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ADB Institute Discussion Paper No.16

**Cross-Border Transport Infrastructure, Regional
Integration and Development**

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Abstract

The paper discusses salient features involved in the recently proliferating initiatives of regional economic integration, especially in transport infrastructure and trade facilitation. It first conceptualizes causal relationships among cross-border transport infrastructure, trade costs, trade and investment, and economic growth, and then distributional issues involved in achieving cooperation toward the virtuous circle. It then discusses institutional and financing issues of the cooperation. Asymmetric benefit-cost distribution may arise due to differences in geography, economic size, institutional history and capacity. While cross-border transport infrastructure may be classified as a club good, careful institutional and financial arrangements are called for in its successful provision. Case studies from the Mekong and Central Asia regions are provided. Then the paper points to some directions for promising future research.

I. Introduction

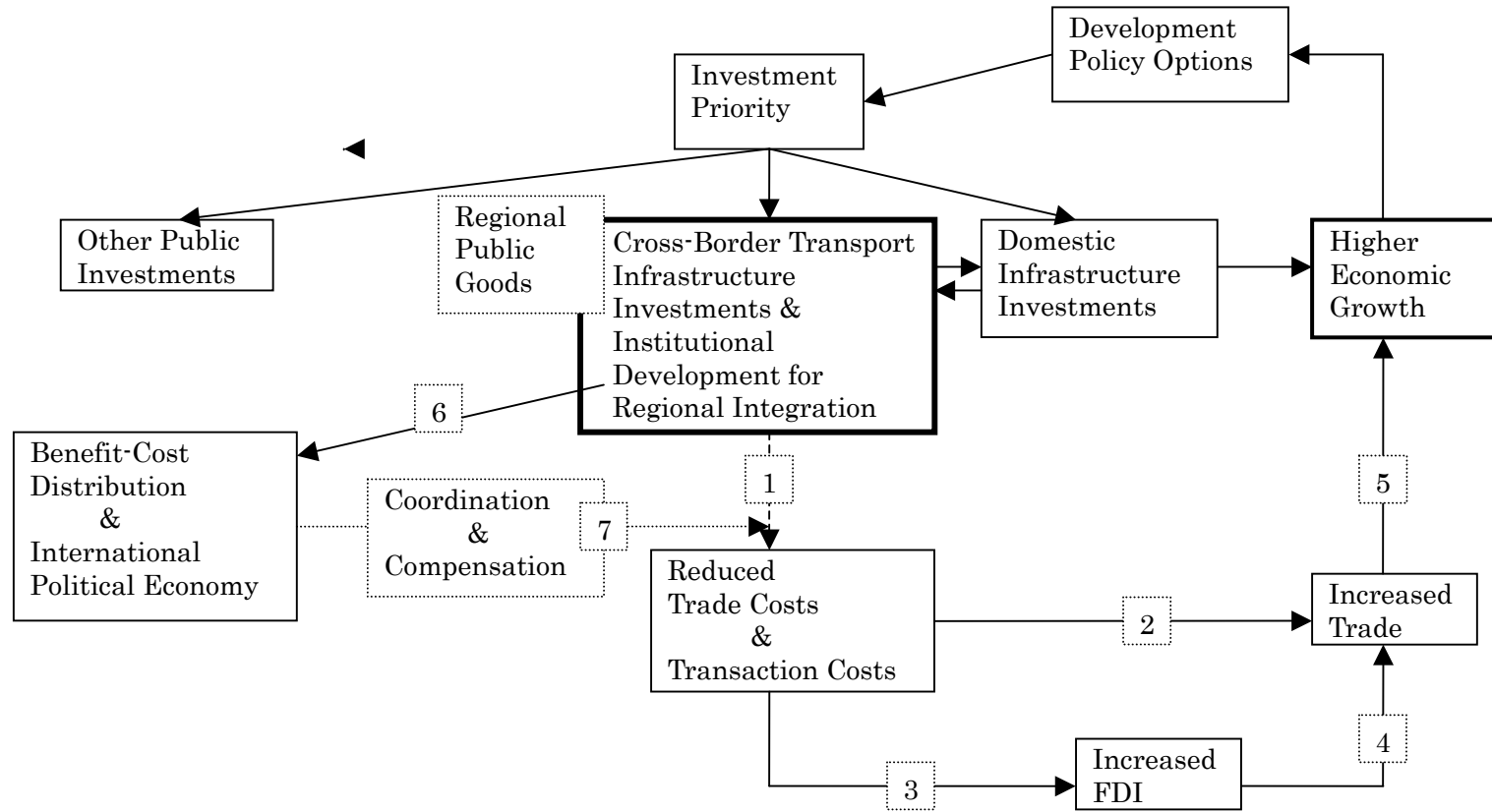
As developing economies become increasingly integrated with the global economy, their governments must make such integration work for their development objectives. In so doing, there would be a critical role for public goods that cross borders in bringing benefits that would not materialize by domestic public goods alone. There can be a variety of public goods that cross national boundaries, ranging from peacekeeping, environmental protection, prevention of infectious diseases, and to basic research and development. This paper focuses particularly on the role of cross-border transport infrastructure and associated regional economic integration. In recent years many countries have joined in the efforts of regional integration worldwide. They aim at generating benefits that are shared by participating countries and cannot be obtained autonomously. The integration effort requires cooperation in many areas, particularly in transport infrastructure and trade policies including reduced tariff and non-tariff barriers, harmonized standards and rules such as product safety rules and improved customs procedures. Regional development institutions have been assisting such cooperation for quite some time. In Asia, the Greater Mekong Subregion (GMS) and the Central Asian Republics Economic Cooperation (CAREC) are being promoted and assisted by the Asian Development Bank (ADB), with high priorities in transport investments and trade facilitation. Examples elsewhere include the South American Regional Infrastructure Plan being assisted by the Inter-American Development Bank (IDB). There seems to be a shared recognition that regional integration cannot proceed without regional transport and infrastructure.

