Progress in Development Studies 8, 2 (2008) pp. 129–62

'Is mining good for development?': the intellectual history of an unsettled question

Jeannette Graulau

Lehman College-The City University of New York

Abstract: The paper presents a general overview of the intellectual history of the question of mining in the development field. It describes the leading development theories and their normative claims with respect to mining, based upon the work of landmark theorists in the field. The contention of this paper is that development theories, swinging like a pendulum back and forth with the question 'Is mining good for development?', have a troubled relationship with the question about mining. The theories that embrace a positive view of capitalism in the classical political economy tradition and mainstream development economics generally support mining for development. The theories that are critical of the capitalist order, including structuralism, dependency, neodependency, world-system, feminist and discourse theory, generally have a strong opposition to mining for development. The unsettled question of mining shows that important questions about the relationship between development and technology, and the equity requirements of such a relationship, remain unsettled in the scholarship. The overarching goal of the paper is to provide initial ground upon which to discuss the normative history of the topic of mining in the development scholarship.

Key Words: development scholarship, mining paradigms, normative history, structuralism

I Introduction

Development theories have had a troubled relationship with mining. Business historians Charles Harvey and Jon Press put it succinctly in the phrase 'the problematic relationship between mineral wealth and sustained economic development' (Harvey and Press, 1990: 2). There are three reasons for this problematic relationship. First, mining is seen, or was considered to be until very recently, independent from economic development. Harvey and Press (1990) state that because for most economists the discovery of minerals was a 'matter of chance', or 'immediate luck', as Mumford (1963) puts it, the issues of mineral discovery and the relationship with technological development were automatically excluded from the exercise of building economic theories. They state:

> One question which deserves much attention is that of how and when resources are discovered, and the pace of their subsequent exploitation. Most observers – including some eminent economists – have inclined to the view that the discovery of workable mineral reserves is largely a matter of chance,

10.1177/146499340700800201

> and therefore not susceptible to economic analysis. Certainly, the folklore of mining contains many references to chance finds which triggered mining booms and brought immense wealth to the lucky prospectors. To date, only a few writers have asserted that the discovery of mineral deposits have been economically determined – most notably Geoffrey Blainey, who argues that discoveries have tended to coincide with the trough and initial upswing of the business cycle, when there has been little alternative employment, and cheap capital has been available to fund exploration (Harvey and Press, 1990: 2).

Second, mining was considered to be a phenomenon deeply and naturally rooted in the history of world empires. As Mumford states:

> Apart from the lure of prospecting, no one entered the mine in civilized states until relatively modern times except as a prisoner of war, a criminal, a slave. Mining was not regarded as a humane art: it was a form of punishment: it combined the terrors of the dungeon with the physical exacerbation of the galley (Mumford, 1963: 67).

Third, theorists of economic development in the twentieth century who address the topic of mining have not been able to build a consistent normative view with respect to mining. This normative view has swung like a pendulum from omission, to favouring, and to opposing mining. The study of the normative view of mining in the development field is important because it shows the long-term 'economic mentality' of the field, as Özveren elegantly puts it in his study of economic theories under the Ottoman Empire in the nineteenth century (Özveren in Psalidopoulos and Mata, 2002: 142). The contention of this paper is that development theories, swinging like a pendulum back and forth with the question 'Is mining good for development?', have a troubled relationship with mining. The paper presents a general overview of the leading development theories and their normative claims with respect to mining, based upon the landmark theorists in the field. This overview is not a chronological description of the topic of mining in development scholarship. Such a task would require several volumes and the collaboration of scholars, researchers, mineral planners and governments across the globe. Rather, this overview seeks to describe the evolution of the question of mineral resources in the most influential development theories. The overarching goal is to provide solid ground upon which to build the normative history of the topic of mining in the development scholarship.

The paper is divided in two sections. The first provides an overview of the major works of classical political economy and their relationship to the topic of mining. The second section discusses the topic of mining in the leading works of the field of development economics, emphasizing the critical schools of development. It describes today's normative view favouring mining as built in the neoliberal reforms of the last three decades. The paper concludes with some observations about the normative history of the question of mining in the development field.

II Classical political economy and mining: a normative view of exclusion

The tradition of the classical political economy of the eighteenth and nineteenth centuries established a normative view of exclusion with respect to mining. This tradition was interested in the topic of economic development of the Western world, and not that of the colonial and overseas territories (Bhagwati and Eckaus, 1990). As such, the topic of mining and metallurgy was not a central concern for the early classical political economy thinkers.

The philosophical foundations of this tradition are to be found in the works of Adam Smith, and included important British economists such as John Stuart Mill, James Mill and David Ricardo, and French ideologues Jean Baptiste-Say, Augustin Cournot and Jules Dupuit, among others (Levy and Peart, 2005; Screpanti and Zamagni, 2005). In contrast to their mercantilist predecessors, who promoted an economic nationalist viewpoint, classical economists attacked the role of the State and embraced Smith's notion of an invisible hand of free market under the policy of *laissez faire* (Adelman, 1999). Adam Smith was a close friend of philosopher David Hume and a contemporary of Voltaire, Jean-Jacques Rousseau, François Quesnay and Robert-Jacques Turgot. His reputation is based upon the tremendous impact and influence of *The Wealth of Nations* (1776). The book is devoted to investigating the nature and causes of a nation's prosperity. In this work, Smith stated that the division of labour was the main cause of prosperity. His discussion on individuals' allocation of labour and resources based on rates of return; his explanation for differentiated wage rates; his strong opposition to mercantilism; and the role he assigned to government in a free market economy (that of provider of infrastructure and enforcer of contracts, grant patents and copyrights to encourage inventions) – all contained in the five books that constitute *The Wealth of Nations* – are considered the pillars of modern liberal economic theory (Adelman, 1999).

The ideas of Adam Smith reflect a broader concern of the generation of classical philosophers with the growth of industrial capitalism in England, France and Germany, the uneven reappearance of mercantilism in countries such as Germany, and the battle against what Roll calls the 'structure of mercantilist foreign trade policy' (Roll, 1973: 149). Commenting on the importance of *laissez faire* in the writings of Adam Smith, economist Jacob Viner says that 'the one social issue on which Adam Smith was a zealot was the issue of freedom of trade vs. mercantilism'. Stark has described Smith's work as the philosophical inquiry about 'the intellectual clarity of mankind', which would characterize classical theorists starting with John Locke; a quest that found its strongest explanatory power in *The Wealth of Nations* (Stark, 1943: 16). Stark states that Adam Smith inherited from Locke the idea of the individual as an intellectual being; an idea inherited from Descartes' corpuscular theory (Stark, 1943; for Cartesian economics, see Pribram, 1983: 97–114). From Leibniz, Adam Smith inherited the definition of the *problema philosophorum*: the question about the relationship between the whole (society) and its parts (individuals) (Stark, 1943).

Adam Smith did not write about mining or metallurgy; however, he was not unaware of the intellectual developments in the field. One of his closest friends was Scottish geologist James Hutton (Stephen and Lee, 1949). In a paper entitled *Theory of the Earth, or an Investigation of the Laws Observable in the Composition, Dissolution and Restoration of Land upon the Globe* (1785), Hutton developed the theory of gradualism, or the view that the Earth changed because of the work of slow forces (Cutler, 2003). This work would have a tremendous impact in the science of metallurgy, and it put Hutton in close contact with Scottish philosophers of the Enlightenment.

The specific linkage between Hutton's and Adam Smith's writings is a subject timidly explored by historians of political economy. The book of John Rae, *Life of Adam Smith*, first published in 1895, seems to be the most complete source on the subject. In it, Rae states that Hutton was one of Smith's closest associates and literary executors during the latter part of Smith's career at Edinburgh (Rae, 1895, reprinted by Liberty Fund Inc., 1999–2005).

In the writings of John Locke, one can see more clearly the normative view of exclusion of the topic of mining in classical political economy. In *Two Treatises of Government* (1689), Locke makes reference to precious metals and describes their usefulness. In Book II, Chapter Five, Locke describes the introduction of metal coins into the state of nature, which in his theory of the social contract refers to the money economy. In Book II, Locke states:

> This is certain that in the beginning, before the desire of having more than men needed had altered the intrinsic value of things, which depends only on their usefulness to the life of a man, or had agreed that a little piece of yellow metal, which would keep without wasting or decay, should be worth a great piece of flesh or a whole heap of corn, though men had a right to appropriate by their labour, each one to himself, as much of the things of nature as he could use, yet this could not be much, nor to the prejudice of others, where the same plenty was still left to those who would use the same industry (Locke quoted from Laslett, 1988).

Since the Earth was produced by the 'spontaneous hand of Nature', it was there to satisfy humans' needs. It is reasonable to infer from Locke that mining and metallurgy were the result of individuals' work upon minerals and relations of barter.

The amount of ground encompassed by the classical political economy tradition cannot be covered in a single paper. It encompasses radically different historical periods that provided the context for highly diverse theories of economic development. However, one of its central ideas, technical progress as the motor to create wealth, had important implications for the normative view of exclusion of the topic of mining. If the essence of capitalist development lay in the accumulation of capital and the increase in labour productivity, mining activities that are based upon increasing the supply of a cheap labour force are not conducive to wealth and development. The classical political economy view maintained that increase in labour productivity was mainly due to the incorporation of technological innovations and to growing specialization. Both allowed for an increase in income, and expanded the possibility of savings and investment increases. Adelman states that the underlying idea of classical political economy was in tune with the essence of capitalism: that it was possible to expand the accumulation process, incorporate technical progress, and utilize its 'benefits' for new processes of accumulation (Adelman, 1999). This was probably the case of mining activities in Central Europe, the Mediterranean and Spain by the seventeenth century. Mining and quarrying relied upon building shafts and galleries, for which a variety of tools and techniques were used, even when they depended upon an abundant supply of cheap labour (Singer *et al.*, 1954–78).

Interestingly, the idea of technical progress in mining was already developed in Europe. The classical political economy tradition emerged at a time when works about mining, minerals and geology appeared in the famous French and English encyclopaedias and dictionaries, such as the following: *Encyclopédiea, ou Dictionnaire Raisonné des Sciences, des Arts, et des Métiers*, by Denis Diderot (1751–80); *Lexicon Technicum* or the *Universal English Dictionary of Arts and Sciences*, published in London in 1704 by Daniel Brown (and others); and the *Universal Dictionary of Arts and Sciences* in two volumes written by Ephraim Chambers (Horblit, 1964; Dibner, 1981). The *Encyclopédiea* by Diderot is considered the greatest encyclopaedia of science, and it covered all the aspects of the technology of metallurgy, mining and smelting (Horblit, 1964). It also contained pictures of mining technology. Of the *Lexicon Technicum*, Horblit states that it is the earliest modern encyclopaedia of science, and contained several entries about mining, smelting and metallurgy (Horblit, 1964).

The most important works on the topic of minerals and metallurgy, in particular *De Ortu et Causis Subterraneorum… De Natura Fossilium* (1546) and *De Re Metallica* (1556), were written by German physician Georgius Agricola Bauer. These works are considered the first handbook of modern systematic mineralogy, and the early standard treatise on mining and metallurgy, respectively (Horblit 1964). The books contain pictures of machines pumping, ventilating, smelting, assaying, transporting and hoisting equipment, and the methods of his time (Dibner, 1981: 43–44). Agricola analysed mining and metallurgy in connection with diseases, the pharmaceutical use of minerals and smelting products, and labour and production. According to the *Dictionary of Scientific Biographies*, Agricola was heavily inspired by his journey to the mining districts of Carinthia, Styria, and the Tyrol. The mining district of Saint Joachimsthal (today Jáchymov in the Czech Republic) became his town (*Dictionary of Scientific Biographies*, n.d.). This was the most important mining centre of Europe. It was in Joachimsthal that the first labour markets appeared, when miners in the fifteenth and sixteenth centuries offered themselves to the people who owned the machines in the mines (Braudel, 1992).

Agricola's work is unprecedented in that it linked mining with the social and economic aspects of development. It also came to be a landmark in the scholarship of Subterranean Geometry, the Euclidean Geometry applied to the building of shafts and mines that was the common practice in Central Europe during the fourteenth, fifteenth and sixteenth centuries (Gamboa, 1761).

Another important work about mining and smelting in Europe was that of Lazarus Ercker, entitled *Beschreibung: Allerfürnemisten Mkineralischen Ertzt Unnd Berckwercks Arten* (1574). According to Dibner (1981), Ercker was inspector-general of the mines of Hungary, Transylvania and the Tyrol, and his work is second only to Agricola in the number of original contributions to the literature of mining and metallurgy (Dibner, 1981: 44). Ercker's book was so important in the field that it became a textbook in the late 1500s (Dibner, 1981).

Another book that exercised great influence in the ideas of technical progress in mining was *Le Diverse Et Artificiose Machine* (1588) by Agostino Ramelli. Ramelli was a captain of engineers to the kings of France and Poland. He prepared this book to show the uses of logging mills, metal-working machines, pumps and other machines (Dibner, 1981: 80). The machines described in Ramelli's work played a crucial role in the development of military armament and tools in Europe. Today, the permanent exhibition of European military tools at the Gallery of Arms and Armors of the Philadelphia Museum of Art serves to corroborate the importance of iron and copper mining for the military and economic development of Europe. An impressive collection of iron helmets, swords, horse armours, elbow gauntlets, and processional crosses from the mid-fourteenth century onwards bears witness to a flourishing science of mining and metallurgy.

The omission of the topic of mining in the early classical political economy tradition is disconcerting, considering the development of what Dibner calls 'renaissance engineering' (Dibner, 1981) and its application to extractive economies in Europe. The information the books provide about technical progress in mining indicates that mining was at the forefront of technological development. Historian Lewis Mumford arrives at this conclusion when commenting on the observations by Agricola in *De Re Metallica* about the modern improvements of mining. In his superb history of technology entitled *Technics and Civilization*, Mumford states:

> The great need of commercial enterprise in the fifteenth century was for a sound but expansible currency, and for capital to provide the necessary capital goods – boats, mills, mine-shafts, docks, cranes-for industry. The mines of Europe began to supply this need even before the mines of Mexico and Peru. Sombart calculates that in the XV and XVI centuries German mining earned as much in ten years as trade in the old style was able to accomplish in a hundred. As two of the greatest fortunes of modern times have been founded upon monopolies of petroleum and aluminum, so the great fortune of the Fuggers in the XVI century was founded upon the silver and lead mines of Styria and the Tyrol and Spain (Mumford, 1963: 75).

