Hierarchical Market Economy and State Capitalism in Brazil:
Its Origins in Iron Ore

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Resumo

No livro recém-lançado, *Minerals and the State in Brazilian Development* (Pickering and Chatto: 2011) eu monto o argumento que as leis e práticas aplicadas aos recursos do subsolo se implicam profundamente no ambiente instituicional que define a economia e a política brasileira no longo prazo. Protegindo sua soberania do subsolo, o setor foi fundamental pela União para promovir uma indústria dos ben-de-capitais com escala enorme e na construção do papel econômica do estado durante o século XX. O subsolo no domínio público ficou interligado com as leis de propriedade geral, proibindo a divisão dos bens imobiliados, em uma maneira que constrangia acesso dos atores privados aos recursos minerais. As interligações entre um regime dos direitos ao subsolo, baseados nos princípios coloniais, e as estruturas da governança que têm bases no corporatismo político e econômico, contribuiam fortamente ao papel econômico do estado brasileiro.

O trabalho anexado faz um resumo dos argumentos principais do livro, mais extende as conclusões aos debates das 'Variedades do Capitalismo' (V-C). O trabalho demonstra o processo histórico que determinava a consolidação do Brasil como uma 'economia com mercado heirarquiazado.' Este estudo-de-caso incorpora dinamismo dentro dos argumentos da V-C ao mesmo tempo que explora as bases históricas na diferenciação entre as economias capitalistas.

Ao fim da palestra apresentarei um resumo corto das minhas pesquisas atuais sobre 'Non-renewable Natural Resources, Institutions and Globalization in the Modern Brazilian Economy.' Este projeto extende as pesquisas sobre a história das instituições da economia-política brasileira para considerar o re-estruturamento (ou não) instituicional dentro do contexto de uma regime globalmente aberto e a nova posição da indústria petroleira brasileira.

Abstract

My book, *Minerals and the State in Brazilian Development* (Pickering and Chatto: 2011) argues that the laws and practices applied to subsoil resources have been vitally important to the institutional environment shaping the economic and political systems of Brazil. By successfully defining property to protect its sovereignty over the subsoil, the State used this sector simultaneously to promote large-scale industry and to build its own role in the economy in the twentieth century. Public sector ownership of the subsoil interacted with general property law, which prohibited the division of physical assets, to structure private economic activity in ways that concentrated access to mineral resources. The interplay between a subsoil-rights regime based on principles from the colonial era and emerging governing structures that relied upon political and economic populism has contributed significantly to constructing the economic role of the modern Brazilian State.

In this paper, I summarize the main arguments of the book and apply its findings to further the development of the "varieties of capitalism" arguments. The paper demonstrates the historically contingent process by which Brazil consolidated a "hierarchical market economy." This case study both adds dynamism to VoC arguments and explores the historical bases for differentiation among capitalist economies.

Finally, I will present a short synopsis of my current research project on "Non-renewable Natural Resources, Institutions and Globalization in the Modern Brazilian Economy." The project extends my research on the political-economic history of Brazilian institutions to consider restructuring (or not) within the contexts of an open global economic regime and the recently developed Brazilian position the petroleum industry.

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In recent decades, the paradigms considered by comparative political economy have shifted. The distinctions between capitalist and centrally planned economies (with a middle ground of "mixed economies") have lost relevance with the end of the Cold War. Attention has turned to "varieties" of capitalism: distinctions between different sorts of market economies. The underlying concern of the varieties-of-capitalism literature is to identify consistent variation across economies that can help to explain differences of political-economy environment that market actors face. The predominant organization of primary economic decision-making actors defines categorization within the VoC framework. The original scholarship in this field, based on analysis of European and other affluent economies has articulated liberal market economies in contrast to coordinated market economies.[1] In liberal market economies, individuals (firms or people) transacting within freely operating markets determine economic activity and institutions. In contrast, non-market relationships (organized by industrial organizations/cartels, personal relationships or other criteria) shape the institutions of coordinated markets.

Extending the reasoning of this research, Ben Ross Schneider has proposed an additional variety, the hierarchical market, which may explain consistent variation relevant to Latin American economies.[2] Hierarchical arrangement of actors within the market, dominated by groups[3] with strong ties to the national policy-making apparatus is the distinguishing feature of these economies. Governance structures give a strong hand to the predominant groups, often acting through the state, in determining firm strategies, the allocation of inputs and outputs and in determining prices.[4] Managing the seeming inconsistencies between "hierarchy" and "market" is one distinguishing feature shaping their prevailing institutions. Schneider identifies four characteristics specific to hierarchical market economies: concentration of domestic enterprise within a small

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[1] B. Hancké, ed. *Debating Varieties of Capitalism: A Reader* (Oxford ; New York: Oxford University Press,2009); P.A. Hall and D.W. Soskice, *Varieties of capitalism : the institutional foundations of comparative advantage* (Oxford [England] ; New York: Oxford University Press, 2001); D. Rodrik, *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth* (Princeton: Princeton University Press, 2007); M.H. Miller, *Worlds of Capitalism: Institutions, Governance, and Economic Change in the Era of Globalization* (New York, NY: Routledge, 2005). Varieties-of-Capitalism research takes the nation as its unit of analysis, in reflection of reigning regulatory authorities and it focuses on private sector enterprise, while also situating actors within the global economic environment.

[2] B.R. Schneider, "Hierarchical Market Economies and Varieties of Capitalism in Latin America," *Journal of Latin American Studies* 41 (2009). This paper will not consider other extensions of VoC categorization that have been applied to Mediterranean and Asian economies. Nevertheless, the correlation between geography and "varieties" of capitalism has received criticism and deserves further analysis.

[3] Earlier research on the formation of economic "groups," strongly derived from the Brazilian experience, includes N.H. Leff, "Capital Markets in the Less Developed Countries: The Group Principle," in *Money and Finance in Economic Growth and Development*, ed. Ronald I. McKinnon (New York: Dekker, 1976); M.C. Eakin, *Tropical Capitalism: The Industrialization of Belo Horizonte, Brazil* (New York Houndmills, England: Palgrave, 2001).