Figure 1 conceptualizes relationships among cross-border transport infrastructure, trade and investment, and development. Governments have their own development policies and investment priorities that best suit their circumstances, but it is often the physical infrastructure development, particularly in transport sector, that is high on the priority list.¹ As transport infrastructure does not normally end at national borders for their users (producers and traders, and eventually final consumers), it becomes necessary to develop cross-border infrastructure and associated institutions as well to maximize the economic benefits of domestic infrastructure.

Cross-border and domestic transport infrastructure combined can reduce trade costs (relationship 1 in the figure), leading to increased trade (relationship 2). Reduced trade costs are also likely to induce increased foreign direct investment (FDI) in the form of intra-firm vertical integration across borders that exploits comparative advantage of each location (relationship 3), which will further increase regional trade (relationship 4), adding to the direct effect of trade expansion. There can be mutually reinforcing effects among cross-border infrastructure, trade and investment. Then the increased international flows would induce higher economic growth (relationship 5), which in turn enlarge the fiscal space for the governments to consider policy options.

¹ In fact, governments in postconflict countries such as Afghanistan put the highest priority to recovery of transport infrastructure during the reconstruction period – on both economic and non-economic grounds.

Figure 1: Cross-Border Transport Infrastructure, Trade and Development



Source: Author

Unique dimensions associated with investments in cross-border transport infrastructure and associated institutional efforts for trade facilitation are those characterized by international political economy and the distribution of benefits and costs that may not be perceived equitable by all parties (relationship 6). There would have to be special arrangements in order to address potential impediments in this regard, such as some self-enforcing mechanism and third-party coordination, or transparent compensation schemes among the participating members (relationship 7). Unless such coordination is successful, the envisaged positive chain will be cut before it begins (relationship 1).

Section II of the paper reviews empirical findings in the literature on the linkages among cross-border transport infrastructure, transport costs, trade, investment and economic growth (relationships 1 through 5 in Figure 1). Section III discusses how the incidence of benefits and costs of cross-border transport infrastructure and regional integration efforts might turn out (relationship 6), and also how regional integration can be reconciled or conflict with extra-regional integration. Section IV discusses how coordinated actions might be reached among the participating countries (relationship 7). Section V discusses case studies from the Mekong and Central Asia regions in light of the points made in the preceding sections. Section VI concludes with suggested further research questions.

II. Effects of Cross-Border Transport Infrastructure on Trade, Investment, and Growth

Geography matters

Traditional theory of international trade assumes away transport costs and geographic considerations in determining trade patterns. But the literature on economic geography that has flourished since 1990s suggests their increasingly obvious importance in explaining trade and development. For example, Radelet and Sachs (1998) find that access to the sea and distance to major markets have a strong impact on shipping costs, which in turn influence success in manufactured exports and long-run economic growth. Sachs, Mellinger, and Gallup (2001) showed that the very poorest regions in the world are those saddled with double handicaps of distance from sea trade and a tropical or desert ecology. Because sea trade is less costly than land- or air-based trade, economies near coastlines have a great advantage over hinterland economies. While this sounds commonsensical, economic geographers contributed quantitative results by combining new software in Geographical Information Systems (GIS) and economic modeling.

Redding and Venables (2004) specify their model such that: market access is a function of the country's and its trading partners' geographical location; supplier access is represented by a distance weighted measure of the location of import supply; and a zero profit condition for firms defines the maximum level of factor prices a representative firm in each country can afford to pay. Their application of the model to cross-section data on trade flows, geographical characteristics, GDP and population, found that: changes in one geographic characteristic (such as whether a country is landlocked) have a common effect on foreign market and supplier access for all countries; access to the coast raises predicted income per capita by 24 percent while loss of island status reduces predicted income per capita by 7 percent; pursuing open trade policy raises predicted income per capita by around 25 percent; and halving a country's distance from all of its trading partners yields an increase of around 25 percent in predicted

income per capita. The results are robust to inclusion of a wide range of control variables such as resource endowments. They suggest that even if tariff and institutional obstacles are removed, the penalty of distance will continue to hold down the incomes of remote regions.

Determinants of trade costs

Radelet and Sachs (1998) used CIF/FOB ratios as the dependent variable for a sample of 92 developing countries and found that: each 10 percent increase in sea distance is associated with a 1.3 percent increase in shipping costs; an extra 1000 miles of sea distance tends to increase the CIF/FOB ratio by about 0.6; landlocked countries pay about 5.6 percent more for shipping than a coastal economy, representing an increase of 63 percent in freight and insurance. Their results indicate that overland transport costs tend to be considerably higher than sea freight costs. Thus, for a given distance from main markets, countries with a higher proportion of transit by land tend to have higher overall shipping costs. This implies the importance of cross-border road transport infrastructure for landlocked countries. The transport costs born by landlocked countries would be increased further by the bureaucratic and often political costs of crossing borders, implying the need for institutional arrangement of cross-border transport.

Limao and Venables (2001) considered two classes of determinants of transport costs: those related to characteristics of the journey and those related to characteristics of the country. For the journey characteristics, they used two types of measures: whether the countries share a common border, and the shortest direct distance between countries. For the country characteristics, they used geographical and infrastructure measures such as an average of the density of the road network, the paved road network, and the number of telephone main lines per person. One of the data they used for the dependent variable was the cost of shipping a 40-foot container from Baltimore to different countries, obtained from a firm that handles forwarding for the World Bank to 64 destination cities. Advantages of this data are that journeys can be broken down into component parts, allowing the estimation of the effects of land and sea distance separately, and that the good shipped is homogeneous, avoiding compositional problems that can occur in aggregate data like CIF/FOB. A disadvantage is that this type of data is difficult to get. From this data, they found that: being landlocked raises transport costs by \$3,450 – compared to a mean cost of non-landlocked countries of \$4,620; an extra 1000 km by sea adds only \$190 whereas a similar increase in land distance adds \$1,380; for landlocked economies, own infrastructure explains 36 percent and transit infrastructure explains 24 percent of the transport cost. They also used the CIF/FOB data for a sample of 103 countries. After deleting those with irregularities and correcting some of the data problems, they found that: if a country could improve its infrastructure from the median to the top 25th percentile, then its CIF/FOB factor would fall from 1.28 to 1.1, equivalent to becoming 2358km closer to all its trading partners; two countries without a shared border would have to be 932km closer in order to have the same transport costs of those with a mean distance between capitals of bordering countries of 1000km. The latter result suggests that transshipment costs and the integration of transport network are quite important.