For historian Fernand Braudel, mining was also responsible for the origins of labour markets in Europe. In Central Europe, Braudel gives accounts of how miners had to offer themselves to the people with machines in the mines, and became among the first wage earners of Europe in the fifteenth and sixteenth centuries (Braudel, 1992). Moreover, mining was also at the centre of the development of foreign exchange bursars (Braudel, 1992). Braudel narrates the history of exchange bursars in the late sixteenth century, and asserts that they could only function if sufficient silver from American territories reached Genoa (Braudel, 1992). The development of fairs in the Spanish-American territories, such as the Nombre de Dios, was also linked to mining. They were modelled after the European fairs, and served as places for exchanging minerals (mostly silver) for European goods (Braudel, 1992). Indeed, the mineral legal tradition of the seventeenth and eighteenth centuries in the Spanish-American territories was inspired from the classic European treatises about metallurgy.

In *Comentarios a las Ordenanzas de Minas, Dedicados al Catholico Rey*, Don Francisco Xavier Gamboa, lawyer of the Real Audiencia of Mexico, describes the importance of several European treatises about metallurgy, in particular the German scholarship represented in the following works: *Vom Markscheiden Kurzer und Gründlicher Unterricht* by Eraſmus Reinhold (1574); *Berg Informasion* by Abr. à S'choremberg (1693); *Balthan Roeſler* by Bergban-Spiegel (n.d.); *Markscheidekunſt* by Nicol Voigtel (1686); and *Gründlicher und Deutlicher Begriff Vom Berg-ban S'chmelzweſen, und Markscheiden* by Joa Gottfried Jugel (1744), among others (Gamboa, 1761: 246–73). Gamboa also acknowledges the contribution of Latin scholarship on mining, in particular the works of San Iſidoro, Poſsidonio, Diodoro de Sicilia, Polibio, Strabòn, Plinio, Cardano and Caryophilo (Gamboa, 1761).[1]

Gamboa's work is pertinent because it puts mining and metallurgy within the context of the scientific revolutions of the Enlightenment; in his words, '*En cada Real de Minas deben criarse prácticos de Ciencias*' (Gamboa, 1761: 232). Gamboa refers to the letter that Madame de Beauſoleil sent to Cardinal of Richelieu, to describe the scientific knowledge that mining requires. Gamboa adds: '*Reſtitucion de Plutòn dirigida al Cardenal de Richelieu,* [Madame de Beauſoleil] *pide en el Gefe, y Director de Minas el conjunto de muchas Ciencias. La Aſtrologìa, para conocer los temperamentos. Arquitectura, Geometrìa, Arithmetica, Perſpectiva, Pintura, la Hydraulica, y otras, que largamente expreſſa*' (The letter pleading for the restitution of Pluto, directed to the cardinal of Richelieu, asks that the Director of Mines be instructed in several sciences. Astrology, for the knowledge of temperaments, Architecture, Geometry, Arithmetic, Perspective, Drawing, and Hydraulic Sciences, and the other sciences that are extensively described in the restitution.) (Gamboa, 1761: 232).

The citation from Madame de Beauſoleil's letter reveals that mining and metallurgy had established themselves as part of the sciences of the Enlightenment. Their importance in Europe is also evidenced by the French editions of mining treatises during the eighteenth century. For example, the French Royal Academy of Science translated and published in 1750–53 and 1753–64 the book entitled *Grundlicher Unterricht von Hütte-Werken... nebst einer vollständigen Probier-Buch, daren enthalten wie allerley. Ertze auf alle Metalle zu probieren...* by Christophe A. Schlüter (1738). Molloy cites C.S. Smith in his description of Schlüter's book as 'one of the most important works on assaying and metallurgy to appear since Ercker' (Molloy, 1986: 176).

Mumford has an explanation for the important role that mining and metallurgy played in Europe during the eighteenth and nineteenth centuries. He states that it was the mining of precious metals in previous centuries that gave rise to new technologies for the transportation and processing of metals during the eighteenth and nineteenth centuries. Mumford states:

> The use of the rare metals and the metallic earths is another characteristic advance of this phase: tantalum, tungsten, thorium, and cerium in lamps, iridium and platinum in mechanical contact points – the tips of fountain pens or the attachments in removable dentures – and of nickel, vanadium, tungsten, manganese, and chromium in steel. (…) As a result of systematic experiment in metallurgy a revolution took place here comparable to that which was involved in the change from the steam-engine to the dynamo. For the rare metals now have a special place in industry (…) (Mumford, 1963: 231).

Mumford is referring to the Industrial Revolution. This period produced an extraordinary amount of work about assaying, mining, metallurgic chemistry, and the prospecting of minerals throughout Europe, as revealed in Molloy's *The History of Metal Mining and Metallurgy: An Annotated Bibligoraphy* (1986). Molloy lists two editions of Johann A. Cramer's *Elements of the Art of Assaying Metals* (1741), which were published in London in 1741 and 1764 (Molloy, 1986: 172). John Budge's *The Practical Miner's Guide…Also a Treatise on the Art and Practice of Assaying Silver, Copper, Lead and Tin…* was published in three editions between 1825 and 1854 (Molloy, 1986: 172). The work of Christlieb E. Gellert was translated as *Metallurgic Chemistry* and published in London in 1776 (Molloy, 1986: 173).

The mining literature of the nineteenth century would be concerned with the economic aspects of mining, as in *An Historical Inquiry into the Production and Consumption of the Precious Metals* by William Jacob (1831), which, according to Molloy, was published in Philadelphia in 1832 (Molloy, 1982: 152). This period would also be concerned with the techniques for assaying precious metals, as indicated in the following titles: *Manuel de l'essayeur* by Louis N. Vauquelin (1799), *A Practical Handbook for Miners, Metallurgists, and Assayers* by Julius Silversmith (1866), *Sulphurets; What They Are, How Concentrated, How Assayed, and How Worked…* by William Barstow (1867), *The Assay and Analysis of Iron and Steel, Iron Ores and Fuels* by Thomas Bayley (1884), and *Assaying* (two volumes) by Charles H. Aaron (1885), among others.

The titles show a deeper inquiry into the institutionalization of science, the application of scientific knowledge to mining, and the utility of mining. Important schools of geology were established during the nineteenth century, such as the following: Société Géologique de France (1830), École Nationale Supérieure des Mines (1816), the Geological Society of London (1807), the Royal School of Mines (1851), and the Bergakademie Freiberg (which established the first fellowship for students of mining and assaying, or the Stipendienkasse in 1702), which had attracted foreign students since the early eighteenth century, and where Alexander von Humboldt was permitted to study in 1790.

These concerns were ignored by the classical political economy tradition. Preoccupied with the philosophical foundations of free trade, the classical political economy tradition left the question of mining mainly in the hands of the German scholarship on mining and metallurgy. The omission of the topic of mining in the British classical political economy tradition brings to mind the metaphor that Braudel uses to describe the two sides of historical change: the conspicuous and the submerged (Braudel, 1987). It seems that the intellectual circles of Great Britain were more concerned with the 'conspicuous' changes of the Industrial Revolution – trade and economic relations between nations – while those of Germany were more concerned with its 'submerged' changes – the centuries of innovation and technological development in mining and metallurgy in Central Europe.

As the international trade in raw materials increased in the nineteenth century, the classical political economy tradition addressed the topic of mining. The normative view of exclusion of mining would change with the tradition initiated by the works of David Ricardo. The next section discusses the emergence of a normative view favouring mining in the development scholarship.

III The pendulum swings: from a normative view favouring mining to one opposing mining

1 Mainstream development economics: 'mining is good for development'

The topic of minerals and mining was going to be addressed, if not explicitly, then indirectly, by British economist David Ricardo. Among his most important works was *Principles of Political Economy and Taxation* (1817), where he developed the theory of comparative advantages, from which a new justification for international free trade emerged. It stated that every country had an ability to find a particular good it could produce at a lower cost relative to other goods, or its comparative advantage (Screpanti and Zamagni, 2005). The exportation of such a good in exchange for other goods would result in welfare increases for every country, given that countries produce and export those commodities they can produce more efficiently. Ricardo assumed that as long as the cost ratios differ among countries in the absence of trade, every country has a comparative advantage (Screpanti and Zamagni, 2005).

The ideas of David Ricardo would dominate the intellectual debates about international trade and development in Great Britain over the next century. In the first place, his works provided rigorous theoretical and mathematical explanations that would capture the economic mentality of the period: labour as a factor of production, the impact of machinery in production, wages, surplus product, value and distribution (Roll, 1973). This was the era of the 'Radical Reformers' John Stuart Mill and Jeremy Bentham; the *Sophismes Économiques* of Frédéric Bastiat in France, whom Cairnes called 'a generous defender of English policy'; the socialism of Robert Owen, Fourier and Saint-Simon; the Ricardian socialists Charles Hall, William Thompson and Thomas Hodgskin; Alfred Marshall and his influential *Principles of Economics* (1890); and the population theory of Robert Malthus (Stark, 1943; Cairnes in Spiegel, 1952: 227; Roll, 1973). Second, as Viner states, British classical political economy was bound up with English politics, the dominant power in global politics (Viner in Speigel, 1952: 719). As part of the legacy of what historian Hobsbawm (1987) calls 'the age of empire', British literature enjoyed a central place in the nineteenth-century intellectual history of development.[2]

In the 1930s, economists Eli Heckscher and Bertil Gotthard Ohlin redefined Ricardo's theory of comparative advantage. According to *The Concise Encyclopedia of Economics*, Heckscher's and Ohlin's work showed that goods can move more easily than their factors of production (Liberty Fund Inc., 1999-2006). Principally, Ohlin's work concluded that a country should export commodities for which there are relatively abundant domestic production factors. The export of such commodities was the comparative advantage of the country (see also Screpanti and Zamagni, 2005).

The idea of comparative advantages was used to justify the specialization of European colonial territories in mining and extractive products (Furtado, 1982). Today, there is abundant scholarship on the topic of comparative advantages in mining (see, for example, for the comparative advantage of the copper industry in the US, Aydin and Tilton, 2000; for copper in Chile, García *et al*., 2001; for mining technology, Porter and Cunningham, 2005).

The concern with the international trade of minerals and raw materials became a common theme of the development literature that was born in the inter-war period (1915–38). Arndt finds that many studies specialized in world commodity trade. He writes:

> World commodity problems were of interest as part of the wider problem of economic stability; Brazil, Malaya, West Africa and the East Indies were studied, because and to the

extent that they were exporters of coffee, rubber, cocoa, and sugar and as such part of the international trading system (Arndt in Bhagwati and Eckaus, 1973: 19).

Since economists of the period were not concerned with the topic of underdevelopment,[3,4] mining was not explicitly discussed in connection to national economic growth. This was part of the normative view of the scholarship of the period, for which the economic growth of colonial territories was not an important concern. As a case in point, economist Eugene Staley, in a report on raw materials and markets prepared for the International Studies Conference of 1937, states:

> The importance of colonies to their present possessors as sources of raw materials or as markets has usually been grossly overrated (Staley, 1937: 7).

In a footnote, Staley mentions some influential scholars who inspired such a line of thinking:

> We are in agreement on this point with Sir Norman Angell (*Raw Materials, Population Pressure, and War*), and with the study recently published by the Carnegie Endowment in the United States (Grover Clark, *The Balance Sheets of Imperialism*), as well as with the United Kingdom Memorandum No. I, which concludes that 'In fact, the problem of access could never be sold by transfer of territory unless whole continents were transferred; the only real possibility of improvement lies in a greater freedom of trade' (Staley, 1937: 7).

Instead, the topic of mining was addressed by mainstream scholarship in its concerns with international trade. One can infer several reasons for the interest in mining in relation to international trade. In the first place, the history of mineral commodity markets from the fifteenth to the eighteenth centuries showed that these were the most profitable commodity trades operating over enormous distances (Arndt in Bhagwati and Eckaus, 1973). In fact, these trades were so profitable that they had a profound impact in the development of credit instruments in Western Europe. Historians have shown how the lines of credit of Charles V with bankers from Augsburg, Genoa and Antwerp were sustained with precious metals from the Americas, or, as Henry Kamen states, with 'the promise of their arrival' (Kamen, 2004: 88):

> The Bankers, in turn, set up or expanded their operations in Seville and the rest of Castile, in order to have direct access to their profit. This meant, inevitably, that a high proportion of the gold and silver from America became pledged to foreign bankers, often years in advance. Charles, obviously, used that part of the precious metals he was entitled to, the 'fifth' levied as a tax on all mine production in America. But from 1523, and more frequently from 1535, he also began to 'borrow' (that is, seize as involuntary loans) shipments that came for the Castilian merchants of Seville. The latter complained bitterly in 1536 that this effectively gave the advantage to foreign merchants: 'they control all the money' (Kamen, 2004: 88-89).

The development of industrial capital in Western Europe and the United States during the eighteenth to the early twentieth centuries intensified and expanded the mineral commodity trades with former European colonial territories of the developing world (see, for example, Prebisch, 1949; Coquery-Vidrovitch, 2002).

In the second place, the experience of World War I (and later World War II) had brought to the field two novel concerns that would impact ideas about mining: war economics and peace economics. As Staley puts it, raw materials were studied in connection with 'the aims, methods and needs of war economy on the one hand, and of peace economy on the other' (Staley, 1937: 19; See also Redmayne, 1923; Clark, 1932; Rawles, 1933; Emeny and Ely, 1934; Mendershausen, 1941; Holmes, 1942). This scholarship addressed the topic of minerals and mining in connection with the needs of the 'war economics' of developed countries. As such, minerals and mining in colonial territories and developing countries were studied as part of the international relations of developed countries. This idea is well-illustrated in the following quotation from *Military Geology and Topography: A Presentation of Certain Phases of Geology, Geography and Topography for Military Purposes*:

> Our dependence upon minerals is even greater in times of war. No nation could hope to carry on war under present conditions without abundant resources of certain essential mineral materials. The lack or the insufficient supply of certain metals would inevitably bring disaster. One thinks first of iron and steel, coal, copper, and the nitrates and sulphur used in making munitions, yet equally necessary is mica for wireless and other electrical insulation work; tungsten, vanadium, chromium, and manganese, necessary in making steel; platinum, necessary for chemical work in the manufacture of munitions; graphite, necessary for crucibles used to produce brass, crucible steel, and various alloys; and antimony to harden bullets. Consequently the military uses of minerals, the location of their deposits, the amounts available, the difficulties of their transportation, the possible development of substitutes if the supply is deficient — all these are vitally important subjects of study at the present time (Gregory, 1918: 253).

