



Brazil's comparative advantage in the global economy

by Graham A. Davis

This paper uses factor endowment theory to determine Brazil's comparative advantage in world trade. By measuring Brazil's current endowments of minerals, land, labor, and physical capital, and comparing these with the endowments of other countries, it is possible to anticipate the structural changes in Brazil's economy should Brazil become a more open economy. The results have important implications for the Brazilian minerals and minerals processing sectors given the recent economic liberalization within the country.

An earlier version of this paper was presented at the First International Symposium on Mining and Development, Campinas, Brazil, July 1995. See also RMR vol 11 No 2.

Graham A. Davis is Assistant Professor of Mineral Economics, Division of Economics and Business, Colorado School of Mines, Golden, Colorado 80401-1887, U.S.A.

In many mineral-based developing countries, and in development economics in general, the minerals industry is under attack. In the development literature, mineral-rich countries are not said to have development advantages, but development problems.¹ Mining has been singled out as contributing to the "backwardness" of developing countries, both for alleged monopsonistic purchasing of labor and its facilitation of discrimination of backwards peoples.² Where industrialization and faster economic growth are desired, the mining industry plays the subservient role of providing the foreign exchange and tax revenues necessary to finance and prop up the production of non-competitive manufactures under grand industrialization schemes. Should the anticipated economic growth not be forthcoming, the "resource curse" is blamed rather than the industrialization plan itself. Even those few economists who rejected industrialization as a growth plan in the 1950s saw agriculture rather than mining as the primary sector activity that could have a leading role in economic growth.³

This paper does not seek to redress these issues. It is enough to simply acknowledge the extraordinary and ongoing development success of the mineral-based economies of the world.⁴ Instead, I focus on Brazil, analyzing the future of minerals in Brazil's economic development. In Brazil we have a mineral producer of undeniable importance, yet so intent on industrialization in the past that its industrial policies have been labeled "Pharaonic" and "megalomaniacal" by Brazil's domestic press.⁵ Indeed, its industrialization has been so intense that it is the only Latin American economy to be nominated to the ranks of newly industrialized country (NIC) by most trade economists.

It has wisely been noted that developing economies need to do more than simply replicate developed country industrial structure if they desire industrial country economic performance.⁶ And, in

keeping with this, Brazil's per capita economic performance in purchase power parity (PPP) terms lags five of the other Latin American countries despite Brazil's more industrialized economy.⁷ The inequality of income distribution in Brazil is comparable to that of South Africa, and 43 per cent of Brazil's population is classified as living in poverty, this statistic worsening yearly.⁸ Perhaps it is for this reason that Brazil has since 1990 been flirting with freer markets and the attendant "de-industrialization" that this might invoke.

The January 1, 1995 signing of the Mercosul customs union between Brazil, Paraguay, Uruguay, and Argentina allows 90 per cent of the trade between these four nations to be free of tariffs. Furthermore, the Brazilian government is no doubt keenly watching Chile's negotiations with the three North American Free Trade Agreement (NAFTA) signatories. As Latin America moves towards more market-oriented economic policies, with Brazil belatedly following suit, in what direction will Brazil's economy move? More importantly, what role will minerals play in Brazil's future development? To answer these questions, this paper explores Brazil's endowment-related comparative advantage in the global economy, with a focus on its mineral endowments under a Heckscher-Ohlin framework. I begin by reviewing the Heckscher-Ohlin paradigm of comparative advantage.

