

Chapter 1

Economic Integration and Industry Location: Theories, Empirical Results, and Implications for CLMV

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1 Introduction

Trade affects the internal location of industry in two ways: it induces firms to specialize and it expands the set of markets that firms serve. If there are industry-specific external economies, firms in related industries will spatially agglomerate (Hanson 1996a). In the context of economic integration, diminished barriers to trade affect industry location particularly in less developed countries. As described below, regional agreements in North America and Europe have caused frontier regions to expand. These regions, which include border regions and port cities, have advantages over internal regions in terms of access to foreign markets. Since trade liberalization induces many firms in developing countries to participate in production networks and to specialize in labor-intensive activities such as assembling and processing of foreign-made components, their inputs as well as final products need to be carried across borders. Therefore, the best industry location, one that minimizes transport costs, is likely to shift to frontier regions.

In East Asia, China has developed rapidly since it opened up to international trade. Simultaneously, a large amount of foreign direct investment (FDI) has been attracted and industry agglomerations have been formed in coastal regions, that is, frontier regions linked to the global market by sea, leaving many internal regions behind. Similarly, Cambodia, Laos, Myanmar, and Vietnam (CLMV) have joined AFTA and/or the WTO and liberalized

international trade since the 1990s. Moreover, transport infrastructures such as the East-West Economic Corridor, the Southern Economic Corridor, and the North-South Economic Corridor have been built and narrowed economic distances in the Greater Mekong Subregion (GMS). As a result, frontier regions are likely to increase their location advantages and lure labor-intensive operations from neighboring countries. It is expected that, as has happened in North America and Europe, economic integration in East Asia will significantly affect internal geography in CLMV.

In this study, I first review theories relevant to economic integration and industry location within a country. In particular, emphasis is placed on the new economic geography (NEG). Secondly, empirical results for North America and Europe are surveyed since they have preceded East Asia in regional integration and a substantial number of studies have been conducted on these regions. The final section summarizes and discusses implications for internal geography in CLMV.

2. Theories

There are two contrasting views regarding the impact of economic integration. Some economists, most notably Krugman and Livas Elizondo (1996), emphasize that declining international trade costs weaken the agglomeration forces of an economy while dispersing forces are left intact. They thus conclude that economic integration tends to disperse industrial activities away from the agglomerated area, leading to regional convergence. Their theories are based on empirical results from North America, especially from a series of studies conducted by Hanson.¹ Many economists in Europe have a different view however. They

¹ The Krugman and Livas Elizondo model is also consistent with the empirical study by Ades and Glaeser (1995), which demonstrates that the population of the largest city (in a sample of 85 countries) was negatively related to the proportion of imports in GNP and positively related to tariff barriers.

observe that economic integration in Europe has increased disparities between domestic regions, although disparities between countries may have shown an opposite trend (Sebastian 1994). The models they have developed are based on the NEG, but they reached different conclusions by introducing different specifications or assumptions into the models.

2-1 Regional Convergence: Narrowing Disparities

Krugman and Livas Elizondo (1996) argue that the growth of huge metropolises in developing countries is due in large part to the rise of import-substituting industrial policy after World War II. The shift away from such a policy, and towards a trade liberalization policy, is therefore likely to limit the growth of metropolises. In other words, closed markets promote huge central metropolises, while open markets discourage them.

The logic of Krugman and Livas Elizondo model is simple. A major reason for the concentration of industries within metropolises is the backward and forward linkages that the sites offer. The model assumes an economy consisting of three locations: two domestic, that is, a core and a periphery region, and the rest of the world. Labor, which is the only factor of production, is mobile between the two domestic locations, but there is no international labor mobility.

