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# Brazil

## Multimodal Freight Transport: Selected Regulatory Issues

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<b>CNT</b>	<b>=</b>	<b>National Transport Federation</b>
<b>COFER</b>	<b>=</b>	<b>Federal Rail Transport Commission</b>
<b>EDI</b>	<b>=</b>	<b>Electric Data Interchange</b>
<b>GDP</b>	<b>=</b>	<b>Gross Domestic Product</b>
<b>GEIPOT</b>	<b>=</b>	<b>National Transport Planning Agency</b>
<b>MTO</b>	<b>=</b>	<b>Multimodal Transport Operator</b>
<b>RFFSA</b>	<b>=</b>	<b>Federal Railways</b>
<b>SISCOMEX</b>	<b>=</b>	<b>Information System for External Trade</b>

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## **Preface**

This report has been prepared by a team led by Antonio Estache (LAIU), on the basis of the findings of a mission which visited Brazil in October-November 1996. The team included Ron Kopicki (PSDPS), Newton de Castro and Chantal Roucolle (Consultants). Jacques Cellier (LAIU) organized many of the key meetings with the government. Messrs. Magalhaes and Gennari, of the Ministry of Transport, were very helpful government counterparts. Hans Peters (TWUTD) offered background material and contributed two boxes to the report.

The report was discussed with representatives of the Government of Brazil at a seminar held in Brasilia in May 1997. This final version reflects many of the suggestions made at the seminar.

The report was prepared under the overall guidance of Gobind T. Nankani, Director, Homi Kharas, Lead Economist and Asif Faiz, Division Chief. Messrs. Hans Peters, Louis Thompson (TWUTD), Shunso Tsukada (EA2IN), and José Carabajo (EBRD), Peer Reviewers, provided technical advice. Suzanne Maia edited the final version of the green-cover report, and Claudia Kandel provided secretarial support.



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## Executive Summary

1. **Purpose of the Report.** With the restructuring and privatization of railways well underway and other sectoral reforms initiated or under consideration, this report aims to provide an overview of the remaining public policy reforms needed to foster the development of an efficient, multimodal freight transport system in Brazil. The report examines critical issues that are likely to influence private investments in Brazil's transport infrastructure and in multimodal operations. It offers a set of recommendations to address these issues, based on international experience and best practices, in order to unleash the full investment potential for the sector. It also seeks to give a sense of the potential benefits and priorities of the proposed reforms.

2. **Underlying Concerns.** The design of public policies that influence logistics costs and investment in multimodal transport systems is a major area of concern given their impacts on: (a) Brazil's *international competitiveness*; and (b) *inter-regional competitiveness* and the economic development of the poorest regions. Conservative estimates presented in the report suggest that avoidable logistics costs add more than US\$1.2 billion per year to the costs of containerized external trade; and at least US\$1.3 billion per year to the costs of domestic commerce in the major inter-regional corridors where rail lines already exist. The overall impact on Brazil's international competitiveness is rapidly increasing with the economy's opening to foreign products and capital. The impact on inter-regional competitiveness is also critical, since the economic development of almost half of the Brazilian states, particularly the poorer states in the North and the Northeast, is suppressed by inadequate transportation options.

3. **Main Policy Issues.** The legal environment for transportation is obviously a critical cornerstone of the reform, but legal provisions alone fall short of ensuring that efficient multimodal transport services will develop. It is also necessary to optimize the effective restructuring, privatization, and regulatory elements for each sub-sector in a comprehensive reform program. Such measures are more likely to reduce transport costs and to foster multimodal transport than legislation alone. While progress in the formulation and design of reform measures has been positive, faster implementation and stricter enforcement of the approved regulatory changes are needed. The most important among the outstanding items in the regulatory arena is perhaps the resolution of the complex issues surrounding access and interconnection rules. Moreover, Brazil has only recently begun to remove economic and administrative barriers to foreign trade and much of the "import substitution" rationale and bureaucratic apparatus are still in place.

4. Other important constraints impeding cost-effective transport options and reduced logistics costs include *missing infrastructure links* and *outdated customs practices*. Indeed, once privatization has taken hold and instilled a market-oriented transportation culture, these will remain the major impediments to efficient multimodal operations, which are evidenced by the bottlenecks and high costs incurred at port and terminal operations, and thus would be the highest priorities for reform.

5. **Main Recommendations.** The policy recommendations outlined in the report emphasize that a fundamental shift in government policies and programs is needed to support privatization.

In the post-privatization era, the role of the government in the transport sector will be to promote efficient operations and investments by the private sector through appropriate regulatory and other creative supporting policies. The Government should have little, if any, direct involvement in operations and investment. The privatization process presents a unique opportunity to create new multimodal transport service “rights” and infrastructure investment opportunities for private companies that, if appropriately engineered, will begin to fill the gaps between stand-alone transportation infrastructure elements. This would enhance the connectivity of the multimodal transport network and allow for efficient multimodal services.

6. The specific recommendations and priorities for the public policy reforms necessary to prepare for the post-privatization era focus on:

- reforming customs’ clearance procedures and practices for trade facilitation;
- clarifying the rules for the restructuring and privatization of the ports system;
- preparing a “blueprint” for the critical investments needed to ensure intermodal connectivity and related supporting policies;
- defining and enforcing rules for multimodal transport operations which foster competition, promoting the standardization of equipment and electronic data interchange formats, and establishing effective conflict resolution mechanisms; and
- strengthening institutional capabilities and professionalism for logistics management.

## CHAPTER I: INTRODUCTION

1. **Background.** Over the last three years or so, Brazil has taken major steps towards the reform of its transportation sector, providing for increased private sector participation and a greater relative role of states vis-à-vis the federal government. The reform is evident in the progress made in the concessioning of railways and roads to private operators, the current implementation of port reforms enacted as laws in 1993, the upcoming privatization of ports, and other measures now being formulated or implemented. In parallel, initiatives to fine tune actions implemented in the earlier stages of reform are expected to improve the efficiency of transport services, thereby enhancing prospects for greater foreign trade and economic growth. Meanwhile, the concessioning of railways and roads is expected to lead to major changes in the effective relative price of these two modes, with the relative price of railways declining at least for some of the services. From a strictly sectoral perspective, the main outcome of the reforms is likely to be Brazil's reduced dependence on trucking for the transport of goods, particularly for medium and long distance hauls. However, for this to occur, observers from both the private and the public sector agree that the major proposed adjustments in the sector have to emphasize the importance of developing rail and water-based multimodal transport services.

2. The support of both the public and the private sectors for multimodal transport development is significant. The 1997 budget proposal for the Transport Ministry included more than 10 major investment projects totaling about US\$2 billion aimed at improving modal interfaces in Brazil. On the private side, the CNT (National Transport Federation) has organized seminars on the importance of multimodal transport for Brazil's international competitiveness. Interviews conducted with private companies during a World Bank mission<sup>1</sup> provide significant anecdotal evidence of an unsatisfied demand for investments in basic transport infrastructure and concern about the inefficient use of transportation resources such as waterways or natural ports. Moreover, the interviews suggest that complex transport regulations and inconsistency in their enforcement cause problems in planning, implementing, and controlling the flow and storage of goods from producers to consumers, undermining the efficiency of the process by which all goods are bought and sold and hence significantly increasing logistics costs. Indeed, "back of the envelope" estimates presented in this report suggest that avoidable logistics costs add to over US\$1.2 billion/year to international trade costs and at least US\$2 billion/year to domestic trade costs.

3. **Purpose of the Report.** In view of the increasing private investor interest in the expansion and upgrading of Brazil's transport infrastructure, this report intends to provide an overview and brief discussion of the main policy issues likely to influence private sector investment decisions. It has the following specific objectives:

- to assess the current logistics costs for a large sample of commodities to the extent possible (which is very limited because of the weakness of the core information available from either public or private sources), and to relate these costs to the

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<sup>1</sup> Undertaken in October-November 1996.

constraints on single and multimodal transport options available to the producers of the commodities;

- to take stock of the progress thus far achieved in the reform of the transportation regulatory environment and of its implications for multimodal opportunities;
- to highlight outstanding regulatory issues in their relevant context; and
- to propose reform measures to address the key identified policy issues.

4. The report is necessarily a modest attempt at addressing a very complex problem in a timely manner. It does not aim at being exhaustive, which would be quite challenging in light of the complex geo-economic, administrative, and legal structure of the country. On the contrary, the report tries to focus on the *essential* policy issues, at the risk of appearing to oversimplify them. The main focus throughout the discussion is to identify areas of **government policy failures** that have contributed to many of the current problems and constraints in the transport sector, and to recommend options for addressing these consistent with the more private sector-oriented strategy recently followed by the Government of Brazil. In most cases, the identified policies sent the wrong signals or incentives to potential investors.

5. **Methodology.** Little or no data is available on the key parameters affecting logistics performance in Brazil. Only slightly more data is available on specific transportation modes and/or commodity and product flows within the country. Given these constraints, much of the evidence used to support the findings and conclusions of this study is necessarily based on a systematic review of the regulatory regime and on field interviews and discussions with private transportation operators, shippers, and consignees as well as interviews with government authorities at the federal, state, and municipal levels.

6. In spite of the limited data, rough estimates of logistics costs for a sample of 15 commodities is provided. They are presented to illustrate the relative importance of some of the main areas of concern for policy-makers. Logistics costs for this discussion are estimated as the sum of freight cost and inventory costs (the details are in an appendix). The tariff approximates the freight cost. Inventory costs, including the financial cost for stocks in transit and at destination, are assumed to be a linear function of modal transit time. Transit times are themselves a function of modal average cruising speeds. The number of working hours per day and working days per year provides additional information on the difference in logistics costs and recognizes the money value of travel time.

7. **Underlying Concerns.** There are two main reasons why the multimodal topic needs to be a key element of any transport strategy for Brazil: multimodal transport's impact on *international competitiveness*, and its impact on *interregional competitiveness and regional development*.

8. **Impact on International Competitiveness.** The relative importance of excessive transport costs for Brazil's international competitiveness is increasing rapidly as the economy is opened to foreign products and capital. Concerns with high logistics costs are leading some industrial producers, for example, to consider moving from Brazil to Argentina to deliver goods in the region because Argentina now has better opportunities for strategies utilizing multimodal transportation services at much lower logistics cost levels. In addition, lower transportation costs

for many basic commodities (e.g., soybeans) can only be achieved by reducing the role of road transport through more effective use of rail, river, or maritime transport.

9. Moreover, with the emergence of Mercosur, the relative importance of transport costs has rapidly escalated. They determine to a significant extent the level of efficiency at which internal markets operate and the level of effective competition among producers. They also influence regional investment decisions. This is an issue of concern for most of the countries in the Mercosur group who are lagging Argentina in the reform of the transport sector.

10. The regional distribution of the gains from reform is however one of the recurring concerns in Brazil. Transport distances are often considerable and without cost-effective transportation, the gains from Mercosur trade could be distributed unevenly among Brazil's different regions. To ensure that all regions can make the most of the opportunities offered by the new trade agreement, transportation logistics need to optimize the advantages that each mode offers. For many basic commodities produced in the northern regions of the country and far from the main consumption centers (i.e. the South and Argentina), this means more effective use of rail, river, and maritime modes of transport and less use of road transport<sup>2</sup> The failure to adopt this strategy can explain to a large extent why transport costs are so high for many commodities in these regions and why their "competitiveness" has been significantly lower than it could be. For instance, soy bean transport from *Mato Grosso* to the *Port of Santos* or *Paranagua* costs about R\$77/ton. This represents almost 50% of the price of a ton of soy beans.<sup>3</sup>

11. Industrial products can also be penalized by transport policy failures. The experience of a multinational enterprise operating in Brazil since the 1920s is quite revealing of the potential costs implied by failures to improve the overall transport policy environment. In this case, the firm faces losses of its products in transit and due to pilferage that are equivalent to 1% of its total exports. Since insurance coverage of cargo is not consistently applied in cases of theft, the firm is considering making deliveries to Mercosur countries from a satellite distribution platform in Argentina unless this problem can be satisfactorily resolved. In Argentina, it also expects to find much lower logistics costs reflecting the deregulation of all transport services, which has increased the quality and flexibility of distribution services and provided greater opportunities for using multimodal transportation service strategies.

12. **Interregional Competitiveness and Regional Development.** The different levels of infrastructure between regions is well recognized as a source of variation in regional performance. This is confirmed by a recent World Bank study assessing the mechanism of growth convergence among states in Brazil, which found that access to better transport infrastructure was a key factor in explaining deviations between the growth performance of individual states and the national average. The analysis shows that as many as 11 of the 23 Brazilian states would experience greater economic growth if they had access to better transport infrastructure<sup>4</sup>. In Chapter II, it

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<sup>2</sup>This has not only cost implications but of course significant environmental implications over the longer run which should not be neglected in any assessment of the returns of investments in transport.

<sup>3</sup>This example is from da Silveira, L.C.A., "Logistics in Transport: Challenges of Efficiency" (1996), mimeo, AEB-Brazilian Foreign Trade Association.

<sup>4</sup>Estache, A. and M. Fay (1996), "Does Lack of Infrastructure Explain Regional Income Differences in Argentina and Brazil in the 1980s?", mimeo, The World Bank.

will be seen that the production in Brazil's poorer northern and northeastern states is relatively more subject to penalties imposed by high transport costs derived from the states' bias in favor of road transport. These results are not an endorsement of indiscriminate investments to increase transport access. Rather, investment in transportation should be done in a carefully considered way (i.e. a more effective assessment of the demand side than typically done in the projects proposed to the Bank) that allows the most efficient use of available resources and therefore, the most effective use of various modal options. A reform program that increases the availability of different modal options and their ability to be efficiently combined in a multimodal approach to reduce total transport costs would certainly benefit all states. However, the positive economic impact is likely to be greater in the northern and northeastern states where the demand for additional transport infrastructure is the strongest.

13. **Ways for the Government to Reduce Logistics Costs.** Logistics efficiency is generally high in economies that: (i) create competitive incentives for service providers to continuously innovate and to seek out lower cost combinations of transport services, and (ii) do not eliminate private sector opportunities to be (more) involved in the provision of adequate transport infrastructure. These are the two main areas in which the Government can directly act to improve existing conditions. The Government is anxious to explore ways to meet the demand for transportation investments, especially those that are most likely to generate large externalities through positive impacts on regional development. The Government is also working to improve investment incentives through a gradual privatization/concessioning of railways, roads, and ports as well as through the decentralization of authority over roads that do not clearly fit a national profile. As discussed later, however, even if much progress has been achieved overall, the implementation of the reforms in the regulatory framework needed to support multimodal transport has been insufficient, thus reducing private sector incentives to take the initiative in seeking lower cost transport opportunities through innovative schemes.

14. **Report Structure.** The remainder of this report is organized as follows: Chapter II reviews demand-side issues and illustrates the potential size and scope of multimodal markets in Brazil. It includes a systematic assessment of the limited evidence available on modal choices and distances covered by the various modes, identifying inconsistencies that suggest an implicit demand for a different modal choice. Chapter III provides a diagnostic of the supply side situation. It focuses on policy issues in each sub-sector (rail, road, waterways, seaports), distinguishing between regulatory issues and logistics factors that are directly or indirectly influenced by government action. Chapter IV suggests various elements for a strategy that aims to achieve the needed changes in the current multimodal policy environment.

## CHAPTER II: SIZE AND SCOPE OF MULTIMODAL MARKETS

1. This chapter profiles the Brazilian freight transportation market. It estimates the size of the market and assesses modal shares within that market. A comparison of various aspects of the costs of each mode reveals, implicitly, the demand for an alternative, wider menu of transport options. Even if the information available is not sufficient to provide an explicit link between the demand for multimodal transportation, it is enough to generate indicators of sources of logistics cost savings.

### A. The Demand for Transport Services

2. The value added of the transport sector in Brazil represents about 4% of the GDP. The total freight transport bill represents 9% to 10% of GDP, which was about US\$680 billion in 1996. Table 1 shows that the growth of freight transport demand with respect to national income is highly elastic, although the elasticity has gradually declined over the past 15 years from 1.23 to 1.08. The elasticity of demand can be explained in terms of two factors. The first is the broad geographical dispersion of the economic activity in Brazil that occurred over the past three decades, with the Southeast region—the traditional industrial powerhouse of the national economy—losing almost 10% of its share of the total GDP until 1985. Over the same period, the less developed northern, northeastern and central-west regions have gradually expanded their respective shares<sup>5</sup>.

**Table 1: Growth Rates for National and Transportation Aggregates**

	1970-80	1980-90	1990-94
<b>GDP</b>	8,63	1,54	2,45
<b>AGRICULTURE</b>	4,73	2,52	3,75
<b>INDUSTRY</b>	9,30	0,29	1,92
<b>SERVICES</b>	9,39	2,61	2,29
<b>TRANSPORT</b>	11,11	2,80	3,28
<b>DIESEL CONSUMPTION</b>	11,23	2,68	3,64
<b>TKM</b>	10,40	4,63	3,53
<b>PASSENGER KM</b>	14,09	3,98	3,61
<b>ELASTICITY OF TRANSPORT WITH RESPECT TO GDP</b>	1,23	1,12	1,08

Source: IBGE and GEIPOT

3. The second cause of the surge in transport demand has been the significant expansion of interregional commerce for all regions. This significant change in product/commodity flow patterns took place at the expense of foreign trade for the northern regions. Indeed, by 1985 much of Brazil's international trade was being channeled through gateways in the southeast. By 1985, the percentage of total interregional trade moving from the northeast to the southeast was 78%, while interregional commerce for the northeast region exceeded its intraregional commerce by 2.5 times. The subsequent opening of Brazil's borders to international trade and the lowering

<sup>5</sup> This trend has apparently been reversed after 1985. Recent preliminary results for the regional distribution of GDP indicates that the Southeast has improved its position in 4 percentage points since 1985, at the expense of the Northeast and South regions in particular.

of formal trade barriers has only marginally influenced these patterns of internal commerce established since the late 1980s.