[4] The hierarchical nature of coordination, from state to firms, contrasts with the horizontal coordination among firms (supported, but not directed by, the state) among CMEs. (M. Doctor, "Brazil and the Varieties of Capitalism," (Rio de Janeiro: Universidade Federal de Rio de Janeiro, 2009).

number of closely held diversified business groups, the presence of foreign multinationals, a relatively low-skilled labor force (human capital) and atomistic labor relations. He further suggests that adding the hierarchical market economy to the liberal and coordinated varieties extends the analytic power of the overall theory with respect to understanding patterns of corporate governance and the economic role of the state. Schneider's formulation of hierarchical market economies anticipates state economic intervention that goes beyond that found in coordinated economies.

At the risk of complicating the "varieties" of capitalism, this paper situates state capitalism within, and along side, hierarchical markets.[5] State-owned enterprises that function within commercial markets, in interaction with private actors, are the defining feature of state capitalism. State-owned enterprise extends the economic role of the state beyond its regulatory and adjudicating functions. While these companies do not comprise the entire exchange structure, they have had strong influence and high profile by virtue of their unique features. A component within the toolkit of centrally planned and mixed economies, SOEs have not disappeared with the seeming dominance of "market players." In the middle of the twentieth century, Brazil offered one of the most prominent examples of state capitalism, and it has played a central role in shaping the institutions and practices of Brazilian markets.

Political scientists have applied Varieties-of-Capitalism theorizing to current-day Brazilian political economy, using both the theory's original dichotomized typology as well as Schneider's more nuanced form that incorporate a strong role for the state. They have reached varying conclusions: Such reforms as privatization, more open capital markets and more direct labor-management relations have suggested a move towards an increasingly liberal market.[6] Alternatively, the formation of new industrial organizations, continued presence of the state within enterprise (so-called golden shares of privatized companies), predominance of public-sector-employee pension funds as investors, and maintenance of tight "small-world" networks suggest new hierarchical forms of governance substituting for their twentieth century versions.[7] Historical analysis can contribute to this debate by establishing the institutional historical background and by suggesting appropriate criteria against which to measure change.[8]

The current paper analyzes Brazilian political economy with two objectives: giving a historical understanding to the origins of Brazilian state capitalism[9] and exploring the connection between corporate governance patterns and the economic role

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[5] State-owned enterprises have operated in markets economies otherwise classified as being dominated by liberal or coordinated. This paper implies that their role in hierarchical economies is particularly attenuated.
[6] V.A. Schmidt, "Bringing the State Back into the Varieties of Capitalism and Discourse Back into the Explanation of Change," in *American Political Science Association* (Philadephia PA2006); L. Weiss, "State Activism in an Age of Globalization: Bringing Development Strategy Back In," (São Paulo: Ford Foundation Workshop on "The Role of hte State in a Global Era", 2008).
[7] B. Renato, "Politics and Trajectory in Brazilian Capitalist Development: Recent Trends," (Rio de Janeiro); S.G. Lazzarini, *Capitalismo do laços: Os donos do Brasil e suas conexões* (Rio de Janeiro: Elsevier, 2011).
[8] Historical analysis also lends depth to the political science research by virtue of the relative freedom that historians have to escape the strict categorization of political science theory.
[9] The current varieties-of-capitalism literature derives primarily from political scientists with deep engagement of economic theory, with scant attention to the formation or evolution of economic systems.

of the state. In doing so, it offers a critical case study to test the ideas underpinning the designation "hierarchical market economy."[10] The paper tests the designation of Brazil as a hierarchical market economy and argues that Brazilian market structure rests on historical, financial and economic bases of state capitalism that emerged in response to deeply seated institutional hold-up problems.[11] The mechanisms that link the state and this hierarchical market economy are practices of capital accumulation and the special characteristics of state-owned enterprises. In the Brazilian case during the middle of the twentieth century, the effort to exploit iron ore reserves in order to support industrialization provided the proximate and strongest arena expressing these dynamics.

Non-renewable natural resources offer an especially constructive venue for these arguments because the capital intensity and relatively risky nature of their successful exploitation provide the circumstances in which states often have extended their functions. In the case of iron ore in Brazil, intervention took the extreme form of the state becoming the entrepreneur to produce and commercialize ore. The justification for this action was that, after a two-decade-long effort to find a domestic private-sector solution, state intervention would allow for the creation and capture of benefits that accrued far beyond the realm of the enterprise that produced iron. This arrangement accommodated institutional and political constraints by obviating the needs for foreign ownership and/or fundamental reforms of longstanding business practices for capital accumulation. Infrastructure development requirements and the stimulus that the resources offered to industrial developments were the major collective goods that the Brazilian economy could capture by extracting iron ore on a very large scale.

IRON ORE AND THE STATE

From the earliest colonial administration of Brazil, the sovereign claimed the subsoil as his/her/state property.[12] A logical implication of the claim was the separation of land ownership from rights to subsoil—mineral—resources.[13] The intent and initial application of the provisions defining subsoil sovereignty were to retain the control of wealth from precious metals for the sovereign. Simultaneously, early Brazilians and their Portuguese colonial overlords had persistently suffered from the difficulty of providing metal tools, machinery and implements to support the production of export commodities. Efforts orchestrated by the state to mine, forge and manufacture implements from ample Brazilian iron ore deposits stretched back to, at least, the 1790s.[14] At the beginning of the

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[10] The implicit contention of the paper is that if the category of "hierarchical market economy" meets Schneider's goal of understanding Latin American political economies, then it must have analytical power when applied to Brazil, the overwhelmingly dominant economy of the region. The paper also implicitly tests the historical relevance of Varieties of Capital theory.

[11] The paper leaves to other scholars the possibility of developing the arguments with respect to human capital and labor relations.

[12] This claim was not controversial, its origin of the principle rested in Roman law. The historical basis for distinguishing between surface and subsoil rights was based on the power of the sovereign. These laws were known as the *Ordenações Filipinas.* (Leis, *Alvará*, 15 August 1603.)

[13] Leis, *Alvará*, 15 August 1608. The rights to specific natural resource on the surface (timber, water, etc.) could also be subject to transfer separately from other resources (especially the right to cultivate). These transactions were left to the market, and their contractual enforcement was not different from other types of contracts.