In a more populated location (i.e. the core region), the concentration of population and industry raises local wages because transport costs are not incurred in the local market where the industry is concentrated. On the other hand, a firm in a less populated location (i.e. the periphery region) must set sufficiently lower f.o.b. prices to sell as much as a firm producing goods in the larger market (i.e. the core region) because almost all output from the less populated location must be sold in the larger market and therefore incur transport costs. As a consequence, local wages, which are determined by f.o.b. prices, are lower in the periphery region. Note that this wage premium in the core region corresponds to the concept

of “backward linkages.” Analogously, if almost all labor and industry is concentrated in the core region, many goods consumed in the periphery region must be imported from the core region, thus incurring higher c.i.f. prices (f.o.b. prices plus transport costs). On the other hand, the core region has the advantage of lower consumer prices because almost all goods are available in the local market without incurring transport costs. This cost advantage corresponds to the concept of “forward linkages.”

These two effects, backward and forward linkages, raise real wages in the core region so that they become the centripetal forces to create and sustain the core-periphery structure. However, the model simultaneously assumes that as the population increases, workers must pay higher rents and/or commuting costs, which reduces real wages in the core region. Such centrifugal forces are likely to disperse population and industry, and break up the core-periphery structure. The geographical configuration of the domestic economy is thus determined by the relative strengths of the centripetal and centrifugal forces.

The authors then examined the impact of lowering trade costs, using numerical data. They demonstrate that as trade costs decline, the centripetal forces weaken vis-à-vis the centrifugal forces, thus leading to the breakup of the core-periphery structure. This occurs because lowering trade costs strengthens the linkages with overseas markets while weakening the linkages with the domestic market. Note that lowering trade costs induces the typical manufacturer to sell to export markets and rely on imported inputs; thus there would be little advantage to a location near a metropolitan center, while the disadvantage of higher congestion costs would loom large.

Following the basic framework of Krugman and Livas Elizondo (1996), Fujita, Krugman, and Venables (1999: Chapter 18) demonstrate that lowering trade costs would promote industry agglomeration with each location specializing in a specific industry (after the breakup of the core-periphery structure). This is considered to be welfare improving since

a firm could increase its real income by locating near to closely related firms. Simultaneously, the dispersion of industry would reduce congestion costs.

2-2 Regional Divergence: Widening Disparities

Monfort and Nicolini (2000) and Plauzie (2001) extend Krugman's core-periphery model (Krugman 1991) into a two country-four region model and a two country-three region model, respectively. Since their model specifications, especially for the centrifugal force, differ from those of the Krugman and Livas Elizondo model and variants (Aloso-Villar 1999, 2001; Mansori 2003), their models lead to different conclusions. As in the core-periphery model, the centrifugal force in their models is given by the pull of an agricultural population tied to the land (i.e. the pull of a dispersed rural market), and lowering international transport costs induces the concentration of economic activities within a country. Note that in the core-periphery model, if interregional transport costs are low, competition from firms located in the large market is severe, so that remaining in the periphery is not profitable. In a similar vein, if international transport costs are low, competition in the periphery comes from foreign producers, which makes this location less attractive than if the local market was sheltered from foreign competition.

According to Plauzie (2001), the Krugman and Livas Elizondo model, in which commuting-cost/land-rent (i.e. congestion cost) is the centrifugal force, is better suited as an urban model that tries to explain the emergence of giant conurbations such as Mexico City. On the other hand, adhering to the basic core-periphery model seems more appropriate when analyzing the consequences of economic integration in Europe: as described below, it is a stylized fact established for Europe that economic integration leads to increased regional disparities within a country.

Crozet and Koenig (2004) further extend the core-periphery model by introducing

spatial heterogeneity into it. In their two country-three region model, the centrifugal force is given by the pull of a dispersed rural market, as in the core-periphery model. In this setting, they first demonstrate that trade liberalization is most likely to result in a spatially concentrated domestic industrial sector. This is because, although trade liberalization, which strengthens links with foreign markets, weakens both the agglomeration force (i.e. backward and forward linkages) and the dispersion force (i.e. the need for domestic firms to locate away from domestic competitors), the latter force is affected to a greater extent than the former. Second, by allowing for two different international transport costs, that is, assuming that one region has distinctly lower transport costs to foreign markets than another, as in the case of border regions or coastal areas, they demonstrate that if competition pressure from international markets is not too high, trade liberalization fosters spatial concentration in the region that has a strong advantage in terms of access to the international market. Moreover, using evidence from Romania, it has been shown that access to the EU market and proximity to a coast was important in determining urban population growth.