Mining would be studied in connection with underdevelopment in the scholarship of development economics that emerged during the post-war period, particularly in the critical schools of development.

Post-war period The field of development during the post-war period was dominated by scholars reviving classical economics (see, for example, Nurkse, 1953; Lewis, 1955; Hahn, 1960; Meade, 1961; Rosenstein-Rodan, 1961; Solow, 1970; Hirschman, 1971; Firestone, 1972). Theories about 'disguised unemployment', 'balanced growth', and 'demonstration effect' prepared the context for the policies of development of the World Bank and the International Monetary Fund.[5] According to Adelman, the charter of the international institutions reflected the idea that underdevelopment was caused by a deficiency in capital (Adelman, 1999). This notion came out of the many rich debates about underdevelopment that were taking place at the time, mainly in the field of economics. Multilateral and bilateral aid programmes concentrated on providing the loans to be used for domestic investments on concessionary terms and financing large infrastructure works (almost exclusively in transport and energy). The idea behind the programmes was creating economic growth based on a 'big push' of simultaneous investments that would generate rapid and self-sustained growth (Rosenstein-Rodan, 1961). The 'big push' was to be achieved through private enterprise and the market economy. Adler states that private enterprise became the dogmatic preference of the World Bank, 'the single most important component of the Bank's development "philososophy"' (Adler in Bhagwati and Eckaus, 1973: 34). This 'dogmatic preference' was going to have a profound impact in shaping an anti-normative view about mining later on.

Probably the most influential work of the dominant development economics tradition was Walter W. Rostow's *Stages of Economic Growth: A Non-Communist Manifesto* (1960). Based on the discussion of the 'preconditions to take off' in this work, one can infer this tradition's normative views on mining. He states:

> And, above all, the concept must be spread that man need not regard his physical environment as virtually a factor given by nature and providence, but as an ordered world which, if rationally understood, can be manipulated in ways which yield productive change and, in one dimension at least, progress. All this and more is involved in the passage of a traditional to a modern growing society (Rostow, 1962: 19).

Rostow adds that the general requirement is to 'apply quick-yielding changes in productivity' to 'natural productive resources'; and to achieve this, 'capital imports can help, of course, but in the end, loans must be serviced; and the servicing of loans requires enlarged exports' (Rostow, 1962: 22). In this view, mining is a sector capable of attracting international finance (investments and loans). This presupposes opening the mining sector to foreign capital. Only in this way could traditional societies transform their natural productive resources into their comparative advantage (Rostow, 1962).

This view of mining was going to be contested by Latin American structuralism and the dependency movement. Latin American structuralism plays a central role in the intellectual and social history of development. First, the ideas of Raúl Prebisch, the father of Latin American structuralism, provided the founding principles for establishing, in 1964, the United Nations Conference on Trade and Development (UNCTAD) – of which Raúl Prebisch became its first Secretary-General. The goal of UNCTAD today is inspired by Prebisch's structuralist analysis: to study, in the words of former Secretary-General Rubens Ricupeiro, the 'systematic biases and asymmetries that impede trade and development prospects in poorer countries' (Ricupeiro, 2002). The prominent and distinguished career of the Argentinean economist also put him right in the direction of the United Nations Economic Commission for Latin America (For more on the life of Prebisch, see Iglesias, 1994; Malan, *et al*., 1999; Ricupeiro, 2004).[6] Second, critical development theories were influenced by the Latin American structrualist debate. According to Africanist scholar Frederick Copper, by the time 'Africanists were jumping on the bandwagon of underdevelopment and world system theories, many Latin Americanists were getting off …' (Copper, 1981: 10; see also Bello, 2002). Third, Latin American structuralism was at the core of the intellectual debates between the *Centro de Estudios Económicos* (Chile), the Fernand Braudel Center (US), and the Samir Amin group in Africa (*Entrevista a Theotônio Dos Santos*, n.d.). Fourth, mainstream theorists devoted a vast amount of work to analysing the impact of Latin American structuralism on US social science thinking and academia. (For an overview, see, for example, Haberler, 1957; Aronowitz, 1979; Almond, 1990; Packenham, 1992). No other development paradigm gained such wide attention from mainstream development theorists as Latin American structuralism and its descendant, the dependency movement – a criticism that involved an attack on ECLA's policies and from where Gabriel Palma reminds us that ECLA gained the pejorative name the 'Trojan horse of Marxism' (Palma, 1978). This furious attention to and surveillance of the new economic mentality of Latin American structuralism on the part of mainstream classical theorists probably occurred because, as Copper prudently reminds us, Smith and Ricardo were the ancestors of structuralism – 'a pedigree which the dependency theorists do not claim' (Copper, 1981: 9).

With the development of Latin American structuralism, the topic of mining would be addressed like never before in the field of development. The importance of structuralism for the question of mining in development scholarship deserves to be discussed at length in the next section.

2 Critical development economics: 'mining is bad for development'

ECLA, structuralism and the dependency movement With the advent of the international crisis triggered by the Great Depression and World War II, many social scientists questioned whether the integration of Latin American economies into the international markets benefited these countries, as the theory of comparative advantages proclaimed.[7] By the late 1940s, and as a response to the crisis, a current of thought appeared, which claimed that the theoretical stream of comparative advantages corresponded to the needs and characteristics of the expansion of capitalism in the last quarter of the nineteenth century, up to the mid-twentieth century. It saw the economic constraints of non-industrial countries as structural failures of the export-oriented model of economic growth. It was going to be known as structuralism, and its leading figure was Argentinean economist Raúl Prebisch. His work formed the working agenda, research goals, theoretical ambitions, and intellectual pillars of the newly-created Economic Commission for Latin America (ECLA) (Bielschowsky, in Malan, *et al*., 1999).

Raúl Prebisch's work created a major revolution within the prevailing economic thinking represented in the classical economic view of international trade based on Ricardo's doctrine of comparative advantages. Prebisch's seminal essay, *El Desarrollo Económico de la América Latina y Algunos de sus Principales Problemas*, analysed the economic growth and development of Latin America as a structural problem of the specialization of the 'periphery' in raw materials and the industrial centres in manufactures within the context of unequal international trade relationships. Bielschowsky comments that Prebisch employed the term 'periphery' in his writings prior to his appointment as ECLA's Executive Director, to emphasize the vulnerability of Latin American countries to the economic cycles of the international economy (Bielschowsky, in Malan, *et al*., 1999: 124). Prebisch argued that the international division of labour, based on comparative advantages, operated to the detriment of the countries specializing in the production of agricultural and mineral commodities because of an inherent tendency towards diminishing terms of trade for raw material exports (Prebisch, 1949).

Primarily seeking responses to Argentina's balance of payments problems, Prebisch studied British trade data for the period 1876-1947 under the suspicion that there was a long-term tendency for prices of primary products (the periphery's exports) to deteriorate relative to the prices of manufactured goods (the centre's exports) (Davis, 1995). After observing a sharp drop in the terms of trade for primary product exporters in the 1920s, and despite the slight recovery the data showed for the 1930s, he concludes that primary resource exporting countries, such as Argentina, had to export an increasing amount of raw material products in order to continue importing the same amount of industrial commodities (Ffrench-Davis and Tironi, 1982). Prebisch concludes that countries specializing in primary products could never expect to follow a path of export-led growth.[8]

Prebisch's work was a radical departure from evolutionist international trade theories, which maintained that the international division of labour worked to the mutual benefit of centre and peripheral countries as they enjoyed comparative advantages in different areas. Bielschowsky elegantly describes Prebisch's importance in the following words: 'Prebisch e ousadia intelectual são sinônimos na América Latina' ('Prebisch is the synomym of intellectual courage in Latin America.') (Bielschowsky, in Malan, *et al*., 1999).

Kay observes that Prebisch's terms-of-trade thesis was consonant with the findings of another United Nations functionary, Hans W. Singer, who, working independently in the UN's New York office, found statistical evidence to support the idea of declining terms of trade for primary products (Singer, 1950). The thesis on the deterioration of commodity terms of trade is known in development literature as the Prebisch-Singer thesis (Kay, 1989). These ideas provided the first generation of ECLA intellectuals with conceptual, analytical, theoretical and ideological referents for understanding the Latin American experience (Ffrench-Davis and Tironi, 1989). It also established the landmarks for the anti-mining intellectual, research and policy tradition of development economics (Davis, 1995).[9]

Dependency theory Following the inductive method, contrary to Rostow's modernization theory which followed the deductive method, the historical-structural approach of the new school of thought used the theoretical concepts of Prebisch's writings, in particular 'periphery' and 'centre' (for more on the method of structuralism, see Bath and James, 1976; Bielschowsky, in Malan, *et al*., 1990: 116–21).

Among the leading figures of the new dependency movement was Brazilian economist Celso Furtado. Drawing on Prebisch's concepts, Furtado argued in his early writings that the classical international division of labour, which confined the periphery to the production of raw materials and the centre to the production of industrial goods, perpetuated the process and condition of underdevelopment of the periphery (Furtado, 1961, 1970, 1982). In his book *Obstacles to Development in Latin America* (Furtado, 1970), Furtado advocates strong government intervention to enhance industrial capacities for the production of manufactures, and to foment in this way a growth pattern through the domestic markets. He argues that the transformation of industry into the most dynamic economic sector through a process of substitution for imports would lead to a higher rate of economic growth than that achieved by the export agricultural and mineral sectors. He defines the process of import substitution as follows:

> It is, in reality, a process of change in the productive structure, allowing a reduction in the share of imports of the aggregate supply without reversion of labor to precapitalist economy. The import of certain goods is reduced, or eliminated; other goods are substituted in the domestic market by local products, while the imports of those items that are hard to substitute are enlarged. Since per capita income is increasing and the coefficient of imports is diminishing, the composition of aggregate demand tends to change, requiring greater alterations in the structure of aggregate supply than those foreseen at the beginning of the substitution process. The period of time required for aggregate supply to adapt to the modifications in the pattern of demand is a primary force responsible for the creation of inflationary pressures. This period can be greatly prolonged through institutional obstacles (Furtado, 1970: 92–93).

He stated that underdevelopment, contrary to what classical economists argued, was not a phase of the development process, because such 'a phase would be overcome if certain factors of production came into play' (Furtado, 1970: xvi). The origins of underdevelopment are to be found in the differentiated distribution and diffusion of the technical progress commanded by the Industrial Revolution. Under this historical process, the economy of the periphery evolved in a disarticulated and dualistic way, and had as its main distinguishing feature the existence of what Furtado called a 'pre-capitalist sector'. Its disarticulated character resulted from the fact that these countries imported advanced technology from industrial centres, borrowed heavily to raise their basic social capital (that is, roads, ports, railroads, infrastructure), most of which concentrated along the export activities, had a restricted state apparatus based upon rigid, oligarchic land-ownership structures and political loyalties (Furtado, 1961). Its dualistic character was in response to the gap in productivity that developed between the export agricultural and mineral sectors and the subsistence sectors (Furtado, 1970). The dualism was more evident and stronger in mineral-export countries, given the external character of the factors explaining the integration of Latin America to the world mineral trade. Imports of capital, the introduction of new techniques of production and organization based on the technical know-how of the industrial centres, and the creation of external economies through the construction of roads, installation of ports, railroads and urban public services facilitated the expansion and concentration of foreign economic power in the mineral sector at the expense of the development of the national economy.

In Furtado's view, mineral and agricultural export sectors impeded the formation of strong domestic markets for goods and services (Furtado, 1961, 1970). The fact that mining, unlike agriculture, concentrated its export activities in geographically isolated areas further deepened the dualism between centre and periphery. More importantly, the development of mining required heavy investments, and the remuneration of the labour force could not be obtained from the lands incorporated into mining activities (in contrast to agriculture, where the principal part of the remuneration of the labour force was paid with the produce obtained from the agricultural lands, as in the case of perennial crops like coffee, cacao and castor beans) (Furtado, 1970).

Another source of dualism in mining referred, according to Furtado, to the capital coefficient per worker of the mineral industry (Furtado, 1970). While mining industries represented a high coefficient of capital per worker and a high level of productivity, these absorb no more than a small fraction of the labour force. Finally, while agriculture evolved through the impetus of individuals testing the absorption capacities of external markets and stimulating groups cultivating a product with favourable conditions in the foreign markets, mining developed in response to the need for mineral inputs of the industrial centre countries (Furtado, 1970; 1961).

The enlargement of a pre-capitalist, backward, rural economy and the concentration of the economy under foreign capital are the main concerns of the Dependency school. Brazilian economist Theotônio Dos Santos, for example, elaborates a critique of the lack of analysis in early structuralist thought of the dominion of foreign, imperialist, oligopolistic capital of the periphery's industrial sectors (Dos Santos, 1969). His main thesis is that Latin America's fundamental problems of development (manifested in the conditions of marginality, poverty, stagnant economic growth, backward agrarian institutions) are intimately related to the process of industrialization of capitalism.

For Dos Santos, the process of the integration of Latin American economies into world markets was fuelled and channelled through US monopolist capital (Dos Santos, 1969). Until the 1940s, foreign monopolist capital was concentrated in agricultural and mineral export sectors. After the end of World War II, monopolist capital had changed its sector of production, and expanded to manufacturing and other industrial sectors (Dos Santos, 1969). The dominance of foreign capital in manufacturing activities had shaped a new dimension to the international division of labour. Imperialism had turned its attention to the industrial sector in response to the protectionist measures of the 1930s and 1940s that the Latin American governments adopted in the wake of the international crisis of the Great Depression.

In the process, a fundamental contradiction had emerged to the detriment of peripheral countries: on the one hand, capitalism had a great need to expand its markets so that more investments could take place, and on the other, monopolist multinational enterprises had a need to control and expand their markets (Dos Santos, in Matos-Mar, comp., 1969). Due to this contradiction, monopolist multinational enterprises had aligned with the oligarchic regimes of rural areas, under which mining and agricultural export sectors developed (Dos Santos, in Matos-Mar, comp., 1969). Industrialization on the basis of monopolist capital had fomented, in the peripheral economies, a concentration of power in the hands of foreign groups, a tendency towards authoritarianism, bureaucratic state regimes, consolidation and integration of Latin American foreign policies with US foreign policy, a tendency towards militarization, and the perpetuation of backwardness in rural extractivist areas (Dos Santos, in Matos-Mar, comp., 1969).