4. By 1992 (the latest year for which data is available), the total volume of intraregional and interregional flows was over 202 million tons, of which 109 million represented interregional flows<sup>6</sup>. About 82% of total interstate commerce moves along a major north-south axis which links the South, Southeast, and Northeast as seen in Table 2 with fairly long average haul distances that are truly suitable for rail, rail-waterway, or rail-road transport modes<sup>7</sup>. The methodology for estimating inter-regional trade flows is presented in Annex 1.

**Table 2: Trade within and between Regions in 1992**

Destination	Origin					TOTAL	Interregional
	NORTH	NORTH EAST	SOUT H EAST	SOUTH WEST	CENTER- WEST		
	Volume (million tons)						
NORTH	2.9	1.9	4.8	.8	.1	10.5	7.6
NORTHEAST	1.0	14.6	14.0	2.4	.4	32.5	17.8
SOUTHEAST	4.5	15.9	60.3	23.3	5.2	109.2	48.9
SOUTH	.5	.6	21.1	13.9	2.6	38.7	24.8
C.-WEST	.2	.2	7.9	1.6	1.6	11.5	9.8
TOTAL	9.2	33.3	108.1	42.0	9.9	202.5	109
Interregional	6.3	18.6	47.8	28.1	8.2		
	Average Length of Haul in Cargo Flows						
NORTH	1.549	3.028	3.484	3.846	2.198	2.878	3.387
NORTHEAST	1.922	669	2,391	3,293	2,263	1,664	2,484
SOUTHEAST	3.819	2.165	532	911	1,065	1,012	1,604
SOUTH	3.879	3.298	913	483	1,298	861	1,074
C.-WEST	2.601	2.197	1,103	1,505	554	1,120	1,214
TOTAL	2.865	1.578	1,020	982	1,097	1,191	1,717
Interregional	3.477	2.293	1,635	1,229	1,206		

Source: De Castro, N. (1995) :5/, based on data provided by the main rail and waterway operators and data published by IBGE and GEIPOT.

## B. The Modal Distribution of Transport

5. In Brazil, large annual volumes, low commodity value-to-weight factors, and the prevalent long hauling distance would appear to favor logistics arrangements involving low-cost water (including inter-coastal) or rail transport options over truck hauling. However, as shown in Table 3, this is not the case at all: trucking clearly dominates. Only 12% of the rail flows within

<sup>6</sup> see De Castro, N. (1995): "Intermodalidade, e o Transporte de Longa Distancia no Brazil", IPEA, Texto Para Discussao No. 367, Rio de Janeiro.

<sup>7</sup> The flows presented in Table 2 and the shares calculated in Table 3 are exclusively for the interstate commerce, both within and among regions. It therefore excludes all flows of the brazilian international trade including bulk exports of iron ore and imports of petroleum. There are, accordingly, significant differences between the figures presented and alternative ones which include export and import flows. For example, Brazil moves more than 150 million tons of iron ore by rail, most of it for export through CVRD's Vitoria-Minas and Carajas subsystems and RFFSA's recently-privatized southeast lines. These are almost dedicated export corridors and are not considered in this report. For more details on the methodology used to estimate interstate commerce flows see Castro, (1989) Perspectivas de Desenvolvimento Regional, in Perspectivas da Economia Brasileira - 1989, IPEA/INPES (cap. 8).

the country involve interline movements—i.e., movements between two or more rail subsystems. These include, for example, movements between RFFSA's operating divisions (before privatization) or between FEPASA, CVRD, or one of the concessioned lines after privatization. Even within the subset of interline movements, the average length of haul is only 585 kilometers. In summary, the rail market share is highest for short distance movements, for which rail cost and service advantages are not as significant. Moreover, the rail market share is actually the lowest for the longest distances<sup>8</sup>. This counter-intuitive result can be explained by the low degree of service integration and/or network connectivity among the rail subsystems that characterized public rail transport in the pre-privatization era. As a result, demand was repressed, as indicated by the modal shares shown in Table 3<sup>9</sup>.

**Table 3. Rail and Water Transport Market Shares in Interstate Cargo Flows (1992)**

Destination	Origin					Total	Interregional
	NORTH	NORTHEAST	SOUTHEAST	SOUTH	C.-WEST		
		T	T				
				<b>Rail</b>			
North	0	0	0	0	0	0	0
Northeast	0	9	3	0	0	5	2
Southeast	0	1	30	2	9	17	2
South	0	0	5	11	12	7	5
C.-West	0	0	11	0	0	8	9
Total	0	4	19	5	8	12	3
Interregional	0	1	5	1	9		
				<b>Waterways</b>			
North	87	65	32	54	0	55	42
Northeast	0	40	23	69	0	33	28
Southeast	8	62	26	26	0	29	33
South	0	8	24	9	0	16	20
C.-West	0	0	0	0	0	0	0
Total	32	51	24	22	0	27	27
Interregional	6	60	21	29	0		

Source: De Castro, N. (1995): *Intermodalidades, Intramodalidade e o transporte de longa distancia no Brasil.* IPEA, Texto para discussao No. 367, Rio de Janeiro, Based on data published by IBGE and GEIPOT. For more details see Annex 1.

6. The performance for water-based transport is also not that impressive, even though 70% of all cargo movement is done through private ports (traffic in public ports is concentrated in Santos and Rio de Janeiro). In 1994, Brazilian ports moved 360 million tons of cargo. International trade accounted for 264 million of the total, split 70%-30% for exports and imports, respectively. In the coastal or cabotage subsector, the general cargo flows have been declining since 1980, reaching only 125,000 tons in 1994. Interior navigation is responsible for moving 12 million tons of cargo (consisting mostly of soy beans and pellets) through ports, but most of this

<sup>8</sup> The correlation coefficient between average length of haul in cargo flows and rail market share is -.58.

<sup>9</sup> Pipelines are responsible for only 3% of freight transportation production in Brazil, most of the flows being within states. Air freight is minimal.

activity is concentrated in *Porto Alegre*, in the state of *Rio Grande do Sul*. The rest of the water-based cargo movement is primarily located in the Amazon region. It is worthwhile noting that inter-coastal navigation in Brazil carries only bulk commodities (72% crude oil and products; 17% minerals; 3% salt). It has a market share of 27% in interstate and interregional commerce for the country when all commodities are taken into account.

7. The primary reason for the under-development of water-based transport options appears to be relatively high container handling and bulk handling charges in Brazil's ports and a lack of specialized multimodal transfer facilities. Port privatization, together with the liberalization of existing restrictions on market entry and a clarification of terminal operator rights and responsibilities vis-à-vis private contract carriers is expected to greatly improve the demand for the development of water-based multimodal services.

### C. Links Between Logistics Performance and Modal Share

8. Several logistics parameters including annual movement volume, shipment size, number of shipments between each origin and destination (i.e. the transportation density), length of haul, and the characteristics of the goods themselves determine the comparative advantage of one transport mode versus another. Table 4 compares the modal logistics costs for trucks and rail transport for a selected group of commodities<sup>10</sup>. This compares the costs observed in the unregulated trucking industry to the costs of rail services working "reasonably" well after privatization or at least much in par with international practice than under RFFSA. The methodology used for comparing logistics costs is presented in Annex 2.

9. According to the estimates in Table 4, efficient rail services in Brazil are often likely to prove more cost effective in terms of total logistics costs. The only exception is in the realm of transporting oil derivatives, for which tariffs are kept artificially inflated above market levels by the government agency managing the distribution of oil products. For non-iron ore products, the rail market share is only 19%. If interregional trade flows were included in the analysis, the market share would be even lower (about 12%) due to the drastic reductions in rail market share in parallel with the increasing length of the haul, as noted earlier. Furthermore, the relative performance of rail and multimodal rail arrangements improves significantly with distance.

10. The weak correlation between logistics costs and market share indicates that shippers may not be fully sovereign in the Brazilian transportation market and that their demand for low-cost service may not be satisfied since in many cases they are forced to rely on the considerably more expensive road transport as illustrated by a study of grain transportation in Brazil published by GEIPOT<sup>11</sup> and summarized in Annex 3, and a study of the Ministry of Agriculture summarized in box 2, chapter IV.<sup>12</sup>

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<sup>10</sup> In this context, lowest economic cost is based on the total logistics costs associated with each of the modal options including multimodal transportation which should be available to the shipper.

<sup>11</sup> BRASIL, MT-GEIPOT. Corredores de Transporte - Proposta de ações para a adequação da infra-estrutura e para racionalização do transporte de grãos agrícolas. Brasília, julho 1995.

<sup>12</sup> Secretaria da Agricultura e do Abastecimento, "Corredores de Transport Multimodais", Ministerio da Agricultura e do Abastecimento, Brasília, Abril 1997.

**D. Reviewing the Evidence on Demand**

11. In an efficient market, a strong correlation generally exists between modal market shares and the relative logistics costs associated with each mode per transported commodity or product. This is obviously not the case in Brazil. There is a basic demand for more transport in general as well as for more cost-effective modal options since the relatively costly road transport option has experienced a notable growth trend despite its high costs. The presence of excessive costs revealed by the analysis, however, also serves as an indicator that only activities with a highly inelastic internal demand can survive in the current business environment. It is therefore very likely that reasonable business opportunities and the related employment and economic growth benefits in many states are being repressed by the extremely high markup imposed by road transport to obtain access to the markets in the southern and southeastern regions where the greatest demand exists.

**Table 4: Modal Logistics Cost Comparisons  
(1994)**

Product	Million tkm	Unit Tariff : truck as % of rail	Transit Time: truck as % of rail	Total Logistics Costs: truck as % of rail	Rail Market Share (as % of total)
Alcohol	1,979	131	48	100	35.5
Cement	3,533	232	45	169	27.3
Coal	2,741	352	44	241	90.2
Corn	317	261	44	158	2.7
Fertilizer	1,477	300	45	133	13.3
Iron ore	91,483	984	44	819	100
Limestone	1,467	255	46	193	13.3
Oil products	6,762	128	45	96	21.3
Pulp and paper	168	252	44	152	22.7
Soybeans	2,294	270	45	144	17.2
Soy meal	3,243	278	45	153	50
Steel Products	2,166	238	47	125	27.8
Sugar	511	267	45	133	13.3
Other	14,501	309	46	116	13.9
<b>TOTAL (excl. iron ore)</b>	<b>41,767</b>	<b>228</b>	<b>45</b>	<b>228</b>	<b>19.0</b>
<b>TOTAL (incl. iron ore)</b>	<b>133,250</b>	<b>479</b>	<b>45</b>	<b>286</b>	<b>37.7</b>

Note 1: Consider the relative cost to be underestimated because in 1994, rail tariffs were higher than costs. Also note that the calculation of transit time assumes an inverse relationship between reliability (typically a key component of logistics costs) and transit time. For details on the methodology see the Appendix.

Note 2: "Other" includes mostly manufactured products.

12. The next chapter looks into the main reasons for the existence of such a significant level of unsatisfied demand for cheaper transport options. Without a doubt, lack of infrastructure is a problem in this regard. However, it is important to understand why, even in the regions where rail, road, and waterway transport are all available, the optimal choice is not necessarily adopted by the service users. This indicates that the problem is also related to other issues, and particularly to institutional aspects, including the regulatory framework.

### **CHAPTER III: DIAGNOSTIC OF THE POLICY ENVIRONMENT IN TRANSPORT**

1. This chapter reviews the main aspects of government policies that can at least partly explain the inadequate support for transport logistics development as well as the lack of multimodal transport facilities in Brazil. Three main areas are covered: (i) the supply of transport infrastructure; (ii) the necessary legal and regulatory framework; and (iii) the aspects of logistics practices that are influenced by policy actions, such as pricing rules and practices. In brief, this chapter discusses the extent to which the unsatisfied demand hinted at by the indicators reviewed in the previous chapter actually reflects more a policy failure than a market failure.

#### **A. Adequacy of Infrastructure Options**

2. Why would Brazilian producers prefer to rely on trucks in spite of the seemingly high costs of this option? One obvious explanation is that until the recent privatization of freight railways there was no other realistic option in terms of reliability and quality of service. First of all, the public railways were so poorly operated that rail was far too costly an option for many businesses. Tracks per se are useless if there are no locomotives, and the option also loses its appeal if the railway does not operate on time. In other words, non-tariff elements are critical to the success of the particular mode and are likely to be a critical element of the regulation of the private operators. Secondly, the poor quality/condition of the connectivity between FEPASA and the rest of the rail system destroyed the continuity that might otherwise have effectively linked north-south market routes. The almost completed privatization of RFFSA and the prospective privatization of FEPASA will, however, probably go a long way towards reducing this limitation on the use of railways (presuming the six concessions of RFFSA and the FEPASA concession can be connected without major problems, which may be questionable).

3. A second explanation seemingly involves implicit subsidies. As already mentioned, user fees paid by road users are considerably below the actual social costs (including not only their environmental impact but also their impact on society through other externalities, such as accidents). For trains, the difference between social and private costs is much more modest and subsequently the implicit subsidy is much lower. Another explanation is that a minimum level of raw infrastructure is needed to support efficient logistics operations—in particular, an infrastructure which ensures adequate multimodal connectivity and has the capacity for rapid and low-cost interchange of shipments from one mode to another. “Bottlenecks” or local constraints in regional or national service networks that may cause delays, adversely affect asset utilization, separate otherwise integrated logistics processes, require additional buffer inventories within supply chains, and generally increase logistics costs.

4. Evidence presented in Chapter II indicates that the lack of raw infrastructure may be a problem, which justifies a look at the available infrastructure from a cross-country perspective to refine that impression. Table 5 compares Brazil’s transportation infrastructure with that of several other large nations of comparable size and economic scale. By these “gross” comparisons, it appears that Brazil’s highway infrastructure is relatively well developed and appropriately matched to the scale of the nation’s markets, whereas its railways are relatively less developed, with significantly less capacity than the scale of the nation’s markets might warrant.

**Table 5: International Comparisons of Transport Infrastructure**

	km of primary highways per '000 capita	km of high-way per tkm <sup>2</sup> of land	km of high-way per GDP \$USM	km rail lines per '000 capita	km rail per tkm <sup>2</sup> of land	km rail per GDP \$USM	km of navigable waterway per '000 capita	km water per tkm <sup>2</sup> of land	km water per GDP \$USM
Brazil	0.72	13.50	0.21	0.17	3.17	0.05	0.31	5.87	0.09
Argentina	1.13	13.11	0.13	1.01	12.31	0.12	0.33	3.98	0.04
Mexico	0.59	23.35	0.12	0.23	10.44	0.05	0.03	1.48	0.01
Canada	4.90	17.76	0.33	3.07	8.98	0.17	0.10	0.30	0.01
India	0.04	10.36	0.12	0.07	19.00	0.21	0.00	1.10	0.01
China	n.a.	n.a.	n.a.	0.05	5.63	0.10	0.09	11.48	0.21

Source: Roads: World Roads Statistics (1995), International Road Federation; Railroads and Waterways, Reddy, M.A.(1996), Ed., Statistical Abstract of the World; GDP, exchange rates, population: IMF (1995), IFS Yearbook

5. The geographic orientation, as well as the scale, of Brazil's basic transportation infrastructure is symptomatic of some of the fundamental problems that need to be overcome in developing Brazil's transport system. Most of the rail lines operating in Brazil, for example, have an east-west orientation reflecting the purpose for which they were originally constructed—that is, to move raw materials to export ports for overseas sale. Moreover, rail lines appear to be unevenly concentrated in the south and southeast as discussed in Chapter II. Modal options available to shippers remain constrained and critical infrastructure “choke” points adversely affect transportation operations during peak periods. In particular, options for moving goods between major manufacturing centers in the southeastern region and the *Port of Santos* are limited to over-the-road truck hauling for large cargo. During the summer season when beach commuter traffic is heavy, truck traffic in littoral areas is limited to a single route that is congested and difficult to negotiate. In addition, only a limited number of river-rail and river-highway transfer facilities and rail-highway intermodal facilities exist in Brazil.

6. The above description provides no definitive proof of policy failure, but it nonetheless suggests that Brazil's transport development strategies have differed considerably from those adopted by other large countries. It also suggests that a careful review of the policy framework is needed to explain the differences in infrastructure availability and the apparent demand suggested by the incomplete “macroeconomic” evidence reviewed in this report and related during interviews of firms conducted during the Bank's mission. Many of the obvious gaps could be closed through a regulatory environment that is more conducive to private investment in the sector/subsectors, or even through public investment when private returns are not sufficient but social rates of returns justify the investments.