[14] G.D. Triner, *Minerals and the State in Brazilian Development* (London: Pickering and Chatto, 2011), Chapter 2.

twentieth century, Brazilian officials and producers continued to wrestle with the problem of providing for the capital goods to support economic growth. Two of the major steps in remedying this problem at the end of the nineteenth century were to re-align mineral rights and to apply interpretations of subsoil rights to industrial minerals, specifically iron ore.[15]

The transfer of Brazilian subsoil (mineral) rights from the public to the private domain in 1891 was the first substantive change to subsoil rights since their original articulation in 1603; the transfer was reversed in 1934. Briefly, the Constitution of 1891, establishing the first republican political regime, attached subsoil rights to the surface (to land) and transferred control of land in the public domain from the Union to the states. This specification had two important implications: landowners (who were seldom miners) controlled mineral wealth and individual states regulated mining, rather than the national government. The purposes for these changes included a seemingly inchoate combination of offering a source of revenues for states to meet their newly decentralized fiscal responsibilities and an interpretation of economic ideology that accepted liberal precepts of private ownership as the most efficacious means of increasing mineral production. Slowly and unevenly, miners both adapted to these changes[16] and increased production (see Appendix Figure). The consensus of the period was that the increases occurred in spite of, rather than in response to, the change of legal regime.

By 1922, international industry officials estimated that Brazilian deposits accounted for twenty-three percent of known global iron ore reserves.[17] The largest and richest deposits were in the *Quadrilátero Ferrífico* centered in Itabira, Minas Gerais (see map), and much of the ore was of exceptionally high quality.[18] As interest shifted from precious to industrial minerals and as the extent of Brazilian iron-ore deposits gained global recognition, concerns about mineral rights took on new dimensions. In 1908, a consortium of British steel producers acquired the land (and thus, also, mining rights) of the deposits in Itabira. The company they formed, the Itabira Iron Ore Company, spent 13 years in pursuit of government approvals and viable development plans for the site, before selling options to the company to an investment group managed by Percival Farquhar in 1921. By 1939 and after much controversy, the Brazilian government refused to continue negotiating with Farquhar's investment group and denied them access to the ore.[19] By the middle of the 1920s, the extent of the Itabira deposits, the difficulties of developing them, and their potential for international trade and domestic industry gave rise to powerful new reasons to re-consider mineral rights. Developing iron-ore deposits

[15] Iron ore is typically a surface mineral.

[16] Triner 2011. Chapter 4 presents evidence that, in the most mining-intensive regions of Minas Gerais, new methods of securing access to mineral deposits gained credibility.

[17] "A Nossa Siderurgia e a Grande Siderurgia" Report attributed to Getúlio Vargas, November 1932; Ministério da Agricultura, Serviço de Fomento da Producção Mineral, memo of 26 May 1936. The volume of reserves estimated in Minas Gerais was 13 billion tons (J. D. Wirth, "Brazilian Economic Nationalism: Trade and Steel under Vargas", DAI-A 27/04: 105). By 197- , Brazil was the world's largest producer of iron ore and in 197--, it became the largest global supplier of exports.

[18] High quality iron ore is high in iron and low in phosphorous content. The Itabira ore was about 68 percent iron. Russia and Sweden had ore reserves of comparable quality to Brazil's, but the high-concentration reserves were of smaller quantity. (PF, Box 5, Folder 62, "Official Note" (1940, re-affirmation of 1936 manifest of mining holdings) Box 7, Folder 86).

[19] A large literature recounts this episode; it is reviewed in Triner 2011, Chapter 4.

in the region became one of the galvanizing political controversies in Brazil during the 1920s and 1930s, and its resolution rested upon redistribution of property and economic activity from private to public domains.

The Constitution and Mining Code, both enacted in 1934, firmly transferred mining rights and regulation back to the national government. The prospect of developing industrial-scale iron-ore mining motivated this reversal.[20] Returning the subsoil to federal domain was the first step toward consolidating the federal state's presence in mining. Increased federal activism in mining quickly followed in the forms of regulatory provisions, nationality constraints and ever-broadening definitions of national security. The abilities to mandate access to the subsoil attached to privately owned land, to allocate concessions and to coordinate concessions with additional preferences became tools that the national government actively used to promote mineral extraction and to select participants within the sector.

The new political regime in 1930, led by Getúlio Vargas, had consolidated the context for renationalizing property rights by establishing centralized governance and "economic nationalism" (defined as the development of a self-sufficient, modern, and industrial domestic economy) as the cornerstones of economic policy.[21] Shifting the relative capacity of the Brazilian economy from agricultural export products toward industrially produced goods for domestic consumption emerged as an explicit national political goal of the 1930s.

Industrialization and economic nationalism were linked goals for a combination of increasingly successful interest groups in Brazilian politics. The military found common cause with leading industrial entrepreneurs.[22] They explicitly associated the (conflated) development of industrial-scale mining and steel production with the "political and economic sovereignty of the nation."[23] Both groups understood secure access to mineral resources and large-scale steel production as the first steps towards

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[20] The argument for change was that private rights, subject to varying state-level regulations, were incapable of maximizing national development. The significant changes to mining regulation were its separation from land and return to the public domain at the national level. Both of these factors contributed to bringing order and security to mining enterprises. Interpretations remained inconsistent about whether ownership of mineral deposits rested with the state or the state's role was to control resources owned by no one (*res nullius*). See, for example United States Tariff Commission, *Mining and Manufacturing Industries in Brazil* (Washington DC: Government Printing Office, 1949), 11-2. For an explicit expression of the industrial ambitions motivating the Mining Code see D. J. Pimenta, 'Exportação de minério de ferro pelo Vale do Rio Doce', *Geologia e metallurgia*, no. 7 (1949). 126.