2-3 Eclectic Views

Both the regional convergence and divergence models are based on subtle relationships between the centripetal and centrifugal forces that are sensitive to model specifications. It is therefore possible that different conclusions are drawn by changing model specifications, or by introducing additional assumptions into the model. On the other hand, several economists point out the importance of idiosyncratic factors relevant to the geography of a country. .

(1) Extension of the congestion model

The following models are extensions of the Krugman and Livas Elizondo model. Thus, a similar consequence is obtainable from these models, but by introducing additional

assumptions into the models, they yield quite different outcomes.

Alonso Villar (1999) extends the Krugman and Livas Elizondo model to explain the size and location of cities. In this model, two kinds of centrifugal force are introduced, one global and the other local. The global centrifugal force is represented by the existence of two adjacent foreign countries, while the local one is due to the existence of commuting cost/land rent. In this setting, the long-term equilibrium is influenced by the sizes of the two adjacent foreign countries. If these countries are very large, the real wage in the border is always higher than in the center, so that they attract cities to the border. On the other hand, if the exterior countries' populations are negligibly small, concentration in the center can emerge as equilibrium, on condition that workers' demand for land is sufficiently small in relation to transport costs. Note that the result of Krugman and Livas Elizondo (1996) can be obtained with a particular case of this model where the exterior country is very large, as in the case of the US vis-à-vis Mexico.

Subsequently, Alonso Villar (2001) elaborates a similar model and further explores its implications. In this model, only two border cities are possible locations for workers to choose. It is then demonstrated that two different centrifugal forces, namely, congestion costs and the immobile demand represented by farmers, have different effects on concentration. That is, by considering immobile farmers, concentration is more likely when transport costs decline, as in Krugman's core-periphery model. On the other hand, by considering congestion costs, concentration is more difficult when transport costs are low, since more workers will want to move to a small city to avoid congestion without paying much for transport costs to deliver goods. Furthermore, it demonstrates that when a country has a low level of industrialization, an immobile demand represented by a foreign market, leads to concentration of production, because any deviating firm would have to compete with a large number of foreign firms and would lose part of its national market. This implies that agglomeration may

be reflective of the low level of industrialization in a less developed country.²

In line with Alonso Villar (1999, 2001), Mansori (2003) extends the congestion model by exploring the implications of increasing returns to scale in transportation (IRST). In the case of constant returns to scale in transportation (CRST), trade liberalization, namely, decreasing transportation costs, leads to the dispersion of economic activities. On the other hand, if increasing returns to scale in transportation (IRST) are introduced into the model, the effects of trade liberalization go in the opposite direction, leading to the concentration of economic activities. This occurs because the advantage of being in the single large city, with lower transport costs due to IRST, outweighs congestion costs. Moreover, if a region has a natural port advantage, it is likely to attract a larger population. Mansori also examines the welfare implications of trade liberalization and argues that trade liberalization is not necessarily welfare improving, because the gains from lower import prices may be overwhelmed by the increased congestion costs associated with the concentration of economic activities.

(2) Idiosyncratic factors relevant to the geography of a country

Krugman (1996) points out that trade protection (i.e. high international transport costs) as well as political concentration and poor transportation infrastructure (i.e. high internal transport costs) increases urban concentration in developing countries. As a consequence, a liberal trade policy is likely to discourage primate city growth and to disperse economic

² In a similar context, Behrens (2003a) points out that trade liberalization does not necessarily lead to regional convergence in developing countries, whereas several developed countries such as the UK seem to experience a gradual dispersion of economic activities. She develops a linear three region general equilibrium model based on Ottaviano et al. (2002) and Behrens (2003b). The model demonstrates that trade liberalization in developing countries with poor infrastructure and a small volume of interregional trade is likely to increase regional disparities, while developed countries with good internal infrastructures and a large volume of interregional trade are likely to experience the dispersion of economic activities.

activities; as does decentralization of political power and investment in better transportation infrastructure.