The Heckscher-Ohlin theory of comparative advantage

Despite economists' reputation for disagreement, we do generally agree that goods trade internationally based on relative differences in cost of production. Unfortunately, this agreement ends when it comes to specifying the origin of these cost differences. In the most celebrated trade theory to date, Swedish economists Eli Heckscher and Bertil Ohlin proposed that it is differences in endowments of inputs to production that explains cost

differences and hence the pattern of international trade. This was later to be named the Heckscher-Ohlin theory of comparative advantage in trade, a theory that I believe is especially applicable when explaining the trade patterns of resource-based nations. Ohlin even gives a mineral example in explicating his theory:

One region may have plenty of iron and coal but little land for wheat growing, while another has plenty of wheat-land but a scanty supply of mineral resources; clearly the former is better adapted to iron production and less well adapted to wheat-growing than the latter. It is the proportion of factors in a region that determines its fitness for specific industries.⁹

Ohlin did not explicitly state how much of an endowment advantage is "plenty" in a multi-factor, multi-country setting. A plentiful endowment has since been defined as a country having a larger share of the world endowment of a factor input than the country's share of world consumption.¹⁰ For Brazil, this means that, given Brazil's share of world GDP of 1.4 per cent¹¹, any factor endowment share in excess of 1.4 per cent indicates a relative endowment advantage and an expected comparative advantage in the production and export of goods intensive in that factor input.

The Heckscher-Ohlin theory of trade is incontrovertible both in theory and under empirical scrutiny; differing factor endowment levels tend to be the main driving force behind specialization in production and international trade across nations. Certain other factors – wages, productivity, taxes and subsidies, level of infrastructure, and macroeconomic policy – can obviously influence a country's competitive advantage over its international competitors. Ohlin recognized this, and, for example, suggested that fraudulent and inefficient government increases the costs of business compared with agriculture, affecting the implications of traditional factor endowment

analysis.¹² Yet, all in all, empirical studies have shown that factor endowments are the dominant aspect in explaining international trade patterns. This is especially so for production and trade in primary resources. The only item that has been found to diminish and even negate a country's comparative advantage in primary resource production is extreme domestic policy, where, for example, unreasonable taxes or threats of appropriation can discourage domestic and international investors from investing in the sector. Even so, the state, realizing the nation's potential in resource production, has often stepped into the void left by the market. Production and trade, it seems, is forthcoming to at least some degree wherever the requisite quality resource endowments exist.¹³

Other theories of trade have been developed to explain trade between developed nations with similar factor endowments, and economies of scale has been used to explain the concentration of manufacturing in certain countries that would seem to have no endowment-related reason for attracting these production facilities. For example, Brazil's large domestic markets may facilitate economic production of scale economy manufactures, where the latter can be identified. In recognition of these special cases, the Heckscher-Ohlin theory of trade does not claim to apply to all goods, but only to those for which factor input costs are the main determinant of final cost. This encompasses all raw primary products, most processed primary products, and certain manufactures. Davis provides a list of these "Heckscher-Ohlin" goods.¹⁴

Brazil's factor endowments

As noted above, Brazil will have a comparative advantage in the production of any Heckscher-Ohlin good that is intensive in factor inputs that are relatively abundant in Brazil. From above, relative abundance is defined as occurring when Brazil's endowment of the factor input is greater than 1.4 per cent of the world en-

dowment. The typical factor inputs assessed are land, labor, and capital. My analysis will add mineral resources, a factor input to mineral and metal production, as a separate type of land.

Land

An abundance of land suitable for agricultural activities leads to a global comparative advantage in the production and export of agricultural goods. Brazil contains 5.5 per cent of the world's permanent pasture, 4.2 per cent of the world's cropland, and 12.6 per cent of the world's forest and woodland, indicating a strong comparative advantage in agriculture. It is an extreme outlier in the broad land category "tropical land," with 804 million hectares, or 95 per cent of its land mass, so classified. The next most endowed country in tropical land is Indonesia, with 167 million hectares, or 88 per cent of its land mass, so classified.¹⁵ Brazil's vast river potential is an enabling factor for the production of goods that have a high bulk to value ratio, and for which land and air transport are not economically viable. This reinforces Brazil's comparative advantage in the production of agricultural goods.

The extensive river network also results in Brazil having a large and potentially low-cost hydro-electric energy endowment. It is estimated that by the year 2000 Brazil will have an installed hydro-electric generating capacity of over 100 000 MW¹⁶, equivalent to about 10 per cent of anticipated installed capacity worldwide. Here we have an energy endowment that, given proper management, facilitates the competitive production of energy-intensive goods.