The works of Marxist economist Paul Baran, despite his not being a *dependentista* (dependency theorist), had a tremendous influence on the structuralist and dependency debates about mining. Baran's most important contribution is his Marxist analysis of the relationship between imperialist capital and underdevelopment, based on the examination of a vast amount of literature from early structuralism, official publications from the US, Great Britain, Brazil, India and other governments, UN publications, and the academic debates between structuralism, Marxism, and orthodox political economic thought (Baran, 1957; Baran and Sweezy, 1966). In *The Political Economy of Growth* (1957), Baran argued that the conditions assumed by neoclassical economics for the 'well functioning' of markets and full employment of factors of production were not present in underdeveloped countries (Baran, 1957). Contrary to the assumption of classical political economy, he asserted that low or extremely low levels of income characterized all underdeveloped countries. The main characteristics of underdeveloped economies were the low consumption levels of their populations, heavy dependence on agricultural and mineral production, including subsistence agriculture, the sub-utilization of capital, natural and human resources, and the heavy concentration of land under landowners (Baran, 1957: 240).

Industrial sectors in underdeveloped countries were characterized by limited and even stagnant investments. Mining investments, in particular, had a 'paralyzing impact' in underdeveloped countries (Baran, 1957). Like structuralist thinkers, he argued that foreign mineral industries lacked 'amplifying investment effects', and had a limited capacity to increase the volume of and diversify their investments and the general economic growth (Baran, 1957). He explained that mineral industries' investments in infrastructure, the opening of roads, ports, electrical plants, etc., were aimed at supplying themselves with the necessary power sources, rather than fostering potential sources of external economies. They did not encourage the dissemination of industries in different economic sectors or the expansion of new markets.

Moreover, Baran cites Paul Singer to assert that the service economy that supplies the mineral export sector is generally a consequence of foreign investments, and never becomes an integral part of the economic structure of the underdeveloped country, except in a purely geographic and physical sense (Baran, 1957: 273-74). Even when these service sectors and industries are planned to satisfy the developmental needs of the isolated regions in which they are located, Baran argues that their effects are null or negative, given the foreign, alien character of the 'artificially introduced services'. In this sense, these potential sources of external economies, situated in countries where capitalism has not overcome its mercantilist phase, feed the mercantilist capitalism and do not contribute to a transition to industrial capitalism. He argues that historically, economic surplus in underdeveloped countries has been obtained by a monopolist consortium of industries – very much the case in mining industries – and is not invested in other economic sectors of the country, not even in opening new firms (Baran, 1957: 254). The surplus is invested by the wealthy in luxury items or is repatriated. For Baran, this is the character of the imperialism that operates through foreign mineral and agricultural export-oriented industries (Baran, 1957).

Mining enterprises are seen as the quintessential manifestation of the exploitation and dominion of foreign monopolist capital. For Baran, mining companies' investments in their host national economies are limited to creating the necessary infrastructure for their own operations: civil work such as the opening of roads, construction of bridges, ports, railroad, etc., which primarily serve the external-export sector (Baran, 1957). Control of the natural resources that provide the input for industrial operations is obtained by expropriating the lands of the local and native populations, or through a 'symbolic' acquisition from governments, feudal lords, or Indian chiefs. Investments in new machinery, equipment, and even human resources are made back in the developed countries, as heavy capital goods are not produced in the periphery (Baran, 1957).

Baran also criticizes foreign mining enterprises for the low salaries paid to the unspecialized local labour force. The labour force receiving high-income salaries is mostly of foreign origin, employed in administrative tasks. This, according to Baran, is the problem that underdeveloped countries face: expropriation of their surplus by foreign mining enterprises and foreign capital's reinvestments in the host countries (Baran, 1957: 263). The state cooperates with foreign enterprises by allowing them to extract the periphery's resources and surpluses without any significant compensation.

Interestingly, Baran is the first Marxist scholar to question the idea that the natural market for foreign mineral industries is the export market. Even if this is the case, he argues, there is no justification for the destruction of national soils commanded by the operations of foreign mining industries, their predatory exploration, the systematic pauperization of local populations, and the physical destruction of native populations (Baran, 1957: 265). The idea that development implies sacrifices is, for Baran, an absurdity, considering that the exportable production of foreign industries is mostly composed of minerals, petroleum, and other extractivist resources.

Baran's discussion of the exploitative character of foreign mining enterprises is a fierce critique of what he terms the 'myopia of Western economists' who, by defending the virtues and advantages of mineral production on the periphery commanded by the technologically advanced industries and processes of the US, are unable to see the ramifications of the exploitation of monopolist capital on the periphery's economic and political life (Baran, 1957).

Fernando Henrique Cardoso and Enzo Faletto analysed these as development failures of the advanced stages of ISS. Their work served to guide the development debates of the following generations; and it provided the basis for the development of leftist political agendas and Marxist approaches among Latin American intellectuals. In *Dependencia y Desarrollo en América Latina* (1969), Cardoso and Faletto analysed the extent to which structuralist theory was plagued by misconceptions and erroneous perspectives.[10] In particular, they criticized the naïve expectation that dominant national elites would push for policies of self-sustained economic growth (Cardoso and Faletto, 1969; see also Cardoso, 1978).[11] The lack of an 'integral analysis' of development was responsible for an incomplete social science rationalization and policy-making that rendered unimportant institutional, social and political processes that used to be relevant, such as the power and dominion of traditional political groups, the national industrial bourgeoisie, and the alliances among them.

Cardoso and Faletto's work placed strong emphasis on the need to study the connections between the economic system and the social and political organization of underdeveloped societies, and its relationship to developed countries. Like the early structuralists, they argued that the historical specificity of the situation of underdevelopment emerged from the unequal relationship between peripheral and core countries. For a global interpretation of development, dependency theorists had to distinguish the differences in the 'real historical process' underlying the conditions of non-development and underdevelopment. They also had to identify the particular relationships characterizing the linkages between countries in any of those situations, and the hegemonic economic and political powers. The inquiry into 'real historical processes' produced an impressive amount of literature analysing what Norman Girvan called the *dependency economics* of the mining regions of the Caribbean, Latin America and Africa (see, for example Girvan, 1973, 1978; González, 1973; Widstran, 1975; Persaud, 1980; Yachir, 1988. For an extensive review of the literature, see Palma, 1978).

Since dependency theory draws upon the structuralist analysis of mineral export economies, defined as oligarchic, imperialist, and backward, it is unable to analyse mining production independent from the position and function of foreign capital. Naturally, Dos Santos, Cardoso, Faletto and Baran cannot envisage, not even in the wake of the failure of ISS in many Latin American countries, any potential for mineral production.

World-system theory The world-system theory of Immanuel Wallerstein proposes a novel understanding of capitalism, which is also pertinent to the discussion of the normative views against mining in development literature. Wallerstein sees capitalism as a 'world-economy', 'a network of integrated production processes united in a single division of labor' (Wallerstein, 1985: 88). He emphasizes that there is an 'economy' wherever there is an 'on-going extensive and relative complete social division of labor' (Wallerstein, 1985: 13).

To this, Wallerstein adds that a capitalist mode of production must be characteristic of a world economy for it to survive; and, inversely, that capitalism cannot be the mode of production except in a system that has the form of a world economy, that is, an extensive division of labour transcending any political and territorial unit (Wallerstein, 1979). The set of integrated commodity chains characterizing the world economy is based upon and organized according to the capitalist principle of accumulation.

This rationalization was a radical departure from structuralism and dependency theory. By taking the 'world economy' as the main unit of analysis, Wallerstein proposed that development and underdevelopment are not just two phases of the same phenomenon as structuralists and dependency writers argued, but were the manifestation of a relationship characterized by an unequal exchange of products containing unequal amounts of social labour (Wallerstein, 1985). They correspond to the capital/labour relationship of appropriation and extraction of surplus value in spaces where productive activities are grouped according to the imperatives of the entrepreneurs seeking to maximize their profits, or the 'anarchy of production' (Wallerstein, 1985). Consequently, spaces, productive processes and relationships are 'core-like', 'periphery-like' and 'semi-periphery-like'.[12]

Another departure from structuralism and dependency theory was the understanding of states as expressions of power. States are not given political structures, but are the result of the imperatives of capital accumulation by the system and, as such, are the political manifestation of the operations of commodity chains.

Wallerstein's theory was nurtured and expanded by the work of Egyptian economist Samir Amin, German economist André Gunder Frank, and Italian economist Giovanni Arrighi. Known to many as the *gang of four*, they brought to the development field solid work on underdevelopment in Africa, Southern Europe and Latin America. Some of their most important works are: *Imperialism and Unequal Development* (Amin, 1973), *The Long Twentieth Century: Money, Power and the Origins of Our Times* (Arrighi, 1994), *World Accumulation 1492–1789* (Frank, 1978), and *The Dynamics of Global Crisis* (Amin, Arrighi, Frank and Wallerstein, eds, 1982). World-system theorists nurtured a rich dialogue between Latin American *dependentistas* and European and African intellectuals (*Entrevista a Theotônio Dos Santos* (n.d.); see also Zerán, 2004, in an interview by Enzo Faletto).

While Wallerstein does not explicitly discuss the implications of world-system theory for mineral economies and mining production, one can infer that the structuralist and dependency assumptions about mining remain virtually unaltered. In the first place, Wallerstein states that the role of raw material producing countries was to provide labour, minerals and sugar to Europe. The consolidation of the 'Atlantic triangular trade' in the sixteenth century shaped the peripheral zones of the capitalist world economy, whereby slaves were shipped from West Africa to work the mines and sugar plantations in the Caribbean and South America; sugar was exported to Europe; and manufactured goods and guns were exported to West Africa (Wallerstein, 1974).[13] Later, the advent of the Industrial Revolution gave way to an extensive international division of labour, and the full incorporation of peripheral zones into the capitalist world economy (Wallerstein, 1979).

Second, peripheries become the territories where economic processes requiring a less skilled and more extensive manpower, which is easily retained at low rates of income – such as mining work – are concentrated (Wallerstein, 1985). Third, given that the capitalist world economy is a chain of productive processes that supersede and transcend any other political identity, the strong bourgeois core exerts pressure over the weaker periphery, resulting in the economic polarization of the productive processes of the core and those of the periphery. Fourth, given that unequal exchange between the core and periphery takes place through the political process of imperialism, the periphery is in an inferior position (politically and otherwise) with respect to the core (Wallerstein, 1985: 1–13). Fifth, assuming that the system develops in wave-like spurts of expansion and contraction, over the history of the capitalist world economy there has always been a periphery, a core and a semi-periphery whose positions, productive processes and relations change with the continuous restructuring of the system.[14] Finally, the devaluation of work under historical capitalism, which is 'a global empirical reality' of the operations of enterprises that regiment the development of resource-rich regions of the periphery, perpetuates the existence of the periphery and the 'condition of peripherality' (Wallerstein, 1985: 24–27).

Neo-structuralism Neo-structuralist theory analyses the historical linkage among nature, the environment and underdevelopment (Sunkel, 1993). Its aim is to study the long-term structural relationship between the development of the productive capacity of natural resources and the potential of Latin American countries to pursue new forms of insertion into the international economy (Sunkel, 1993: 2). Sunkel defines neo-structuralism as:

> [A] renewed development strategy from within, as compared to the previous inward-looking and current outward-looking development strategies (…) This strategic option represents a Latin American attempt at formulating an alternative to neoliberalism (…) based on a critical review of the contribution of the traditional structuralism of the 1950s and 1960s and the neostructuralism of the 1980s (Sunkel, 1993: 2–3).

Neostructruralist theorists analyse the structures, institutions, and dynamics of globalization that widen and expand the gap between industrial and industrializing regions of the world economy (see, for example, Ocampo, 1998; Coatsworth, 2004; Taylor, 2004; Irogbe, 2005). The work of Italian agronomist Nicolo Gligo is relevant in discussions on this theory's normative views about mining.

Gligo's main idea is that with the development of peripheral societies, the growing social and economic polarization was encouraged, which was manifested in the emergence of informal economies, peasant migration to agricultural frontiers, dualistic agricultural development (an export, technologically advanced sector versus a peasant subsistence sector), high demographic pressures, and high demands on water and energy (Gligo, 1980, 1986). Under dependent development and a highly stratified social structure, people exert pressure on the environment, causing depressed environmental situations that mostly affect urban and rural marginal populations. This began with the colonization process in Latin America, where the widespread idea that Spanish American resources were virtually infinite led to high deforestation, soil erosion, and social, demographic and structural disorganization of Latin America (Gligo, 1980). Agricultural production was severely affected in several ways: increasing food demand trends; increasing need for imports of energy inputs and agro-production; and artificial agricultural ecosystems, which were made to depend heavily on energy subsidizes (Gligo, 1980, 1986).

Gligo's neostructuralist analysis of development and natural resources starts from the fundamental premise that:

> The system through which poor societies relate to their physical environment has created the descending spirals generated by the survival efforts of populations trying to make the best possible use of available resources (Gligo, in Sunkel, 1993: 186).

With respect to mining, Gligo states that mining operations have historically encouraged patterns of severe deforestation and erosion of soils (Gligo, 1980). The need to clean and break large stretches of land, the need to produce the wood and energy required by foundries, and the maintenance of the system of animal traction that provided transportation are the structural requirements of mining operations. For example, historically mules, donkeys and horses have been used to transport minerals to the ports; these were domesticated and grazed in vast stretches of land that became overgrazed (Gligo, 1980). Land was reorganized according to the empire's interest in populating regions that had greater prospects for mining operations. Native cultures were forced to work in agricultural and mining enclaves. Moreover, agricultural production was oriented initially to serve mining purposes, and new agricultural and livestock products were incorporated based on the needs of mining extraction (Gligo, 1980). Territorial space was organized according to an ownership structure based on large, landed estates, and supported by 'seignorial monopoly over agricultural land, the paternalistic ideology inherent to the *encomienda* and the hegemonic control over power-sharing and representation mechanisms' (Gligo, in Sunkel, 1993: 188). Due to the organization of mining as an enclave, no significant pressure was exerted in favour of the expansion and penetration of inland territories.

Gligo asserts that the pattern of deforestation, soil erosion and land restructuring inherent to the economies of extraction continued well into the late 1930s, when the international crisis triggered by the Great Depression provoked the restructuring of Latin American economies (Gligo, 1980). With the advent of ISS, Latin American governments relegated mining and agricultural enterprises to second place. Indeed, there were no significant regional policies of economic development for mining or agriculture during this period. Gligo adds that these enterprises were left unprotected. Although his analysis is not clear as to the state of mining during the many phases of ISS, it is logical to presuppose that mining became in those decades an arena where foreign and national interests merged and collided (Gligo, 1980).