Transport costs and trade

For firms in small open economies that do not have influence on world prices, the higher the transport costs, the more that they will have to pay for imported intermediate goods,

and the less likely they can compete in export markets. Countries with higher transport costs would also be less likely to attract foreign investment in export activities. Regression results from Radelet and Sachs (1998) show that geographical attributes strongly influence the growth of manufactured exports: the longer a country's coastline relative to its sea, the higher is the growth of manufactured exports; countries with high transport costs will find it more difficult to promote export-led development, even if they reduce tariff rates, remove quantitative restrictions, and follow prudent macroeconomic policies; particularly in labor-intensive export sectors, high transport costs can easily wipe out export profitability even if wage levels were to fall to zero. Some geographically disadvantaged countries such as Mongolia, Rwanda, Burundi, Bolivia may not realistically be able to replicate East Asian model of export-led growth.

Limao and Venables (2001) used a gravity model in estimating the impact of trade costs on trade flows. They found that overall doubling transport costs from the median value reduces trade volume by 45% and moving from the median value of transport costs to the 75th percentile cuts trade volume by two-thirds. One of their notable findings was the strong influence of the infrastructure variable. Moving from the median to the top 25th percentile in the infrastructure variable raises trade volumes by 68 percent, equivalent to being 2005km closer to other countries. Moving from the median to the bottom 75th percentile reduces trade volumes by 28 percent, equivalent to being 1627km further away from trading partners. For landlocked countries, improvement on its own infrastructure from the median to the 25th percentile increases trade volume by 13 percent, improvement in transit infrastructure increases the trade volume by 2 percent, and simultaneous improvement increases trade volume by 15 percent – implying the importance of complementary national investments in cross-border transport infrastructure. Their analysis on African countries found that the representative landlocked economy has transport costs 50 percent higher and trade volumes 60 percent lower than the representative coastal country, and much of this can be attributed to poor infrastructure, and particularly to the high cost of distance in Africa.

Transport costs and trade-FDI nexus

In the trade literature, intra-industry trade is attributed to the presence of imperfect competition such as monopolistic competition, rather than to comparative advantage. Fujita, Krugman and Venables (2001) incorporated transport costs explicitly in the monopolistic competition model and showed that uneven development (or concentration of manufacturing activities) may be a predictable consequence of growing world integration. In their two-country framework, "North" immediately gains from division of labor through reduced transport costs, while "South" initially loses because of de-industrialization. Low wages in South are not enough to attract manufacturing activities because of the lack of sufficient forward and backward linkages. Eventually, however, further reduction in transport costs move the world into a globalization phase. The value of proximity to customer and supplier firms diminishes as transport costs fall, and so the sustainable wage gap between North and South narrows. In the limit of zero transport costs, factor price equalization results.

Markusen and Venables (2000) did numerical exercises on an extended Heckscher-Ohlin model that incorporates monopolistic competition, trade costs, and multinationals. Their findings include the following. (i) At given levels of trade costs and relative fixed costs, multinationals exist when the countries are relatively similar in both relative and absolute factor endowments. Convergence in income levels between major

trading partners – Europe, US and Japan – may be one cause of the growth in multinationals; (ii) The presence of trade costs may create incentives for agglomeration of the factor used intensively in the increasing returns sector; factor mobility may increase trade volumes, meaning that commodity and factor trade are complements over some range of initial endowments. (iii) Multinationals may displace trade, but also create intra-firm trade, which tends to reduce real factor price differences between economies, thus reducing the tendency towards agglomeration. Following on the third point, Venables (2001) argues that vertical FDI is a complement to trade and may even create flows that are much larger than the value of the final goods produced.

Two types of FDI are related to transport costs in a contrasting way. One type of FDI that can be called “domestic market oriented” FDI replaces home country exports by production at the destination country and is induced by high trade costs. This type of FDI was dominant in developing economies from 1950s to 1970s during which their governments adopted import-substitution industrialization policies whereby developed country manufacturing firms were induced to jump the trade barriers. In more recent years, the same type of FDI has increased among developed economies for similar reasons of jumping mainly non-tariff trade barriers. This can partly explain the persistent flows of intra-industry trade. The other type of FDI which can be called “export-oriented” or “vertical” FDI is motivated by factor price differences among countries and greatly induced by the reduction in transport costs, and is associated with intra-firm trade which exchanges intermediate and final goods. It could take a form such as locating product planning and R&D in high-income home country, producing intermediate goods in middle-income countries with certain level of production technologies and exporting them to low-income countries with unskilled labor abundance. This type of FDI creates a distinct “vertical” type of intra-industry trade.²

For the “vertical FDI” from developed to developing countries, its typical advantage is access to cheap labor to undertake labor-intensive parts of the production process. The main costs are the additional costs incurred in managing an operation at a distance. As large developing economies like People’s Republic of China (PRC), and perhaps followed by India, become increasingly integrated with the global trade network, intra-firm trade associated with vertical FDI becomes an increasingly important form of intra-industry trade. In this type of trade, products and associated services at different stages of processing are likely to cross borders multiple times, increasing trade volumes further.