## **B. The Regulatory Environment**

7. For private investment to occur on a significant scale in rail and water transport, as well as in multimodal infrastructure, open sector entry and pricing freedom such as that currently prevailing in the trucking industry will have to be extended to the other transport modalities. Moreover, problems such as the government's interference and restrictive regulations that have, among other factors, limited the scope of rail transport and have caused ports to become major barriers for coastal navigation must be exorcised. The reform programs for the rail and port subsectors provide the appropriate and crucial vehicle for amplifying the benefits of a properly

designed reform strategy across most, if not all, transport modalities. To correctly see where the critical issues are in this effort, this section assesses: (i) the institutional and regulatory reforms that are being carried out by federal government of Brazil in the transportation sector, specifically focusing on rail, port, road freight transport, and multimodal issues; and (ii) the impact of the reforms on multimodal infrastructure developments.

### ***B-1. Ports***

8. **Achievements.**<sup>13</sup> The ongoing restructuring of port services is slowly introducing the major changes required under the reform legislation enacted in February 1993. A new institutional structure is gradually taking shape, headed by local port authority councils and encompassing the constitution of port labor management agencies and the qualification of private port operators. New tariff structures are being tested. Work permits for longshoremen are being canceled, but compensation packages are provided to cover the job losses. Even at public ports, the contracted labor force is decreasing rapidly.<sup>14</sup> At the port of *Santos*, for instance, the number of employees under contracts was reduced by 20% (to 5,800) between 1993 and 1995. These changes are all aimed at loosening the restrictive labor contracting and work rules, and will also enable the redesign of tariff structures. Overall, progress on this front is slow, but the reform process is likely to gain momentum as the privatization program for smaller ports—along with that of the port areas and terminals under major public ports—continues to evolve. As competition grows between the ports as well as among the terminals, other remaining institutional problems are likely to be solved.

9. **Issues.** The port subsector is central to opening opportunities for multimodal arrangements that involve water transportation. In Brazil's foreign trade, 95% of all cargo movements are by ocean vessels. The coastal navigation route (including the Amazon river and *Lagoa dos Patos*, RS) is a 10,000 km waterway along which 17 state capitals are located (with *Sao Paulo* and *Curitiba* less than 100 km from the nearest port on this route). At cruising speed, for similar levels of capacity utilization and with the proper regulatory conditions, the operating cost per ton-km for water transport is generally hard to beat. Established modern technologies, such as roll-on/roll-off, lighter aboard ship (LASH), and containerization make water transport services competitive with those of other transport modes as long as the operators manage to consolidate enough cargo to fill up the carrying capacity of the vessel without compromising the frequencies of sails.

10. Therefore, the competitive position of water-based multimodal transport is basically defined by its ability to concentrate cargo in hub ports and move them efficiently in and out of the vessels. There is a huge market for cargo flows in Brazil along its vast coastline that could be efficiently served by the water mode. Nevertheless, the ports handling these services impose a tough penalty both in terms of out-of-pocket costs and service quality. This can only change through the full implementation of the already approved port law, particularly in terms of removing restrictions on labor contracting and work rules. The incentive for unions and local vested interest to find a common ground in labor negotiations will often be a direct effect of the

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<sup>13</sup> See also Report No. 15663-BR entitled "Brazil: The Custo Brazil since 1990-92" dated June 21, 1996.

<sup>14</sup> This decline was however more than offset by labor force without contract. It increased from 4,700 in 1994 to 7,500 in 1995.

enhanced competition confronting them (from other regional ports or even from other terminals within the same port). It is important to structure the port areas under the jurisdiction of each port authority in a manner that increases the possibilities of competition, but this requires the strengthening of the relevant policy guidelines as well as the implementation of the recent reform promoted by the government.

11. Although the new port legislation made great progress in removing costly regulatory restrictions, it did not provide clear policy guidelines for the institutional re-organization of the port system. Policy questions regarding this issue include: How should the Ports Councils evaluate and approve proposed port tariffs, particularly in regions served by only a few facilities that have some degree of monopoly power? By constitutional mandate, port services are an obligation of the federal government, but they can be concessioned or authorized to private interests through public bidding. Law No. 9.277, enacted in May 1996, also allows the Government to delegate authority over public ports to states or municipalities through direct agreements. The Government may influence port policy through its delegated representative participating in each of the Port Authority Councils. For now, the federal government has decided to prepare, through BNDES, the privatization of ports.

12. The Government seems to be gradually defining its policy orientation through a multi-pronged strategy involving the de facto splitting, concessioning, and transferring of authority to other entities. On one front, 12 of the smaller ports have been selected for private concessioning in several stages. On another, the larger ports (*Santos* and *Rio de Janeiro*) are the subject of a study on the leasing of areas and terminals. Three small ports managed by the Rio Dock Co. (CDRJ)—*Forno*, *Niteroi*, and *Angra dos Reis*—are likely to be leased separately. Although this policy option mix may help to break down political resistance to the restructuring of the port sector, there is no guarantee of the consistency of these undertakings (in their aims and application). It is also not yet clear what type of institutional arrangement will emerge from this process, nor (more importantly) how effectively it will work. The future role of the existing dock companies is another area of great uncertainty, as well as the steps that will be necessary to restructure them. Finally, the federal government has yet to decide how it should deal with the major public ports that are currently run by states when their concessions expire.<sup>15</sup>

## ***B-2. Rail Transport***

13. **Achievements.**<sup>16</sup> Before its privatization was initiated in 1996, the rail operator, RFFSA, operated 22 thousand kilometers of lines—amounting to 73% of Brazil's rail network—with 1,420 locomotives (with less than 60% availability), 38,000 wagons and 42,000 workers. Moving 80 million tons per year, RFFSA's production is around 36 billion ton-kilometers (though stagnating for the last 8 years), representing annual revenues of about US\$700 million. The RFFSA system was restructured into six regional subsystems for privatization. Beyond these six, the two other rail freight operators in Brazil are: FEPASA, owned by the State of *São Paulo*, and which is expected to be privatized in 1997; and CVRD, a recently-privatized conglomerate that owns and operates *Estrada de Ferro Vitoria-Minas* and *Estrada de Ferro Carajas*.

<sup>15</sup> In Rio Grande do Sul, two of the terminals have already been concessioned and more are scheduled for the next few months.

<sup>16</sup> See also Staff Appraisal Report No. 15580-BR for the Federal Railways Restructuring and Privatization Project, dated May 27, 1996.

14. The RFFSA concessioning is a major step in the direction of increasing cost-effective transport in Brazil. New investment and expansion of the rail systems is likely to be one of the main outcomes of the privatization strategy, but it remains to be seen how the investment strategy followed by the private operators pursuing their own interests will coincide with public interest. In this regard, there is already some concern about the concession of the northeast system.

15. **Issues.** The rail system in Brazil is probably one of the most important elements for the development of multimodal arrangements. On one hand, its broad geographical coverage and inland penetration give it a clear advantage over water transport. On the other hand, its flexibility with respect to the volumes hauled in each train and the relatively small size of the basic unit (i.e., the wagon or car) further reinforces this advantage in light of the typical shipment sizes found in Brazilian commodity markets.

16. **The Rules for Different Kinds of Systems are Still Evolving.** Meanwhile, the administrative and institutional barriers between railways and railway departments are considerable, and may not be sufficiently attenuated by the privatization model chosen by the federal government because of potential political interference. Indeed, when the RFFSA system was divided into six regional subsystems, it considerably increased the number of players and the diversity of interests that have to be coordinated and reconciled in order to achieve full connectivity for the rail system. The problem of subsystem integration in Brazil is further aggravated by the fact that some of the bigger concessions are operated by their own major shippers (as is the case for the southeast concession and the CVRD lines). Although no captive shippers have yet raised any issues, international experience suggests that it will only be a matter of time. In the near term, the connectivity between the FEPASA system and RFFSA's six successor concessions looms as a potential problem. Without quickly establishing clear rules for interchange or mutual traffic, there will be little room for reliable intermodal or intramodal services through and around São Paulo.

17. The concession contracts signed between the federal government and the new concessionaires give exclusivity for the operator of the subsystem to explore and develop rail transport in its concession area. However, the concessionaire is also required to operate mutual traffic (i.e., to haul the wagons of other concessionaires). If for any reason the concessionaire cannot operate mutual traffic, it must concede open access to other interested concessionaires. It is doubtful that these provisions can of themselves guarantee the connectivity and integration of the rail system and thus allow Brazil to take full advantage of its long distance market potential. Rather, close coordination of the various operators is needed to develop appropriate multimodal transport services. This was clearly observed in the merger activity that followed transport deregulation in the US and in international markets. In the process of privatizing the rail concessions in Brazil, it is possible that the 20% ceiling for voting shares applied to individual consortia members encouraged the participation of these members in several concessions, and consequently served to strengthen their intra-industry operational and management ties. On the other hand, some of the rail concessionaires also have competitive relationships, particularly those with access to alternative maritime ports (e.g., *Tubarão/Capuaba/Praia Mole, Santos, Sepetiba, Rio de Janeiro*). In this regard, the Government should be aware of the possibility of changes in concession control that would reduce competition in these corridors.

18. These items are potentially serious problems if the major regulatory reform program in general and access pricing and interconnection rules in particular (announced as part of the privatization strategy) are implemented too quickly without appropriate safeguards to ensure competition. This is because the subsector suffers from a lack of appropriate regulation, and any attempt to enforce the fundamental original regulations (*Regulamento Geral de Transportes - RGT*) would be problematic since they are not yet consistent with the requirements of streamlined economic regulation. Dozens of articles in the regulatory law treat relatively minor aspects of railway obligations, typologies, due process, nomenclature, and so forth, but very little is said about commercial conduct, fair competition, and enforcement of mutual traffic agreements. Moreover, in contrast to the ports and air transport subsectors, rail regulation in Brazil is binding only with respect to general tariff controls. The 1996 regulatory law has not yet achieved improvements in the economic regulation of the subsector. Many regulatory issue areas remain obscure, including pricing (discrimination, captive shippers, dumping, confidentiality of contracts), competitive access (including the design of complex access pricing rules), and rail abandonment. Yet these are precisely the areas that are critical to the medium-term success of the reform program and to the development of a multimodal "vision" of private investment in the sector. Finally, there are also many uncertainties regarding the Government's interpretation and application of the new Public Service Concessions Law in the rail subsector.

19. The Ministry of Transportation is working on these reform issues, but progress has been slower than expected. Thus far, the Ministry's department in charge of the control and coordination of land transportation has only undertaken limited activities in the area of rail transport. Nonetheless, its role as an intermediary for fostering rail intramodal connectivity is likely to become more important now that RFFSA's system is split into six independent concessions and as other ongoing projects mature (*Ferroeste, Ferronorte and Ferrovia Norte-Sul*).

20. Regarding the rail subsector's share of the total transportation market, Brazil transports huge volumes of interstate and interregional commerce (over US\$200 billion per year, in interstate), and the distances involved appear to favor arrangements using rail or water (coastal) transport. Nevertheless, rail transport has a disappointing 12% share in the overall interstate commerce and a negligible 3% share in the longer haul interregional flows. In comparison, coastal navigation, which deals only in bulk commodities (72% crude oil and products; 17 minerals; 3% salt), has a market share of 27% in interstate and in interregional commerce. Trucking accounts for 61% of all interstate flows, and has a 70% market share of the flows between regions.<sup>17</sup> Even in the denser economic flows between the south and southeast regions, where rail infrastructure is in better condition, its market share is small. The rail flows that manage to break the intramodal administrative barriers do so for short distances in one or more subsystems, which thus facilitates the service control by each administrative unit.

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<sup>17</sup> Pipelines are responsible for only 3% of freight transportation production in Brazil, being most of the flow within states. Air freight is minimal.

### ***B-3. Road Freight Transport***

21. **Achievements.** The road transport subsector is also following a privatization strategy. The Government has recently concessioned five major roads, of which three are already collecting tolls. The federal government is also transferring many of the roads under its jurisdiction to the states, which are similarly pursuing private concession programs. These roads support the flows that generate freight revenues of about US\$50 billion per year, undertaken by between 11,000-15,000 privately-owned trucking firms and 350,000 independent truckers or trucks owned by "non-trucking" firms. The trucking firms alone have about 270,000 employees and generate annual operating revenues of US\$10 billion. These firms have operated under minimal restrictions for a long time now.

22. On the whole, this segment of the transport industry is dominated by private and independent truckers. Generally, the vehicles owned by the independent truckers are older, with a significant proportion of adapted medium-sized trucks with conventional open bodies. Their operations are concentrated on medium and long distance hauls. The truckers appear to be the most likely victims of a future switch to rail or water-based transport options. They have a powerful lobby that the Government will probably have to confront, and clearly articulated concerns about expected changes in the transport sector.

23. **Issues.** The road transport industry is ready for multimodalism. The Brazilian truck industry has a huge and very efficient segment that provides various types of services according to load volume and type. One segment of the industry provides hauling services for bringing small volumes, in appropriately sized vehicles, to concentration centers; from there, concentrated volumes are shipped in appropriate larger trucking vehicles to distribution or redispach centers. Trucking firms utilize third parties extensively for longer haul services, but they rely on independent truckers for this function rather than rail transport. Thus, independent truckers deliver over 50% of total production volumes on average. If trucking firms realized that the privatized and market-oriented railways could be a major provider of services for them, especially for long distance hauls, investments would be quickly stimulated in terminals, specialized equipment would be fabricated and adopted, and multimodal services would become a viable option.

24. Currently, the pricing or fee regime favors trucks over rail transport options. For example, truck load rates charged by interstate trucking firms are comparable to the average rate charged by FEPASA and RFFSA (excluding iron ore rates), or around 2.9 cents/tkm. These rates applied for long distance trucking have a cost advantage over rail, because the average rail cargo distance in Brazil is much shorter. User charges applied to road transport are low in general because of the implicit subsidies related to the environment and safety costs for instance, but also because of the widespread practice of non-compliance with axle and total weight limits which prevails in the truck hauling industry. However, the concessioning of existing road networks is expected to lead to the reduction or elimination of the implicit subsidies for road use, and to allow stricter oversight and control over axle weight limits. Thus, it is expected that the relative transport prices will change as a result of the new measures introduced in the road transport subsector and the "re-regulation" of rail.

25. In the medium to long run, however, the trucking industry's considerable flexibility will remain its main source of competitiveness. In Brazil, truck owner/operators have a major role to play in providing services during seasonal peaks due to their greater geographic mobility and ability to quickly adapt their operating modes to demand requirements. This ability is of great importance in a country the size of Brazil where agricultural production is spreading to areas further away from the traditional market base. If these owner operated trucks are not driven out of the market by lack of access to reasonable financing terms, their greater regulatory flexibility will continue to threaten rail and water transport and to reduce opportunities for truly multimodal transport, as long as these later modes are subject to much harsher regulation.

26. As a result of the road concessioning process followed by the federal government or, more specifically, the manner in which tolls are calculated for bidding purposes, a pernicious but subtle penalty might be imposed on road users. This problem could arise because the toll offered in the bids are calculated according to a desired cash flow estimated by each bidder, in which are factored the major cost components: i.e., the investments required by Government for expansions, rehabilitation, etc. and regular maintenance. Therefore, if the Government expects that more capacity expansions are needed, the requested tolls will be higher, and vice-versa. This may result in a mosaic of tolls that have little relevance to the actual costs imposed by the vehicles. The impact of truck transport costs due to this scheme may be unevenly distributed in a geographical sense, thus penalizing some regions and/or commodities more than others. To avoid this problem, a more consistent tariff policy needs to be formulated to guide road concessioning.

#### ***B-4. Intermodal and Multimodal Transport***

27. **Achievements.** The regulatory framework for multimodal transport is very weak. It follows a complex path that is not viewed as reassuring by many private operators (including those in the rail sector). Intermodal transport is governed by Law No. 6.288/75 and Decree No. 80.145/77 (revoked in 1991), in which it was defined as transport activities involving different modes under the same contract. The fact that the law distinguishes intermodal transport by a unique contract that rules different modes rather than by a single coordinating entity (independent of the number of contracts) has diverted attention to discussions on one of its key instruments: the contract of carriage, or bill of lading. In 1986, a model for an intermodal bill of lading was approved by Decree No. 92.461, but it was later revoked in 1991. Several other pieces of legislation (*Portarias* No. 64/86, 890/77, and 909/80) signed into law by the Ministry of Transportation were revoked on August 24, 1990 by *Portaria* No. 763.

28. In 1990, a bill (*Projeto* No. 4.586) was sent to Congress proposing the creation of a "Multimodal Transport Operator (MTO)" category of operator. The proposed law would regulate both international and domestic multimodal transport, but would not place any restrictions on entry. The proposed law focused on: (i) the definition of the scope of multimodalism; (ii) the operating requirements for MTOs; and (iii) the conditions of the contract of carriage and the obligations and rights of both the MTO and the shipper. It also refined the definition of containerization, allowing international units to be used domestically. After more than five years in Congress, the bill was recently approved by the Congress and sent to the Senate for approval.

29. **Issues.** Whereas the original proposal was broad in scope and relatively liberal, the new legislative proposal is very restrictive. The most recent version, for example, restricts domestic multimodal operations (i.e., those with both origin and destination within Brazilian territory) to Brazilian firms. Foreign firms would only be authorized on a reciprocity basis. These provisions are inconsistent with international multimodal standards. They are also inconsistent with the general liberalization of capital program promoted by the Ministry of Economy (and observed not only in Brazilian electricity concessions but also in the new railway concessions).