Contemporary neostructuralist theorists have added to the question of mining in development a wealth of empirical evidence to support the claim that neoliberal reform and globalization entail the intensification of patterns of uneven development. The work of Gavin Bridge, for example, analyses what he calls the 'new geographies of resource extraction', which are created by neoliberal reforms in investment, trade and production (Bridge, 2004a, 2004b; Jonas and Bridge, 2003). According to Bridge, the mining boom of the mid-1990s shows the spatial expansion of mining capital in the developing world. Under neoliberal reforms, mining companies have created the strategic targets for new investment opportunities in the global South (Bridge, 2004a). Drawing upon spatial analyses of mining investments in the developing world in the last decade, Bridge concludes that an evolution in patterns of investments has not been accompanied by a structural shift in the geography of development. He says:

> [R]ecent patterns of investment have actively contributed to a process of uneven development as both existing spatial inequalities in investment are consolidated and new patterns and scales of inequality emerge (Bridge, 2004b: 411).

Bridge's work provides solid data on the 'unevenness of development'. His work is sympathetic to and supportive of the neo-structuralist normative view against mining. The timid theoretical claims of Bridge's work are not a shortcoming; he provides a solid methodological framework within which to study flows of mining investments as a spatial mechanism that reproduces the relationship between the core and the periphery.

Development as a discourse In the 1980s, the intellectual debate about development turned its attention away from structures of production, industrialization of national economies, and the international markets and trade, to the analysis of development as a discourse. One of the most influential intellectuals of this new perspective is Arturo Escobar. His work is an incisive scrutiny of the language, ideas, methods of inquiry, and assumptions and ideologies of development scholarship (Escobar, 1985, 1995, 1996). Escobar argues that development is a mechanism for producing truth about the Third World. As he says,

> Development can best be described as an apparatus that links forms of knowledge about the Third World, with the deployment of forms of power and intervention, resulting in the mapping and production of Third World societies (Escobar, 1996: 213).

Escobar stated that development is a colonizing form of knowledge, which colonized reality, and became reality itself (Escobar, 1996). The 'linguistic turn' provided by discourse, as Jan Nederveen Pieterse calls it, attempted to uncover the mechanisms through which the construction of ideas becomes the production and organization of power (Pieterse, 2000). In this view, development was criticized for its Western, liberal, positivist credo that glorifies rationality, individualism, modernity, and the market (Escobar, 1996).

According to Pieterse (2000), this debate had a solid forum in the journal *Development: Seeds for Change*. Many authors who appeared in the first issues of the journal seemed to share a strong political commitment to the rejection of every aspect of development (Pieterse, 2000). For example, Gustavo Esteva, identifying development with a 'malignant myth', stated: '[T]he development decades were a huge, irresponsible experiment that, in the experience of a world-majority, failed miserably' (Esteva, 1985: 78).

Esteva's characterization of development entailed a fierce critique of the impoverishment of the masses brought about by the rapid modernization of Latin American economies which only responded to the imperatives of Western markets (Esteva, 1985). In this view, modernization of the Third World necessarily implied the adoption and imposition of exogenous forms of production that were based on the needs of the industrialized world, and the exclusion of native forms of production. For Esteva, development, rather than being an economic agenda or a set of policies, was a myth, a metaphor, and a threat of colonization and Westernization of the Third World (Esteva, 1985). Thus, the necessary consequences of development were exploitation, subordination, marginalization, homogenization and poverty in the Third World.

The study of development as a discourse provided the first analytical framework within which to study ideologies of development. It brought to the development field an inquiry unexplored by its structuralist predecessors: the extent to which knowledge about development entailed relationships of domination, representation, ideology and power. For the first time, intellectuals were pushed to explore their own discourses of development, and scrutinize the development epistemology from within the scholarship. Many works promptly followed, exploring the discourses of uniformity, cultural imperialism, consumerism, poverty, and native peoples, among others (see, for example, Sachs, 1992; Crush, 1996; also, 'Post-Marxist Aporias' by Siar, 1998). Moreover, theorizations of alternatives to development and post-development emerged as a response to the failures and crimes that have been the steady companions of development (Sachs, 1992).

Notwithstanding its significant contribution, this critique has not led to any fruitful framework within which to study the topic of mining. It has set itself apart from any theoretical and political effort to give concrete answers to contemporary dilemmas of development.

Feminist development scholarship and mining

The feminist scholarship in development called attention to the gendered division of labour in mining production ('Atu Emberson Akin, in Harcourt, 1994); women's struggles against economic exploitation in mining (Barrios De Chungara, 1978); the notion of femininity and the role of women in peasant miners' cultural rituals (Nash, 1979); and women's subordination to the sexual and patriarchal structures of mining (Rodrigues, 1994).[15] It put at the forefront of the gender and development debate the need to study women's activities in mining economies of the developing world.[16]

Feminist political economy made a significant contribution to the study of women's work in primary and peasant production. It has offered an insightful collection of fieldwork on this topic that provided empirical grounds to demand gender-sensitive policy-decision tools from development aid agencies (see, for example, Momsen and Townsend, 1987; Pietilä and Vickers, 1990; Deere, 1995). In this tradition, the early work of German anthropologist Maria Mies is worth mentioning. In *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labor* (Mies, 1986), Mies argues that women's work in peripheral areas allows the 'ongoing primitive accumulation and colonization' necessary for capitalist expansion and development. Drawing upon Rose Luxemburg's analysis of the process of capital accumulation, she argues that the contemporary international division of labour rests upon the maintenance and recreation of an asymmetrical sexual division of labour within and outside the family.

The few works that exist on women in mining have emphasized, with one notable exception, women's subordinate roles in the sexual service sectors of mining economies, household economy and the provision of security, women's reproductive work, and women's productive work as an appendage to that of men (Barrios de Chungara, 1978; Nash, 1979). An analysis of linkages between women's labour in mining and national economic development do not abound in the field. Two notable works along this line are an essay by 'Atu Emberson Akin on women's labour in nickel mining in the Pacific ('Atu Emberson Akin, in Harcourt, 1994), and the book by Lahiri-Dutt and Macintyre on women miners in developing countries (Lahiri-Dutt and Macintyre, 2006).

This scholarship has not challenged the normative view against mining of critical development theories. While providing a rich body of work about women in development, it reifies the anti-mining normative view of structuralism, dependency and world-system theories.

3 The pendulum swings back in favour of mining: neoliberalism and the 'Extractive Industries Review Report'

The development debate today is dominated by a positive view with respect to mining. This view has its roots in a diverse group of theories that view mining as promoting 'clusters' of industrial growth, technology-intensive production and commercialization of knowledge (for a brief overview of theories along this line, see WBG/IFC, 2002; Pedro, 2006). These theories are part of a broader intellectual and policy paradigm that one can identify with neoliberalism. Gilpin's definition of neoliberalism is useful here: '[It] refers to the application of principles of neoclassical economics to economic development and other aspects of economic affairs' (Gilpin, 2001: 306).

Neoliberal theories about mining converge in the idea that mining produces competitive advantages for mineral-rich developing countries. The theoretical shift from comparative to competitive advantage emphasizes the increasing importance of technology, companies' specialization and economies of scale in international trade, rather than natural resources endowments (Gilpin, 2001). It establishes a normative rationale that favours mining based on (and under conditions of) transnational capital intervention in developing countries. It seems that the idea of competitive advantages emphasizes the networks of trade, production and marketing of mining companies over factor endowments. Hansen describes how the theory of competitive advantages provided an environmental dimension to the normative view in favour of mining (Hansen, 1998). It refers to the idea that developing countries are 'pollution heavens' with abundant 'contamination endowments', which means that they have a natural pollution absorption capacity given their low levels of industrialization (Hansen, 1998).

The neoliberal policy paradigm is the most recent episode – in the Braudelian sense – in the longer history of neoclassical economics. It is the product of the last three decades of international financial intervention in the developing world. It started officially with the Structural Adjustment Program Loans (SAPLs) of the early 1980s, followed by the Washington Consensus approach to international development in the early 1990s, and the recent Extractive Industries Review initiative. These would build an economic mentality that favours the withdrawal of the state from traditional mineral policy areas. The increasing dispersion of international financial and credit networks to the developing world have given an extraordinary impetus to this mentality.

SALPs were designed by the International Monetary Fund as a response to the debt crisis of the Third World.[17] In the area of mining, SALPs put in place a set of fiscal and legal incentives to transfer to foreign capital the allocation, tenure and operation of mineral rights (Campbell and Clapp, 1995; SAPRIN, 2002; Campbell, *et al.*, 2003). The following areas were targeted by SALPs: no-discrimination against foreign capital; flexible concessionaire regimes; guarantees to remittances abroad; provisions for international arbitration; and protection for investors (Campbell, *et al.*, 2003; Sánchez, *et al.*, 2001).

The second wave, identified as Washington Consensus (a term coined by John Williamson), aimed at deepening the liberalization reforms that started with SALPs. The fall in commodity prices at a time of expansion in the supply of primary products, the recession of North American and Western European markets, and the loss of access to foreign credit prompted a rapid intervention by Washington-based institutions in developing countries (Schaeffer, 2005). The intervention of the US Treasury, Federal Reserve Board, the IMF and World Bank aimed at promoting reforms in the following areas: fiscal discipline, reordering public expenditure priorities, tax reform, liberalization of trade, interest rates and inward foreign direct investment, privatization, deregulation and property rights (Williamson, 2002).

In a paper entitled 'Strategies for African Mining' from the Mining Unit of the Industry and Energy Division of the World Bank (IBRD/WB 1992), the World Bank described a set of policy criteria to be applied to mining as part of the Washington Consensus (Campbell, *et al.*, 2003). An enterprise survey conducted among 80 international mining companies, asking 'what influences their investment decisions in developing countries' provided the basis for the strategies for African mining (IBRD/WB 1992: 16). The sample included junior and multinational mining companies with exploration budgets ranging from US$ 1–2 million to US$ 50–100 million. The following criteria – in order of importance – were identified in the survey: (a) mineral potential and infrastructure; (b) guarantee of mining rights as a precondition prior to exploration; (c) ownership and control of mining operations; (d) minimal political and economic risks; (e) risk premiums; and (f) solid information about the country – financial, political, geological, etc. (IBRD/WB 1992: 16-18).

The World Bank paper identifies a group of countries that have put in place legislation to build 'an environment conducive to investment' – Chile, Indonesia, Papua New Guinea, Botswana and Ghana (IBRD/WB 1992: 20). Following the experience of mining investments in these countries, the World Bank defines key lessons for the rest of the developing world. These are as follows:

a) 'sound macro-economic and trade policies with few restrictions or controls on mineral exports or needed imports of plant, equipment, services and supplies';
b) 'a legal framework, which adequately defines the investor's rights and obligations. This includes legal safeguards which set forth important details like operational control, marketing arrangements, dispute resolution, and so on';
c) 'security of tenure to give the investor assurance of being able to enjoy the fruits of success';
d) 'a fiscal package which shares equitably the rent of profitable production among the various parties concerned';
e) 'guarantees of access to foreign exchange at market rates for repayment of debts, capital and profit repatriation, and purchase of essential inputs';
f) 'institutions which are well-equipped, able to respond to private investors in a professional and timely manner and which prevent or minimize corruption' (IBRD/WB 1992: 20).

The economic mentality embraced by the Washington Consensus is that governments are facilitators of foreign investments. The States are important for building conditions of institutional stability, reduce foreign investors' risks, and improve economic management by transferring mineral rights in the five areas targeted by SALPs to corporatist capital.

A Report commissioned by the Joint World Bank/Civil Society/Government Structural Adjustment Participatory Review Initiative (SAPRI) indicates that during this period, Washington-based institutions granted the highest amount of credit to mining: US$ 5,950,000,000 by the World Bank Group; US$ 946,000,000 by the European Bank for Reconstruction and Development; US$ 2,025,000,000 by the Asian Development Bank; US$ 1,073,000,000 by the Inter-American Development Bank; and US$ 40,500,000,000 by Export Credit Agency Financing of Upstream Oil and Gas Development – Not Mining – for the period 1994–99 (SAPRI 2002).

The most recent neoliberal policy wave is represented by the World Bank in its report, *Striking a Better Balance: Extractive Industries Review Report* (WBG, 2003). The Extractive Industries Review (EIR) Report seeks to promote mining activities in the context of the increasing liberalization of the mineral sectors of industrializing regions. The novel normative view about mining represented by the EIR Report is its emphasis on promoting corporatist mining as a way of achieving poverty alleviation and sustainable development. This includes normative stances about the environmental impacts of mining, human rights, and the rights of indigenous peoples. These come from the World Commission on Environment and Development (1987)[18] also known as the Brundtland Commission, the UN Conference on Environment and Development (1992),[19] and the UN Committee on Economic, Social and Cultural Rights.[20] In this regard, the EIR Report states:

> If the WBG is to have a role in the extractive industries, it must be one of contributing to the objective of poverty alleviation through sustainable development. Accordingly, WBG operations in the extractive industry sector should meet strict criteria to ensure that they contribute to equitable and sustainable development, promote sustainable livelihoods, and alleviate poverty. (…) Extractive industry projects considered for World Bank Group support should be evaluated to ensure that their expected benefits – especially for the poor – are sufficiently higher than their estimated costs, including environmental and social costs. Further, local communities bearing the costs should clearly benefit from such development. The outcome will often depend on helping countries to create the policy and institutional frameworks needed for extractive industries to contribute to sustainable development (WBG, 2003, Vol. I: 4).

The most conspicuous antecedent of the EIR Report is the Extractive Industries Transparency Initiative (EITI). This initiative seeks to build an international regime to promote 'good governance' and 'transparency' in resource-rich developing countries. It is aimed at addressing questions about political and institutional failures of the State in managing its mineral accounts. The speech of Germany State Secretary Erich Stather at the meeting of the International Advisory Group of EITI describes it as 'an overarching information unit', for the 'establishment of internationally binding standards' (Stather, 2006: 2–3).[21] The problems of Dutch disease and revenue volatility, according to World Bank Senior Advisor Charles McPherson, are to be addressed by 'good governance', for which transparency is 'the building block' (McPherson, 2006). In the words of Mr Rashad-Rudolf Kaldany, Director of the Oil, Gas, Mining and Chemicals department of the World Bank, 'the objective is to increase transparency over payments and revenues in the extractives sector in countries heavily dependent on these resources in line with the Statement of Principles and Agreed Actions agreed at the London Conference on EITI on June 17, 2003' (Kaldany, 2005: Annex 1, par. 1.1).