Transport costs, trade and economic growth

Transport costs, via their impact on trade, are likely to affect countries’ long-run rate of economic growth. Many empirical studies point to the positive impact of increased trade and openness on economic growth. They appear to share an understanding that one of the common threads in the “East Asian Miracle” stories is the openness of the economy and the virtuous cycle of increased trade, economic growth and investments in export-oriented manufacturing industries that are in comparative advantage. In terms of the link between transport costs and economic growth, Radelet and Sachs (1998) found that for exporters of primary products, higher transport costs would reduce the rents earned from natural resources, thereby possibly lowering aggregate saving rates and

² One of the recent empirical studies documenting “vertical intra-industry” trade is Ishido, Ito, Fukao and Yoshiike (2003).

investment, and that higher transport costs would raise the price of all imported capital goods, which tends to reduce real investment and slow the process of technology transfer. They find a strong negative relationship between transport costs and economic growth after controlling for the other variables. For example, doubling shipping costs from an 8 percent to 16 percent CIF band is associated with slower annual growth of slightly above 0.5 percent. All else being equal, a landlocked country, with shipping costs 50 percent higher than a similar coastal economy, could expect slower growth of about 0.3 percent a year.

III. Asymmetric Incidence of Benefits and Costs

While trade creation benefits induced by cross-border transport infrastructure and regional economic integration can be significant in the aggregate, distributions of the benefits and costs associated with them may not necessarily accrue to the participating economies in an equitable way.

A pronounced example of the asymmetric benefit-cost incidence with cross-border transport infrastructure is the Kunming (Yunnan Province of PRC) to Chiang Rai (Thailand) road that is being supported by ADB. Most of the benefits are expected to accrue to Yunnan Province and Thailand, but major investments will be required in environmentally and socially sensitive areas of Lao PDR. Initial hopes of attracting private investment in the Lao PDR portion of the road diminished recently, partly because of the impact of the Asian economic crisis, and partly because of social and environmental concerns. In some cases, distortions in national policies exacerbate distributional concerns about regional initiatives. The current national policies in Lao PDR, Thailand, and Viet Nam have a strong bias against agricultural trade and investment. These policies will result in suboptimal levels of returns from investment in transport infrastructure, and can be expected to have a particularly adverse impact on Lao PDR, which has a strong comparative advantage in agriculture production but very limited opportunities for export of manufactured goods (ADB 1999). Benefits from transport infrastructure can be asymmetric and much less tractable when the economies are not comparable, such as Brazil and Uruguay, perhaps because of differences in size, economic needs, and geographical advantage such as coastal versus landlocked location. The gains from integration are likely to be large for landlocked countries that need transport corridors as a lifeline to export and import their goods. Gains for the coastal countries are typically smaller, although still positive because the corridors will enhance its access to the interior market (Schiff and Winters, 2002).

Cross-border infrastructure projects are generally much more complex and risky than national ones. Synchronizing project phases in different countries can be difficult. Participating countries face different political and economic circumstances and cycles, and may proceed at different paces. For example, structural characteristics of poor neighboring economies may limit the economic gains that regional trade agreements can achieve and may cause the benefits to be distributed unevenly. Experience with integration agreements among poor countries suggests divergent economic outcomes and an absence of mechanisms to distribute gains equitably. Examples of setbacks and conflict resulting from real or perceived asymmetry abound (Ferroni 2002).

Regionalism versus multilateralism

Benefit-cost incidence with regional public goods such as transport infrastructure and regional economic integration must inevitably face the issue of regionalism versus multilateralism. This is because depending on the specific ways the regional integration is pursued, the total benefits from it might be more than offset by lost opportunities from integration with the rest of the world, whereby taking away from the maximum possible economic benefits to be distributed among the members.

Venables (2001) makes three main points regarding the economic effects of regional integration. First, the trade-off between trade creation and trade diversion provides a strong argument for North-South rather than South-South free trade agreements. South-South agreements are prone to trade diversion because sectors develop that have comparative advantage relative to partner countries, not relative to the world as a whole. Second, fuller exploitation of economies of scale means that firms from larger domestic markets may have head-start advantage and drive out competitors from partner countries with smaller domestic markets. Third, there may be geographical agglomeration effects at work in addition to economies of scale in each industry. To the extent that regional integration creates agglomeration effects, development might take place in just one of the member countries rather than in all. There is a potential for divergence of economic structure and income between member states of regional integration agreements. The unequal distribution of benefits from integration implied by the first mechanism can be amplified by the second and third mechanisms.

The form of regional economic integration that is likely to cause the largest trade diversion effect is customs union. Venables (2003) shows that customs union membership will lead to convergence of income levels within a union composed of high income countries, but divergence within a union composed of low income countries. The argument is based on the comparative advantages of member countries, relative to each other and to the rest of the world. For example, consider two countries that are both unskilled labor abundant relative to the rest of the world (say, Uganda and Kenya), and suppose that one of them, Uganda, is also unskilled labor abundant relative to Kenya. If these two countries form a customs union, the comparative advantage of Kenya relative to Uganda will cause Kenya to export the skilled labor intensive good (say, manufactured good) to Uganda, which in turn will export the unskilled labor intensive good (say, agricultural good). The first of these flows is trade-diverting: Uganda is getting its imports of manufactured good from Kenya, not the global lowest-cost supplier. The second is trade-creating: Kenya is importing agricultural good not just from the union partner but from the global lowest cost supplier. The general argument here is that the country with an 'intermediate' comparative advantage will do better from the customs union than the one with the 'extreme' advantage. For two low-income countries this unequal distribution of benefits causes income divergence. In contrast, for two high-income economies (both with above-world average skilled labor abundance) the extreme country is the highest skilled-unskilled labor ratio. Thus, exactly the same force that drives income divergence in a customs union between Kenya and Uganda, leads to income convergence in a customs union between, say, France and Spain. It follows that developing countries are likely to be better served by North-South than by South-South integration.

An extended point from the discussion above is that, as Schiff and Winters (2002) argues, increases in intra-regional trade volumes do not necessarily mean that

investment in regional transport projects bring about maximum net benefits once trade diversion effects are taken into account. Therefore, in evaluating alternative cross-border transport projects, they must be assessed using the same value for the same goods traded, as should be done in standard benefit-cost analysis based on a consistent numeraire. Similarly, comparing pre- and post-agreement intra-regional trade volumes would overstate the benefits of the regional agreement if the analysis does not incorporate possible trade diversion effects. These considerations are especially relevant for regional agreements involving many coastal countries, for whom trade diversion effect would be larger if the agreement involves common external trade barriers.