30. The political debate in Brazil on the importance and relevance of the required restrictions is somewhat surprising considering that many countries have deliberately avoided the same debate by instead adopting the standard international documentation (ICC Bill of Lading). The international standard enables transaction costs that would be imposed on the private sector by unnecessary country specificity to be reduced through what is basically a standard commercial contract. Brazil's adoption of an international standard document would in fact have been quite consistent with its efforts to coordinate transport policies in the Mercosur context as well. Moreover, the international standard would greatly reduce the Government's role in this area to the creation of an independent commercial arbitrator—possibly including professional commercial law judges as members—or the authorization of a specially qualified mediator.

### **C. Policy Sources of Logistics Breakdown**

31. This section offers a systematic diagnosis, from the perspective of a private sector user or investor, of potential areas for policies that would bolster specific and necessary components of logistics practices and procedures in Brazil, not only in the context of transport sector reform but in broader contexts as well. While the list of deficiencies is not exhaustive, those that are identified may be sufficient to indicate that policy failure to appropriately deal with these issues is itself a critical factor in explaining inefficiencies in Brazil's transport sector. Failure to correct these weaknesses rapidly, as some of Brazil's partners in Mercosur have done, is likely to penalize Brazilian companies in this significant market.

32. While the standard performance indicators used to assess logistics costs are not available in Brazil, a number of indirect measures of logistics efficiency are useful in diagnosing the underlying causes of Brazil's disappointing logistics efficiency performance<sup>18</sup>. These indicators include:

- diversity of third party services;
- transfer pricing methods; and
- harmonization of trade facilitating and customs practices.

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<sup>18</sup> Two key parameters determine the efficiency of any specific product or commodity supply chain: i) costs incurred (or cash flows committed) at each value adding step in the supply chain and the aggregate costs incurred over the entire period between when products are ordered (manufactured or otherwise beneficiated) and when they are finally sold (or cash receipts received). The relevant measure of this parameter for a product distribution system is the ratio of logistics cost to final sale price; and ii) the elapsed time of the logistics cycle measured from the time when orders are placed to the time when delivery of ordered products is completed. The relevant measure of this parameter is the order cycle time. The "bottom line" in determining the efficiency of any given logistics supply chain is the value of the working capital which is committed to product procurement, storage and delivery in advance of its final sale.

### **C-1. Diversity of Third Party Services**

33. **International Best Practice.** In most countries, third parties play a critical role in the design and development of multimodal systems as well as in the making of markets for multimodal services. Third party service providers are to transportation markets what investment brokers or bankers are to capital markets. They mediate between carriers (who offer line haul services) and beneficial owners of cargoes in performing one or more of the following valuable services:

- Consolidate multiple shipments into single loads that completely fill the standard loading parameters of the equipment provided by line haul carriers and thus realize economies of scale in shipment;
- Match specific shipments with scheduled or programmed transportation capacity, which would otherwise be underutilized;
- Combine multiple transportation components under a “single bill of lading” multimodal package and offer this combined transportation service with single coverage liability, thus assuring safe, reliable door-to-door service;
- Make arrangements on behalf of equipment lessors for repositioning and/or backhaul use of equipment that would otherwise require paid-for repositioning;
- Satisfy, on behalf of beneficial owners of freight, all of the transportation, insurance and other commercial requirements which are conditions for completing sale terms;
- Facilitate timely documentation processing and prove compliance with all customs, insurance and financial formalities, which are prerequisites to a completed transaction.

34. In competitive transportation markets the range and scope of third party services are diverse. Typically, they are difficult to enumerate in a license without constraining future service refinements by the licensee. Third party services quickly become differentiated at the level of the individual accounts. For example, third parties may serve as either a shipper’s agent or as a carrier’s agent. They may specialize in consolidation or warehousing. They may or may not combine customs brokerage together with other logistics support services. They may also offer their own negotiable bill of lading and provide their own door-to-door liability coverage for transportation services which originate or terminate beyond Brazil’s borders, or they may choose to make arrangements through other ‘correspondent’ overseas agents on behalf of their clients. In general, beneficial owners of cargoes are best served when they have a diversity of logistics service providers from which to choose. However, these providers also need to be sufficiently regulated to assure that they can meet their obligations to shippers regarding product liability protection and/or third party insurance.

35. **Brazil’s Experience.** The number of third parties in a market as big as Brazil’s should theoretically range in the hundreds. Largely because of restrictions to entry imposed by the Government, however, this is not the case. For example, only two separate commercial groups have been licensed by the Ministry of Transportation as Multimodal Transportation Operators or MTOs under the Mercosur Treaty--which says that any firm that is registered and with capital of at least 80,000 SDR can apply. This apparently reflects some delay in the release of a decision by the Treasury. Whatever its source, this effective rationing of these licenses, which are essential to competition in buy/sell transactions for international cargo movements, creates a rent-seeking environment that adversely affects Brazil’s entire distribution economy. Again, this is inconsistent

with the overall spirit of deregulation and liberalization of the economy observed in other sectors. In fact, many of the firms interviewed complained quite explicitly about this problem and its financial consequences.

36. Moreover, the licensing procedure used by the customs service to designate agents for inland clearing has likewise restricted the availability of bonded cargo movement and storage rights, thus constraining competition among freight forwarders. Similarly, the number of customs brokers licensed by Brazilian customs authorities is limited in number and actually is insufficient. Brazil customs service is aware of this problem and is taking steps to liberalize the procedure that it uses to grant customs broker rights to new licensees, but this is experiencing unexpected delays.

### ***C-2. Transport Pricing Method***

37. **International Best Practice.** When the regulatory environment is appropriate, methods for administering multimodal service prices are derived from and related to the competitive and administrative arrangements under which carriers and third party providers operate. When carriers operate exclusively as wholesalers and third parties as retailers in the packaging of multimodal services and in collecting fees from retail shippers, then retail transportation prices are simply *negotiated* between beneficial owners and their shipping agents. Line haul carrier prices are typically transparent and based on some cost plus formulation in the through price. Shippers can create appropriate incentives in the contracts negotiated with their agents to assure that the freight charges they pay are minimal (i.e., at or below market clearing levels). In similarly competitive positions, interline pricing as well as price equalization among shippers are no longer issues, as market openness and competition take care of both.

38. **Brazil's Experience.** Based on field interviews with several multinational corporations which are large volume shippers, pricing rules appear to be the root of serious problems occurring in routine business deals. There are two main reasons for this. First, not every link in the multimodal supply chain in Brazil is sufficiently open to competition to assure that service prices are based on marginal cost. For example, the Council which controls tariffs for the Port of Santos recently raised the ports tariffs significantly and, in particular, the tariff for the transfer of containers from port property to one of the bonded terminals near the port by several times the original price, and the price became rigid. None of the few bonded warehousemen in the port were willing to discount their price below the published rate, even for commitments from large volume shippers. Until market forces or some form of surrogate regulation becomes effective for each critical element of multimodal service, through prices and coordinated services will be possible only under the terms and conditions set by the least competitively challenged mode. This may reflect the transition costs of an evolving system but it may also be an indicator of a more fundamental problem with the overall approach to transport pricing in a very decentralized country.

39. Second, because in Brazil third parties become agents of specific carriers or develop their own multimodal transportation capability (as in the case of the two multimodal transportation operations), conflicts of interest can arise and these pricing approaches no longer suffice. Under these circumstances, shippers have the option to unbundle their multimodal service package, shop for individual components, and hire a customs broker and discount freight forwarder to

reintegrate the modal pieces under a single bill of lading, and to monitor the delivery services of each of the participating line haul carriers. This approach is more expensive and more costly to administer. Moreover, it is only as effective as the openness and contestability of each of the modes and services offered to the shipper warrant.

### ***C-3. Trade Facilitating and Customs Clearance Procedures***

40. **International Best Practice.** Customs authorities in every country are faced with the need to accomplish four, sometimes offsetting, objectives:

- maximize the revenues which they collect for the state;
- intercept contraband which is being smuggled into the country;
- collect trade statistics; and
- facilitate the movement of cargoes across national borders and hence improve the nation's logistics efficiency.

41. Modern information management technologies and modern methods for processing information and for inspecting cargoes can shift the tradeoffs among these conflicting objectives, but in the end, the tradeoff is determined implicitly or explicitly as a matter of public policy. In developed countries, the international trading community has an effective voice in assuring that customs procedures facilitate trade and are generally user-friendly. Indeed, many developed countries have re-engineered their customs procedures so that they can be effectively integrated into the logistics and traffic management functions of large volume shippers or their customs agents. The guiding principles in these re-engineering efforts are always: simplification of processes and procedures, collection of the minimum data required to satisfy statutory requirements, standardization of document forms and their harmonization with international standards set by the UN and the International Chamber of Commerce, and selectivity in the choice of cargoes actually inspected based on a priori information about shippers, consignees, etc.

42. **Brazil's Experience.** In Brazil, tradeoffs among the four objectives have been made: first, in favor of maximizing the revenues collected by customs agents; next, in favor of intercepting contraband and non-licensed imports; and third, in favor of collecting trade data. The trade facilitation objective clearly ranks last with regard to public policy and public service design. The recently developed computer-based clearance system, SISCOMEX, is a good case in point. This system was undergoing testing with several large volume international shippers before being fully implemented in January 1997. While the system is clearly a major improvement over past practices, it may require some fine tuning. Indeed, the early tests suggest that instead of facilitating trade and reducing trade transaction costs, the new customs system could in some cases have the opposite effect, as it consolidates outdated and inadequate customs procedures that should have been re-engineered prior to designing the new system.

43. Brazil's customs service is not very customer-oriented and the introduction of the new computer-based clearance system does not promise to help improve this situation. Customs' defined mission, the incentive compensation of customs officers, and the professional advancement of customs officials have little relationship with the speed of cargo clearance or the importers and exporters' cost of strict compliance with customs requirements. Moreover, the

customs clearance process is complicated by the requirement—carried over from the era of minimal current accounts and rationed hard currency—that all imports be licensed before they are shipped. This requirement complicates the process of shipping products into Brazil. It requires at least one additional step in the logistics chain: the party billed must apply for a license in advance of shipment. It also disadvantages the country as a transshipment and regional distribution center for the Mercosur market. Moreover, the process of describing the goods to be imported requires a detailed and refined description of products and their point of original manufacture, which often causes delay and penalties when the goods arrive and do not precisely correspond to the description in the original license.

44. Finally, over the years Brazil has also developed a number of different customs clearance regimes, each designed to facilitate the bonded movement of cargoes beyond the original port of entry and thus relieve congestion problems. Some of these regimes involved third party service providers who sold internal clearance and bonded storage services to beneficial owners of cargoes. In fact, one of the most important advances of the new legislation is the right granted to private terminals to serve third party cargoes. So far, more than 40 contracts have been signed with the federal government, authorizing the full use of these terminals. However, to become operational these terminals have to submit and approve a “customs project,” and the customs personnel have to be assigned to these new places. Very little has been accomplished in this domain, causing delays in the provision of these new services. Moreover, the scarcity of personnel and systems resources further deters the progress of port reforms and ultimately of multimodal transport on many fronts.

45. Other regimes were set up to support specific multinational corporations as an inducement for investing or basing manufacturing or distribution facilities in Brazil. However, at many gateways, customs service hours have been shortened and do not correspond to normal business hours. Because cargo cannot be released without the signature and official release of a ranking customs official, cargoes accumulate at these gateway points and generate storage charges and/or risk damage or loss.<sup>19</sup>

46. All these problems reflect the fact that *Brazil has only recently begun to remove economic and administrative barriers to foreign trade and much of the “import substitution” rationale and bureaucratic apparatus are still in place.* The introduction of SISCOMEX for exports has already been accomplished and is a step in the right direction. Substantial improvements have already been reported. The system’s import leg is still being tested, however, and the clearance of imports is still subject to a great number of taxes, fees, and commissions that impose substantial costs in addition to port and stevedoring charges. In the longer run, customs reform should deal with the functional unbundling of customs certification and clearance, on one hand, and federal tax collection on the other. The joint performance of these two duties has resulted in an enormous responsibility, power, and discretion concentrated in the hands of government officials in this operations area. The lack of personnel and structured systems,

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<sup>19</sup> Brazilian Customs are also planning to launch a bidding process for over 30 inland bonded warehouses. It is particularly important for the development of multimodal transport of foreign trade flows that these warehouses be located at strategic rail terminals that connect to major ports. The bidding terms of this process however is somewhat limited by the legal requirements for public tendering, as well as the public service nature of the service to be rendered. As such, the winning proposals may be chosen through minimum tariff criteria (Decree 1910, May 1996) which may restrict the development of adequate services.

compounded by liberal supervision, have created conditions ripe for opportunistic behavior to flourish. This issue was also a concern in Mexico. Box 1 explains how it was addressed.

### **Box 1: Lessons from Mexico's Customs Reform**

In the early 1980s, Mexico introduced a number of reform initiatives to open its economy. A key stone of the change was the reform of customs administration and procedures which were adjusted in line with the trade reforms.

Customs procedures were highly centralized and antiquated, involving numerous complex, time consuming and non-transparent steps. Traders faced long processing delays and substantial undocumented costs in clearing merchandise. An enormous amount of legislation and ordinances applicable to customs had proliferated over the years, many were never published and underwent constant changes. No uniform standards for application of the rules were exercised. Almost unlimited discretion and negotiating power were given to customs officers, with the results that the authorities had lost control of the process. The Directorate General of Customs (DGC), part of the Ministry of Finance, operated with nearly full independence and little supervision. This situation was aggravated by tight limitation of customs broker licenses. The brokers enjoying such licenses were generally considered to be major accomplices in customs irregularities. The structure of broker fees was such that 70% represented compensation for "undocumented expenses". Thus there was a clear incentive to increase such discretionary payments to customs officers.

In 1989, the Government stepped in and introduced major changes in the organization and management of customs services. DGC was stripped of many of its prerogatives, which were assigned to other agencies within the Ministry of Finance, and was left with the sole mandate of facilitating the physical process of customs clearance and prevention of smuggling. The customs administration was decentralized. Top line staff were reshuffled and some replaced to collapse colluding cliques and to encourage more professionalism. Customs reform is part of the overhaul of the tax system and customs has now been integrated with general tax collection. The rights and obligations of traders and customs have been widely published to enhance transparency. Traders no longer make payments of tariffs to customs officials but to commercial banks which opened branch offices in customs facilities.

Widespread computerization and electronic data linkages are the backbone of the reformed inspection system (and this was recently recognized by Brazil with the introduction of a new computerized system discussed elsewhere in the report). A computer generated a random selection process to determine which trade transactions are to be inspected, so as to remove discretion and negotiability. The number of steps in the customs process has been reduced from 12 to 4. The new system has led to the closure of several inspection facilities. Customs clearance must now be carried out at the border or at an interior site within the jurisdiction of a trader's local fiscal office. This removed the need for long detours to clear customs at sites with no geographical relationship to the trader. Entry to the previously tightly controlled brokers segment has been liberalized and the regulated fee structure was phased out. Brokers have to compete, which will determine the level of their fees. Any irregularities are subject to stiff fines. The remaining customs personnel benefits from an official incentive scheme whereby they receive bonuses for meeting predetermined productivity levels.

The first year benefits of the reforms were estimated at 5% of the total value of merchandise trade in 1989 or close to 1% of GDP. These savings resulted from an average 3 day reduction in customs transit time, with attendant reductions in the costs of interest, storage, and transport, as well as lower broker fees, and eliminated "undocumented" expenses. Daily collections of customs duties increased between 12% and 15%.

47. **Customs Reform and Mercosur.** A final area for potential institutional development involves the logistics requirements and opportunities which will increasingly emerge from Mercosur. The first meeting of the Mercosur Council at the end of 1991 established guidelines for the transport sector, in particular, aimed at: (i) significantly reducing transportation costs and attracting the requisite amount of private investment for the sector; (ii) fostering the process of deregulation for the international transport of goods between the country members; and (iii) concentrating on the regulatory provisions, taking into account the asymmetries in regulation that affect the integration process. The Mercosur Council recently enacted several decisions to

substantiate the above guidelines. The most important were the agreements for joint customs operations and standardized common forms for customs declarations (MIC/DTA). These would enable door-to-door movements of trucks, thereby avoiding the need of transshipments at the frontiers. Unfortunately, the progress in implementing these rather simple bureaucratic procedures have been weak. Most of the recommendations made by these groups are still waiting to be adopted and incorporated into each country's legislation. At the end of 1996, the most important road transport link, at *Paso de los Libres/Uruguaiana*, was still operating with two independent customs units--although they are now expected to be integrated in 1997. There is also fierce resistance that is endemic in the two customs bureaucracies to any movement toward the integration of operations. The use of the MIC/DTA document that allows the customs inspection to be performed only once at the origin is still very limited. One reason for this is the limited number of customs units or bonded warehouses at the origin points. Another reason is the preference of trucking firms to make use of independent truckers, which in turn limits the continuation of the trip at the frontier: only trucks owned by authorized international transport operators are allowed through the border. The resistance of customs units at the frontier to facilitate these integrated procedures at the border has also been cited as one of the problems.

#### **C-4. Other Concerns**

48. The preceding issues and concerns are very serious impediments specific to the development of an effective logistics policy. Beyond these, however, there are other pressing problems for which the Government needs to consider policy initiatives, too. Though not specific to logistics, they nonetheless have a strong potential impact on transport costs and multimodal options.