[21] On the Vargas Regime see G. Vargas, "A industrialização do ferro - base de nova estrutura econômica do Brasil (1931)", in *A nova política do Brasil* (Rio de Janeiro: Livraria José Olympio Editora, 1938-41). See also R. M. Levine, *The Vargas Regime; The Critical Years, 1934-1938* (New York: Columbia University Press, 1970); J. W. F. Dulles, *Vargas of Brazil: A Political Biography* (Austin: University of Texas Press, 1967); J. D. Wirth, *Economic Nationalism: Trade and Steel Under Vargas* (Stanford, Calif.: Stanford University Press, 1969).

[22] On the strong and increasing role of the military in domestic politics, see J. Murilo de Carvalho, *Forças armadas e política no Brasil* (Rio de Janeiro RJ: Jorge Zahar Editor, 2005). Carvalho suggests that the Vargas regime, particularly during the Estado Nôvo from 1937 to 1945, came at the initiative of the armed forces (109-10). On the emergence of entrepreneurs and industrialists as interest groups, see E. Diniz and R. R. Boschi, *Empresários, interesses e mercado: Dilemas do desenvolvimento no Brasil*, Humanitas (Belo Horizonte and Rio de Janeiro: Editora UFMG; IUPERJ, 2004), 44-54.

[23] *Revista Commercial de Minas Gerais* #30; March 1940, 49.

economic modernity and independence from fluctuations in global commodity markets. With time, both ideology and pragmatic political competition aligned the Vargas regime with industrial entrepreneurs and the military.

The military and industrial entrepreneurs constituted powerful interests to ensure that the state perceived iron and steel as a sector that generated important positive externalities not captured by private entrepreneurs, thus motivating state participation to ensure their provision. Defining domestic iron-ore mining as a strategic national interest hinged on its important externalities of enhancing military security and rapid, broad-based industrialization. Control of the iron-ore deposits at Itabira became the defining issue for economic nationalism.[24] The first order of business for implementing the strategy of economic nationalism was to address the Itabira Iron Ore deposits both because of the political controversy already attached to the effort and because it offered the most immediate prospects for export earnings and steel production.

Increasing constraints against foreign ownership in the mining sector through the 1930s addressed concerns about the ability to direct sectoral development of the domestic economy.[25] Some historians have attributed the increasingly tight provisions against foreign participation in mining as a reaction against Farquhar's attempt to control the Itabira ore deposits, which he targeted solely for export as a private enterprise.[26] More pointedly, Juarez Távora, the Minister of Agriculture and main architect of the Mining Code, expected the re-separation of the subsoil to "guarantee the federal government the tools necessary to avoid and annul assaults such as those of the Farquhar Group."[27] However, constraints from ancillary resource and institutional endowments—outside the realm of minerals rights —did not allow for easy alternatives (discussed below.)

Through the 1930s two comprehensive assessments re-appraised the original Itabira arrangements, while also searching for viable domestic alternatives to developing a project of similar scope.[28] Forms of state-sponsored incentives, including subsidies, tax and tariff relief and preferential access to military markets, were among the tools of industrial policy that the review commissions explored. State participation in these goals was a way to finance development through the easy collection of economic rents, protect against foreign dominance of strategic sectors and enhance the chance of domestic entrepreneurial success.[29] However, direct ownership and capital participation were not options they considered.[30]

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[24] M. M. A. Chiarizia, 'Itabira Iron Ore Company Limited' (Universidade Federal Fluminense, 1979), 13; Wirth, *Economic nationalism*; E. B. Burns, *Nationalism in Brazil: A Historical Survey* (New York: Praeger, 1968).

[25] CPDOC: AGM 1936.07.30 (letter from A. Magalhães to Francisco de Chateaubriand 30 July 1936). Even so, pockets of support for foreign investment in mining could still be found (Flynn, E. Miles 'Se o Brasil quer desenvolver a mineração' in *Mineração e Metalurgia*; Volume 8, 48 (April 1945) 379-82).

[26] Wirth, *Economic nationalism*.

[27] J. A. Ribeiro, *A era Vargas*, 3 volumes (Rio de Janeiro, RJ: Casa Jorge, 2001), Volume 1, 123-4.

[28] The National Steel Commission Report of 1931/32 and the report of the Technical Council of Economy and Finance (Ministry of Finance.) (Brasil. Ministério da Fazenda, "A grande siderurgia e a exportação de minério de ferro brasileiro em larga escala; Estudos e conclusões apresentadas ao Presidente da República em 27 de julho de 1938," (Rio de Janeiro1938).

[29] CPDOC: EMS pi Soares 1939.07.26; CPDOC: HB 22.08.16, 19 August, 1938 (1904); Jayme da Silva Lima, "O problema siderúrgico brasileiro sob o ponto de vista das indústrias militares;" S. Draibe, *Rumos e*

Global diplomatic exigencies of World War II offered the opportunity for the Vargas regime to implement its ambitions. Allied concerns about securing iron ore for war materiel and Brazilian alignment of war diplomacy resulted in the transfer of ownership of the Itabira Iron Ore Co.'s deposits to the Brazilian Treasury, guaranteed market for exports during its start-up phase, while also providing access to US Export-Import Bank loans and technical assistance, in 1942.[31] The Washington Accords allowed for the creation of the Companhia Vale do Rio Doce (Vale) to mine the Itabira Iron Ore deposits. An equally strategic agreement had created the Companhia Siderúrgica Nacional (National Steel Company or CSN) the preceding year.[32] These circumstances severed the long-standing connection between iron-ore mining and steel production with two distinct state-owned enterprises. Forming the two companies initiated large-scale state-owned industrial production and transformed the state into Brazil's largest industrial producer.

POLITICAL ECONOMY OF IRON ORE

Iron ore was an easily accessible resource. Why was private domestic enterprise with private property rights apparently unable to extract it on an industrial scale? The coordination problems created by institutional and resource endowment constraints were daunting and they rendered iron ore a highly capital intensive project.[33] Extracting ore from the ground was the easiest part of the project. Despite its generous endowment of iron ore, the capital requirements for two essential components impeded ambitions for large-scale ore mining during the first half of the twentieth century. Transportation infrastructure and fixed investment in plant and equipment were binding financial constraints for Brazilian ambitions in ferrous metals.[34] Iron-ore deposits in the mountainous *Quadrilátero Ferrífico* were far from the most robust demand for iron and steel products, in the coastal regions of São Paulo and Rio de Janeiro. These were the locations of industrialization, large-scale export-agriculture, and ports for ore exports.