IV. Coordination Mechanisms

Taxonomy of regional public goods

Search for efficient provision of regional public goods (RPGs) such as cross-border infrastructure and regional economic integration must start with the understanding of the nature of RPGs in question. By the criteria of “publicness”, or the degrees of non-excludability and non-rivalry, cross-border transport infrastructure and regional integration (‘transport RPG’ hereafter) would fit best as a club good which has a limited extent of both non-excludability (e.g., toll roads can limit users; regional agreements are indeed clubs) and non-rivalry (congestion causes rivalry; too many members in a regional agreement may dilute integration benefits). Publicness of RPGs can also be translated into feasible supply structure of RPGs, which depends on the nature of *aggregation technology* from individual supplies of the members. The aggregation technology is to a large extent a function of free-riding incentives, which in turn is a function of divisibility and appropriability of the returns from each member’s own contribution. Among several types of aggregation technology that Sandler (2004) provides, transport RPG would fit best in either the *weakest-link* in which the smallest contribution fixes the effective RPG supply level for the entire region, or the *weaker-link* in which smaller contributions determine the overall provision. An example of the weakest link would be the least well-functioning transport infrastructure and institutions in a region that may determine the reliability of the whole regional transport system. Free-riding is not a serious problem in this case but the real issue is capacity of the least contributor. In the case of the weaker link, there is an incentive to contribute beyond the smallest contribution because doing so has some additional benefits. The issue is capacity to some extent and also coordination problem involving who contributes more.

Supply of some types of transport RPG could be described as the *weighted-sum* in which alternative weights are applied to countries’ efforts in aggregating them, or *best- or better-shot* in which the largest or larger contributions determine the overall level of the RPG supply. An example of the weighted-sum case would be air traffic hubs. On the one hand the overall efficiency of a hub will depend on the quality of the lesser airports, but on the other hand, the specific impact of each “spoke” or “feeder” airport will vary according to its relative importance in the network. While delays in a high-volume route will affect most other routes, delays in a little-traveled route will have little impact on the overall hub operation. An example of the best-shot case would be a regional seaport: the quality of a region’s maritime transport to and from other regions will depend on the choice of the location for the seaport, its capacity and operational efficiency.³

³ Examples here are taken from Ruffin (2004).

Financing and institutional arrangements

Equally important in RPG supply is financing. As there is no supranational entity authorized to impose taxes on individual nations – with the exception of EU – alternative mechanisms of financing RPGs are required. When conditions are conducive to formation of clubs, as may often be the case for cross-border transport infrastructure, there is less need and rationale for direct financing by international entities. Financing instruments for club goods include tolls that reflect differences in tastes revealed by total usages as well as internalize congestion externalities. Cost sharing will depend on the distribution of scale economies, the form of the congestion, and other considerations such as competitiveness of output and factor markets in the region’s transport sector. In such arrangements, public “coaxing” can be minimal. Mainly information provision and facilitation by existing regional development agencies may be sufficient. Their role would be to fill the gap or inconsistency between the nature of aggregation technology and the quantity of RPGs supplied under existing market incentives – in other words, filling the gap between marginal benefit and cost for individual participants. External aid could subsidize club-related charges (toll charges for roadways and waterways; transmission charges for electricity, etc.) when some members cannot afford them to ensure an agreed level of equity.

Club arrangements can work for most aggregation technologies. For weakest-link and weaker-link RPGs, independent provision is promising if countries have sufficient means to provide an acceptable level. Free riding would be limited. Regional trade arrangement could provide the requisite coordination. But capacity issue remains. For best- or better-shot RPGs, they can be provided if capacity can be achieved either by dominant nations, or otherwise through coordination and pooling. For weighted-sum RPGs, they could be supplied by nations with country-specific benefits. In all cases, the key is to set up institutions that help align cost-sharing arrangements with the incentives arising from expected benefits perceived by participating countries. The members could form a fee-based coordination agency similar to International Maritime Organization and International Telecommunications Union (both are specialized UN agency financed through membership fees). Table 1 summarizes RPG aggregation typology and corresponding institutional implications.

Table 1: RPG supply technologies and institutional implications

Supply Technology	Strategic Considerations	Institutional Implications
Weakest or Weaker Link	Well-endowed players have an incentive to assist those less well-off. Actions and/or contracts are self-enforcing. General rationale for foreign aid.	Rich countries may contribute the public good directly to increase aggregate supply levels. Regional agencies can channel funds and direct actions to raise public good levels to acceptable standards. Capacity building required in poor countries.
Best or Better Shot	Focus on the best or better-endowed members who are dominant in determining the RPG level. Problems arise when these nations derive less than proportionate benefits from the action.	Regional agencies may focus on the dominant nations and encourage or support their provision of RPG.
Weighted	Some participants receive greater (or less) private benefits and thus have greater (or less) inducements to	Regional agencies need to support only those nations with less country-specific benefits. They could also collect and

Sum	contribute. Captures pure public and private good representations as special cases.	provide information on the benefit-cost matrix to encourage independent financing.
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(Source) Adapted from Sandler (2001).

In addition to the costs of coordination and perceived asymmetric distribution of net benefits, the difficulty of cooperation can be compounded by some members unwilling to cooperate based on non-economic rationale such as national pride and political tension. In such a case regional agreements can assist by locking countries into reciprocal requirements for cooperation. Required first is a long-term commitment. Concluding a trade agreement is one thing, but persisting in the effort needed to consolidate benefits over time is another. Second, participating countries must take complementary national measures needed, such as reforming the customs procedure in line with the regional standard. Implementing such reform is often more difficult than signing an international agreement. Third, in the interest of sustainability, the members who are perceived to gain less relative to their contributions must be compensated to keep the coalition. Fourth, contracting parties should bind themselves with treaties or agreements that are self-enforcing wherever feasible in the absence of courts or higher authorities to appeal to (Ferroni 2002).