49. **Enforceability of Contracts.** Typically, the rights and responsibilities of shippers, consignees, and carriers --including international carriers providing cross-border transportation services-- are derived from a well defined legal foundation. In Brazil's case, no basic legislation exists for cross-border transportation services or multimodal operators. Many belonging to this group call themselves "Multimodal Transporters," but lack the expected service coverage associated with multimodal transporters in Europe or in North America. Instead, the two multimodal operators chartered to operate within Mercosur have been authorized under the Mercosur Treaty. Without a specific legal basis, however, the resolution of disputes over specific movements and the enforceability of cross-border buy/sell contracts remain problematic. Furthermore, the federal judiciary is slow to act on its case load and decisions are sometimes unpredictable.

50. **Cargo Losses and Damages.** The loss rate for cargoes moving both within Brazil and across Brazil's borders is extremely high. Pilferage, highway high-jacking, and theft from warehouses, particularly in the largest ports (mostly São Paulo and Rio) are recurrent. One of the companies interviewed in this analysis noted that it was losing 1% of its export shipments and 10% of its domestic shipments, of an average value of \$500,000 per year. As a result, product security has become a major issue for multinational corporations doing business in the country. In addition, the normal types of cargo losses also occur, such as those due to water damage, mishandling, and traffic accidents. Consequently, insurance claims and insurance premiums are extremely high in Brazil, and the definition and enforcement of liability for losses or damages

frequently requires judicial intervention. Cargo liability for losses and damages is normally defined within the contract of carriage. However, claims against carriers and warehouse staff are normally surrogated against private, third party insurers who in turn surrogate their risk against the state-owned insurance company. Things are changing, however, and reinsurance with foreign companies is now allowed for all foreign trade.

51. **Design Standardization for Efficient Transportation Equipment.** The trucking fleet in Brazil is composed of a diverse set of equipment with varying cargo-carrying capacities. Logistics managers do not appear to have adopted a standard lot size matched to the most efficient transport envelope which is allowed under current truck size and weight regulations. Moreover, the rail equipment fleet is old and includes primarily general purpose cars, such as box cars and gondolas. Very few specialized equipment designs that are created to match the loading and unloading capabilities of particular shippers are utilized in Brazil's railway systems. The recent adoption of a standard pallet design by the national association of grocery chain operators suggests, however, that coordination is improving between shippers and carriers in Brazil. Having chosen a standard pallet for interchange and for pooling among distribution companies, the next logical step would entail a similar consensus design for a standard domestic container within which an integral number of standard pallets would fit snugly. The Government could assist by providing information on the options and practices prevailing in other Mercosur member countries.

52. **The Need for Logistics Information Systems.** Logistics information systems are digital data exchange networks that link all the trading partners involved in a specific industry, distribution channel, or commodity market. These information networks require trading partners to exchange information with one another in a standard EDI format and to link up by way of an intelligent network hub that creates new information while interchanging information among the trading partners. A third party logistics information management company normally resides at the hub of any logistics information network. EDI-based logistics information systems are at a preliminary stage in Brazil. The customs service is currently testing its own stand-alone system (SISCOMEX), and the Brazil Trucking Association is likewise developing an EDI system of its own. To date, no system has been implemented that crosses modal lines or links trading partners and their service providers with a diversity of procurement, transportation, and logistics information needs. Again, the Government could support the effort by providing the right incentives to allow the private sector to take on this responsibility. The implementation of the telecommunications sector reform is also likely to be a key element in the successful development of EDI information systems.

#### **D. Reviewing Policy Needs**

53. This diagnostic assessment clearly indicates that there are many policy areas requiring adjustment to obtain an environment conducive to cost-effective multimodal transport. The discussion of sector-specific issues also shows that there are many policy-based distortions, including implicit or explicit subsidies, and growing problems caused by the suspension of the implementation of regulatory reforms needed to provide critical entry, access or exit rules. It is also revealed that the collaboration between the federal government and the private sector to address the outstanding issues has been, at best, modest. These issues all add up to a long reform

agenda and, although individual items on the agenda may seem to matter equally, this is misleading.

54. The legal environment for transportation is obviously a critical cornerstone of reform, but legal provisions alone are not sufficient to ensure that multimodalism will become a viable transport option in Brazil. The effective restructuring, privatization, and regulation elements must also be provided for each sub-sector under a comprehensive reform program. Reform measures—and specifically, the resolution of complex issues such as those pertaining to access and interconnection rules—are likely to directly reduce transport costs and thus foster multimodalism through economic incentives rather than through legislation on the issue.<sup>20</sup> Cost-effective transport options and reduced logistics cost will, in turn, be made possible through targeted investments and streamlined customs practices. Indeed, once privatization has taken hold and fostered a market-oriented transport culture, the major impediments to multimodal operations and priorities for further reforms will be the bottlenecks and high costs incurred at port and terminal operations, especially in light of the impact of these factors on the international competitiveness of Brazil and on interregional trade patterns. Specific suggestions on improving the chances of successful reform implementation are proposed in the following chapter.

#### CHAPTER IV: POLICY RECOMMENDATIONS

1. Based on the privatization program for Brazil's transportation infrastructure that has already been decided upon and partially implemented, the following recommendations aim to provide a supplementary policy perspective. They emphasize the need for a fundamental shift in government policies and programs in some specific areas in response to privatization. In the post-privatization era, the role of the Government in the multimodal arena is expected to shift to creative policy-making and to the promotion of economically-justified infrastructure, with minor, if any, participation in investment projects and in commercial activities. With progress on privatization, a unique opportunity exists to create new multimodal service "rights" and infrastructure investment opportunities for private companies. These measures, if appropriately engineered, will begin to fill the gaps that now exist among stand-alone infrastructure elements and thus greatly enhance Brazil's overall multimodal network connectivity.

2. The recommended role for the Government in the post-privatization era includes:

- fully addressing the needs of customs reform;
- clarifying the rules under which port reform is implemented;
- defining a "blueprint" to identify the main areas in which investment is needed;
- defining and enforcing rules for multimodal competition and operation;
- getting the right incentives to build multimodal infrastructure
- improving the incentives to standardize equipment
- train the workers of the sector on logistics management.

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<sup>20</sup> For example, the ability to issue a single bill of lading (B/L) was seen as one of the critical elements needed to facilitate multimodal transport. Yet, though provisions for single B/Ls were included in Law No. 6.288/75, no significant measure of progress in expanding multimodal transport systems has been achieved simply by having the legal basis in place.

3. The following discussion for each of these items includes specific examples or options for immediate government initiatives in the relevant area.

**A. Customs Reform**

4. Brazil's customs service appears to be the main area in the transportation sector requiring fundamental institutional reform. A key issue in this context relates to the size of the customs workforce and its development. With only 1,100 employees covering 361 gateways, Brazil's customs service resources are too thinly spread. Moreover, the operating hours for port and container freight stations do not coincide with customs' hours of service. In addition, the responsibilities of customs officials are split among various offices, causing a back-up of cargoes awaiting their batch release. Even if the number of customs' employees were to double in 1997, which has apparently been recommended in the budget proposal, the work load still appears to greatly exceed the capacity of the work force. In recruiting new customs officials, greater emphasis should be given to technical training, specifically in engineering areas. The post-recruitment training should focus on logistics management, thereby enabling shippers and customs officials to increasingly share a common value perspective.

5. **Staffing Needs.** Local customs officials do not always possess the technical skills needed to make informed and discriminating decisions about the appropriate tariff description of a particular electronic, mechanical or bio-technology products. Several shippers suggested that in recruiting new customs officials, greater emphasis be given to technical training in relevant engineering fields and that this background be enhanced with post-recruitment training in logistics management so that shippers and customs can develop a commonly shared perspective on value.

6. **Customs Processes.** International trade and cargo flows could be facilitated and expedited by re-engineering customs procedures and methods used to collect duties and other taxes and to detect contraband. For this purpose, it might be useful to solicit the views of knowledgeable users of customs services in an effort to improve the efficiency and speed of clearance transactions. For example, process quality improvement could be achieved if local customs officials meet periodically with shippers, customs agents, and multimodal operators to discuss ways to simplify clearance work and to coordinate separate activities more efficiently. The Brazilian customs service is already implementing a new automated customs clearance system, SISCOMEX. In this initial stage, the customs service has invited a number of users to test the system and recommend changes to fine tune it. This is a very positive step in the direction of making Brazilian customs more shipper friendly.

7. Indeed, the implementation of SISCOMEX opens a new set of opportunities to tighten service parameters and to address management problems that cause clearance delays at specific gateways. It should also enable reductions in administrative costs and workloads associated with preparing customs documentation. For example, SISCOMEX could be used to monitor the detention time of containerized cargoes awaiting clearance. It could also measure the performance of and provide incentives for enhancing the performance of individual customs officers based on cargo throughput. Currently, customs officers are paid based on a flat salary and a bonus for collected revenue.

## **B. Clarifying the Rules of the Game for Port Reform Implementation<sup>21</sup>**

8. Since port reform is a key component of the successful overhaul of the transport sector in Brazil and is central to effective multimodal options, its direction and implementation merit close attention. By virtue of their historical inefficiency and lack of responsiveness to client needs, general cargo ports have increased the cost and diminished the service reliability of all of the subsequent links in the multimodal supply chain. Since the passage of the 1993 Port Act, limited competition has emerged among local port authorities. However, interregional port competition is clearly not a sufficient condition to stimulate fundamental changes in the way in which Brazilian ports do business. A necessary condition, which should be promoted as rapidly as possible, is privatization.

9. **The Rules to Clarify.** Before responsibility for managing port assets is shifted to the private sector, a number of issues require clarification, definition, and/or direct government intervention. These issues, which are beyond the ability of the private sector to resolve by itself and thus need to be included on the Government's agenda, include:

- define public/private sector responsibilities for maintaining and replacing infrastructure, including:
  - common user infrastructure, such as channels which require periodic dredging, navigational aides and breakwaters, which should be retained by the public port authority;
  - specific user infrastructure such as docks and quays, which should be maintained by private terminal operators;
  - superstructure such as warehouses and terminal pavement which can be maintained by private concessionaires who may or may not be private operators; and
  - cargo handling equipment;
- contingent on the development of reasonable benchmarks that provide caps on public infrastructure replacement dues and private terminal service fees, remove price regulation for freely-negotiated services specified in contracts between private terminal operators and/or shipping agents and beneficial owners of cargoes; ensure that specialization in port services, especially in multimodal transfer services, are not hamstrung by the formal categories of services and fees contained in port tariffs;
- clarify private terminal operators' ability to directly negotiate labor contracts, on their own behalf, and to deal with the relevant port labor union. This may possibly include "company unions" who offer the most attractive terms and conditions regarding basis of pay, gang size, and minimum staffing. Once these issues are resolved, the private sector can begin the process of improving both the cost and the quality of service offered at Brazilian ports.

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<sup>21</sup> There is a similar need to work on the reform of rail regulation, but the work agenda was already spelled out and agreed in the context of the concessioning process.

10. The federal and some state governments are dealing with many of these issues, but on a case by case approach, which helps privatization transactions but is likely to complicate conflict resolution without general rules that apply across the board. Moreover, some of the contractual arrangements which provide the legal support for this approach are quite incomplete. For instance, renegotiation rules have not been specified in most of the port privatization contracts reviewed so far.

### C. A "Blueprint" for Investment Needs

11. **The Need for a Blueprint.** Brazil does not have the appropriate infrastructure needed to support efficient multimodal transportation. For instance it does not have a nation-wide system of ISO container terminals, and river ports are just starting to be recognized as elements of a multimodal network. National priority must therefore be given to building the necessary infrastructure, and particularly to providing the missing intermodal links, including railways, rail multimodal terminals, inland waterway terminals, and port-side intermodal container terminals. The first step should be to define and analyze the requirements for a sustainable nationwide multimodal service network for the future. This assessment can serve as a network blueprint that would identify bottlenecks (as in Box 2) and missing links in the existing network, and set priorities for the corrective actions in the context of the overall system or subsystem. Priorities should be derived from explicit economic analysis (as those conducted for the North-South corridor), rather than the approach used in performing the existing technical studies that have produced long lists of desirable "multimodal" projects. In other words, high priorities will logically be assigned to projects in areas where demand outstrips capacity and the benefits of multimodal operations justify the individual investments from an *economic* point of view (including externalities). Once a general consensus is achieved regarding a multimodal master plan, the Ministry of Transport could begin to work on developing discrete incentives and defining concessionaire programs that would induce the private sector to make the necessary investments.

12. The most distinctive feature of future infrastructure development in Brazil will be the greatly expanded role of private capital and the active participation of private companies in the construction, operation and management of new transportation infrastructure. An essential role will remain, however, for the public sector in building up Brazil's multimodal infrastructure. Essentially, the Government must find ways to work with and through the private sector in order to assure that both private and public sectors share common goals and perceptions regarding the technical, economic, financial, and environmental feasibility of future multimodal development.

### **Box 2: Potential Multimodal Projects in Brazil for the Agricultural Sector**

The Ministry of Agriculture has assembled a useful inventory of the constraints imposed by the lack of multimodal transport options in Brazil. They propose new approaches to develop four multimodal transport corridors: Northeastern, Center-North, North and Center West. They also show how these corridors, with on a more extensive use of rail, would benefit the agriculture sector. They estimated the total cost of this investment at about US\$800 million, and are convinced that at least half of the investment could be made by the private sector without much risk. Their preliminary analysis shows that the costs of producing and exporting soy beans from Chapada to Rotterdam could be cut from US\$ 171 to \$148/ton by combining the use of river and road transport rather than relying only on road transport. Similarly, for soy beans from Nova Xavantina, the cost of domestic transport could be cut from \$71/ton to \$38/ton. The point is that there seems to be enough evidence that multimodal approaches to the transport of agriculture products could lead to a portfolio of projects to be offered to private sector investors and with significant potential benefits to some of the poorest regions of the country.

Source: Corredores de Transporte Multimodais, Ministerio da Agricultura e do Abastecimento, Secretaria de Politica Agricola, Departamento de Planejamento Agricola.

#### **D. Defining the Rules for Multimodal Competition**

13. **The Key Role of Government.** A comprehensive, transparent multimodal law (along the lines spelled out in the proposal currently being considered by the Congress but with a few adjustments as discussed in this chapter) should be passed as quickly as possible to minimize confusion and increase the predictability of the environment in which transport operators make investment decisions. It might be preferable to simply adopt the relevant standard international statute/s to ensure international compatibility. To do so, the Government should clarify the public service obligations of core transport service providers—such as port, rail, and intracoastal and inland water transport operators—including the obligation to provide open access to their service networks to third-party users, such as commercialization agents (e.g., freight forwarders, multimodal transport operators) who are qualified to integrate the core transport modes into door-to-door service packages under a single bill of lading. Several types of rules and standards promoting “connectivity” among stand-alone services and “interchangeability” of intermodal equipment among carriers will be required to ensure that an integrated network will work effectively and to give multimodal service providers a much better basis for understanding how they can develop markets for multimodal services.

14. **Suggestions to Start the Process.** The Government, with the support of the relevant private sector trade associations, will have to define and promulgate rules and standards in the following areas: (i) definition and development of new intermodal services, including EDI standards, commodity description standards, and standard place locations; (ii) intermodal and multimodal equipment design standards, together with standard equipment descriptions and designations; (iii) operating rules and equipment design features that assure safe intermodal operation; and (iv) execution and confirmation of equipment interchanges. The final element is probably outside the purview of Government and more properly in the domain of the relevant trade associations. The Government could start by defining the following:

- location codes, including intermodal and multimodal interchange points;
- equipment parameters and designations which are EDI compatible;

- EDI format for representing these and other essential transport data digitally and for interchanging equipment electronically;
- interchangeable equipment features including weights, lengths, heights, lift lock locations, turning geometry, etc.; and
- equipment designs that are safe to operate and safe to interchange to other users .

15. **Consultation with the Private Sector.** Another set of rules needs to be developed jointly with the appropriate carrier trade associations in order to assure that inter-carrier services are priced in an orderly and pro-competitive way and that qualified carriers who wish to participate in interline multimodal movements are not unreasonably excluded. In order to achieve this objective a price administration system needs to be developed to facilitate the formation of joint rates among multiple carriers and to provide a clearinghouse for new commercial opportunities. In this process, the Government's role would be to monitor and sanction whatever transparent price administration system the various trade association groups put forward in order to assure that it is pro-competitive and does not encourage collusive and/or exclusionary pricing practices.

16. **Anticipating the Need for Conflict Resolution Mechanisms.** Unlike for single mode transport areas, there is no clearly identified regulator for multimodal transport. To promote multimodal development, the Government particularly needs to decide how conflicts between and among shippers and different carriers should be handled. One possibility is the creation of a specialized dispute resolution forum in which specified transportation and commercial law issues would be adjudicated and inter-modal disputes arbitrated. In order to avoid jurisdictional overlap with other adjudicatory or litigatory venues, the range and scope of issues over which the intermodal commission has authority needs to be clearly defined.

17. The forum could be authorized to have jurisdiction over the following issues, among others: 1) Securing necessary legal approval to authorize the use of electronic signatures in accepting multimodal service and cargo, 2) rights to shippers vis a vis MTO's in assuring reasonable rates and responsible business practices, 3) reasonable revenue division standards among modes and individual carriers, and 4) rights of competing carriers to participate in joint multimodal rates and routes.

#### **E. Creating the Right Incentives to Build Multimodal Infrastructure**

18. Beyond the development of new multimodal infrastructure, a role exists for the Government in defining and opening opportunities for new market entrants to provide multimodal services. This may require the termination of many distortionary subsidies, and will require major changes in the regulatory environment, especially entry rules.