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metamorfoses: um estudo sobre a constituição do Estado e as alternativas da industrialização no Brasil, 1930-1960, Coleção Estudos Brasileiros (Rio de Janeiro, RJ: Paz e Terra, 1985), 106. Draibe offers a cogent explanation that colonial experience had conditioned Brazilians against any activity that may offer an opportunity for foreign (or "imperial") control.

[30] In fact, the Treasury vetoed one proposal in 1937 because it relied on a treasury guarantee for a bond issuance. (Brasil. Ministério da Fazenda, "A grande siderurgia e a exportação de minério de ferro.")

[31] Washington Accords of March 1942. Ministério das Relações Exteriores, MDB 48/5/2: Emb. Washington /11C/812(.42)/1942/Anexo 1. The enabling legislation within Brazil for the Accords is *Decreto-Lei* #4352, 1 June 1942.

[32] The US military gained permission to establish a base in the northeast of Brazil, with easy access to the North African war front in exchange for the financial and technical support in the establishment of CSN. While the resources to form CSN appeared opportunistically, the establishment of Vale required exogenous events.

[33] Industrial policy of the period conflated iron-ore extraction and its industrial transformation into pig iron and steel when considering the mineral's economic possibilities. This conflation has a basis in logic; ore processed (refined) into pig iron is the first step to its further transformation to steel. The elimination of impurities resulted in a relatively homogeneous mineral composition: about 3½ percent to 4½ percent carbon, 3 percent to 4 percent other minerals and the remainder is iron.

[34] In the Itabira project, as it was finally implemented in 1942, the distribution of initial capital improvements allocated more than one-half of the development investment to railroad and port development. (Pimenta,, "O minério de ferro, Part 1": 98.) See also *Revista Commercial de Minas Gerais*; Volume 1, Number 1 (October 1937): 43-52.

The land transportation most suitable for iron ore was the railroad, with enhanced capacity and capability for heavy freight across mountainous terrain. The engineering and technological requirements for the railways were complicated, but solutions existed. The second constraint imposed by resource endowment was that coke (the mineral form of coal), useful for refining iron ore and necessary as an input for transforming iron into increasingly complex steel products, was not available in sufficient quantities within Brazil; plant-based charcoal continued to substitute for coke.[35] Britain supplied coal imports, which Brazilian financial authorities regarded as a drain of hard currency.[36] More to the point of this paper, the transportation needs (railroads and ports) of imported coal were the inverse of the requirements for iron ore.

Formal industrial policy that targeted large-scale iron and steel began to take shape in the 1920s at both the level of state and federal governments. These policies included such measures as transport subsidies, tariff exemptions, tax exemptions to iron-ore miners who also produced pig iron and steel, and preferential access to mineral coke. Despite the range of public incentives and subsidies, domestic entrepreneurs were unable to formulate plans that could realistically expect to accumulate the capital for a project of similar scope as the Farquhar's.[37]

The first Itabira Iron Ore Company plan for investment in 1911 was for 214,000 *contos*.[38] The scale of this one enterprise was very large relative to Brazilian access to capital markets (Table 1). Subsequent hypothetical plans were similarly disproportionate to the size of local markets. When the Companhia Vale do Rio Doce opened in 1942, as the successor to the Itabira Iron Ore Co., it and the companion integrated-steel project (Companhia Siderúrgica Nacional, both with a majority of the capital held by the national government) each had statutory equity that was one-third larger than the next largest firm on the Rio de Janeiro stock exchange and they accessed bond markets for long-term domestic loans equal to its capital (Cr$300 million, of each) by 1946.[39] All indications support the conclusion that the capital-intensity of industrial mining increasingly rendered sole-proprietorship or small family-centered partnerships infeasible business structures.

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[35] Attempts to produce steel without reliance on coke (the "Smith process") received little mention, and were not seriously considered. Lobato attributes this lack of attention to the prominence of British methods in the industry (M. Lobato, *Ferro: A solução do problema siderúrgico do Brasil pelo processo Smith* (Rio de Janeiro: 1931), Chapter 3). As an indication of its importance, the state nationalized the coal industry in 1942, simultaneously with its programs to construct large ore-export and integrated steel enterprises.

[36] United States Department of Commerce and Labor, Bureau of Manufactures, Special Consular Reports. "Coal Trade in Latin America" (Washington DC: Government Printing Office, 1910), 21-5.

[37] See footnote 28 for reference to the federally sponsored efforts to find alternatives.

[38] *Serviço Geológico e Mineralógico do Brasil*, 1923, 32.

[39] Vale Annual Report, various years; Pimenta, "Companhia Vale do Rio Doce".

	IIO	PF	PF	PF	PF	Vale
year of plan:	1911	1921	1928	1930	1938	1942
Itabira Iron Ore, Capital, as % largest companies on Bolsa de Valores						
Largest company without govt guarantee	3560	3511	2939	1907	956	133.33
Largest company, not RR or bank	356	843	490	763	1594	133.33
Largest company	305	602	294	763	956	na

Table 1 **Plans to Develop Itabira Iron Ore Deposits, Relative Size of Projects**

Source: Triner 2011 Appendix Table A.6.
Notes: These plans represent those put forward by: the Itabira Iron Ore Company (IIO), The Percival Farquhar Group (PF) and Companhia Vale do Rio Doce (Vale), respectively, in the years indicated.
Their plans did not indicate the funding distribution between equity and long-term capital; the amounts represented here assume that funding occurred entirely through equity.