Citing counterexamples against Krugman (1996), Henderson (1996) argues that the analysis of urban concentration in the NEG deals with a few cities or regions only and is far from a generic or general framework. At the same time, he emphasizes that the impact of trade on national space is situation-specific, depending on the precise geography of the country. For example, as indicated by Hanson (1998b), Mexico and the US share a land border, so that over 80% of merchandise trade is transported by road or rail. Border regions, therefore, have gained significant location advantage over internal regions, since trade liberalization and NAFTA, due to good access to the US market. On the other hand, most trade between the US and the countries of Central and South America is shipped by sea or air. Therefore, there is no mechanism in place to relocate industrial activities to border regions. Conversely, it may further exacerbate geographical concentration of large cities with good access to major sea ports or airports.

As described below, idiosyncratic factors relevant to the geography of a country appear to be critically important when examining the effects of trade liberalization in the various CLMV countries.

3. Survey of Empirical Results

3-1 North America

After World War II, Mexico adopted an import-substitution industrial policy. In 1985, however, it decided to join the GATT, and started opening its economy to trade. Since then, integration with the US economy has proceeded rapidly, and industrial location, especially in the border regions, has changed drastically. Hanson wrote a series of papers about the effects

of economic integration on both the US and Mexico, and his work inspired many economists, including Krugman and Livas Elizondo (1996).

In his earlier papers, Hanson (1994, 1996b) developed a model of regional production networks based on localization economies. The model assumes that an industry has two production stages: a composite input production stage, which has location specific external economies, and an assembly stage, which has constant returns to scale. By agglomerating in an industry center, the first stage (composite input production) activities could enjoy external economies, but agglomeration in the industry center inevitably drives up wages and land rents, thus pushing the second stage (low skill assembly) activities to outlying regions.

During the period of import substitution in Mexico, Mexico City was an industry center with firms engaged in both stages of production, while labor-intensive assembly activities were dispersed throughout the country. After opening up to international trade, however, a production network was formed between the US and Mexico. In this new setting, the US specializes in first stage activities, while second stage activities are relocated to the northern border region of Mexico. Note that the northern border region has a location advantage over internal regions in terms of access to the US market; hence it is less costly for the border region to import parts and components from the US and to export assembled final goods back to the US. From this evidence, Hanson conjectures that trade liberalization has significantly affected industry location within countries, and conducts a series of empirical studies. Among his findings, the following seem particularly relevant.

- Hanson (1996b) examines the influence of trade liberalization on wages in the apparel industry. He finds that after trade liberalization, distance from Mexico City, which used to be negatively correlated with regional relative wages, becomes a less significant factor affecting wages, while being in a border region significantly increases wages.

- Hanson (1997) demonstrates that import substitution contributed to the creation of metropolises such as Mexico City, but that the opening to foreign trade and investment has undermined the economic rationale of megacities. Simultaneously, he finds that special economic zones located along the U S-Mexico border (i.e. *maquiladoras*) have played an important role in compressing regional differentials.
- Hanson (1998a) examines the effects of trade reform on regional employment in Mexico. He finds that employment growth after trade reform was higher in regions that are relatively close to the US. It is also shown that, as NAFTA further integrates Mexico into the North American economy, the ties between northern Mexico and the southern US will strengthen, while those between northern and southern Mexico will weaken.

As described above, economic integration has significantly affected industry location and has contributed to narrowing regional disparities in Mexico.

Similarly, Hanson (1995) examines how the growth of offshore assembly in Mexico has affected manufacturing activities in US border cities. It is demonstrated that city pairs, such as San Diego-Tijuana and El Paso-Ciudad Juarez, form bi-national metropolitan areas and engage in extensive trade in goods and labor services across borders. In this newly formed bi-national production network, US border cities specialize in the production of parts and components for Mexican assemblers.

Moreover, such a structural change is reflected in empirical results. Hanson (1995) demonstrates that as *maguiladoras* in Mexico have increased over the last two decades, so too have complementary manufacturing activities in US border cities. As a result, it is shown that there is a positive and highly significant relationship between export manufacturing activities in Mexican border cities and manufacturing employment in US border cities (Hanson 1996a, 1996c). These results suggest that economic integration has induced the relocation of manufacturing activities toward the border region in the US.