Mineral resources

Countries with large mineral reserves are more likely to be endowed with large quantities of quality ore than countries with small reserves. Since high quality ore usually confers low extraction costs, large endowments generally facilitate low cost mineral production. Hence, as a

rule, countries with large mineral endowments will enjoy a cost advantage in mineral production over those with less significant endowments. They will thus have a larger market share, measured as the percentage of world production. According to the Heckscher-Ohlin theory of trade, where a country's endowment share is larger than the country's share of world consumption, and given that it has an adequately developed infrastructure and transportation network, it will also be a significant exporter of that mineral.

That this is so has been empirically verified for South Africa.¹⁷

Brazil has previously been found to be well endowed with minerals, ranking 14th out of 58 countries in relative mineral endowment in 1975 and exhibiting a corresponding comparative advantage in mineral production and exports at that time.¹⁸ Table 1 below lists Brazil's current reserve share, production share, and export share for its 22 most important minerals. Brazil's reserve share is greater than its world consumption share of 1.4

per cent in 12 of these minerals, indicating that, in accordance with this comparative advantage in mineral production, it should have significant production and exports in each of these 12 minerals. This does tend to hold, although while the average world rank in reserve share of these 12 minerals is 4.3, the average rank in production is lower at 5.7. The production of potash and rutile seems particularly low given Brazil's healthy reserve share. The export ranking of these 12 minerals also lags the reserve share where such rankings are available, indicating something within the economy that discourages the development and export of these extensive mineral reserves.

Table 1. Reserve share, production share and export share. Brazil, 1992

	Share of world reserve base ¹ per cent	World rank	Share of world production per cent	World rank	Share of world exports per cent	World rank
Columbium (Niobium)	86	1	79	1	na	na
Rutile	51	1	0.5	7	na	na
Tin	25	1	16	3	11	5
Bauxite	10	3	10	4	14	3
Iron ore (Fe content)	10	3	16	3	30	1
Nickel (unwrought)	4	8	3	10	1	10
Potash	4	6	0.4	12	na	na
Tantalum	4	7	22	2	11	8
Asbestos	2	5	6	4	7	4
Gold	2	7	4	7	na	na
Magnesium	1.9	5	3	9	3	6
Zirconium minerals	1.9	6	3	6	0.2	na
Manganese ore	1	5	10	4	14	3
Tungsten	0.6	11 ²	1	na	1	na
Barite	0.4	11	1	11	0	na
Ilmenite	0.4	12	2.3	10	na	na
Graphite (natural)	0.3	na	5	7	3	8
Rare Earth Compounds	0.3	na	2	6	1	9
Yttrium	0.3	8	3	5	na	na
Chromium	0.2	7	2	7	3	8
Beryllium	na	na	8	4	na	na
Kaolin	na	na	4	5	4	4

Sources: British Geological Survey (1994), UNCTAD (1994), U.S. Bureau of Mines (1993).

Notes: na = not available. 1. Reserve base as defined by the U.S. Bureau of Mines (1993).

2. Reserves, on a value basis (World Resources Institute 1994).

Labor

Brazil's adult population makes up 3.1 per cent of the world population, indicating that it is a country relatively well-endowed with labor under the Heckscher-Ohlin framework.¹⁹ Previous studies using data from the mid 1970s have also found Brazil to have a relatively large endowment of labor.²⁰ Leamer directly measured Brazil's labor endowment and compared it to the world endowment, as is done here. In breaking labor down by skill category, Leamer found that Brazil had a comparative advantage in goods that required unskilled labor, although its relative endowment of skilled labor, or human capital, was favorable and improving. Balassa and Lucke inferred that Brazil is endowed with labor by examining its trade flows, an endowment-discovery technique called revealed comparative advantage that is unreliable for economies with strongly distortionary trade incentives, as is the case in Brazil.