INSTITUTIONAL HOLD-UP

Capital intensity contrasted sharply with institutional biases in favor of small enterprise. Brazilian business history amply documents the predominance of tightly held large diversified business conglomerates in the midst of a proliferation of small enterprises and the presence of multinational firms to operate in sectors in which domestic enterprise have trouble establishing themselves—defining features of hierarchical market economies.[40] One hypothesis to explain these characteristics, especially given financial theory and the structure of formal capital markets (for equity shares and bonds) through most of the twentieth century, would be the arrested development of capital markets. However, recent scholarship has begun to challenge that explanation, suggesting that unresponsive capital markets in Brazil emerged only from the 1920s.[41] The mechanisms that allowed for large-scale capital accumulation were in

[40] On the proliferation of small enterprise, see: J. H. Welch, *Capital Markets in Development: The Case of Brazil* (Pittsburgh: University of Pittsburgh Press, 1993); N. H. Leff, "Capital Markets in the Less Developed Countries: The Group Principle", in *Money and Finance in Economic Growth and Development*, ed. R. I. McKinnon (New York: Dekker, 1976); M. C. Eakin, *Tropical Capitalism: The Industrialization of Belo Horizonte, Brazil* (New York Houndmills, England: Palgrave, 2001). For assessments of multinationals, see W. Dean, *The Industrialization of São Paulo* (Austin: Institute of Latin American Studies by the University of Texas Press, 1969); P.B. Evans, *Dependent development: the alliance of multinational, state, and local capital in Brazil* (Princeton: Princeton University Press, 1979). Among the literature on individual entrepreneurs in Brazil, seeH.F. Lima, *Industrialistas brasileiros, Mauá, Rui Barbosa, Roberto Simonsen: Apéndice, 3 Documentos Raros*, vol. 12, Biblioteca Alfa-Omega de Ciencias Sociais. História; Ser. 1a (São Paulo: Editora Alfa-Omega, 1976). J.d.S. Martins, *Conde Matarazzo, o empresário e a emprêsa: Estudo de sociologia do desenvolvimento* ed. Coleção Estudos Brasileiros, second ed., vol. 1 (São Paulo: HUCITEC, 1976); C.G. Guimarães, "A Casa Bancária Mauá, MacGregor & Cia. (1854-1866) e o império no Brasil," (Universidade Federal Fluminense, Niterói1996).
[41] See, for example: A.G. Hanley, *Native Capital: Financial Institutions and Economic Development in São Paulo, Brazil, 1850-1920* (Stanford, Calif.: Stanford University Press, 2005); S. Haber, "Financial Markets and Industrial Development: A Comparative Study of Governmental Regulation, Financial Innovation and Industrial Structure in Brazil and Mexico, 1840-1930," in *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914*, ed. Stephen Haber (Stanford CA: Stanford University Press, 1997); A. Musacchio, *Experiments in Financial Democracy: Corporate Governance and Financial Development in Brazil, 1882-1950* (New York: Cambridge University Press,

place by the beginning of the twentieth century. The Commercial Code of 1890 permitted the free formation of limited-liability joint-stock companies, and local debenture and equity markets existed to facilitate the acquisition and exchange of financial assets. Nevertheless, deeply seated institutional constraints continued to inhibit capital accumulation in manners that formal capital markets did not address.

From the earliest colonial regulation, two principles governed the Brazilian economy. First, the overriding principle of business property law in Brazil was to preserve the integrity of fixed assets (mines and sugar plantations, for all practical purposes). Once accumulated, property could not be re-divided, if doing so reduced its productive capacity.[42] Second, one of the most persistent features of personal property law has been to preserve the inheritance of personal estates among all legally recognized heirs, limiting the ability of an individual to determine the distribution of assets within his/her estate.[43] These legal structures and the practices governing property have proved remarkably constant over time, and remain in effect (if with altered terms.)

In consequence, general laws on the composition, functioning and transferability of business partnerships developed very slowly. The success of partnerships relied on good will and personal relations. Personal partnerships became deeply entrenched as the most efficacious form for dealing with ambiguities about claims. Elsewhere I have invoked the example of the St. John d'el Rey Mining Company through the nineteenth and first half of the twentieth centuries to demonstrate the effects of indivisibility and personal inheritance practices on business partnerships. The St. John d'el Rey was an exceptional enterprise because it had the rights to the richest gold vein in the world until South African veins were fully developed and because of the unusually detailed documentation of its business transactions. The conflicts between indivisibility of real assets (including mines) and mandated division of personal estates resulted in claims and lawsuits against the mining company that required generations to settle. Heirs of sellers emerged posthumously, claiming both resources and a share of the company's profits (essentially asserting partnership rights) as their inheritance; unintended partnerships remained in place for generations; claims to unproductive property were constantly challenged. Continual legal cases consumed significant human and financial resources. Although the St. John d'el Rey Mining Company survived until the second half of the twentieth century, its experience demonstrates the disadvantages that impeded businesses when they were confronted with the strength of family-defined property and business

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2009); W.R. Summerhill III, "Inglorious Revolution: Political Institutions, Public Debt and Financial Development in Imperial Brazil."

[42] Deviations from this practice required a cumbersome judicial process. This principle was a generalized version of the indivisibility provisions of the 1603 *alvará*. 'Indivisibility' applied to real assets in a general sense. Sugar plantations and mills were equally protected, and these provisions made it impossible, into the twentieth century, to establish formal credit markets for real estate (mortgages) because of the inability to offer the property as collateral (S.B. Schwartz, *Sugar Plantations in the Formation of Brazilian Society: Bahia 1550-1835*, (Cambridge: Cambridge University Press, 1985), 202-4; G. D. Triner, *Banking and Economic Development: Brazil, 1889-1930* (New York: Palgrave Press, 2000), 135-8).

[43] A. C. Metcalf, *Family and Frontier in Colonial Brazil: Santana de Parnaíba, 1580-1822* (Berkeley: University of California Press, 1992), 95-6. Metcalf offers the most thorough discussion in English of the concept of family property and inheritance in early colonial Brazil. She distinguishes between inheritance possibilities between nobility and commoner, going so far as to say that, among noble families, the concept of property was familial, rather than individual.

networks. As late as the 1950s, company officials asserted that the business practices that they faced remained virtually unchanged from when the company first opened in 1832.[44]

Under these circumstances, the imposition of kinship-based business networks could always compromise the benefits of modern business organization. Small, kinship-based partnerships with tight control by owners formed around inheritance structures that worked with, rather than against, established law. As an outcome, indivisibility privileged prior capital accumulation while inhibiting future accumulation on a scale sufficient to build large mining enterprises.[45] The relevance of the St. John d'el Rey's experience is what it reveals about the *absence* of large innovative firms that accumulated capital through depersonalized markets. Rarely was it worthwhile for private enterprises to undertake the strategies of the St. John d'el Rey.[46] In consequence, capital formation and technological innovation posed strong barriers to forming dynamically growing business enterprise. Capital intensity and inherent risk attenuated these problems in mining.