19. **Cutting Implicit and Explicit Subsidies.** The earlier chapters have clearly illustrated the importance of subsidies as a source of distortion in modal choices. These subsidies should gradually be removed, letting the individual transport modes evolve into competitive service providers according to their own economic merits or full cost basis. It is expected that the private developers of motor- ways and port terminals will progressively enforce the application of user charges that are adequate to cover the cost of efficient maintenance and provide a reasonable

return on capital. Economically sound multimodal decisions will therefore only be made by the private sector if market prices reflect the full economic (marginal) cost of providing competing services, including, for example, the significant costs imposed on the environment by the trucking industry.

**Box 3: The New Economics of Regulation.<sup>22</sup>**

Over the last 10 years or so, academics have started to understand the consequences of the asymmetry of information between the regulators and the regulated firms such as concessionaires. These firms are typically better informed than the regulators about: (1) the costs and demand conditions in the industry; (2) its own actions (for instance, how much efforts it is making to actually minimize costs). The potential problem resulting from the first source of information asymmetry is what economists call the adverse selection problem, in other words the firms control hidden information. The problem resulting from the second source is called moral hazard, i.e. when the firm can take hidden actions to avoid having to comply with regulatory requirements. It is likely that the rail freight carriers have better estimates of the costs of complying with some of the service obligations imposed by the concession contract (e.g. access to other users of the rail). In fact, some specialists argue that the main problem for regulators is that they can't observe the firm's cost-reduction efforts. If the regulator does not know the accurate costs, many of the standard pricing rules (or a mechanism in which the firm is simply instructed to offer a fixed price or tariff) are no longer the best economic choice. The solution is to give the concessionaires an *incentive* to minimize costs. This incentive is not to be derived from a plain payment to the firm (as is done for instance in SUDAM through tax reductions) but through the specific design of the regulatory scheme. This scheme should not only encourage the cost reducing activity but it also has to encourage, and sometime impose, the firm to reveal "private" information about its cost and demand conditions.

To illustrate how the lack of information can affect the government's decision, one may consider the case of a regulator who has to request a service expansion from a concessionaire. When the concessionaires of a service with increasing returns (as in the rail sector) have hidden information or can take hidden actions, the cost of an expansion obligation for instance will be affected by the firms' efforts or actions (e.g. cutting unobservable quality or maintenance to minimize cost rather than increasing the productivity of labor for instance) and this in turn will affect the most efficient way of designing the regulatory contract with the firm. Typically, the firm can be offered a fixed price contract or it can be paid a price that depends on the final cost of the project. In the fixed price contract, the government bears no risk and hence the price must be high enough to convince the firm to participate in the expansion. The firm will do the best it can to minimize cost, since the difference between the price and the cost will drive its profits. In the cost-plus contract, the government shares the risk and when the risk level is high, this may be the only way of getting the firm involved. The main problem here is that the firm has no incentive to try to minimize costs. In practice, the challenge faced by regulators is often to reach agreement on an intermediate contract which grants the firm some markup but with some incentive to cut costs.

This is just an illustration of the importance of the regulatory design for the achievement of multiple objectives (fiscal--if you get the firm involved, you have to disburse less as a government--, efficiency and sometime equity). While the implications of the more theoretical models do not appear to have direct implications in the current regulatory debate in Brazil's transport sector, their results give some insights to the costs imposed by information asymmetries and can guide policy formulation. More fundamentally, however, they are very present in this debate and the work on access pricing for the railways sector, for instance, will have to reflect many of the insights provided by the new economics of regulation.

**20. Advancing Regulatory Reform.** Government can significantly reduce distortions in modal choices by defining the dimensions of commercial risk and of public service requirements attached to entry licenses or similar entry qualifications into the various segments of the multimodal market. A broad spectrum of multimodal services exists, ranging from the low capital

<sup>22</sup> This box was included at the request of GEIPOT to clarify some of the terminology and avoid some of the misunderstandings stemming from a lack of familiarity with the standard terminology in this new area. For instance, the concept of incentive in this terminology has nothing to do with the financial or fiscal instruments talked about in Brazil. It deals with impact that economic policies and their legal instruments have on the behavior of service providers and users.

end of the spectrum with multimodal transport operators, freight forwarding and cargo consolidation, all the way to the high capital end, exemplified in services like intracoastal shipping and equipment leasing. Multimodal transport even encompasses a technology-intensive service segment in EDI-based logistics information services and electronic interrogation and tracking of cargo movements (see Box 3, the new economics of regulation).

21. **Liberalize Licensing and Entry Requirements.** The general recommendation is that the Government implement liberal licensing and entry requirements for each of the major multimodal service segments, as well as allow free unconditional entry into interstitial (newly emerging) service segments. In short, an explicit entry policy should be articulated in a federal statute that allows for unrestricted and unconditional market entry, unless explicitly restricted and reserved for conditional entry. This should include a definition of minimal market entry requirements for equipment leasing companies. It would also encourage leasing companies to invest in transport equipment to take advantage of accelerated depreciation, tax credits for transport equipment investment, and lower taxes on imported transportation equipment, which equal those available to investors in manufacturing equipment.

22. Multimodal service providers in Brazil currently operate without an explicit statutory sanction and without explicit market entry conditions. Multimodal transport operators in Brazil currently have the option of being licensed under the terms of a multilateral treaty under Mercosur, recently ratified by the Congress. To date, three private companies have taken this route, two of the them being subsidiaries of the same company. In addition, the entry requirements for being licensed as an MTO under Brazilian law are apparently not well understood since only two firms have been approved to date. In addition, uncertainty remains concerning the legal basis with which the two licensed MTOs can offer multimodal transportation in countries beyond Mercosur or indeed in Brazil. A comprehensive multimodal statute should be passed as quickly as possible to avoid confusion and increase the predictability of the environment in which transport operators are making their investment decisions.

23. In sum, the basic function of the Government is to set the rules under which private sector providers can compete. Setting the rules involves clarifying the types of risks that private sector participants in multimodal transportation, third party logistics and commodity trading could be expected to assure. Importantly, it also involves defining other types of risks (i.e., policy risks) which they do not need to assume. Key areas for policy risk clarification include:

- i. entry and licensing criteria for each of the business segments essential to efficient logistics operations;
- ii. conditions and requirements for insuring commodities. These conditions and requirements go to licensing criteria for bonded storehouses which certify the quality, quantity, and tradability of commodities received. They also involve the definition of standard product grades or qualities (e.g., nutritional and moisture content of soybeans), as well as the protection plans available to beneficial owners of products or commodities entrusted to bonded storers or warehouseurs;<sup>23</sup>

<sup>23</sup> Securitization of commodities allows their ownership to change hands without any change in physical custody or movement of commodities. It involves the selling of standard ownership contracts which specify the volume and quality of the product being bought or sold. It provides greater liquidity to traded goods and reduces and risks associated with participation in a particular supply chain (through hedging in spot or future markets); it greatly reduces the associated logistics costs.

- iii. definition of liability for cargoes moving under the custody of various insurance coverage for loss and damage in transit and in storage:
- iv. clarification of reciprocal rights for MTOs, freight forwarders, and others vis-à-vis Brazil's primary trading partners. This includes the right to issue negotiable bills of lading, the right to maintain foreign bank accounts and to incur and pay commercial obligations in foreign currency.

24. **Clarify Public Service Obligations.** To make sure that entry takes place under as much information as possible, the Government should clarify the public service obligations of core transport service providers, including port operators, rail, intracoastal, and inland barge operators, to open their service networks to public users, including to third party resellers (e.g., freight forwarders, MTOs, etc.) who are qualified to integrate these core modes into single bill of lading, door-to-door service packages.

25. **Eliminate Other Distortions.** If the Government determines that the recapitalization and modernization of the nation's fleets of rail cars, locomotives, domestic containers, river barges, and container lift equipment are high priorities, the development of an open and competitive transportation equipment leasing industry is the most effective way to assure this outcome. To this end, barriers to entry, inconsistent with the Mercosur objectives, should be reduced or removed, tariffs and taxes on imported transport equipment which is not currently manufactured in Brazil lowered, and tax benefits in the form of accelerated depreciation and/or investment tax credits increased to the same level enjoyed by manufacturers and producers. This should include the removal of all constraints prohibiting the use of a single combined bill of lading. For example, remove the requirement that MTOs purchase domestic cargo and liability insurance from domestic providers who are co-insured with the national insurance company. Allowance for released value liability, which is negotiated with shippers on a case-by-case basis, should be allowed. Moreover, no restrictions or constraints should be imposed on MTOs who wish to open foreign bank accounts or to freely convert domestic currency in order to purchase multimodal services from foreign carriers.

#### **F. Strengthening Institutional Capabilities and Professionalism for Logistics Management**

26. In order to effectively work with and through the private sector, the government will increasingly require strong private sector counterpart organizations with whom to cooperate. However, at the present time, multimodal services are in their infancy in Brazil and few true multimodal operators exist. As this market segment begins to mature, the Ministry of Transportation or a multimodal development authority should place high priority on fostering an effective trade association and counterpart. Multimodalism presently represents a small portion of the total business base for the dominant participants in this market, who are primarily railways and water carriers. It follows that steps should be taken to accelerate the development of a Brazilian Railways Association and of a Brazilian Inland Water Carrier Association. A strong Brazilian Trucking Association already exists, however, as it represents the dominant transport mode, its interests are always clearly in favor of the development of multimodal capabilities.

27. Opportunities exist, as well, to involve the demand side, or *users* of multimodal services, in adopting an effective policy and regulatory framework, as well as in developing new multimodal infrastructure and services. Again, no major Professional or Trade Association currently exists within Brazil which represents the buyers and potential buyers of logistics and multimodal services. The notable exception is ICEX, which represents the 300 largest importers and exporters in Brazil. This group formed primarily as a clearing house for resolving issues involving Brazilian Customs.

28. In addition to the development of interest groups, the development of professionalism and of a professional code of ethics among logistics managers is equally important for the development of a multimodal market. This could be achieved through a training program designed to improve effectiveness of the demand side of the emerging market for logistics and multimodal services, at the same time that capabilities on the supply side are being improved. This objective can only be met through incremental development of the skills and abilities of *individual enterprise managers* to improve the quality of economic decisions regarding the design of supply chains, the selection of modes, carriers, forwarders, routes, shipment sizes, methods of payment, insurance and settlement. The program could include development of a comprehensive curriculum in logistics management. Graduates of the program could form a core professional association which could continue the process of professional skills development through cooperation with similar associations in Japan, North America and Europe.

#### **G. Assessment of Potential Payoffs**

29. The opening statement of this report asserted that the two main reasons why the development of an effective multimodal strategy are essential to Brazil are:

- its likely major impact on *international competitiveness*; and
- its potential impact on the *regional development* of the poorest regions.

30. **Impact on International Competitiveness.** It is difficult to assess the exact impact of the relevant reforms on international competitiveness. One reasonable indicator would be to use the impacts seen on the costs of containerized foreign trade flows of general cargo. General cargo moving in containers represents about 30% of the 40 million tons of *general cargo* imports and exports. Total exports and imports are around 280 million tons including *bulk cargo*. The costs presented here are estimated for trade volumes in 1996. The specific logistics costs items imposed on containerized import and export cargo are shown in Table 6. The data is based on the port of *Santos*, which concentrates 63% of the imports of general cargo and is the area best served in terms of infrastructure services. The estimates of potential savings are based on international best practice. They are obviously extrapolations, but not unrealistic since similar gains were also achieved under Argentina's reform. These estimates are detailed in Annex 4.

31. Almost 35% of the estimated import logistics cost is incurred at sea, including the contribution to the renewal of the Brazilian merchant marine (AFRMM), which is based on a 25% surcharge on ocean freight rates (see Table 6 hereafter). Port costs include the port handling (*capatazia*) and warehouse tariffs charged by the Dock of Santos, stevedoring costs, a per ton tax created by the 1993 port legislation to fund stevedoring severance payments, and a US\$25 payment for the release of the bill of lading (for convenience, it is assumed that each container

carries one shipment with a corresponding bill of lading ). Inland transport costs are calculated for the *Santos-São Paulo* route. In this case, the shipment is assumed to be sent to a bonded warehouse, adding US\$170 to cover the charge by the customs agent (the actual charge is between 1 and 2 minimum wages). The costs at the bonded warehouse—including handling, insurance and storage—add up to US\$289, which is the smallest cost component. Administrative and customs costs (US\$1,727) include both the import license and the declaration fees charged by the Brazilian Government through *Banco do Brasil*, the administrative cost paid to the customs agent and the contribution to the customs agent Union.

32. The potential savings from the proposed policy reform contemplate improvements in port productivity and costs, with impacts on ocean freight rates (reduction in ship's turnaround time), and on trucking costs (reduction of waiting time to load and unload containers). Administrative costs are reduced by 70% in case of the contribution to the customs agent Union and to zero in the case of the ad valorem payment to the customs agent. These savings would be derived from a reduction in entry barriers in the provision of this type of service, as well as from the improvement of the management systems supporting the importation activity (e.g., SISCOMEX for imports). The import declaration cost is reduced to a reasonable fixed value per shipment. It should be noted that most of these uncommon ad valorem charges are residuals from the days of 'import substitution policies' that should be replaced by cost-based practices.

**Table 6: Savings from Improved Ports and Multimodal Options for Containerized Trade (estimates for 1996)**

Cost Item	Unit/Ba se Value	No. of Units	Current Costs per Containers (US\$)		Potential Costs per Container	
			Import	Export	Import	Export
AT SEA			1,625	1,240	1,488	1,130
AT PORT			414	389	204	196
INLAND			720	528	391	322
TRANSPORT						
AT BONDED			289	n.a.	211	n.a.
WAREHOUSE						
ADMINISTRAT			1,727	50	320	25
ION/CUSTOMS						
LOGISTICS			4,775	2,207	2,614	1,673
COST/CONTAI						
NER						
TOTAL	\$billion		2.15	0.93	1.18	0.70
LOGISTICS						
COST/YEAR						

Note: the table is calculated assuming the following indicators for 1996: 420,000 containers for exports and 450,000 containers for imports, assuming average shipment sizes of 12.3 tons for both exports and imports and average shipment values of US\$50,000 for imports and US\$28,000 for exports.

For details on potential % cost reduction based on international best practice, see table 1, Annex 4.

33. The results show that total logistics import costs could, under conservative estimates, be reduced from about US\$4,775 to about US\$2,614 equivalent per container through appropriate policies. The logistics costs of moving 450 thousand import containers would be reduced from US\$2.2 billion in the present situation, to about US\$1.2 billion under the policy reform scenario. The savings represent about 4.5% of the value of the shipment, estimated at around US\$50,000

per container. Assuming a 5% growth of imports by containers, from 1996 to 2012, the net present value of the savings would add up to US\$10 billion, at a 12% discount rate. In sum, the size of the potential cost savings possible through policies targeted to improving the logistics supply chain can be substantial. However, a combination of policies will be needed to achieve these gains.

34. Using similar assumptions and adjusting for all the bureaucratic constraints that do not apply, the table shows that the minimum gains for export would be more modest but would still be quite significant in relative terms. Total export logistics costs for general cargo would go down by at least 25% under a more streamlined approach to transport regulation. Totaling the gains from lower logistics costs for exports and imports adds up to US\$1.2 billion for the containerized general cargo. Per unit, it represents an implicit tax of 2.0% of the average shipment value for exports. A rough order of magnitude for the cost reductions in total international trade to be achieved through policy reform would multiply the savings for containerized trade by a factor of three to account for non-containerized trade, implying a potential reduction in logistics costs of about US\$3.5 billion, almost 10% of the share of transport in GDP.<sup>24</sup> This should help improve Brazil's international competitiveness.

35. **Impact on Interregional Competitiveness.** A significant reduction in interregional freight costs should be one of the main benefits of a successful redefinition of the structure of Brazil's transport services, particularly if rail privatization enhances the use of rail-based multimodal services. This could stimulate the development of new local industries in some regions and favor the growth of some existing industries. These gains are very difficult to calculate without a detailed assessment of demand elasticity for these products and a much more detailed market analysis than that provided in this study. It is worthwhile, however, trying to assess the distribution of cost savings across regions to provide some idea of the main beneficiaries of a national multimodal strategy resulting from a greater reliance on more cost-effective modes for long distance freight transport.

36. The main source of these gains is likely to come not only from the natural growth of today's traditional rail markets, but mostly from the increased rail market share in interregional commerce flows. The estimates of the size of the interstate commerce indicated in Chapter II show that, in 1992, there were approximately 120 million tons of cargo moving by truck over an average distance of 1,200 kilometers. Interregional commerce hauled over roads along corridors also served by rail lines exceeded 53 million tons, over an average hauling distance of 1,700 kilometers.<sup>25</sup>

37. The impacts of this modal imbalance towards truck transportation can be seen in the truck freight component of the interstate commerce in Brazil. Trucking costs, based on operational costs for truck load shipments, are estimated with a cost function that is sensitive to the average

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<sup>24</sup> Although the impact of the reform will be somewhat more modest for bulk cargo because it is already to a large extent moved through private terminals, the gains for general cargo are probably underestimated since the share of containerized cargo is likely to grow more rapidly with the types of reform proposed here.