This normative view of mining is supported by a wide number of scholars in the field of development (see, for example, Auty and Mikesell, 1998; Hilson, 2004; Hilson and Potter, 2005). They argue that neoliberal reforms increase the volumes of mineral production, strengthen export market niches, and intensifies linkages between domestic mineral economies and global mineral markets (Hilson, 2004). Empirical work, such as that of Auty and Mikesell (1998), is built to support the idea that good governance can promote sustainable mineral-driven growth by preventing the 'external and internal disturbances' incompatible with sustained growth (Auty and Mikesell, 1998).

The challenges to this normative view come from a wide range of theories that combine environmental, ecological, neo-Marxist, feminist and neostructuralist frameworks (see, for example Clüsener-Godt and Sachs, 1995; Davis, 1995; Leamer, *et al.*, 1999; Godoy, 2001; SAPRIN, 2002). The intellectual arguments of these theorists are supported by the political pressure of transnational networks of communities and interested parties that are forming to lobby against mining at regional, national and international levels, such as Fatal Transactions, Partizans, and the Minewatch Asia-Pacific Project. The intellectual and political pressure levied by critics of neoliberalism does not seem powerful enough to inspire a new economic mentality, or normative view, with respect to mining.

Hence, the pendulum today remains on the side favouring mining for development.

III Conclusions

The brief exploration of the history of the normative views on mining in development scholarship reveals that the question 'Is mining good for development?' has followed a difficult road, from the omission of the topic in the early classical political economy tradition, to moving back and forth between favouring and opposing mining. It is clear that every time the pendulum moves, new questions, ideas and theories are in the making. The scientific revolution of Renaissance Europe, in particular that of renaissance mining engineering, described by Smith as 'larger than the struggle against the Turks or the doctrinal differences of Catholic and Protestant' (Smith in Grünhaldt Sisco and Smith, 1951: ix); the intellectual revolution of Adam Smith, David Ricardo, and later on, that of Latin American structuralism; the fruitful debates about Western ideologies; and women's labour in mining all created new ideas about development, which are the foundations for today's debates about mining.

The last movement of the pendulum in favour of mining brings new elements to the intellectual history of development. First, it conveys the idea that there is a global consensus on the desirability (and superiority) of neoliberal reforms for mining. This is done by spreading the core values of what Cerny (2000) elegantly calls the 'Anglo-Saxon spirit' of capitalism (ideas about flexibility, competitiveness, diversification of portfolio, transparency, accountability). These values are built as the material basis of the flows of investment and finance promoted by the World Bank. Second, it is devoid of philosophical questions about development, at least when compared and contrasted with its intellectual predecessors in the long-term history of ideas about development. The *problema philosophorum* of its predecessors were the origins of wealth, the nature of international trade, and the nature of capital. The *problema philosophorum* of the new economic mentality seems to be of a technical order: how to *apply* a given set of theories to mining. The concerns with *muchas Ciencias*, as expressed by D. Francisco Gamboa, seems to be a matter from the past. This might be a 'necessary evil' inherent to the neoliberal historical episode of the question of mining in development. It is worth recalling the words of Malthus from an anecdote by Jacob Viner: in a speech of introduction to Senior's lectures on population, Malthus said that 'it was among the disadvantages of public lectures, that the lecturer sometimes thought he was called upon to say something new, where there was nothing new to be said' (Viner in Spiegel, 1952: 719).

It is clear that the normative understanding of mining in development scholarship is not tied to ideas about the geology of the Earth. As seen in this paper, the nineteenth-century genealogy of the topic of mining starts with international trade theories, in particular the theory of comparative advantages. If, as Braudel asserts, 'material life is at the root of everything' (Braudel, 1992), the debate about development must 'get more physical', as geographer William Doolittle puts it (Doolittle, 2006, personal communication). It means incorporating the scholarship about mining, metallurgy and geology in the theorizations for development.

Understanding the troubled relationship between mining and development is useful when it comes to understanding the mistakes, failures and disasters in the history of mineral policies. Consider, for example, the ways in which Germany defined national health and nutritional policies based on the mineral needs of its war economy during World War I. These policies attempted to reduce domestic consumption and the import of certain foodstuff, to encourage the imports of mineral and metal-related products to defy the raw materials blockade of 1914–18 (Staley, 1937). Another historical failure was the prohibition of small-scale iron ore mining in Brazil during the 1940s. This prohibition transformed Brazil into an importer of iron ore from international markets (after being able to sustain its domestic demand with its own national production) (Cleary, 1990). The greatest disaster in mineral development is still unfolding: the resource wars and their legacy in the African countries of Angola, Sierra Leone, Liberia and the Democratic Republic of Congo (see, for example, Innes, 1984; Zack-Williams, 1995). Examining and using historical analogies in mineral development is an urgent task in order to avoid the mistakes of the past.

Other mistakes and failures are more subtle. They refer to the way ideas about mining in the development field allow for certain institutions, university programmes, and research centres to dominate the public policy arena. Mirowski and Van Horn (2005) have called attention to this question in their exploration of the history of economic theories of the Chicago School of Economics. This is a question that also applies to theories of mining and development, and deserves further analysis: What is the relationship between dominant normative views about mining and funding for research programmes? This is a question about the material basis of the political economy of mining in the field of development.

Today, the dominance of the World Bank Group, the International Monetary Fund, and multinational mining corporations in building a normative rationale favouring mining must come under scrutiny. A topic with an incoherent normative history and a troubled relationship with development theories (with, indeed, very short periods of tranquillity in such a relationship), has today become an integral part of mineral policies in industrializing countries. What are the outcomes of mineral policies that have swung between favouring and opposing mining? This question deserves a long-term, multidisciplinary engagement. It also requires that social scientists scrutinize our tools, methods, techniques, and ideas about mineral policies. To what extent does the incoherent normative history of mining create an obstacle for building mineral policies over the long run? To what extent is the incoherent normative history inherent to development theorization? It is worthwhile to remember Adler's words, when he stated that the lack of a 'definite concept of the development process or philosophy was inherent to the business of the World Bank in its early decades (Adler, in Bhagwati and Eckaus, 1990: 30). Even when one can infer that any aspect of development will have the same limitations, the environmental, geological, and economic aspects of mining deserve further theoretical inquiry and policy examination. The increasing conflicts between peasants and small-scale miners and mining companies, and the exhaustion of mineral deposits, are problems that cannot wait any longer.

In the short term, the normative history of mining ultimately reveals that the question 'Is mining good for development?' is important because of the further questions it throws up. These questions include the meaning of development, the relationship between development and technology, and the equity requirements of this relationship. Unless those questions are settled, my forecast is that mining will continue to have a troubled relationship with development scholarship.

Today's debate about mining and development seems to be a century-long product of, and response to, the dismantling of the myth of El Dorado. Is it also the disillusionment of the new century with the dismantling of this myth, a myth that had the power to attract, as Italian Jesuit Antonio Andreoni saw it in 1711, *personas de todas condiciones*? To replace the myth of El Dorado, the nineteenth-century classical political economy produced a new myth, which today underlies the economic mentality about mining: a myth that one can call *El Dorado Technicum*. Powerful ideas about technology dominate the debates about mining, including the development of peasant and artisanal mining, where rural violence, mercury pollution, and the environmental impacts of what British anthropologist David Cleary called 'ethnogeology' are problems that still wait for solution (see Cleary, 1990; Chaparro Ávila, 2003; Hilson, 2003). Will the key to a new movement of the pendulum lie in the debate about technology? For the answer, development scholarship will have to wait patiently for new generations to come and bring a future 'father of innovation', as Jeremy Betham was once called, a new 'apostle of Adam Smith', as Speigel reminds us about Jean Baptiste Say, and a new economist with the 'intellectual courage' of Raúl Prebisch.

Notes

1. Gamboa recognizes the Latin scholarship because it explains '*la Philoſophia natural y secreta de los metales*' (the natural and hidden philosophy of metals), even when Gamboa says that the Latin works are difficult to understand (Gamboa, 1761: 2). Taking as an example the Latin edition of Agricola, he says, '*Con Agricola no se puede contar para el uso común de los Metalicos por ser latino su idioma* (…) *y en materia tan extraña que su comprensión necesita ciencia como lo lamenta Monſieur Helot, de la Academia Real de las Ciencias*' (The work of Agricola is of little help to the common Miners. Monsieur Helot, of the Royal Academy of Sciences, laments that only with the aid of science one could understand its Latin language.) (Gamboa, 1761: 2).
2. New research on economic theories in nineteenth-century Russia, Poland, Rumania, the Middle East and the Ottoman Empire promises to address the historiographical gap between the West and the East (see, for example, İnalcik 1993; Dasgupta 1993; Psalidopoulos and Mata 2002).
3. Arndt calls attention to notable exceptions, such as Dutch colonial economist J.H. Boeke and British economists J.S. Furnivall, Lord Hailey and W.K. Hancock. In particular, Boeke developed the theory of 'social dualism' based on his experience as a colonial administrator in the Dutch Antilles. It referred to 'the clashing of an imported social system with an indigenous social system of another style' (Arndt in Bhagwati and Eckaus, 1973: 20). These economists attempted to conceptualize the problem of underdevelopment with special emphasis on the problems of the Southeast Asian colonies (Arndt in Bhagwati and Eckaus, 1973).
4. For this scholarship's silence on the topic of under-development, Arndt calls the inter-war years the mainstream. In his own words, 'the problems of long-term economic growth all but disappeared from the mainstream of economics and, to a degree which is astonishing in retrospect, Western economists ignored the under-developed world' (Arndt in Bhagwati and Eckaus, 1973: 16).
5. For a revision of the theories of economic growth, see Adelman (1961), Falkus (1968) and Hoselitz (1960). An excellent source is also the *Handbook of Development Economics*, particularly Volume 1 (Chenery and Srinivasan, 1988) and Volume 3B (Behrman and Srinivasan, 1995).
6. ECLA, which later included the Caribbean and came to be known as ECLAC, was a United Nations agency established in 1948 with its headquarters in Santiago, Chile, following a decision taken by the General Assembly of the United Nations in 1947 (Kay, 1989). The criticisms made by many Latin American delegates to the United Nations that the region was excluded from the Marshall Plan and had no access to much-needed financial resources prompted the Assembly to favour the creation of a regional commission for Latin America (Bielschowsky, in Malan, *et al*., 1999).
7. The impact of the Great Depression on the international markets for raw materials has been extensively studied (Matos-Mar, comp., 1968; Prebisch, 1971; Furtado, 1982). It suffices to say that with the Great Depression, raw material products of Latin American countries lost an important export market. These countries promptly found themselves facing a surplus of raw material, rapidly falling prices, and an increasing demand for manufactures (Prebisch, 1971). Their capacity to import was reduced by 50 percent, and the crisis provoked a return of the labour force engaged in activities for the external sector to the so-called pre- or semi-capitalist sectors (Sunkel, 1993). Countries that, prior to 1929, had agricultural and mineral exports equivalent to a fifth of their gross internal product, suddenly experienced a lowering of export prices and a drastic shrinkage of the quantum exported (Sunkel and Paz, 1970).
8. Such data was criticized as being misleading by many economists contemporaneous to Prebisch, who advocated the comparative advantages theory (Higgins, 1959; Levin, 1960). He finally published the report in 1949, arguing against trade based on comparative advantages and advocating government intervention to promote government-protected industrialization in Latin American countries.
9. Important names, such as Celso Furtado, José Medina Echevarría, Regino Botti, Jorge Ahumada, Juan Noyola Vázquez, Aníbal Pinto, Osvaldo Sunkel and Maria Da Conceição Tavares, identified themselves with Prebisch's arguments against specialization in primary production, consolidating the ECLA school of thought (for more on ECLA's writings, see Malan, *et al*., 1999).

10. Christobal Kay observes that an English translation of the book appeared 10 years after its first publication in the Spanish language (Kay, 1989: 230).
11. Specifically, Cardoso and Faletto addressed three aspects of the structuralist and dependency thinking of the 1940s, 1950s and 1960s, which might have distorted in some ways the vision of and expectations about Latin American development. The first aspect was the 'typological analysis', or the analysis of 'traditional' and 'modern' societies. They criticized the analytical and methodological approach to development as an evolutionary trend towards industrialization, with stages running from traditional to modern societies. The flaws of this approach were its lack of analysis of the socio-historical specificities of each transitional phase, as manifested in Latin American countries (Cardoso and Faletto, 1969). Along this line, they questioned the poor understanding of the social, political and institutional aspects of the 'structural dualism' that characterized many Latin American countries in their transitions towards modernity. Second, Cardoso and Faletto raised objections to the notion of social change in structuralist and dependency theories. The methodological assumption that the political, social and economic characteristics of the core represent the future stage of development of the periphery overlooked the historical variations and singularities of each case of underdevelopment. In particular, they criticized the 'demonstration effect' analysis, whereby modernization is taken as the manifestation of a single, isolated variable, such as mass mobilization. For example, the ways in which an accelerated rate of urbanization in Brazil was viewed as the single causal variable to explain and predict patterns of social and political orientations similar to those of centre countries was problematic. Similarly, high social mobilization and the early experience of syndicalization in Argentina were not factors sufficient to demonstrate that this country was at the edge of modernization in a manner similar to that of centre countries (Cardoso and Faletto, 1969). The third aspect they discuss is related to what they call 'reciprocal determinations between structure and process'. The concept refers to an analytical perspective that links the structuralist analysis of the economic and social aspects of development to the analysis of historical processes (Cardoso and Faletto, 1969). The problem of the social control of production and consumption is, for them, the starting point for a historical and sociological analysis.
12. In Wallerstein's theory, the term 'core-like' is used to denote the locations of 'ceaseless' accumulation and concentration of capital and continuous appropriation of surplus-value, originated by states that represent the interests of enterprises, and the processes that incorporate strong-state machineries, mechanized labour value, and are highly profitable. The term 'periphery-like' is employed to designate the 'dependent zones' that were incorporated into the international division of labour with the expansion of the world economy over historical time, and as a consequence of its internal needs (Wallerstein, 1985). The colonies and semi-colonies, where the system operated to facilitate the flows of surplus to core regions via unequal exchange, are characterized by 'periphery-like' relationships of production. The operation of the system in these zones is referred to as the peripheralization of the incorporated territories. 'Semi-periphery like' is used to describe the simultaneous coexistence of 'core-like' and 'periphery-like' productive processes in zones that can be attached as satellites to one core power in specific historical periods and circumstances (Wallerstein, 1985: 80–91).
13. This idea reflects the tremendous influence of the work of Caribbean historian Eric E. Williams in early world-system theory (see, for example, Williams, 1944).
14. As production expands in the search for accumulation, the amounts produced throughout the world-economy exceed the effective demand resulting from the existing distribution of world income (as fixed by the resolutions of prior, acute sociopolitical conflicts). Consequent periods of stagnation reduce overall production and lead to class struggles, which forces a redistribution of the world income to the lower strata within the world economy. This redistribution expands the market, at least in the core zones, and this can be most effectively compensated for, in terms of the interest of the upper strata, by the incorporation of new zones within the world economy, adding a new component of ultra-low-income-receiving direct producers.
15. This concern was also influenced by debates in the field of anthropology about the methods and techniques for conducting fieldwork and gathering data about the object of study (see, for example, Apffel-Marglin and Marglin, 1996; Wolf, 1996).
16. Along the lines of critical development theory, other feminists have also made extraordinary contributions to the study of the positions, options and constraints of women's work in peripheral countries, and their relation to global capitalist dynamics of accumulation, appropriation, production, consumption and growth (Friedmann, *et al.*, 1996; Mies, *et al.*, 1988). These scholars have challenged the male-biased normative position and patriarchal epistemological assumptions underlying the notions of industrialization, modernization, labour, production and economics. They have also questioned the paternalistic character of First World feminism towards Third World women (Mohanty, *et al.*, 1991).