PRIVATE AND PUBLIC

In fact, metallurgy companies remained small. Small size was especially pronounced within the state of Minas Gerais, where the major iron-ore deposits were situated. (Table 2).[47] *Mineiro* metallurgy companies were about one-third the size of the Brazilian average (by capital) and about one-quarter the national average by production. Among iron forging and laminating companies (those concentrated in the use of iron ore) the difference was even more pronounced: these *mineiro* companies were, on average 20 and 17 percent the size of the Brazilian average, by capital and production respectively. Transport costs as a share of total expenses for *mineiro* metallurgy companies were more than triple the national average.[48] Tellingly, mining and metallurgy companies also remained organized as unincorporated sole proprietorships or partnerships. The limited-liability joint-stock organizational structure was slow to permeate the sector (Table 3).

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[44] Anon. St. John d'el Rey Mining Company Limited; (J.H. Whittier?), "Historical Notes," St. John d'el Rey (Nova Lima Brazil1960), 6.

[45] Triner, *Mining and the State*, Chapters 4 and 5.

[46] Other real property seldom maintained its productive value across generations, as the St. John d'el Rey's exceptionally rich gold mines. The most important commercial crops, sugar and coffee, depleted their soils within about twenty-five years, mitigating the need to maintain the physical integrity of a continually 'productive' unit across generations. Failed excavations and short-lived businesses demonstrated the lesser value of other mining endeavors.

[47] Inconsistent evidence from the 1907 industrial census also suggests that metallurgy companies were considerably smaller in 1920 than they had been in 1907 (Industrial Census 1907, as cited in L. A. Corrêa do Lago, F. Lopes de Almeida, and B. M. F. de Lima, *A indústria brasileira de bens de capital: Origens, situação recente, perspectivas* (Rio de Janeiro: Fundação Getúlio Vargas, 1979)).

[48] Sources: Centro Industrial do Brasil. *Brazil: Its Natural Riches* (1910); Directoria Geral de Estatística. *Recenseamento do Brasil de 1920.* Forging and laminating company data are unavailable at this level of detail.

	1907			1919		
	Total Brazil	Minas Gerais	Minas Gerais, % Total Brazil	Total Brazil	Minas Gerais	Minas Gerais, % Total Brazil
Total Metallurgy						
Average Statutory Capital (contos)				132	42	32.1
Production (contos)	427	148	34.7	204	51	25.0
Expenses, transportation % total				2.8	9	316.7
Iron Forging & Laminating						
Average Statutory Capital	136			206	41	20.0
Production				285	48	16.8

Table 2 **Size of Metallurgy Companies, 1907 and 1919**

Sources: Centro Industrial do Brasil. *Brazil: Its Natural Riches* (1910); Directoria Geral de Estatística. *Recenseamento do Brasil de 1920*; see Triner 2011 (Appendix Table A.5.)

	Total	Unincorporated	Limited-Liability Joint Stock	Joint-Liability Partnership	Other
Total Metallurgy					
Brazil	509	479	22	4	4
Minas Gerais	76	72	1	2	1
Iron Forging & Laminating					
Brazil	116	102	9	2	3
Minas Gerais	32	na			

Table 3 **Corporate Structure of Metallurgy Companies, 1919** (number of companies)

Source: *Recenseamento do Brasil de 1920*, Table 16: 186.
Note: Forging & Laminating is a subset of Total Metallurgy.

Reinforcing the small scale of organized business and in contrast to the large demands of the Itabira project on capital markets, the immediate first-order impact on Brazilian macroeconomic measures remained small. Farquhar's investment group presented its first full proposal to exploit the Itabira deposits, in order to export ore to Britain in 1921. Figure 1 uses the projections from this unrealized enterprise to estimate counterfactually the first-order impact of the project on export revenues, import expenditures and national production, under the most favorable assumptions for project implementation.[49] This potential early success would have increased export revenues by less than 1.5 percent through the 1920s and 1930s, while reducing import expenditures (for pig iron) by as much as 2.2 percent (Figure 1). The relatively larger impact on

[49] The scale of the project would have transformed iron-ore mining and metallurgy in Brazil. If expeditiously and successfully developed according to this plan, Itabira Iron Ore Company exports would have reached a level almost 250 percent above the actual volume of total iron ore exports in 1942, and the company's production of pig iron would have exceeded annual actual Brazilian consumption until 1939.

imports than on exports substantiates the importance of the import-substituting possibilities that had been one of the priorities for Brazilian authorities. Increased exports and decreased imports, combined (one notional measure of the opportunity costs of not undertaking the project), could have accounted for a maximum of 0.15 percent of national production.

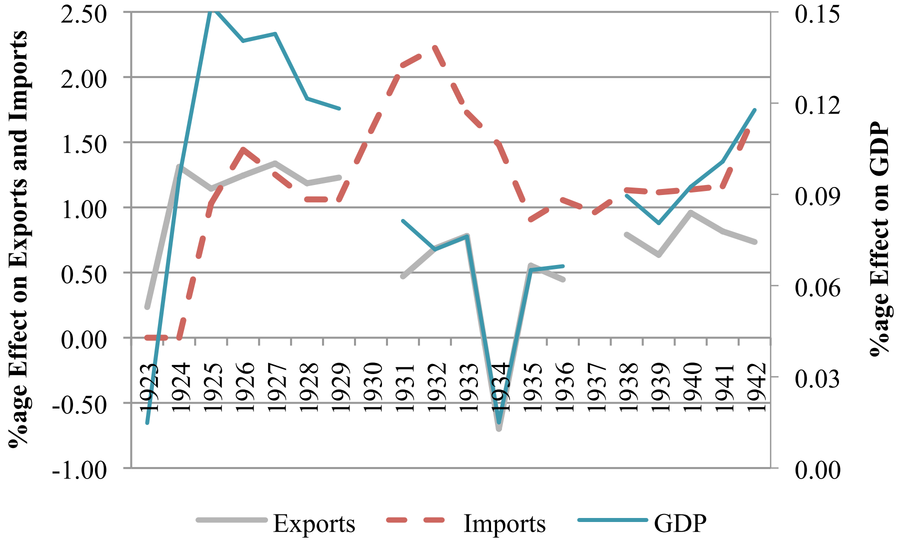

Figure 1 **Itabira Iron Ore Projections: Contribution to Macroeconomy, as of 1921**

Source: Triner 2011 Appendix Table A.6.
Note: For methodology and assumptions see Triner 2011 Data Appendix.

