linkages. A larger number of firms producing in the same region increases demand for labor, leading to higher wage costs - expression (12). Product market competition is also tougher in regions where more varieties are produced locally; if more varieties are available locally instead of being imported subject to trade costs then the price index of industrial goods is lower - expression (1) - so, for a given price and level of expenditure, local demand for each industrial good is smaller - expression (6). Product and labor market competition tend to make firms located in markets with relatively many firms less profitable, encouraging exit and leading to the geographical dispersion of industry.

Pulling in the opposite direction there are cost and demand linkages. Cost linkages come from the lower prices that firms and consumers have to pay for manufactures in regions where there are relatively many firms - expressions (1), (2) and (4). Demand linkages arise as an increase in the number of demand firms and / or workers raises local expenditure on manufactures - expression (7). Cost and demand linkages tend to increase the short-run profitability of firms in regions with a large number of firms, and they lead to entry. When they are strong enough they can overturn product and labor-market competition, thereby making dispersed outcomes unstable and triggering industrial agglomeration.
In the long run, profits must be zero wherever there is a positive measure of firms, and there must be no firms wherever profits are negative. That adjustment takes place increasing the number of firms if profits are positive and decreasing it (for potential, if not for actual, firms) whenever they are negative.

4 Numerical Simulations

Throughout this section we are going to use similar values of the parameters to undertake two different experiments. Given a fixed value of internal trade costs between Border and Hinterland, we will study the industrial shares, the degree of population concentration and the regional real wages as international trade costs go down. In the first case we will assume that Eastern population is perfectly immobile, whereas in the second experiment we will allow for free migration - though subject to congestion costs - between Border and Hinterland.

Our choice of parameter values will be identical to Puga and Venables (1997)'s with respect to $\mu = 0.55; \gamma = 0.5; \text{ and } \theta = 0.8$. However, we selected $\sigma = 3$ instead of $\sigma = 4$ in order to prevent real-wage levels to decrease everywhere with trade openness, which was due to tougher global competition. On the other hand, we had to assign some values to the new parameters in our model: $\Phi = 0.85$, $\delta = 0.05$, $K_H = K_B = 1/2$, $K_w = m_w = 1$, $m_H + m_B = 1$. The degree of internal trade openness between Hub and Spoke ($\Phi_I$) is, by assumption, always bigger or equal than the degree of international trade freeness ($\Phi_I$).

We can observe our results for the fully-restricted-labor-mobility case in figures 4 and 5, where the horizontal axis in each panel shows the degree of international trade openness ($\Phi_I$), bounded between zero and one. Our simulations do not intend to capture the whole set of stable steady-states at any level of international trade costs: we just obtain a stable steady-state for the initial value of trade openness, and make the economy follow a path as those costs decrease.
Tougher competition from the West offsets the effects of higher exports and cheaper imports of intermediates for the Hinterland, and less and less firms are able to break even there. Nevertheless, due to its proximity to the Western market, the Border gets a growing share of world manufacturing. As we can observe on figure 3, the first-nature advantage of the Border leads to a process of interregional divergence. Meanwhile, due to the home-market effect and the strength of linkages in the largest country, trade openness also generates another process of international divergence (see figure 2). Both characteristics seem to correspond roughly to the initial years of the transition period, when we know that migrations within the East were still subject to significant restrictions.

We have checked that, by introducing the migratory liberalization in the midst of the trade liberalization process - as we think it took place in the real world- we are able
to replicate more closely our stylized facts, reflected on figures 1-3. To that purpose, we have tentatively chosen period 7 as the particular date when migrations within the East are fully allowed. We can observe in figure 6 that, immediately after the migratory liberalization is enacted in period 7, an important contingent of population flows from Hinterland to Border in response to higher real wages (net of congestion costs). This higher degree of population concentration within the East enlarges the home-market of this country and attracts a higher world share of manufacturing varieties, in such a way that - for the first time since trade openness started to increase - international real-wage levels start to converge.
If we plot the average real wages of East and West (see the second panel on the previous figure), we obtain a U-shaped curve very similar to Figure 2. It is noticeable that the policy shock in period 7 triggers an international convergence trend that is reinforced by the last stages of trade openness, once vertical linkages weaken and lower labor costs finally induce firms to relocate towards the East. The same policy reform is responsible for the relative improvement of the living standards in the Hinterland relative to the Border, given that the labor-supply effect outweighs the home-market gain in the Border and the deterioration in the Hinterland.

Nevertheless, the migratory liberalization has also a different, unintended effect on real wages. The above mentioned enlargement of the Eastern share of world manufacturing gives rise to a weakening of Western agglomeration economies. This reduces the strength of vertical linkages and forces the exit of a significant measure of firms in the global economy. That global deindustrialization (represented on the figures below) results from a finer division of the manufacturing sector across locations, which does not fully exploit the available vertical linkages in the larger Western area. That general tendency generates a few seemingly counterfactual results, like a decrease in the real wages in the West and the Border. We could arguably defend our case by saying that this model captures just a limited range of forces in the global economy, and many others could be responsible for the underlying growth in Western standards of living.

A possible implication of our results suggests that keeping all migratory movements contained in the CEE zone - by means of severe restrictions to East-West flows - could backfire against the Western countries and damage the global industrialization process. An interesting extension of this model would be exploring the welfare consequences of East-West migration and check whether a globally unrestricted migration policy would be superior from an efficiency point of view.
Ind. Utility with labor mobility

Real Wages
Real Wage in Spoke
Real Wage in Hub
Real Wage in West

Degree of Trade Openness

Ind. Utility without labor mobility

Real Wages
Real Wage in Spoke
Real Wage in Hub
Real Wage in West

Degree of Trade Openness

Industrialization with labor mobility

Mass of (local) varieties
n1 (Hub)
n2 (Spoke)
n3 (West)
n1+n2+n3 (global)

Degree of Trade Openness

Industrialization without labor mobility

Mass of local varieties
n1
n2
n3
n1+n2+n3

Degree of Trade Openness
5 Conclusions

In this paper we have examined some mechanisms - exclusively related to economic geography, trade openness and freedom to migrate - as possible factors to account for the recent real-income profile of CEE countries. We have deliberately disregarded any interference of technological differences across regions or unrelated public-policy factors. As a result, the belated incorporation of freer international trade and new labor mobility emerge as candidates to explain the evolution of both external and internal disparities.

However, neither trade openness nor free migration are unambiguously welfare-enhancing, and we have emphasized some channels by which they could generate a slump in terms of indirect utility for several locations (and not for others), which creates potential conflicts of interests. In particular, allowing for limited labor mobility within the East - while the West remains a "fortress" - may result in a lower global industrialization with respect to the case of perfect migratory restrictions.

6 References


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