Unbalanced costs and benefits and the frequent need for lumpy front-end investments can make cooperation in cross-border infrastructure difficult. Unless there is a dominant member willing to bear the burden of enforcement on other smaller countries, a free-rider problem may become insurmountable. Punishment becomes more difficult to enforce the more parties there are to an agreement. This strategic problem does not only afflict agreements once they are in place but also pervade the negotiation phase. Each partner makes an assessment of the likely enforcement problems in deciding whether to join the agreement. The alternative to explicit punishment is trust. Anything that can foster trust in regional cooperation is valuable. Joint institutions to study the costs and benefits of cooperation and examine potential cooperative solutions have often proved helpful in providing transparency and increasing trust. Such institutions should ideally be made up of independent experts from all the countries involved. The US-Canada International Joint Commission (IJC), which coordinates waterway usage between the two nations, is an example. It might be easier to conclude cooperative agreements if the countries are the members of existing regional integration agreements, which provide ready-made framework of cooperation and punishment. International organizations can also participate in, or help create, institutions to foster trust (Schiff and Winters 2002).

Apart from distributional and game-theoretic considerations, differences in the domestic organization in the transport sector may translate into difficulties in agreeing on a common framework. A variety of national rules that favor domestic over foreign transport companies creates significant delays at border crossings. Countries can also differ substantially in their financial and technical capacity to maintain their part of the infrastructure. With limited financial resources and policy implementation capacities, the governments of countries like Cambodia and Lao PDR face major hurdles in mobilizing or even finding skilled workers and engineers to plan and execute cross-border infrastructure projects. External technical assistance and financial support can sometimes be an essential ingredient in implementing, if not establishing, regional cooperation agreements.

Once institutions for coordination and capacity building are in place, the provision of transport RPGs can generally be assigned to the private sector through a variety of

arrangements such as concessions, BOT, and privatization. An example is the railway running between the capitals of Cote d'Ivoire and Burkina Faso. After a long history of poor performance of the two separate national railway companies, the governments decided to seek greater efficiency by turning the railway line operation over to a private concessionaire. The two governments liquidated their railway operating companies and replaced them with "railway landlord corporations" that own each country's tracks and rolling stock and other equipment, which they lease to the concessionaire. The concessionaire sets its own rates and pays its landlord companies a usage fee, and also pays the debt service for loans the governments or landlord agencies take on for rehabilitation investments. This arrangement enabled cutting of redundant staff, restructuring of passenger services and dropping of loss-making operations (Schiff and Winters 2002).

V. Case Studies in Asia

Greater Mekong Subregion (GMS)⁴

GMS economies (Viet Nam, Thailand, Cambodia, Lao PDR, Myanmar, and Yunnan Province of PRC)⁵ are adequately diverse so that benefits associated with the North-South integration would be dominant in their cooperation. The trading relationship between Thailand and Lao PDR illustrates complementarities at work in terms of different factor endowments and levels of economic development. Thailand provides a significant portion of Lao PDR's demands for manufactured goods and buys a significant share of Lao PDR's resource-based exports such as hydroelectric power and timber.

The initial focus of the GMS program supported by ADB since early 1990s was on overcoming inadequate transport and communications linkage. Realizing scale economies in the region depends on the harmonization of legal and regulatory frameworks and the facilitation of cross-border flows of goods and services. High-priority transport corridors include: Phnom Penh-Ho Chi Minh City Highway; Cambodia Road Improvement; East-West Transport Corridor (linking Thailand, Lao PDR and Viet Nam); and North-South Transport Corridor (linking Yunnan Province of PRC, Lao PDR and Thailand). These are being built and are expected to be completed in 2004-2007.

However, it remains difficult to accurately measure benefits and costs of these investments and estimate their distribution. The new ADB strategy in 2004 proposes developing an integrated master plan beyond 2006 that would evaluate: (i) trade, investment, and tourism flows for which infrastructure is needed; (ii) prospects for strengthening multimodal linkages; and (iii) integration of subregional development schemes that would help transform the transport corridors into full-fledged economic corridors. The challenge here is to develop mechanisms that allow for regional perspectives and the quantitative assessment on distribution of benefits and costs to be built into projects from their inception. In the case of the North-South Corridor linking Kunming to Chiang Rai, careful financial planning (e.g., reasonable user charges,

⁴ Information included in this subsection draws on ADB (2004a; 2004b; 2003; 1999).

⁵ The origins of GMS can be traced to the 1957 establishment of the Mekong Committee, which then comprised the four riparian countries of the lower Mekong Basin. But the region was racked by conflict, so there was little progress over the following three decades. The process was revitalized in 1992 when ADB initiated a formal program of cooperation.

private co-financing, cost sharing, and/or efforts to mobilize grant financing for the Lao PDR section of the road) will be required to ensure an equitable distribution of the costs and risks associated with this development.⁶

As road linkages are developed and GMS members open their economies, their governments recognized the need to address regulatory and institutional issues such as: restrictions on the entry of motor vehicles; different standards pertaining to vehicle size, weight and safety requirements, driver qualifications; customs procedures and assessment of duties; and visa requirements. In order to mitigate these impediments, the Cross-Border Transport Agreement was signed by Lao PDR, Thailand and Viet Nam in 1999. Subsequently Cambodia acceded to the agreement in 2001, PRC in 2002, and finally Myanmar in 2003. The agreement has been designed to complement similar agreements of the ASEAN and to be consistent with applicable international conventions. All annexes and protocols of the agreement are scheduled to be signed by 2005.

Early signs of trade-investment nexus are emerging in GMS. Share of intra-GMS trade in total trade has increased from 5.7 percent in 1992 to 12.6 percent in 2002, although the share of trade with GMS economies vary – Lao PDR having the highest share at over 60 percent and Yunnan Province of PRC having the lowest share at about 2 percent. While unofficial intra-GMS trade has been significant all along, a notable recent trend is the growing formal intra-Mekong trade. A similar trend is observed for FDI flows. Net FDI flows from the six GMS economies to Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam combined rose sharply from \$130 million in 2000 to about \$210 million in 2002. It is conceivable that the trade-investment nexus that catalyzed rapid industrial development and structural change in East Asia is also at work here. As wages rise in the original ASEAN countries and GMS economies improve macroeconomic performance and strengthen governance, the latter will be well placed to receive similar types of investments to those which have been going to the former.