<sup>25</sup> The comparative advantage of rail technology over trucking is quite sensitive to the distance of the haul. At such distances rail cost and service advantages in cargo transportation are almost unbeatable.

distance of the flows.<sup>26</sup> For distances of 1,000 and 2,000 kilometers, the unit operational cost is, respectively, US\$39 and US\$32 per 1,000 ton-km. Maintenance, safety and environmental costs were calculated using a vehicle-kilometer unit cost equivalent to US\$0.12. According to these rough estimates, operational costs total over US\$5 billion, of which 78% are incurred in interregional trade. Transportation costs relative to regional incomes also accrue with more intensity to less industrialized regions. The Northeast, for instance, pays almost US\$2 billion in trucking services each year for its interregional commerce.

38. The potential reductions in freight costs can be assessed taking the difference in the long run marginal costs of the rail and trucking modes. A conservative estimate of rail marginal costs was based on RFFSA's figures for 1991-93, assuming that the private concessionaire would operate with the necessary labor force as calculated by the recently implemented RFFSA Staff Retrenchment Program. It is known that some concessionaires have further reduced the labor force by as much as 25% after taking over the management of the concessions. Real average wages are expected to increase by 20% after privatization. The resulting average long run marginal cost of rail transport is about US\$15 per 1,000 ton-km.

39. Assuming an increased rail market share to 50% of truck flows in the major interregional corridors where rail lines already exist, the gains are estimated at over US\$1.3 billion equivalent per year. If new lines are implemented, particularly in the North-South corridor, allowing rail services to and from the North region, an additional US\$500 million equivalent could be saved each year. These savings are quite substantive for the country. Considering that federal public expenditures in the sector (including road maintenance) have remained under US\$1 billion in the 1990s, transport service users have been willing to pay more to carriers to get their products delivered.

40. The regional distribution of the gains to be derived from a new multimodal transport policy was assessed on the basis of the methodology described in Annex 1. The assessment shows that, ignoring the gains that can be achieved through specific projects, the South East and the South regions are the main potential beneficiaries of the changes; but the Northeast region is also likely to get a fair share of the gains under this rather conservative evaluation of the total gains. The impact of specific projects such as the North-South railway project, if implemented, is likely to lead to a much wider redistribution of the gains. The direction of this redistribution is of course difficult to assess, but many potential investors are already exploring new opportunities that a North-South rail option would allow. Table 7 suggests that the potential for relocation of production centers or for the creation of new markets in the North, allowed by much lower logistics costs, are quite significant. Some potential investors have expressed interest in developing a paper and pulp industry, others have considered developing a steel industry in some of the poorest states. The final outcome of the redistribution of the gains will of course not only depend on the introduction of better transport policies and on better multimodal options. But the document provides enough evidence to suggest that growth opportunities in the poorest regions will increase with better infrastructure and a better transport policy environment. In other words, the report's policy recommendations, if implemented, should not only improve Brazil's international competitiveness but also the regional competitiveness of its poorest regions.

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<sup>26</sup> Total cost = 0.25xDistance<sup>0.73</sup>xVolume.

**Table 7: Savings in Freight Transport Costs Resulting from Increased Rail Market-Share  
(estimated for 1996, in 1996 US\$ million)**

<i>Destination</i>	<i>Origin</i>					<i>TOTAL</i>
	<i>NORTH</i>	<i>NORTHEAST</i>	<i>SOUTHEAST</i>	<i>SOUTH</i>	<i>CENTRAL- WEST</i>	
<i>NORTH</i>						
<i>NORTHEAST</i>				372	38	410
<i>SOUTHEAST</i>		191		232	75	498
<i>SOUTH</i>		29	209		45	283
<i>CENTRAL-WEST</i>			117	35		152
<b>TOTAL</b>		220	698	305	120	1,343

## H. Conclusions

41. This chapter's main conclusion refines the findings of the preceding chapter. The refinement stems from a clearer sense of the match of reform proposals with objectives. To make sure that transport reforms contribute to the overall objectives of the country, the main change that is needed is in the area of customs. To ensure that the internal growth objectives are met, the most important element is to formulate a good investment strategy for projects which the private sector will not take on its own. To secure the private resources needed to co-finance or even fully finance the investment requirements, reforms in the regulatory regime are especially critical. Although proceeding, progress on this path is taking longer than many in the private sector had hoped.

42. The policy recommendations outlined in the report emphasize that a fundamental shift in government policies and programs is needed to support privatization. In the post-privatization era, the role of the government in the transport sector will be to promote efficient operations and investments by the private sector through appropriate regulatory and other creative supporting policies. The Government should have little, if any, direct involvement in operations and investment. The privatization process presents a unique opportunity to create new multimodal transport service "rights" and infrastructure investment opportunities for private companies that, if appropriately engineered, will begin to fill the gaps between stand-alone transportation infrastructure elements. This would enhance the connectivity of the multimodal transport network and allow for efficient multimodal services.

43. The specific recommendations and priorities for the public policy reforms necessary to prepare for the post-privatization era focus on:

- reforming customs' clearance procedures and practices for trade facilitation;
- clarifying the rules for the restructuring and privatization of the ports system;
- preparing a "blueprint" for the critical investments needed to ensure intermodal connectivity and related supporting policies;

- defining and enforcing rules for multimodal transport operations which foster competition, promoting the standardization of equipment and electronic data interchange formats, and establishing effective conflict resolution mechanisms; and
- strengthening institutional capabilities and professionalism for logistics management.

## COMPARISON OF LOGISTICS COSTS:

### Methodology and Results

1. Table A1 hereinafter summarizes a "back-of-the-envelope" analysis of logistics costs for the largest commodity flows of the Southeast and South regions of Brazil, which are well served by the rail network. The table shows that the rail option is more economical in terms of freight and total logistics costs. The only exception is the case of oil derivatives in which tariffs are artificially kept above market levels by the government agency that manages the distribution of oil products. On the other hand, the comparison of rail volumes with the size of these market segments reveals that the most economic modal option is not predominant. For non-iron ore products, the rail market share is only 19%. If inter-regional trade flows were included in the analysis, this market share performance would be even lower (around 12%), because of the drastic reduction in rail market share with the length of the haul, as seen in Table 3 of the main text. It should also be noted that the relative performance of rail and multimodal rail as compared to trucks improves significantly with distance. Accordingly, the comparative advantage of rail logistics cost would be even higher for these long distance flows.

2. The starting point for constructing table A1 is the rail transport data for 1994, adding the yearly figures for the three major common carriers: RFFSA; FEPASA; and CVRD (both Vitória-Minas and Carajás sub-systems). The first three columns present the volume (thousand tons), production (million ton-kilometers), and revenues (R\$ million). Totals for these variables indicate that the Brazilian rail system hauled 246 million tons during that year, generating revenues of almost R\$1.3 billion. The average distance of rail flows, 542 kilometers, confirms the diagnosis of a balkanized system, serving almost exclusively confined regions. The distance is the longest for iron ore (608km). Therefore the global average for non-iron ore products is only 438 kilometers. Relevant logistics data elements for each commodity include the unit value of the commodities (in R\$ per ton) and the rail tariff, calculated by the ratio of revenues to production. A truck tariff function is estimated based on actual rates charged by independent truckers during 1994, which vary according to the distance traveled. The results show the expected economies of distance (tariff =  $0.25 \times \text{distance}^{0.73}$ ) and are statistically quite robust ( $R^2 = 0.95$ ;  $n=39$ ). But these tariffs are probably below the long-run marginal costs of the trucking industry. Truckers typically operate below break-even levels, making money to pay for fixed and common costs in relatively short peak periods. Moreover, these tariffs do not include the tolls on the recently-concessioned roads nor the environmental impacts of road transportation.

3. The freight cost difference is a first measure of the rail advantage, taking only the modal tariffs as a comparison basis. Taking only the non-iron ore products, it would cost R\$940 million more to transport all the 95.4 million tons by truck than by rail. To get a more complete estimate of logistics cost, we compute rail and truck transit times which are functions of modal average cruising speeds, number of working hours per day, and working days per year. The railways' slower cruising speed is only partially compensated by both longer working hours per day and more working days per year. On the other hand, road distances are on average 20% shorter than rail distances.

4. Inventory costs take into consideration the financial costs for stocks in transit and at destination. The latter is estimated following a model similar to Baumol-Vinod's inventory model of freight demand<sup>27</sup>. The model intends to explain the choice of transport made by shippers, as well as their total demand for transportation services. The optimal modal choice results from a trade-off among freight rates, speed, dependability (variance in speed) and en-route losses. It takes into account that a faster and /or more dependable service reduces the shipper's or receiver's inventories, including his safety stock and his inventory in transit. Hence the inventory model makes possible a direct comparison of the four attributes on which mode selection is based and leads to a model of rational choice in transport demand. The cost trade-offs as a function of the shipper's inventory and transportation choices are expressed by the total logistics cost function:

$$\text{Logistics costs} = \text{direct shipping cost} + \text{in-transit inventory carrying cost} + \text{ordering cost} + \text{consignee's inventory carrying cost.}$$

- Where direct shipping cost = (unit shipping cost) x (the amount shipped per year).
- in-transit inventory carrying cost = (cost per unit of time) x (transit time) x (amount shipped).
- ordering cost = (cost per order) x (number of shipments).
- receiver's inventory cost = (cost per unit per year) x (average inventory level).
- Baumol assumes that safety stock costs may be estimated as a function of the standard deviation of inventory requirements. This is the case if the stochastic demand and lead time elements satisfy a Poisson probability distribution.

5. In this analysis, the average inventory level and the safety stock for each commodity is calculated as a linear function of modal transit time. It is therefore implicitly assumed that the standard-deviation of transit time is also proportional to transit time, which is a reasonable and conservative assumption given the relatively small range of average distances. The specific linear multipliers for the inventory at destination for rail and truck transportation alternatives are 10 and 4, respectively.

6. The resulting inventory costs for each mode is calculated and added to the tariff costs, resulting in the total logistics costs. Interest rate is 20% per year, which is high for international standards but conservative for the Brazilian economy. The next column shows the rail logistics cost advantage over truck in percentage. It should be noted that only for alcohol and oil products the costs are approximately equal. This can be explained by the government's control of the tariffs and the transport choices for these products. The transport of these products is paid through a fund administered by a federal agency; their tariffs are well above what would prevail in a market situation.

7. The last two columns of Table A1 compare the size of the transport markets and the rail market shares. The railways' performance is good for iron ore and coal, which are predominantly exports and import commodities, respectively, with concentrated origins and destinations. On the other more disperse flows, railways' share falls to less than 20%.

<sup>27</sup> Baumol, W. and Vinod, H., An inventory theoretic model of freight transport demand, *Management Science*, vol.16 (7), pp. 413-21, March 1970.

**Table A1 - Logistics Cost Comparisons for Truck and Rail Transportation in Brazil**

	Volume	Production (million tkm)	Revenues (R\$m.)	Unit Value Cargo \$/ton	Rail Distance (km)	Rail tariff (\$/1000 tkm)	Truck tariff (\$/1000t km)	Freight cost Diff. \$	Rail Transit Time	Truck Transit Time	Inventory Cost by Rail	Inventory Cost by Truck	Logistics Cost per ton by Rail	L. Cost per ton by Truck	Total Logistics Cost by Rail	Total L. Cost by Truck	% of L. Cost rail vs truck	Size of the Market mill t	Rail Market Share (%)
Sugar	981	511	8.8	298	521	17,3	46,2	12,3	2,9	1,3	6,90	1,24	15,9	21,3	15,6	20,8	25,3	7,4	13,3
Fertilizers	3.339	1.477	23.7	110	443	16,1	48,3	39,6	2,5	1,1	2,16	0,39	9,3	18,2	30,9	60,7	48,9	9,4	35,5
Alcohol	4.700	1.979	73.8	95	421	37,3	48,9	19,1	2,3	1,1	1,78	0,32	17,5	17,5	82,2	82,1	-0,1	9,8	48,0
Limestone	6.511	1.467	33.3	57	225	22,7	57,9	43,0	1,3	0,6	0,57	0,10	5,7	11,0	37,0	71,4	48,2	48,8	13,3
Coal	8.481	2.741	40.7	80	323	14,9	52,5	86,0	1,8	0,8	1,15	0,21	6,0	14,4	50,5	121,7	58,5	9	90,2
Cement /pellets	7.262	3.533	71.7	75	487	20,3	47,0	78,6	2,7	1,2	1,62	0,29	11,5	19,4	83,5	140,6	40,6	26,6	27,3
Oil products	13.091	6.762	245.7	103	517	36,3	46,3	56,0	2,9	1,3	2,36	0,43	21,1	20,3	276,6	266,3	-3,9	61,4	21,3
Soymeal	6.244	3.243	53.7	220	520	16,6	46,2	80,1	2,9	1,3	5,08	0,91	13,7	20,9	85,4	130,6	34,6	12,5	50,0
Corn	709	317	5.8	180	448	18,4	48,1	7,8	2,5	1,1	3,58	0,64	11,8	18,6	8,3	13,1	36,3	26,6	2,7
Iron ore	150.411	91.483	412.0	35	608	4,5	44,3	3.000	3,4	1,5	0,00	0,00	2,7	22,4	412,0	3.376,0	87,8	150,411	100,0
Steel products	7.176	2.166	48.6	350	302	22,5	53,5	56,0	1,7	0,8	4,70	0,85	11,5	14,3	82,3	102,6	19,8	25,8	27,8
Soybeans	4.103	2.294	38.6	240	559	16,8	45,3	54,4	3,1	1,4	5,96	1,07	15,4	22,2	63,1	91,0	30,7	23,8	17,2
Wheat	1.842	602	13.2	170	327	22,1	52,4	15,2	1,8	0,8	2,47	0,44	9,7	14,7	17,8	27,0	34,2	8,1	22,7
Pulppaper	464	168	3.4	330	363	20,2	50,9	4,3	2,0	0,9	5,33	0,96	12,7	16,4	5,8	7,5	22,6	12,7	3,7
Other	30.471	14.501	221.9	500	476	15,3	47,3	386,8	2,6	1,2	10,58	1,90	17,9	20,7	544,2	629,8	13,6	220	13,9
Total excl. iron ore	95.374	41.767	883.5		438	21,2	48,4	939,5							1.383,8	1.765,9	21,6	502	19,0
Total	245.785	133.250	1.295.6		542	9,7	45,7	3.970,0							1.795,9	5.141,9	65,1	653	37,7

## ASSESSMENT OF INTER-REGIONAL TRADE FLOWS:

### Description of Methodology

1. The continental dimensions of Brazil together with the geographic dispersion of the economic activities throughout its territory generate a significant volume of interregional commerce which, in turn, is an important element for regional development and income distribution. In spite of the economic relevance of these flows, there is evidence that Brazilian shippers and consumers are paying an unduly high transport bill, mostly because of institutional and regulatory barriers to the establishment of efficient multimodal transport arrangements. As a consequence, truck transportation predominates in these long distance flows (more than 1000 kilometers), imposing a huge cost to commerce, particularly for less industrialized regions in their trade with the Southeast.

2. This appendix describes the methodology used to assess the transportation cost of inter-regional commerce and the distribution of this cost both by region and sector of the economy. The methodology is divided into two main model blocks. The first block -- a multi-regional input-output economic model (MRIO) -- determines the principal economic variables of interest on a regional level and establishes intersectoral and interregional relationships. The second block -- a transport model (TM) -- determines the physical flows corresponding to the monetary flows of commerce, allocating these flows by transport mode. (see diagram hereafter).

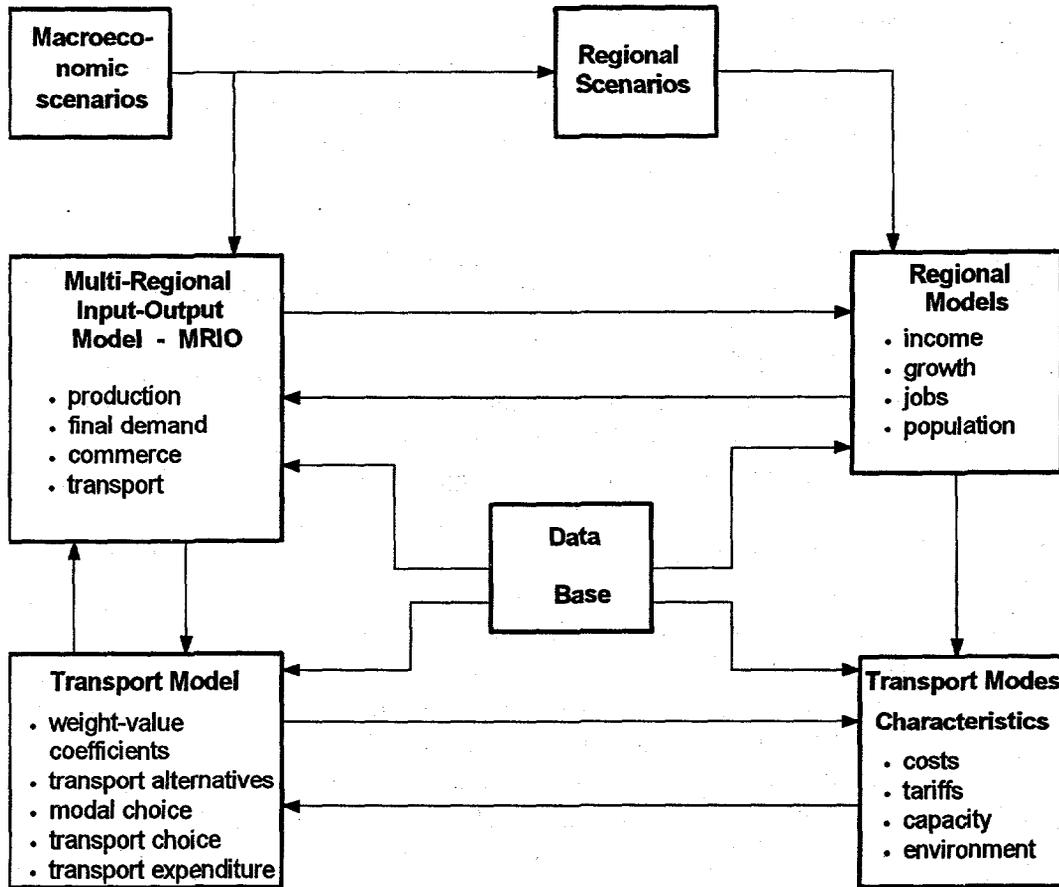
#### A. The Multi-Regional Input-Output Model

3. The MRIO model takes into account: (i) interregional trade patterns for each major sector; (ii) regional input-output coefficients and final demands (government and private consumption, investments and exports minus imports); and (iii) transport costs for each inter-regional logistic link. The results of the MRIO model (interregional flows), estimated for a base year, can be projected with the dynamic econometric regional development models, resulting in a flow of transport outlays by sector and by region. The impact of alternative logistic schemes, made possible by the proposed institutional and regulatory reforms, can be analyzed by varying the supply and the modal shares of interregional traffic. The sectoral and regional distribution of transport cost savings can also be obtained.