Currently, skilled labor appears to make up between 81 per cent and 88 per cent of the labor force, depending on the index used.²¹ This equates to some 3.6 per cent of the world's endowment of skilled labor. Brazil's unskilled labor equates to only 1.6 per cent of the world endowment. From this we see that Brazil now has a stronger comparative advan-

tage in goods that require skilled labor as an input than those that require unskilled labor, although it continues to hold a comparative advantage in both. However, the state of technical skills among the populace is low.²² With only 7 per cent of the work force listed as professional or technical²³, Brazil does not appear to have a comparative advantage in high-technology products.

Physical capital

The endowment of physical capital is typically measured as gross domestic fixed investment (GDFI) as a percentage of world GDFI. The GDFI figure is usually the cumulative investment over the past 16 years, reflecting the assumption that capital stock has a 16 year life. For obvious exchange rate and data collection reasons the world GDFI figure is difficult to estimate. The one study that has attempted such measurement found Brazil to have a relatively poor endowment of physical capital in 1958, with the disadvantage having grown by 1975.²⁴ Thus, during most of its early industrialization period, Brazil's plans to produce and export capital-intensive manufactures were contrary to the nation's global comparative disadvantage in the production of such goods.

As of 1993, Brazil's GDFI was equivalent to about 5 000 USD per capita²⁵, insufficient by world standards to confer a comparative advantage in the production of goods that are intensive in physical capital.

Brazil's production and trade patterns

The above analysis indicates that Brazil's endowment-related comparative advantage lies in the production and export of primary resource products and in labor-intensive manufactures such as textiles and leather. It has a comparative disadvantage in capital-intensive manufactures such as machinery, automobiles, and chemicals due to a poor overall endowment of physical capital. This means

that in the absence of domestic price distortions Brazil's economy will be able to competitively produce and export primary products and labor-intensive goods, while importing its capital equipment needs.

But Brazil has had one of the most distorted factor price structures in Latin America, a consequence of its extensive industrialization planning.²⁶ Prior to 1930 the economy was largely agrarian, with agriculture being responsible for 40 per cent of GDP.²⁷ Since then the state has, under a number of governments, attempted to industrialize and diversify its production away from a traditional agro-export base. The resultant domestic price distortions have been noted to have depressed agriculture's terms of trade by an average of 8.3 per cent between 1960 and 1984.²⁸

Despite this, agricultural production and exports in general follows the direction expected from our comparative advantage analysis, although perhaps not to the degree expected. The strong comparative advantage in agriculture, as indicated by large endowments of agricultural land and rivers, resulted in Brazil's export trade being heavily dominated by tropical agricultural products prior to the 1980s, with agriculture making up 75 per cent of merchandise export value in 1970.²⁹ Agricultural products still account for 11 per cent of GDP and 24 per cent of merchandise exports, and Brazil is self-sufficient in food except for wheat.³⁰ Brazil continues to be the world's largest producer and exporter of coffee and orange juice concentrate, and is the second largest exporter of soybeans.

There is little doubt that agricultural production and exports would flourish even more should Brazil reduce its unfavorable distortion of agricultural prices and provide supporting infrastructure. For example, on the 500 million acre cerrado, a particularly fertile savannah that covers 11 Brazilian states, farmers are tilling only one fifth of the arable land. A

rail link to the port of Santos would increase production from this region substantially.³¹

Brazil's mineral production and exports have not been as substantial despite an equally impressive endowment. Brazil has never been categorized as a mineral-based economy, in contrast to many of the other Latin American countries. With only 16 per cent of its merchandise exports as minerals and fuels, and with minerals contributing only 1.4 per cent to GDP, Brazil was, as of 1991, ranked 43rd in the world in terms of mineral dependence, falling from 37th in 1970.³² That production and exports of minerals is not higher in world terms is probably due to the negative distortionary impacts that the industrialization program has had on incentives for investment in the minerals industry. The obvious exceptions are iron ore and bauxite, where massive state involvement initiated the production and processing of these minerals to their metal derivatives, utilizing the large hydroelectric endowment referred to above. When this and other mineral beneficiation is taken into account, all mineral and beneficiation activity is estimated by some sources to account for an impressive 25 per cent of GDP.³³ The comparable number for the United States, for instance, is 5 per cent of GDP.³⁴ Metals and minerals taken together appear to make up about 36 per cent of Brazil's export trade³⁵, a reasonable but not extraordinary figure.