3-2 EU

As in the case of North America, a substantial number of empirical studies have been conducted to examine the impact of the eastern enlargement of the EU on member states. In particular, much attention has been paid to its influence on the internal geography of Central and Eastern European Countries (CEECs). However, unlike those concerning Mexico, many of these studies suggest that economic integration has increased concentration of industrial activities, thus widening regional disparities. Simultaneously, they demonstrate that economic integration has attracted industrial activities to border regions between incumbent and new member states, which is by and large a similar phenomenon to what occurred in the US-Mexico border region.

Using the regional data from CEECs, Egger, Huber, and Pfaffermayr (2002) demonstrate that trade liberalization tends to foster regional divergence and support the view of Monfort and Nicolini (2002) and Paluzie (2001) (see also page 5). They test for regional σ convergence of real wages in the period 1991-1998. Out of eight CEECs, they find regional wage convergence only in Poland and Bulgaria, and claim that this is consistent with previous results concerning income convergence in the EU candidate countries (Petraikos, 1999; Gorzerak, 1996). Simultaneously, it is shown that countries with faster growing export openness, particularly in intermediate goods trade, experience large increases in regional disparities.³

³ There is a different view regarding regional convergence in CEECs. A new economic geography (NEG) model predicts wage gradients and specialization patterns that are smoothly related to the region's relative market access. It is thus expected that regions with relatively good access to the main market, such as capital regions of respective countries and the capital of the EU (i.e. Brussels), will have a higher wage. However, before opening up to the international market, the centrally planned economies tended to be strongly centered on the capital region. Therefore, it is possible that wages and sectoral locations of employment are not systematically related to market access except for discrete concentration in the capital (this hypothesis is named a 'Comecon hypothesis'). In order to test which prediction is correct, Brühlhart and Koenig (2006) used the regional data of the five CEECs. They find that wages

Resmini (2003) demonstrates that proximity to the EU border has stimulated a catching up process in the periphery regions of CEECs. Location theory has traditionally considered border regions as disadvantaged areas because of their peripheral position.⁴ However, as in North America, the eastern enlargement of Europe encourages firms to relocate to regions with relatively better access to foreign markets. In fact, the regression results indicate that relative employment (i.e. the share of the region in national manufacturing employment) is lower when distance to the EU border is higher. Furthermore, econometric prediction indicates that relative employment growth will be higher in regions bordering incumbent EU member states (with Hungary representing the highest predicted growth rate), while internal regions have much lower predicted growth.

Brühlhart, Crozet, and Koenig (2004) on the other hand, investigated the impact of the eastern enlargement of the EU on internal geography in Western Europe. Using the three region core-periphery model, they first demonstrate that the eastern enlargement will favor the location of industry in regions proximate to the accession countries, particularly in those sectors in which direct import competition from the accession countries is unlikely to be strong. Then, using the simulation technique, they predict that the impact of the eastern enlargement is significantly different depending on the regions' geographic location relative to new member states. In particular, the regions bordering with new member states are likely to benefit relatively more.⁵ The effect on regional per capita income, for example, is six times larger in the most affected region (Burgenland, Austria, bordering with Hungary) than in the

are discretely higher and service employment is strongly concentrated in capital regions. This evidence appears to confirm the relevance of the 'Comecon hypothesis', but the authors conjecture that the extreme concentration in capital cities is likely to erode and give way to smoother gradients driven by market access.

⁴ Moreover, national borders are considered to affect regional economies negatively by artificially cutting up spatially complementary regions and by increasing transaction costs due to tariffs, differences in language, culture, and business practices.

⁵ At the same time, it is shown that regions that are relatively far from the economic centers of the pre-enlargement EU benefit relatively more (Brühlhart, Crozet, and Koenig, 2004).

least affected one (South Yorkshire, UK). It is worth noting that this is comparable with the geographical situation in the US where the relocation of manufacturing activities toward the border regions occurred after integration with the Mexican economy.