Efforts to enhance intra-GMS integration are unlikely to work against extra-GMS integration because the GMS program is a classic case of market-driven integration which relies on non-official institutions induced by market activities that had been ongoing in the Mekong region. Trade and investment facilitation measures being taken are non-discriminatory and complementary to those pursued by ASEAN Free Trade Area (AFTA). Thus, directly or indirectly, countries outside GMS will also have non-discriminatory access. In fact, AFTA has been the driving force behind trade liberalization in the Mekong economies. An agreement has been struck for PRC to join AFTA, making Yunnan Province a key through which closer links will be forged between PRC and the newer ASEAN members in the GMS: Cambodia, Lao PDR, Myanmar and Viet Nam. In these countries, tariffs have already fallen sharply for a wide range of commodities as they get closer to their target dates when 0.5-percent tariffs will apply to most intra-ASEAN trade.

AFTA, nonetheless, apparently falls within the definition of “institutional” – as opposed to market-driven - integration based on a legal agreement that prescribes tariff reductions on a discriminatory basis. This raises an issue of trade diversion versus trade creation. To minimize trade diversion, the original ASEAN members have been reducing their

⁶ Here, the economic gains accruing to Lao PDR relative to PRC and Thailand may be underestimated in terms of trade creation benefits versus diversion costs, which would presumably be in favor of landlocked countries relative to coastal countries. If this can be demonstrated empirically, then, there would be less need for compensation or cross-subsidization.

external tariffs in conjunction with reductions on intra-ASEAN trade. AFTA's greatest achievement may have less to do with what it prescribes or mandates but rather what it promotes indirectly through the long-standing commitment of its members to the concept of "open regionalism".

To make things complicated further, the freedom of a FTA member to set their own external tariffs raises the possibility of trade and production *deflection*. Trade deflection occurs when imports enter the FTA via the member country with the lowest external tariff. This deflects the region's other partners' trade with the rest of the world and deprives the member country of tariff revenue. In the case of GMS, revenue is likely to be lost to another member like Singapore, which is virtually a free trade port. Similarly, production deflection occurs if the manufacturer of products containing imported inputs shifts to countries that have lower tariffs on the inputs. Investment deflection occurs when differences in tariffs outweigh differences in production costs, which will reinforce the effect of production deflection. To deal with these deflection effects, AFTA imposes "domestic ASEAN content" requirements based on rules of origin. These rules limit regional trade preferences to commodities that incorporate a minimum of 40 percent domestic ASEAN content. But rules of origin are notoriously difficult to police, and the administrative burden can be substantial. Ideally, the new ASEAN members in GMS should do away with tedious and costly tasks of implementing rules of origin by adopting nondiscriminatory approach from the beginning.

One avenue through which even a non-open regionalism can promote multilateralism is through the strong links that the original ASEAN members have with industrialized countries. Increasing integration with the original ASEAN countries will provide the GMS economies with a conduit to the outside world because the former economies conduct most of their trade extra-regionally, and receive most of their FDI from non-ASEAN members. By integrating more closely with the original ASEAN members, the newer GMS members will increase their opportunities for trade and investment with the rest of the world. By being part of ASEAN, the GMS countries are also technically part of the "ASEAN+3" arrangement. Besides, multilateralism is already revealed by many of GMS countries being WTO members. Thailand and Myanmar have been members of WTO for quite some time. Cambodia joined WTO in September 2003. Lao PDR and Viet Nam are aggressively seeking membership.

Central Asian Republics Economic Cooperation (CAREC)⁷

The CAREC Program being supported by ADB seeks to encourage economic cooperation among Kazakhstan, Kyrgyz Republic, Mongolia, Uzbekistan, and the Xinjian Uygur Autonomous Region of PRC. After gaining independence in 1991, the former Soviet republics in Central Asia faced the twin challenge of nation building and transition to a market-based economy. The process is made particularly difficult by a number of unfavorable factors such as landlocked location and remoteness from major world markets. Therefore, developing regional markets among themselves is seen to mitigate the difficulty by gaining from trade with each other. Growth of freight volume and passenger traffic has been high among CAREC economies at over 10 percent per year in road traffic in most countries. However, 1,500km of roads in the region deteriorate each year and capital repairs have been well below annual requirements for years. It is urgent to first rehabilitate and upgrade the existing roads which were not built to support the large volume of heavy trucks that are appearing now. Against this

⁷ Information included in this subsection draw on ADB (2004c; 2004d; 2004e).

background, Phase 1 of the CAREC program (1997-98) focused on identifying infrastructure needs and policy issues impeding cross-border traffic. Phase 2 (1999-present) consisted of assessing projects selected as priority in Phase 1, specifically in the areas of trade, road and rail transport, and electric power as well as policy reforms that would remove cross-border barriers.

Despite the common interest toward increasing intra-regional trade, however, most of the countries in this region have trade-restricting policies and practices. For example, in 1999, Kazakhstan temporarily imposed a 200-percent tariff on selected goods from Kyrgyz and Uzbekistan. This was in response to the Russian financial crisis and the sharply devalued ruble that threatened to flood the region with suddenly cheap Russian goods. The use of import quotas by PRC limits trade between Xinjiang and CARs. Other barriers to trade include transit fees and the costs of customs clearance including corrupt border practices.