17. The debt crisis officially started on 27 March 1981, when the Polish government declared that Poland could not meet its debt obligations with Western banks (which amounted to US$ 27 billion). Other countries promptly followed Poland's statement: the Rumanian government suspended its payments on its US$ 7 billion, and in 1982, the Mexican government declared its suspension of payments on its US$ 90 billion foreign debt (for the causes of the debt crisis, see Schaeffer, 2004: 79-120).
18. From the Bruntdland Commission, the Report takes the famous definition of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WBG, 2003: 3).
19. From this Commission, the Report takes the need to achieve sustainable development on a global basis (WBG, 2003).
20. From this Commission, the Report takes the definition of poverty as 'a human condition characterized by sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living and other civil, cultural, economic, political and social rights' (WBG, 2003: 3).
21. Germany's Ministry of Economic Cooperation and Development, the Department for International Development of United Kingdom, the Ministry of Foreign Affairs of The Netherlands, and the Royal Ministry of Foreign Affairs and the Norwegian Agency for Development Cooperation of Norway are the architects of the EITI principles. They are the donors of EITI's fund, called the EITI-Multi-Donor Trust Fund.

References

Ackerman, R. 1998: Is Mining Compatible with Sustainable Development? A World Bank Perspective. *International Council on Mining and the Environment Newsletter* 6(1), 1–3.

Adelman, I. 1999: *Fallacies in Development Theory and Their Implications for Policy*. Department of Agricultural and Resource Economics at Berkeley, University of California.

——— 1961: *Theories of Economic Growth and Development*. Stanford University Press.

Adelman, I. and **Morris, T.** 1997: Development History and Its Implications for Development Theory: An Editorial. *World Development* 25(6), 831–40.

Almond, G.A. 1990: *A Discipline Divided: Schools and Sects in Political Science*. Sage Publications.

Amin, S., Arrighi, G., Frank, A.G. and **Wallerstein, I.**, editors. 1982: *The Dynamics of Global Crisis*. Monthly Review Press.

——— 1973: *Imperialism and Unequal Development*. Monthly Review Press.

Apffel-Marglin, F. and **Marglin, S.A.** 1996: *Decolonizing Knowledge. From Development to Dialogue*. Clarendon Press.

Arndt, H.W. 1973: Development economics before 1945. In Bhagwati, J. and Eckaus, R.S., editors, *Development and Planning Essays in Honour of Paul Rosenstein Rodan*. MIT Press.

Aronowitz, S. 1979: The End of Political Economy. *Social Text* 2, 3–52.

Arrighi, G. 1994: *The long twentieth century: Money, power and the origins of our times*. Verso.

Auty, R.M. and **R.F. Mikesell.** 1998: *Sustainable Development in Mineral Economiesl*. Clarendon Press.

Aydin, H. and **Tilton, J.E.** 2000: Mineral endowment, labor productivity, and comparative advantage in mining. *Resource and Energy Economics* 22(4), 281–93.

Bath, C.R. and **James, D.D.** 1976: Dependency Analysis of Latin America: Some Criticisms, Some Suggestions. *Latin American Research Review* XI(3), 3–54.

Baran, P. 1957: *The Political Economy of Growth*. Monthly Review Press.

Baran, P. and **Sweezy, P.** 1966: *Monopoly Capitalism*. Monthly Review Press.

Barrios de Chungara, D. 1978: *Let me speak! Testimony of Domitila, a woman from the Bolivian mines*. Monthly Review Press.

Bee, A. 2000: Globalization, grapes and gender: Women's work in traditional and agroexport production in northern Chile. *Geographical Journal* September, 255–65.

Behrman, J. and **Srinivasan, T.N.** 1995: *Handbook of Development Economics*, Volume 3B. Elsevier Science B.V.

Bello, W. 2002: Pacific Panopticon. *New Left Review* 16, 68–85.

Bhagwati, J. and **Eckaus, R.S.**, editors. 1990: *Development and Planning Essays in Honor of Paul Rosenstein Rodan*. The MIT Press.

Braudel, F. 1995: *The Mediterranean And the Mediterranean World in the Age of Philip II*, Volume I. University of California Press.

——— 1992: *Civilization and Capitalism 15th–18th Century, Volume II The Wheels of Commerce*. University of California Press.

——— 1987: *A History of Civilizations*. Penguin Books.

Bridge, G. 2004a: Contested terrain: Mining and the environment. *Annual Reviews of Environmental Resources* 29, 205–59.

——— 2004b: Mapping the bonanza: geographies of mining investment in an era of neoliberal reform. *The Professional Geographer* 56(3), 406–21.

Campbell, B. and **Clapp, J.** 1995: Guinea's economic performance under the structural adjustment: importance of mining and agriculture. *The Journal of Modern African Studies* 33(3), 425–49.

Campbell, B., **Hatcher, P.** and **Sarrasin, B.** 2003: Factoring in governance is not enough. Mining Codes in Africa, policy response and corporatist responsibility. *Minerals and Energy* 18(1), 2–13.
Cardoso, F.H. 1978: *Ideología de la burguesía industrial en sociedades dependientes*. Siglo XXI Editores.
Cardoso, F.H. and **Faletto, E.** 1969: *Dependencia y Desarrollo en América Latina*. Editorial Siglo Veintiuno.
CEPAL. 1995: La inversión extranjera y las empresas transnacionales en América Latina. *Notas sobre la economía y el desarrollo* 576–77.
——— 1989: Development of Mining Resources of Latin America. *Estudios e Informes de la CEPAL* 48.
——— 1982a: Report of the meeting on horizontal cooperation for the development of the mineral resources of Latin America, 14–18 June, Bogotá, Colombia.
——— 1982b: El crecimiento económico y la política de recursos mineros en los países en desarrollo, 24 de marzo de 1982.
——— 1982c: Seminar on policies and negotiations with TNCs in the mining-metallurgic sector of Bolivia. CEPAL.
Cerny, P.G. 2000: Restructuring the Political Arena: Globalization and the Paradoxes of the Competition State. In Randall D. Germain, editor. *Globalization and Its Critics: Perspectives from Political Economy*. Macmillan Press Ltd, pp. 117–38.
Chaparro Ávila, E. 2003: Small-scale mining: A new entrepreneurial approach. ECLAC Document LC/L.1834-P/I. August 2003. CEPAL.
Chenery, H.B. and **Kretschmer, K.S.** 1956: Resource Allocation for Economic Development. *Econometrica* 24(4), 365–99.
Chenery, H.B. and **Srinivasan, T.N.**, editors, 1988 *Handbook of Development Economics*, Volume 1. Elsevier Science B.V.
Chilcote, R.H. 2000: *Comparative Inquiry in Politics and Political Economy*. Westview Press.
Clark, E., editor. 1932: *Boycotts and Peace*. *A Report by the Committee on Economic Sanctions*. Harper and Brothers.
Cleary, D. 1990: *Anatomy of the Gold Rush*. University of Iowa Press.
Clüsener-Godt, M. and **Sachs, I.**, editors. 1995: *Brazilian Perspectives on Sustainable Development*. UNESCO.
Coatsworth, J.H. 2004: Structures, Endowments and Institutions in the Economic History of Latin America. *Latin American Research Review* 40(3), 126–44.
Coquery-Vidrovitch, C. 2002: Afrique noier: De la colonisation a la recolonisation? *Economie Appliquee* 55(2), 207–24.
Copper, F. 1981: Africa and the World Economy. *African Studies Review* 24(2/3), 1–86.
Crush, J., editor. 1996: *The Power of Development*. Routledge.
Culver, W.W. and **Greaves, T.C.** 1985: *Miners and Mining in the Americas*. Manchester University Press.
Cutler, A. 2003: *The seashell on the mountaintop: a story of science, sainthood, and the humble genius who discovered a new history of the Earth*. Penguin Books.
Dasgupta, A. 1993: *A History of Indian Economic Thought*. Routledge.
Davenport-Hines, R.P.T. and **Van Helten, J.J.** 1986: Edgar Vincent, Viscount D'Abernon, and the Eastern Investment Company in London, Constantinople and Johannesburg. *Business History* 28(1), 35–61.
Davis, G. 1995: Learning to Love the Dutch Disease: Evidence from the Mineral Economies. *World Development* 23(10), 1765–79.
Deere, C.D. 1995: What difference does gender make? Rethinking peasant studies.. *Feminist Economics* 1(1), 53–72.
Dictionary of Scientific Biography. n.d.: Agricola, Georgius. *Dictionary of Scientific Biography*. [online]. Published by the Cultural Heritage Language Technologies, Linda Hall Library, History of Science Collection. Available from http://www.chlt.org/sandbox/lhl/dsb/page.77.php [accessed 3 June 2006].
Dibner, B. 1981: *Heralds of Science as represented by two hundred epochal books and pamphlets in the Dibner Library, Smithsonian Institution*. Burndy Library and Smithsonian Institution.
Dobb, M. 1963: *Economic Growth and Underdeveloped Countries*. International Publishers.
Dore, E. 2000: Environment and Society: Long-Term Trends in Latin American Mining. *Environment and History* 6(1), 1–29.
Dos Santos, T. 1969: The crisis of development theory and the problem of dependence in Latin America. In Berstein, H., editor, *Underdevelopment and Development*. Penguin, pp. 57–80.
Emeny, B. and **Ely, J.E.** 1934: *The Strategy of Raw Materials: A Study of America in Peace and War*. MacMillan.
Firestone, O.J. ed., 1972: *Economic Growth Reassessed*. Ottawa: University of Ottawa Press.
Kaldany, R.R. 2005: Administration arrangement between the Royal Ministry of Foreign Affairs of the Kingdom of Norway and the Norwegian agency for Development Cooperation, and the International Bank for Reconstruction and Development and the International Development Association Concerning the Multi-Donor Trust Fund for the Extractive Industries Transparency Initiative. Washington, D.C., 5 April.
Escobar, A. 1996: Imagining a post-development era. In Crush, J., editor, *The Power of Development*. Routledge, pp. 211–27.
——— 1995: *Encountering Development: The Making and Unmaking of the Third World*. Princeton University Press.

Escobar, A. 1985: Discourse and power in development: Michel Foucault and the relevance of his work to the Third World. *Alternatives* (10), 377–400.

Esteva, G. 1992: Development. In Sachs, W., editor, *The Development Dictionary*. Zed Books, pp. 6–25.

Falkus, M., editor. 1968: *Readings in the History of Economic Growth*. Oxford University Press.

Ffrench-Davis, R. and **Tironi, E.**, editor. 1982: *Latin America and the New International Economic Order*. St. Martin's Press.

Frank, A.G. 1978: *World Accumulation 1492–1789*. Monthly Review Press.

Friedmann, J., Abers, R. and **Autler, L.** 1996: *Emergences: Women's Struggles for Livelihoods in Latin America*. UCLA Center for Latin American Publications.

Furtado, C. 1982: *El subdesarrollo lationamericano: Ensayos de Celso Furtado*. Fondo de Cultura Económica.

——— 1970: *Obstacles to Development in Latin America*. Anchor Books.

——— 1961: *Desenvolvimento e subdesenvolvimento*. Editora Fondo de Cultura Econômica.

Gamboa, D.F.X. 1761: *Comentarios a las Ordenanzas de Minas Dedicados al Catholico Rey*… En la Oficina de Joachin Ibarra, calle de las Urofas. Año MDCCLXI.

García, P., Knight, P.F. and **Tilton, J.E.** 2001: Labor productivity and comparative advantage in mining: the copper industry in Chile. *Resources Policy* 27(2), 97–105.

Gilpin, R. 2001: *Global Political Economy Understanding the International Economic Order*. Princeton University Press.

Girvan, N. 1978: *Corporate Imperialism: Conflict and Expropriation Transnational Corporations and Economic Nationalism in the Third World*. Monthly Review Press.

——— 1973: The development of dependency economics in the Caribbean and Latin America. *Social and Economic Studies* 22(1), 1–33.

Gligo, N. 1986: *Agricultura y medio ambiente en América Latina*. Editorial Universitaria Centroamericana & Sociedad Interamericana de Planificación.

——— 1980: Notas sobre la historia ecológica de América Latina. In Gligo, N. and Sunkel, O., editors, *Estilos de Desarrollo y Medio Ambiente en América Latina*. Fondo de Cultura Económica.

Godoy, R. 2001: *Indians, Markets and Rainforests: Theoretical, Comparative and Quantitative Explorations in the Neotropics*. Columbia University Press.

González, E. 1973: Venezuela: nueva política petrolera y dependencia. *Social and Economic Studies* XXII (March).

Gregory, H.E., editor. 1918: *Military Geology and Topography: A Presentation of Certain Phases of Geology, Geography and Topography for Military Purposes*. Yale University Press.

Grünhaldt Sisco, A. and **Smith, C.S.** 1951: *Lazarus Ercker's Treatise on Ores and Assaying, Translated by Anneliese Grünhaldt Sisco and Cyril Stanley Smith*. University of Chicago Press.

Haberler, G. 1957: Los términos del intercambio y el desarrollo económico. In Ellis, H.S., editor, *El desarrollo económico y América Latina*. Fondo de Cultura Económica.