4. Summary and Implications for Internal Geography in CLMV

As described above, there are conflicting views about the influence of trade liberalization (or economic integration) on internal geography in the liberalizing countries. In particular, those who observe industry location in North America, such as Hanson, Krugman, and Livas Elizondo, consider that trade liberalization disperses industrial activities, and thus contributes to narrowing regional disparities. On the other hand, those who observe the effects of the eastern enlargement of the EU, most notably Monfort, Nicolini, and Paluzie, suggest that trade liberalization increases the concentration of industrial activities, leading to regional divergence. Furthermore, it is notable that the difference in model specifications for the dispersion forces (whether the congestion model or the core-periphery model) yields distinctly different conclusions about the results of trade liberalization.

On the other hand, there are notable similarities in these two models. They both indicate that (1) agglomeration forces in a metropolitan area (i.e. backward and forward linkage effects) are weakened by international trade liberalization and (2) frontier regions (in particular border regions) have location advantage over internal regions in terms of access to foreign markets, and thus are likely to attract industrial activities.

Moreover, there are eclectic views which incorporate aspects of both the regional convergence and the divergence models. The models built by Alonso Villar and Mansori, for example, yield different conclusions by changing the specifications or assumptions given in the models. Meanwhile, Henderson and Hanson emphasize the importance of idiosyncratic factors relevant to the geography of a country.

The factors affecting internal geography are complex. It seems extremely difficult to construct a general or generic model which deals with all kinds of countries. In this respect, as suggested by Henderson and Hanson, it may be a more practical approach to take into account idiosyncratic factors relevant to the geography of the target country. In the following, implications of the previous sections are discussed with particular reference to the internal geography of respective CLMV countries.

In CLMV, frontier regions such as border regions and port cities have attracted much attention from investors since trade liberalization or regional integration. In Vietnam, metropolises such as Ho Chi Minh City and Hanoi are frontier regions which are located in the vicinity of major sea ports. It is therefore possible that trade liberalization may further accelerate the concentration of industrial activities in these metropolises. On the other hand, lowering trade barriers and the construction of economic corridors could attract some industrial activities to border regions. In particular, Vietnam's strengthening link with China might increase the location advantage of northern border regions as well as Hanoi. On the other hand, border regions with Laos and Cambodia, such as Lao Bao and Moc Bai, may not induce a significant relocation of industries due to the relatively small population sizes of these countries (regarding the influence of the sizes of the adjacent countries, see descriptions about Alonso Villar, 1999 on page 7).

In Laos, as in Vietnam, the largest city, Vientiane, is a frontier region which is located in the vicinity of the border with Thailand. It is therefore possible that trade liberalization could further accelerate the concentration of industrial activities in Vientiane. Meanwhile, border regions such as Denh Savanh (bordering with Vietnam) and Savannakhet (bordering with Thailand) might attract some industrial activities, but it is uncertain whether such centrifugal forces are strong enough to change the industrial distribution in Laos.

Cambodia has a unique geographical feature. Unlike other CLMV countries, the only

metropolis, Phnom Penh, is located inland (although it is connected by river to neighboring countries). Trade liberalization might, therefore, undermine its location advantage especially in export-oriented industries. On the other hand, special economic zones (SEZs) have been established in frontier regions such as Sihanouk Ville (a port city), Bavet (bordering with Vietnam), and Poipet and Koh Kong (bordering with Thailand) to attract export-oriented industries. It is therefore possible that as long as frontier regions can attract a substantial number of firms, the nationwide distribution of industry may be changed considerably.

Myanmar has joined the WTO and AFTA, but its internal political situation has invited economic sanctions from the West, and it is, in fact, not linked to the global market yet. As a consequence, foreign firms are not likely to invest in the internal territory of Myanmar, instead selecting an alternative location to employ low cost workers from Myanmar. Border regions with Myanmar are one such a candidate. Hence the Thailand-Myanmar border regions have attracted labor intensive activities, particularly from areas such as Greater Bangkok, where the industrial agglomeration has raised labor costs and other congestion costs significantly.⁶

⁶ In the second year of the Project (Economic Integration and Its Impacts on Industrial Location in CLMV), empirical studies will be conducted to test the hypotheses or expectations presented here.

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