4. The MRIO model, is a versatile tool for various types of impact analysis (sectoral investments, income distribution, etc.). It is also particularly adequate for appraising regional development policies in general, and transportation policies in particular, since it emphasizes on the determination of relationships among inter-regional flows. It can be used to estimate and compare the long-term regional, sectoral and national economic effects of alternative plans of investment in transport and in other sectors, in each region. The evaluation on the national level

takes into account the sum of the positive and negative effects, in all regions or sectors. This type of modeling has been extensively used in this type of analysis<sup>28</sup>.

### Inputs and Outputs of the MRIO and Transport Models



5. The basic equation of the model which defines the structure of sectoral production of each region, is as follows<sup>29</sup>:

<sup>28</sup> - Carter, A.P. and Brody, A. (eds.); Contributions to Input-Output Analysis, vols. I and II; Amsterdam, North-Holland Publ. Co., 1970; Amano, K. and Fujita, M., "Long run economic effect analysis of alternative transportation facility plans - regional and national", J. of Regional Science 10(3), 1970; Judge, G.G. and Takayama, T. (eds.); Studies in Economic Planning over Space and Time; Amsterdam, North-Holland Publ. Co., 1973.- Miernyk, W. et al.; Simulating Regional Economic Development; Lexington, MA; D.C. Heath and Co., 1970;- Polenske, K.; The United States Multiregional Input-Output Accounts and Model; Lexington, MA, D.C. Heath and Co., 1980;- Richardson, H.W.; Input-output and economic base multipliers: looking backward and forward; Journal of Regional Science, 25(4), 1985.

<sup>29</sup> For more details, see Polenske, K.; op. cit., 1980.

$[X] = [I - C \cdot A]^{-1} \cdot [C \cdot Y1 + Y2]$ , where

[X] = sectoral production matrix by region;

[I] = identity matrix;

[C] = matrix of inter-regional trade coefficients by product;

[A] = input-product matrix, consolidated for all regions (block-diagonal matrix, with each block being the matrix for one region);

[Y1] = final demand vector, excluding exports; and

[Y2] = final demand vector for exports.

6. The solution of the model for a given year provides the regional income aggregates, the necessary sectoral investments to allow for a certain increment in regional production vis-à-vis the previous period, and principally the inter-regional trade flows. These are passed on to the transport model in the form of the demand to be met in that year.

## B. Sectoral and Regional Aggregation, and Inter-Regional Trade

7. The sectoral aggregation consolidates sectors from the point of view of generating relatively homogenous shipment characteristics (17 sectors were used). The regional aggregation followed the five standard IBGE Foundation macro-regions (North, Northeast, Southeast, South and Center-West). The estimate of the potential inter-regional transport flows also assumes that the current commercial relationships between the Brazilian states will remain unchanged.

8. The data source for inter-regional trade is the Ministry of Finance (*Secretaria de Economia e Finanças do Ministério da Fazenda*), which consolidates data related to the interstate purchases and sales by Brazilian firms, which are subjected to the states' "value-added" tax: (ICMS)<sup>30</sup>. The results for 1985 show that the overall volume of transactions reached 31% of Brazil's GDP, which would represent almost US\$ 220 billion, in 1996 figures. The MRIO model was calibrated for the year 1985. The results replicated the available statistics for regional incomes and trade.

## C. The Transport Model

9. The solution of the MRIO model yields monetary estimates for inter-regional trade flows broken down by product. These monetary flows of commerce are the starting point for determining the demand for inter-regional transportation. The first step is to transform the monetary flows into physical ones, multiplying by a weight/value coefficient, which varies according to product and region of origin. The physical flows obtained are allocated to the available transport modes in each origin/destination pair. The transportation costs can, then, be quantified for each mode, product or region.

10. The weight-value coefficients were obtained from census data for 1985. Coefficients of modal choice were calculated for available statistics on rail and water (coastal and river) transport flows. Movements by road were determined by difference between the latter and total flows. Transport production was calculated combining distances by mode and physical flows. Finally, transport expenditures were estimated from modal freight rates.

<sup>30</sup> cf. Secretaria de Economia e Finanças, Ministério da Fazenda; Rev. de Economia e Finanças, 369; Jan/March 1987, and matrix of trade updated for 1991.

## GRAIN TRANSPORT COSTS IN BRAZIL'S MAIN CORRIDORS

1. GEIPOT and IPEA have jointly carried out a comprehensive study of grain transportation in Brazil<sup>31</sup>. The study, which was published by GEIPOT in 1995, analyzed all the major transport corridors, which moved the 68 million tons of grain produced in 1993. The major objective was to help defining a strategy for government action in the short, medium and long run, to correct for the existing malfunctions identified in those corridors.
2. The study included all the states of the Southern region (Rio Grande do Sul, Santa Catarina and Parana), São Paulo and Minas Gerais, both in the Southeast, Goiás, Mato Grosso and Mato Grosso do Sul, in the Center-West, Rondonia in the North, and Bahia, Piauí and Maranhão in the Northeast.
3. The grain production data were obtained from the systematic census of the IBGE Foundation, disaggregated by municipality. The data was complemented by surveys of major associations of grain producers and processors. The consumption in each macro location was estimated based on population and per capita consumption parameters calculated by EMBRAPA. The resulting surpluses and deficits were the basis for estimating the origin and destination matrix. Modal flows for rail and water modes were collected from the respective operators. Truck transport of grain was estimated as a residual flow from the total not transported by rail or water. Truck flows by origin and destination were also checked with major shippers.
4. Transportation costs were estimated for each mode. Rail costs included operational items and track maintenance as a function of gross-tons produced in each link. Truck costs were based on the PICR (Projeto Inter-Relacionamento de Custos Rodoviários) methodology developed by GEIPOT with the support of the Bank, under the HDM project. They took into account both vehicle types and the road conditions. Water transport costs were calculated on the basis of characteristics of the convoys used or projected for each waterway.
5. The costs of moving the grain were calculated for two situations. First, from the observed choices of routes and modes made by shippers and consignees. Second, using the multimodal-multiproduct planning model STAN - Strategic Transportation Analysis, which allocates flows to routes and modes according to the best option available, and allows the assessment of specific changes in infrastructure and operational costs.
6. Notwithstanding the differences in methodologies, particularly in the modal cost functions, GEIPOT's results for the two allocations confirm the conclusions of this report: multimodal alternatives are apparently more economical, but shippers and consignees prefer using the truck mode. The table hereafter shows that the reductions in transportation costs for the multimodal alternative is 16% on average, in spite of the longer distance of the haul. All the current routes/modes observed are by the truck alternative, except for the first one, Brasília-Vitória. The

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<sup>31</sup> . BRASIL, MT-GEIPOT. Corredores de Transporte - Proposta de ações para a adequação da infra-estrutura e para racionalização do transporte de grãos agrícolas. Brasília, julho 1995.

simulated ones are multimodal alternatives by rail and/or water with road combinations, whichever is cheaper, and include transshipment and/or port handling charges.

7. It is worth noting that the cost reduction obtained if all 68 million tons of grain were moved by the multimodal alternative would be equivalent to US\$642 million (average distance of 2,178 km). These savings are likely to be conservative given the low estimated trucking costs used in the analysis (US\$24 per 1000 tkm).

Table 1. Grain Transport Costs in Main Corridors

Origin	Destination	Current Routes/Modes <sup>1/</sup>			Simulated Routes/Modes <sup>2/</sup>			Reductions in	
		Distance (km)	Cost (US\$/t)	Cost (US\$/tkm)	Distance (km)	Cost (US\$/t)	Cost (US\$/tkm)	Distance (%)	Cost (%)
Brasilia	Vitoria-ES	1865	27,51	0,015	1865	27,51	0,015	0	0
Rondonopolis-MT	Santos-SP	1407	40,22	0,029	1593	34,11	0,021	-13,2	15,2
Cassilandia-MS	Maringa-PR	649	13,48	0,021	649	13,48	0,021		
Sorriso-MT	Paranagua-PR	2244	54,95	0,024	2487	52,36	0,021	-10,8	4,7
Foz Iguacu-PR	Paranagua-PR	735	23,34	0,032	771	23,11	0,030	-4,9	1,0
Campo Grande-MT	Santos-SP	1502	31,34	0,021	1289	25,97	0,020	14,2	17,1
Diamantino-MT	SF do Sul-SC	2428	51,21	0,021	2314	41,75	0,018	4,7	18,5
Rio Grande-RS	Belem-PA	4217	87,78	0,021	4581	71,68	0,016	-8,6	18,3
Rio Grande-RS	Fortaleza-CE	4739	98,85	0,021	5028	68,25	0,014	-6,1	31,0
Uruguaiana-RS	G Valad.-MG	2558	53,22	0,021	2887	42,92	0,015	-12,9	19,4
Foz Iguacu-PR	Fortaleza-CE	4471	91,44	0,020	3787	65,36	0,017	15,3	28,5
Rondonopolis-MT	Salvador-BA	2481	52,21	0,021	3128	50,78	0,016	-26,1	2,7
Santa Rosa-RS	R. Grande-RS	682	19,26	0,028	907	16,51	0,018	-33,0	14,3
S. M. Oeste-SC	P. Alegre-RS	635	17,15	0,027	701	16,82	0,024	-10,4	1,9
Uruguaiana-RS	P. Alegre-RS	710	18,93	0,027	690	11,93	0,017	2,8	37,0
<b>Average</b>		2088	45,4	0,023	2178	37,5	0,019	-6,8	16,1

1/ Trucking except for Brasilia-Vitoria (railways)

2/ Multimodal alternative

## LOGISTICS COSTS OF CONTAINERIZED IMPORTS AND EXPORTS

1. Brazilian port costs have been extensively identified as a major barrier to trade. A recent study by the World Bank (BRAZIL: The Custo Brasil since 1990-92, Report No. 15663-BR) found that high unit port costs add approximately 6 percent to exporters' costs. For exporters of manufactured goods that use the ports of Santos or Rio de Janeiro, the figure is as high as 10 percent.

2. This Annex takes a detailed look at import logistics costs of containerized cargo through Brazilian ports. Imports have been increasing quite remarkably in recent years, after Brazil lowered its import tariffs and appreciated the Real, as part of the general policies to curb inflation and open up the national economy. In fact, non-petroleum imports have increased from US\$17.5 billion in 1992 to US\$47 billion in 1995, and they continued to increase in 1996. The imports of general cargo represent only 7% of the overall import flows in tonnage, which added up to 71 million tons in 1994. Nevertheless, the logistics cost to move the general cargo corresponds to more than half the total import logistics costs. Taking ocean freight, for instance, general cargo rates took US\$844 million of the total US\$1,6 billion spent in 1994.

3. Of the 5.1 million tons of general cargo imported to Brazil in 1994, 69% were containerized in 20 and 40 feet units (64% and 36%, respectively), making a total of 284 thousand loaded units. The average shipment size was approximately 12 tons, in both cases. The logistics cost items imposed on containerized import cargo are shown on the attached table. The figures are based on the port of Santos, which shows the handling costs in Brazil. On the other hand, the Santos area is probably the best served in terms of infrastructure services (shipping lines and frequencies, roads and trucking firms, railroads, warehouses, etc.) which, in turn, may lower other logistics costs incurred by firms. Santos is also the port that concentrates 63% of the imports of general cargo.

4. The cost items are grouped by segment of the physical movement or functional area: sea; port; inland transport; inland warehousing; administration/customs. About 34% of the logistics cost is incurred at sea, including the contribution to the renewal of the Brazilian merchant marine (AFRMM) which is based on a 25% surcharge on the ocean freight rate. Port costs add the port handling (capatazia) and warehouse tariffs charged by the Dock of Santos, stevedoring costs, a per ton tax created by the 1993 port legislation to fund stevedoring severance payments, and a US\$25 payment for the release of the bill of lading (for convenience, it is assumed that each container carries one shipment with a corresponding bill of lading). Inland transport costs are calculated for the Santos-São Paulo movement. The shipment is assumed to be sent to a bonded warehouse, adding a US\$170 charge by the customs agent's Union (the actual charge is between 1 and 2 minimum wage). The costs at the bonded warehouse, including handling, insurance and storage, add up to US\$289, which is the smallest cost component. Administrative and customs costs (US\$1,727) include both the import license and declaration fees charged by the Brazilian government through Banco do Brasil, the administrative cost paid to the customs agent, and the contribution to the customs agent Union.

5. The potential savings from the proposed multimodal policy reform agenda contemplates improvements in port productivity and costs, with impacts on ocean freight rates (reduction in ship's turnaround time), and on trucking costs (reduction of waiting time to load and unload containers). Administrative costs are reduced by 70% in case of the contribution to the customs' agent Union and to zero in the case of the ad valorem payment to the customs agent. These savings would be derived from a reduction in entry barriers in the provision of this type of service, as well as from the improvement of the management systems supporting the importation activity (e.g., SISCOMEX for imports). The import declaration cost is reduced to a reasonable fixed value per shipment. It should be noted that most of this uncommon ad valorem charges are remanescence of the days of the 'import substitution policies' that should be replaced by cost-based practices.

6. The results show that total logistics import costs can be reduced from US\$4,775 to US\$2,614 equivalent per container. The logistics cost of moving 450 thousand import containers would be reduced from about US\$2.2 billion in the present situation, to about US\$1.2 billion under the policy reform scenario. The savings represent about 4.5% of the value of the shipment, estimated at about US\$50,000 per container. Assuming a 5% growth of imports by containers, from 1996 to 2012, the net present value of the savings would add to almost US\$10 billion equivalent, at a 12% discount rate.

7. The major conclusion of this analysis is that the size of the potential cost savings made possible through adequate policies targetted at improving the logistics supply chain can be substantial. However, a combination of policies will be needed to achieve these gains.

Table 1: Potential Logistics Cost Savings for Containerized Trade

Cost Item	Unit/Base Value	No. of Units	Current Costs per Containers (US\$)		Potential % Cost Reduction Based on International Best Practice	Potential Costs per Container	
			Import	Export		Import	Export
<b>AT SEA</b>			1,625	1,240		1,488	1,130
Freight rate	\$/container	1,100	1,100	1,100	10	990	990
Merchant Marine Fund	% on ocean freight	25	275	n.a.	0	248	n.a.
Insurance	% on FOB value	0.5	250	140	0	250	140
<b>AT PORT</b>			414	389		204	196
Handling	\$/container	170	170	170	40	102	102
Storage	\$/container	110	110	110	50	55	55
Stevedoring	\$/container	100	100	100	70	30	30
Stevedore Severance Fund	\$/container	0.75	9	9	0	9	9
Release of Bill of L.	\$/B/L	25	25	n.a.	70	8	n.a.
<b>INLAND TRANSPORT</b>			728	528		391	322
Freight Rate	Santos-SP /container	500	500	500	40	300	300
Insurance	% on FOB value	0.1	50	28	20	40	22
Customs Agent Union (bonded transp.)	\$/shipment	170	170	n.a.	70	51	n.a.
<b>AT BONDED WAREHOUSE</b>			289	n.a.		211	n.a.
Storage	% on CIF value	0.3	154	n.a.	40	92	n.a.
Handling	\$/ton	8.4	103	n.a.	10	93	n.a.
Insurance	\$/on CIF Value + import tax	0.05	32	n.a.	20	26	n.a.
<b>ADMINISTRATIVE/CUSTOMS</b>			1,727	50		320	25
Import/Export License	\$/shipment	116.7	117	50	50	58	25
Customs agent (paper work)	% on FOB value + \$/license	1	670	n.a.	80	134	n.a.
Import Declaration	% on CIF value	1.5	770	n.a.	90	77	n.a.
Customs Agent Union	\$/declaration	170	170	n.a.	70	51	n.a.
<b>LOGISTICS COST/CONTAINER</b>			4,775	2,207		2,614	1,673
<b>TOTAL LOGISTICS COST/YEAR</b>			2.15	0.93		1.18	0.70

Note: the table is calculated assuming the following indicators for 1996: 420,000 containers for exports and 450,000 containers for imports, assuming average shipment sizes of 12.3 tons for both exports and imports and average shipment values of US\$50,000 for imports and US\$28,000 for exports.