Hahn, F.H. 1960: The Stability of Growth Equilibrium. *Quarterly Journal of Economics* 74, 206–26.

Hansen, M. 1998: Economic Theories of Transnational Corporations, Environment and Development, Copenhagen Business School.

Harcourt, W.A., editor. 1994: *Feminist Perspectives on Sustainable Development*. Lynne Rienner Publishers.

Harvey, C. and **Press, J.** 1990: Issues in the history of mining and metallurgy. *Business History* 32(3), 1–14.

Higgins, B. 1959: *Economic Development. Principles, Problems and Policies*. W.W. Norton & Co., Inc.

Hilson, G.M. 2004: Structural adjustment in Ghana: Assessing the impacts of mining-sector reform. *Africa Today* 51(2), 53–77.

——— editor. 2003: *The Socio-Economic Impacts of Small-Scale Mining in Developing Countries*. Taylor and Francis.

Hilson, G.M. and **Potter, C.** 2005: Structural Adjustment and Subsistence Industry: Artisanal Gold Mining in Ghana. *Development and Change* 36(1), 103–31.

Hirschman, A.O. 1971: *A Bias for Hope Essays on Development and Latin America*. Yale University Press.

Hobsbawm, E.J. 1987: *The Age of Empire 1875–1914*. Vintage Books.

Holmes, H.N. 1942: *Strategic materials and national strength*. Macmillan.

Horblit, H.D. 1964: *One Hundred Books Famous in Science Based on an Exhibition Held at the Grolier Club*. The Grolier Club.

Hoselitz, B.F., editor. 1960: *Theories of Economic Growth*. Free Press.

Iglesias, E.V. 1994: *The Legacy of Raúl Prebisch*. Inter-American Development Bank.

Ïnalcik, H. 1993: *The Middle East and the Balkans Under the Ottoman Empire: Essays on Economy and Society*. Indiana University Press.

Innes, D. 1984: *Anglo American and the Rise of Modern South Africa*. Monthly Review Press.

Irogbe, K. 2005: Globalization and the development of underdevelopment of the Third World. *Journal of Third World Studies* XXII(1), 41–68.

Johnson, W.L. and **Kamerschen, D.R.** 1972: *Readings in Economic Development*. South-Western Publishing Company.

Jonas, A.E.G. and **Bridge, G.** 2003: Governing nature: The re-regulation of resources, land use-planning,

and nature conservation. *Social Science Quarterly* 84(4), 958–62.
Kamen, H. 2004: *Empire How Spain Became a World Power 1492–1763*. Perennial.
Kay, C. 1989: *Latin American Theories of Development and Underdevelopment*. Routledge.
Lahiri-Dutt, K. and **Macintyre, M.**, editors. 2006: *Women Miners in Developing Countries Pit Women and Others*. Ashgate Publishing Ltd.
Leamer, E., Maul, H., Rodríguez, S. and **Schott, P.K.** 1999: Does Natural Resource Abundance Increase Latin American Income Inequality? *Journal of Development Economics* 59, 3–42.
Levin, J. 1960: *Export Economies: Their pattern of development in historical perspective*. Harvard University Press.
Levy, D.M. and **Peart, S.J.** 2005: The Theory of Economic Policy in British Classical Political Economy: A Sympathetic Reading. *History of Political Economy* 37(1), 120–42.
Lewellen, T.C. 1995: *Dependency and Development: An Introduction to the Third World*. Begin & Garvey.
Lewis, W.A. 1955: *The Theory of Economic Growth*. Richard D. Irwin, Inc.
——— 1954: Economic Development with Unlimited Supplies of Labor. *The Manchester School of Economics and Social Studies* 22 (May), 139–91.
Liberty Fund Inc. 1999–2006: *The Concise Encyclopedia of Economics*. By Henderson, David R., editor, first published in 1993 as *The Fortunate Encyclopedia of Economics* by Warner Books. Available from: http://www.econlib.org/library/Enc/bios/Ohlin.html [accessed 8 August 2006].
——— 1999-2005: *Life of Adam Smith*. John Rae, first published in 1895, by Macmillan and Co., Available from http://econlib.org/LIBRARY/YPDBooks/Rae/raeLS21.html [accessed 15 May 2006].
Laslett, P., editor. 1988: *Two Treatises of Government By John Locke*. Cambridge University Press.
McPherson, C. 2006: Extractive Industries Transparency Initiative. World Bank Energy Week. Washington, D.C., 6 March. Available from: http://www.eitransparency.org/section/abouteiti/speechespresentations [accessed 5 November 2006].
Malan, P. Maria da Conceição Tavares, Antonio Barros de Castro, Carlos Lessa, Fabio Sá Earp, Ricardo Bielschowsky, Sulamis Dain, José M. Camargo, Reinaldo Gonçalves, João P. and **De Almeida Magalhães**. 1999: *Vinte anos de política econômica*. Contraponto.
Matos-Mar, J., com. 1969: *La crisis del desarrollismo y la nueva dependencia*. Amorrortu Editores.
——— com. 1968: *La dominación de América Latina*. Amorrortu Editores.
Meade, J.E. 1961: *A Neo-Classical Theory of Economic Growth*. Greenwood.
Mendershausen, H. 1941: *The Economics of War*. Prentice Hall.
Mies, M., Benholdt-Thomsen, V. and **Werlhof, C.** 1988: *Women: The last colony*. Kali for Women.
——— 1986: *Patriarchy and Accumulation on a World Scale: Women in the International Division of Labour*. Zed Books.
Ministry of Foreign Affairs of Denmark. 2005: Nicolaus Steno. Available from http://www.ambwashington.um.dk/en/menu/InformationaboutDenmark/EducationandTraining/FamousDanishScientists/NicolausSteno.htm [accessed 3 June 2006].
Mohanty, C.T., Russo, A. and **Torres, L.**, editors. 1991: *Third World Women and the Politics of Feminism*. Indiana University Press.
Molloy, P.M. 1986: *The History of Metal Mining and Metallurgy An Annotated Bibliography*. Garland Publishing, Inc.
Momsen, J.H. and **Townsend, J.G.**, editors. 1987: *Geography of Gender in the Third World*. SUNY Press.
Moreno, K. and **Gandarrilla Salgado, J.G.** n.d.: La teoría de la dependencia y el sistema mundial Entrevista a Theotônio Dos Santos. Available from http://www.herramienta.com.ar/varios/8/8-7.html [accessed 16 January 2006].
Mumford, L. 1963 [1934]: *Technics and Civilization*. Harcourt Brace & Company.
Nash, J. 1979: *We eat the mines and the mines eat us: dependency and exploitation in Bolivian tin mines*. Columbia University Press.
Nurkse, R. 1953: *Problems of Capital-Formation in Underdeveloped Countries*. Oxford Univeristy Press.
Ocampo, J.A. 1998: Más allá del Consenso de Washington: Una visión desde la CEPAL. *Revista de la CEPAL* 66 (December), 7–28.
Packenham, R. 1992: *The Dependency Movement: Scholarship and Politics in Development Studies*. Harvard University Press.
Palma, G. 1978: *Dependency: A Formal Theory of Underdevelopment or a Methodology for the Analysis of Concrete Situations of Underdevelopment? World Development* 6, 881–924.
Pedro, A.M.A. 2006: Mianstreaming Mineral Wealth in Growth and Poverty Reduction Strategies. *Minerals and Energy Raw Materials Report* 21(1), 2–16.
Pegg, S. 2003: Globalization and natural-resource conflicts. *Naval War College Review* 56(4), 82–96.
Persaud, T. 1980: *Conflicts between multinational corporations and less developed countries: The case of bauxite mining in the Caribbean with special reference to Guyana*. Arno Press.
Pieterse, J.N. 2000: After post-development. *Third World Quarterly* 21(2), 175–91.

Pietilä, H. and **Vickers, J.** 1990: *Making Women Matter. The Role of the United Nations*. Zed Books.
Prebisch, R. 1971: *Latin America: A problem in development*. Institute of Latin American Studies.
——— 1949: *El Desarrollo Económico de la América Latina y Algunos de sus Principales Problemas*. CEPAL.
Pribram, K. 1983: *A History of Economic Reasoning*. The Johns Hopkins University Press.
Porter, A.L. and **Cunningham, S.W.** 2005: *Tech mining: exploiting new technologies for competitive advantage*. Wiley.
Psalidopoulos, M. and **Mata, M.E.** 2002: *Economic Thought and Policy in Less Developed Europe: The Nineteenth Century*. Routledge.
Rawles, W.P. 1933: *The nationality of commercial control of world minerals*. American Institute of Mining and Metallurgical Engineers.
Redford, K.H. and **Mansour, J.A.**, editors. 1996: *Traditional peoples and biodiverity conservation in large tropical landscapes*. Island Press.
Redmayne, R.A.S. 1923: *The British Coal Mining Industry During the War*. Clarendon Press.
Ricupeiro, R. 2004: La renovada contemporaneidad de Raúl Prebisch. *Revista de la CEPAL* 1ro de diciembre.
——— 2002: *Statements by Rubens Ricupeiro, Secretary-General of UNCTAD (1995-2004)*. Available from http://www.unctad.org/templates/webflyer.asp?docid=2545&intItemID=3552&lang=1 [accessed 18 December 2005].
Rodrigues, R.M. 1994: *Mulheres do Ouro: O Trabalho Femenino nos Garimpos do Tapajós*. Secretaria de Estado de Indústria, Comércio e Mineração.
Roll, E. 1973 [1938]: *A History of Economic Thought*. Faber and Faber Ltd.
Rosenstein-Rodan, P. 1961: Notes on the Theory of the Big Push. In Ellis, H.S. and Wallich, H.C., editors, *Economic Development in Latin America*. Macmillan.
Rostow, W.W. 1962 [1960]: *Stages of Economic Growth. A Non-Communist Manifesto*. Cambridge University Press.
Sachs, W., editor. 1992: *The Development Dictionary: A Guide to Knowledge as Power*. Zed Books Ltd.
Sánchez, F., Ortíz, G. and **Moussa, N.** 2001: Mining in Latin America in the late 1990s. *CEPAL Natural Resources and Infrastructure Division*.
SAPRIN. 2002: *The Policy Roots of Economic Crisis and Poverty, A Multi-Country Participatory Assessment of Structural Adjustment*. Prepared by the Structural Adjustment Participatory Review International Network (SAPRIN).
Sautter, H. 1978: Underdevelopment and dependence: An Economic Evaluation of Dependency Theory. *Economics* 18.
Screpanti, E. and **Zamagni, S.** 2005: *An Outline of the History of Economic Thought*. Oxford University Press.
Siar, D., editor. 1998: Post-Marxist Aporias. Special Topic. *Cultural Logic: An Electronic Journal of Marxist Theory and Practice* 1 (2). Available from http://clogic.eserver.org/1-2/1-2index.html [accessed 13 November 2006].
Singer, C., Holmyard, E.J. and **Hall, A.R.** 1954–78: *A History of Technology Vol. I. From Early Times to Fall of Ancient Empires*. Clarendon Press.
Singer, H.W. 1950: The Distribution of Gains Between Investing and Borrowing Countries. *American Economic Review* 40(2), 473–85.
Solow, R.M. 1970: *Growth Theory: An exposition*. Oxford University Press.
Staley, E. 1937: *Raw Materials in Peace and War*. Council on Foreign Relations.
Stark, W. 1943: *The Ideal Foundations of Economic Thought: Three Essays on the Philosophy of Economics*. Routledge.
Stather, E. 2006: Achieving transparency in resource extraction and trade – harnessing our partner countries' natural wealth for poverty reduction and development. Bonn, Germany, 31 August. http://www.eitransparency.org/section/abouteiti/speeches presentations [accessed 14 November 2006].
Stephen, S.L. and **Lee, S.S.**, editors. 1949: *Dictionary of National Biography*. Oxford University Press.
Sunkel, O., editor. 1993: *Development from Within: Toward a Neostructuralist Approach for Latin America*. Lynne Rienner Publishers.
Sunkel, O. and **Paz, P.** 1970: *El subdesarrollo latinoamericano y la teoría del desarrollo*. Editora Siglo Veintiuno.
Surin, K. 1998: Dependency Theory's Reanimation in the Era of Financial Capital. Available from http://www.duke.edu/literature/dependency.htm [accessed 18 February 2003].
Taylor, L. 2004: *Reconstructing Macroeconomics Structuralist Proposals and Critiques of the Mainstream*. Harvard University Press.
United Nations. 1998: Problema básico de aumentar la capacidad de los países en desarrollo y las economías en transición de obtener ventajas económicas y sociales máximas de su potencial de producción minera. Consejo Económico y Social, Comité de Recursos Naturales. United Nations.
——— 1980a: The role of TNCs in the production and export of minerals. *Proceedings of the 6th Session of the Committee on Natural Resources*, Mineral Resources Development Series, No. 47, pp. 33–64.
——— 1972: *Small-scale Mining in Developing Countries*. United Nations.
——— 1970: *Mineral Resources Development with Particular Reference to Developing Countries*. United Nations.
——— 1953: *Role of minerals in the development of East Asia and the Far East*. United Nations.

Wallerstein, I. 1985: *The politics of the world economy: The states, the movements and the civilizations*. Cambridge University Press.
——— 1980: *The Modern World-System, Volume II: Mercantilism and the Consolidation of the European World-Economy*. Academic Press.
——— 1979: *The Capitalist World-Economy*. Cambridge University Press.
——— 1974: *The Modern World-System, Volume I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. Academic Press.
Widstrand, C., editor. 1975: *Multinationals firms in Africa*. Scandinavian Institute of African Studies.
Williams, E.E. 1944: *Capitalism and Slavery*. University of North Carolina Press.
Wolf, D., editor. 1996: *Feminist Dilemmas in Fieldwork*. Westview Press.
World Bank Group. 2003: *Striking a Better Balance*: *The EIR*. World Bank.
World Bank Group/International Finance Corporation. 2002: *Treasure or Trouble? Mining in Developing Countries*. International Finance Corporation.
World Gold Council. 2001: The New El Dorado: The Importance of Gold Mining to Latin America. Available from http://www.gold.org/pub_archive/pdf/eldorado.pdf [accessed 3 April 2003].
Yachir, F. 1988: *Mining in Africa Today: Strategies and Prospects*. Zed Books.
Zack-Williams, A. 1995: *Tributors, Supporters and Merchant Capital*. Avebury.
Zerán, F. 2004: Enzo Faletto rompe tres décadas de silencio, Necesitamos una nueva ética de comportamiento. *Cuadernos del CENDES* 21(56), 131–40.