Manufactures, classified as SITC categories 5 through 9, make up 58 per cent of Brazil's exports.³⁶ The production and export of textiles, clothing, footwear, and leather, all labor-intensive manufactures, has generally been at the level expected given Brazil's labor endowment.³⁷ Consistent with the idea that Brazil can effectively compete in these areas without government support, private firms dominate these "traditional" sectors.³⁸ Even so, inefficient use of the abundant factors, which the Heckscher-Ohlin theory equates to a diminishing of an endow-

ment, has made certain of the traditional sectors internationally uncompetitive. Brazil's 4,000 firm shoe industry, for instance, is burdened with outdated administration and technology. Imports of shoes have climbed from 35 MUSD in 1993 to 258 MUSD in 1994. This, coupled with decreased exports, has put 42 000 Brazilians out of work.³⁹ As for high-technology or capital-intensive goods, Brazil's favorable endowment of human capital is offset by its poor endowment of physical and technological capital, meaning that it in theory does not have a comparative advantage in these products.

Leamer found Brazil's trade patterns to agree with these endowment levels in 1958 and 1975, and Braga verified that Brazil had no comparative advantage in capital-intensive steel production as of the 1970s.⁴⁰ The country's celebrated early industrialization and transformation into a heavy industry and high-technology manufacturing economy was therefore largely a result of the government industrialization plan, relying on protected domestic markets to absorb output. State investment was admittedly needed to initiate the steel, aeronautics, and petrochemicals industries due to lack of interest of private investors.

Brazilian exports of sophisticated capital-intensive products are nevertheless currently seen by some analysts as competitive or at least potentially competitive due to the economies of scale that Brazil's large domestic market provides⁴¹ and a nascent "technological dynamics" within the country.⁴² Aside from the production of steel and aluminum using Brazil's large endowments of mineral reserves and hydro-electric power, which tend to offset its poor physical capital endowment, these claims of competitiveness are difficult to support. The relative lack of physical capital raises the cost of capital, making competitive production of capital-intensive manufactures difficult. In addition, certain Brazilian manufactures that are allegedly competitive

for economy of scale reasons have until recently relied almost solely on captive domestic markets for sales. In these cases external markets are not penetrable for quality or other reasons, and domestic recession is therefore devastating. For example, Fleury notes that the contraction of the domestic market for machine tools in 1989 created havoc in the industry.⁴³ This "strategic" product was not internationally competitive on quality and delivery bases, even if an economy of scale manufacture, and producers therefore could not switch to foreign sales to offset the domestic losses. Other researchers have noted that under the less protective economic environment of the 1990s the only way for many capital-intensive manufacturers in Brazil to meet international quality standards and confront international competition in both domestic and foreign markets is to raise price to foreign buyers, threatening previously established market share.⁴⁴ This brings into question whether it is possible to achieve an international competitive advantage in manufacturing based on economies of scale where an abundance of the other factor inputs is absent.

The role of minerals in Brazil's future

There are still resource dependency worries in Brazil, and concern that Brazil does not yet have the "correct" position within the international division of labor.⁴⁵ But history has shown that a comparative advantage in resources derived from extensive mineral and agricultural endowments is, for better or for worse, virtually impossible to shed. An interesting case is South Africa, which, despite 70 years of at times radical development policy aimed at moving its production and exports away from minerals, was just as firmly entrenched in mineral production and export in 1993 as it was in 1970.⁴⁶ Other mineral-based economies find themselves in a similar situation.