Unlike the case of GMS economies, the share of intra-CARs (Kazakhstan, Kyrgyz Republic, Tajikistan and Uzbekistan) trade in total trade has generally decreased from 1998 to 2003: from 3.4 percent to 1.8 percent for Kazakhstan; from 24.8 percent to 16.6 percent for Kyrgyz Republic, and from 32.6 percent to 22.4 percent for Tajikistan. There can be several reasons for the poor intra-regional trade performance. First is the similarity of the economies. Many of the CAREC economies are primary commodity based (e.g., oil in Kazakhstan and Azerbaijan, gas in Uzbekistan, gold in Kyrgyz Republic, cotton and aluminum in Tajikistan, and copper, gold and cashmere in Mongolia). Consequently, most governments tended to implement protectionist policies to move away from their dependence on commodity trade. Second, the countries have pursued different transition strategies. Kyrgyz Republic and Kazakhstan adopted a reformist approach, although the process has slowed in both countries; Uzbekistan adopted a more gradualist and protectionist approach; Tajikistan suffered through a civil war for much of the 1990s and is lagging behind in the transition process.

Various regional organizations that involve the five CAREC countries have been driven by political considerations and lacking in economic substance. Non-tariff barriers are a greater obstacle to trade in the region than the tariff levels. The list of products exempted from the free trade regime could be extensive. Border transaction costs may reach 7-10 percent of the value of goods being transported. Particularly detrimental to intra-regional trade has been the recent policy measures introduced by the government of Uzbekistan. The existing border controls have been tightened to control the inflow of low-quality consumption goods mainly from PRC that are transported by traders from Kazakhstan and Kyrgyz Republic. Kazakhstan, on its part, has been imposing quotas and anti-dumping tariffs on Kyrgyz cement. It could be argued that the larger economies in the region, such as Kazakhstan and Uzbekistan, have less economic incentive in improving market access for their smaller neighbors.

There are broadly two types of trade arrangements in which Central Asian countries participate: organizations with broader CIS country participation,⁸ and organizations exclusively within the Central Asian region. The most important among the former type would be the Eurasian Economic Community (EAEC) that was signed in 2001. The EAEC replaced the CIS customs union, originally signed in early 1995 by Belarus and

⁸ Commonwealth of Independent States (CIS) was created in 1991. Current members are: Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan and Ukraine.

Russia, followed by Kazakhstan (1995), Kyrgyz Republic (1996), and Tajikistan (1999). EAEC aims to create a customs union and eventually a single economic space among the member states. A common external tariff agreement was endorsed by the EAEC in 2000, envisaging a gradual unification of external tariffs over five years. In terms of intra-regional arrangement, current cooperation is centered within the Central Asian Cooperation Organization (CACO). Russia was admitted to CACO in May 2004. CACO focuses on cooperation in customs, tariffs, trade, transport and food. Mongolia is one of the few Central Asian countries with WTO membership (joined in 1997) but not a part of any regional trade agreement. It has adopted a liberal and open trade regime with across-the-board import tariff of 5 percent and no quotas or licensing requirements. However, Mongolia is the most geographically disadvantaged and faces limited market diversification of most of its exports. Overall, the numerous regional trade agreements, coupled with inconsistent rules, may create additional barriers to trade, as it increases transaction costs - the spaghetti-bowl problem - and the scope for corruption and uncertainty about the rules and distrust among the members.

Similar to the cooperation in the Mekong region, further analytical work can contribute to increased cooperation in Central Asia. Quantitative assessments of gains and losses for individual countries will reduce the uncertainty about cooperation, enhance the trust among the countries, and help them work out self-enforcing arrangements. CAREC countries have taken steps to simplify cross-border transport procedures. With assistance from UNCTAD, a draft Transit Traffic Framework Agreement is being negotiated among Mongolia, PRC, and Russia. CACO also plans to simplify cross-border procedures among its members. In the CAREC program, too, transit coordination stands out as a key factor for trade facilitation, especially for landlocked countries. The signing of a transit agreement between Kazakhstan and the Kyrgyz Republic in March 2004 is a positive move. The Kyrgyz and Tajik customs expressed interest in entering into a similar transit agreement by the end of 2004. A regional forum held in Beijing in April 2004 aimed to share country experience in the reform of customs codes, and compare various computerized customs systems to distill lessons learned.

VI. Concluding Remark

Findings from the economic geography literature indicate significant gains to be exploited from reducing transport costs by investing in cross-border transport infrastructure and associated regional integration. Practice in cross-border economic cooperation also indicates benefits from regional transport facilitation including the elimination of non-physical barriers such as standardization of customs procedure. On the other hand, both theoretical and empirical literatures indicate asymmetric incidence of the benefits of regional integration among developing economies, necessitating mutually acceptable coordination and/or compensation arrangements. In recognition of these general implications, future applied research questions could include the following:

- (1) How much additional benefits are there really in cross-border transport investments and how would they be distributed depending on the specific mix of the economies in the region? For example, does different geographical mix of the economies (e.g., whether the participating countries are dominantly landlocked, dominantly coastal, or mixed) make any systematic differences in yielding additional aggregate economic benefits, and also in the distribution of economic benefits?
- (2) What are additional benefits other than the reduced vehicle operating costs that are

- normally excluded from the conventional transport investment appraisal but should be reasonably included in the appraisal of cross-border transport investments? Particularly interesting would be is the role of cross-border FDI which not only advances trade creation but also fastens factor price equalization within the region. Also potentially promising is the additional benefits from agglomeration (i.e., economies of scale and scope), distribution of which, however, may be asymmetric.
- (3) How would the analytical tools in economic geography help improve the methodology of distributional analysis of cross-border transport investments? Would some simulations with economic geography models help refine the framework of distributional analysis and help provoke reasonable compensation arrangements?
 - (4) What is the best sequence of the investment among physical infrastructure, establishment of coordination institution, capacity building of some participating governments, etc. in maximizing the economic benefits and minimizing transaction costs in coordination?

Answers to these questions would obviously differ from region to region. Also any standardization of empirical findings on these questions may be a long shot. However, detailed research on a specific region would yield some useful insights for other regions. In view of the interests by national governments and international agencies including ADB, and given circumstances of data availability, the first natural candidate for empirical research would be the Mekong region. Perhaps the first and second questions above, or part of them, could be investigated in the context of the Mekong region more or less in line with the approaches taken by Limao and Venables (2001) and Redding and Venables (2004). Tackling the third and fourth questions might naturally follow from findings in dealing with the first and second questions.

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