This leads me to believe that Brazil is well positioned to be a world class pro-

ducer and exporter of mineral and agricultural products in spite of its industrialization drive. The above reserve shares for Brazil are undoubtedly conservative, as constitutional prohibitions on foreign ownership have led to lagging cumulative exploration of the country. In the past, Brazil was hailed as one of only a dozen of countries that produced the majority of the world's non-fuel minerals.⁴⁷ Any movement by the state towards less distortionary markets and more friendly foreign investment laws will reduce the implicit protection to Brazil's domestic manufacturing industries, and diminish the incentives that in the past have directed private capital and labor away from the country's natural resources. At the same time, any new exploration that constitutional reforms induce will expand the country's reserve base. With the extensiveness of the resource endowments revealed in the above discussion of land and mineral endowments, economic liberalization is likely to increase and re-establish Brazil's role as a major producer and exporter of primary resources and mildly processed resource products, be this to the desire or chagrin of state planners.

Given the reform platforms of recent administrations, we may already be seeing indications of this "de-industrialization" of Brazil. Excluding imports of gas and petroleum, the minerals trade surplus was 1 200 MUSD in 1993 against total mineral production of 6 400 MUSD.⁴⁸ This is a healthy trade surplus given domestic growth of 4.5 per cent and industrial sector growth of 8.1 per cent. There is news of a 1 500 MUSD investment in the Salobo copper mine by Companhia Vale do Rio Doce (CVRD) and Anglo American.⁴⁹ In addition to this, investments in potash production are expected to triple Brazil's potash output by 1996.⁵⁰ In terms of exploration, CVRD is encouraging foreign mining companies to prospect on its rich land holdings. Finally, infrastructure developments in the

Carajas region are expected to make this area one of the largest and most important mining developments in the world.⁵¹

Conclusions

Brazil is a regionally dualistic economy. In the south, Rio Grande do Sul's economic performance has been compared to Portugal and South Korea. In the north, Paraiba's level of development has been compared to that of Kenya.⁵² With most of Brazil's new mineral finds in the northern region, and with the protection of the industrialization drive having reduced Brazil's economic output potential by at least 9.5 per cent of GNP in the 1960s⁵³, a rediscovery of Brazil's comparative advantage in mineral and agricultural production is a step forward in economic development for even Brazil's most backward regions. The recently concluded Uruguay round of multilateral trade talks has industrial nations cutting barriers on mineral and metal imports by up to 70 per cent, while tariffs on agricultural imports are to be reduced by 36 per cent over 6 years.⁵⁴ The only remaining barrier to Brazil's development as a primary resource producer are market distortions within its own economy and a reluctance by policy-makers to accept this outcome of "Western" trade theory⁵⁵ as welfare-enhancing.

Taking further note of Brazil's dualism, it is likely that the consideration of Brazil as two or even three separate regions would be a more reasonable study than that of a unified Brazil undertaken here. In this new case, were endowment data available on a regional basis, we might find that the south does have a comparative advantage in manufactures, while the north has a comparative advantage in minerals and the interior an advantage in agriculture. Even so, this would only highlight the lackluster performance of the north as a mineral producer and exporter. Freer Brazilian markets will expose Brazil to a spectrum of world prices that will irrevocably steer investment and resources into the pro-

duction and export of minerals, be this desirable or not.

Notes

A version of this paper was presented at the First International Symposium on Mining and Development, Universidade Estadual de Campinas, Campinas, Brazil, July 10-13, 1995. The author would like to thank Tom Duggan and Saul Suslick for assistance with data collection, and Augusto Ferreira Mendonca for helpful discussions on the Brazilian economy. The author notes that the impressions presented are his own.

1. Lewis 1984, 1989.
2. Myint, 1954.
3. Bauer and Yamey 1957, pp. 235-36, Viner 1953.
4. Davis 1995.
5. Schneider 1991.
6. Balassa 1989a, p. 243.
7. These are Chile, Uruguay, Venezuela, Argentina, and Colombia. World Bank 1994.
8. Burki and Edwards 1995.
9. Ohlin 1967, p. 6.
10. Leamer 1984.
11. United Nations 1993, World Resources Institute 1994.
12. Ohlin 1967, p. 61.
13. Tilton 1983, 1992.
14. Davis 1994, Chapter 7.
15. World Resources Institute 1994.
16. Leamer 1984.
17. Siddique 1995.
18. Davis 1994.
19. Leamer 1984.
20. World Bank 1993.
21. Balassa 1989a, Leamer 1984, Lucke 1990.
22. International Labour Office 1994.
23. Villaschi 1994.
24. International Labour Office 1994.
25. Leamer 1984.
26. International Monetary Fund 1994.
27. Balassa 1989a, 1989b.
28. Villaschi 1994.
29. Schiff and Valdes 1995.
30. World Bank 1993.
31. Bonelli 1994, Central Intelligence Agency 1994.
32. Lewan 1995.
33. Davis 1995.
34. Suslick 1995.
35. U.S. Bureau of Mines 1993.
36. Bonelli 1994.

37. Bonelli 1994.
38. Lucke 1990.
39. Fleury 1995.
40. "Making Shoes" 1995.
41. Leamer 1984., Braga 1984.
42. Schneider 1991.
43. Villaschi 1994.
44. Fleury 1995.
45. Chudnovsky, Lopez and Porta 1994.
46. Villaschi 1994.
47. Davis 1994.
48. Bosson and Varon 1977.
49. Barboza and Maron 1994.
50. Mining Journal, March 10 and 24, 1995.
51. Spooner 1994.
52. Barboza and Maron 1994.
53. Burki and Edwards 1995.
54. Balassa 1989b.
55. Harmsen 1985.
56. Mehmet 1995.

References

- Balassa, Bela, 1989a, *Comparative Advantage, Trade Policy and Economic Development*. New York: New York University Press.
- Balassa, Bela, 1989b, *New Directions in the World Economy*. New York: New York University Press.
- Barboza, Frederico Lopez Meira, and Maron, Marcos Antonio C., 1994, "Brazil," in *Mining Annual Review* 1994. London: Mining Journal Ltd., pp. 81-83.
- Bauer, Peter T., and Basil S. Yamey, 1957, *The Economics of Under-developed Countries*. Chicago: University of Chicago Press.
- Bonelli, Regis, 1994, "Productivity, Growth and Industrial Exports in Brazil," *CEPAL Review*, April, pp. 71-89.
- Bosson, Rex, and Varon, Bension, 1977, *The Mining Industry and the Developing Countries*. New York: Oxford University Press.
- Braga, Carlos Alberto Primo, 1984, *Steel, Trade and Development: A Comparative Advantage Analysis with Special Reference to the Case of Brazil*, Ph.D. dissertation, University of Illinois at Urbana-Champaign.
- British Geological Survey, 1994, *World Mineral Statistics 1988-92*. Keyworth, Nottingham, UK.
- Burki, Shahid Javed, and Edwards, Sebastian, 1995, "Consolidating Economic Reforms in Latin America and the Caribbean," *Finance and Development* (March), pp. 6-9.

- Central Intelligence Agency, 1994, *The World Fact Book 1994*. Washington, DC.
- Chudnovsky, Daniel, Lopez, Andres, and Porta, Fernando, 1994, "The Petrochemical and Machine Tool Industries: Business Strategies," *CEPAL Review*, April, pp. 49-70.
- Davis, Graham, 1994, *South African Managed Trade Policy: The Wasting of a Mineral Endowment*. Westport, Connecticut: Praeger.
- Davis, Graham, 1995, "Learning to Love the Dutch Disease: Lessons from the Mineral Economies," *World Development*, October.
- Fleury, Alfonso, 1995, "Quality and Productivity in the Competitive Strategies of Brazilian Industrial Enterprises," *World Development*, 23.1, pp. 73-85.
- Harmsen, Richard, 1995, "The Uruguay Round: A Boon for the World Economy," *Finance and Development* (March), pp. 24-26.
- International Labour Office, 1994, *1994 Yearbook of Labour Statistics*. Geneva.
- International Monetary Fund, 1994, *1994 International Financial Statistics Yearbook*. Washington, DC.
- Leamer, Edward E., 1984, *Sources of International Comparative Advantage*. Cambridge: The MIT Press.
- Lewan, Todd, 1995, "Brazil's 'cerrado' an Agricultural Paradise," *Denver Post*, September 10, p. 7A.
- Lewis, Stephen R. Jr., 1984, "Development Problems of the Mineral-rich Countries," in *Economic Structure and Performance: Essays in Honor of Hollis B. Chenery*, Moshe Syrquin, Lance Taylor, and Larry E. Westphal, eds. Orlando: Academic Press, Inc., pp. 157-77.
- Lewis, Stephen R. Jr., 1989, "Primary Exporting Countries," in *Handbook of Development Economics*, Vol. II, Hollis Chenery and T. N. Srinivasan, eds. Amsterdam: Elsevier Science Publishers, pp. 1541-1600.
- Lucke, Matthias, 1990, *Traditional Labour-Intensive Industries in Newly Industrializing Countries: The Case of Brazil*. Boulder, Colorado: Westview Press.
- "Making Shoes in Brazil: Not Just a Load of Cobblers," *Economist*, June 24, 1995, pp. 61-63.
- Mehmet, Ozay, 1995, *Westernizing the Third World: The Eurocentricity of Economic Theories of Development*. London: Routledge.
- Myint, Hla, 1954, "An Interpretation of Economic Backwardness," *Oxford Economic Papers*, 6.6, pp. 132-63. Reprinted in *Paradigms in Economic Development: Classic Perspectives, Critiques, and Reflections*, Rajani Kanth, ed. Armonk, NY: M. E. Sharpe, pp. 17-46.
- Ohlin, Bertil, 1967, *Interregional and International Trade*. Rev. ed. Cambridge, Harvard University Press.
- Schiff, Maurice, and Valdes, Alberto, 1995, "The Plundering of Agriculture in Developing Countries," *Finance and Development* (March), pp. 44-47.
- Schneider, Ben Ross, 1991, *Politics Within the State: Elite Bureaucrats and Industrial Policy in Authoritarian Brazil*. Pittsburgh: University of Pittsburgh Press.
- Siddique, Saud, 1995, "Financing Private Power in Latin America and the Caribbean," *Finance and Development* (March), pp. 18-21.
- Spooner, Jane, 1994, "Potash," in *Metals and Minerals Annual Review 1994*. London: Mining Journal Ltd., pp. 98-99.
- Suslick, Saul, 1995, *The Brazilian Mining Industry: Current Interests and Prospects*, paper presented at the Fourth Annual Mineral Economics and Management Society Professional Program, Boulder, Colorado, March 9-11, 1995.
- Tilton, John E., 1983. *Comparative Advantage in Mining*. Working paper WP-83-91, International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Tilton, John E., 1992. "Mineral Endowments, Public Policy, and Competitiveness." *Resources Policy* 18.4, pp. 237-49.
- United Nations, 1993, *World Economic Survey 1993*. New York.
- United Nations Conference on Trade and Development (UNCTAD), 1994, *UNCTAD Commodity Yearbook 1994*. New York: United Nations.
- U.S. Bureau of Mines, 1993, *Mineral Commodity Summaries 1993*. Washington, DC.
- Villaschi, Arlindo, 1994, *The Newly Industrialized Countries and the Information Technology Revolution: The Brazilian Experience*. Aldershot, UK: Avebury.
- Viner, Jacob, 1953, *International Trade and Economic Development*. London: Oxford University Press.
- World Bank, 1993, *World Development Report 1993*. Oxford: Oxford University Press.
- World Bank, 1994, *World Development Report 1994*. Oxford: Oxford University Press.
- World Resources Institute, 1994, *World Resources 1994-95*. New York: Oxford University Press. ■