Simply put, the large demand on capital markets would have been asymmetrical and disproportionate with the small impact on macroeconomic measures for the first-order effects of the Itabira project. Although Itabira Iron Ore profit expectations may have been sufficient for its private investors, the importance of the project for the Brazilian economy lay in its externalities, not its first-order effects. These disparate results for public and private sector considerations suggest an explanation for the inability to develop domestic industrial-scale iron-ore projects.

The tools of formal capital markets, the issuance of equity securities and bonded debt, offered opportunities to mitigate the problems of asset indivisibility and the need for personal ties to cement partnerships. Many enterprises actively benefited from them.[50] However, change was slow. Business practices had evolved to invoke financing tools to an extent that was much smaller than necessary for unproven and capital-intensive industrial iron-ore endeavors. The transactions costs incurred by changing the fundamental institutions of indivisible real assets and mandated partible personal estates fell on those, small in number and easily identified, with entrenched property interests. Whether seen as an interest group or an entrenched elite, property owners had constructed a system to accommodate deeply embedded rules that had become their norm for structuring and sustaining their commercial affairs.

[50] Haber, "Financial Markets and Industrial Development"; A. Musacchio, *Experiments in Financial Democracy: Corporate Governance and Financial Development in Brazil, 1882-1950* (New York: Cambridge University Press, 2009).

Collective action theory offers an explanation in the strong possibility for stasis in the face of competition between established and new interest groups, when the identification and distribution of the benefits of institutional change remain indistinct.[51] In its major formulation, Olson hypothesizes that for fundamental institutional change to be effective, it must produce higher returns than the previous ones, concord with other institutions, and the benefits need to accrue to those economic actors who incur the costs of change. Olson further theorizes that small, tightly defined groups have important advantages relative to larger, more disparate groups in effectively representing their interests. Smaller, cohesive groups can more easily coordinate action and identify higher marginal benefits to its members from collective action. These concepts point to the disadvantage of those attempting to innovate by industrializing mining relative to traditional activities. The costs of changing capital accumulation practices fell to a small, highly privileged group; while the beneficial externalities fell to a highly diversified and indistinct group.

Foreign enterprise offered another possible avenue for escaping the problem of capital accumulation. Practices and procedures for establishing large-scale joint-stock companies, not subject to the constraints of local custom, could permit capital accumulation for endeavors within Brazil, and they had previously done so.[52] Such activities also offered the potential of transferring technology and incremental capital into the economy. By the 1920s, however, the political implications of importing capital had become irresolvably complicated with respect to developing industrial minerals, with the Itabira Iron Ore Company at the center of the controversy.

State-owned Enterprise and the state's role within the economy

In light of shifting domestic and global perspectives, ambitions for mineral rights escalated and another fundamental institution—the State—came into play. The Brazilian government viewed the externalities derived from iron ore production and steel manufacture as beneficial. The positive externalities included support for broader industrial development through the increased supply and lower prices of basic inputs, infrastructure, export earnings from exported ore, and the demonstration effects of large managerially sophisticated enterprise. While the gains could accrue widely throughout the Brazilian economy, the entrepreneurs taking the full risks of innovation and investment could not realize the full gains. In other words, these risks[53] remained internalized, while the gains were externalized. State-ownership accommodated the political realities that mitigated for domestic control at the same time that it responded to the demands of crucial groups.

Even with the arguments for state intervention in the productive economy, the idea of the state owning business enterprises that operate in conjunction with the private sector, as developed in the Brazilian case, is not natural, inevitable, or even obvious.

[51] M. Olson, *The Logic of Collective Action: Public Goods and the Theory of Groups* (Cambridge, Mass.: Harvard University Press, 1971).

[52] G.D. Triner, "Kinship Groups, Firm Structure and Property Rights in Nineteenth and Twentieth Century Brazil," *Enterprise and Society* 8, no. 1 (2007); G.H.B. Franco, *Reforma monetária e instabilidade durante a transição republicana*, 2 ed. (Rio de Janeiro: Banco Nacional de Desenvolvimento Econômico e Social, 1987 [1983]).

[53] Transactions costs, in the jargon of institutionalists.

Galambos and Baumol suggest that the motivations to establish SOEs have typically been the failure of markets or market-oriented capitalism to provide collective goods.[54] Some of the common justifications for state intervention have included the presence of information asymmetries, externalities or systemic synergies.[55] The choice of establishing an SOE to satisfy a demand for a good or service that private markets do not otherwise provide also requires an ideological willingness of the state to assume a direct role in production and commerce. In other words, an SOE facilitates hierarchical means to direct economic development. As in many economies, state ownership had precedents in Brazil. It had co-existed with private enterprise in infrastructure (for example, railroads, urban transportation, telegraph, etc.) and banking – sectors that were widely perceived to provide significant value as collective goods.

From a very pragmatic perspective, state-owned enterprises enjoy intrinsic advantages over those of private entrepreneurs.[56] They spread the business and investment risks across the wider population who benefit from the collective goods, rather than limiting risk to private investors. The state's creditworthiness can contribute to lowering the cost of capital.[57] For large, risky capital-intensive projects these advantages can be considerable. When information asymmetries render regulation unreliable, the state's role as major investor implies that relevant regulatory information is available, even while setting up a conflict between regulation and market participation. Finally, profit maximization may receive lower priority in public enterprise than in private sector efforts, providing an implicit subsidy to the firm. All of these considerations pertain strongly to mining.

Embedded ideas about one of the fundamental concerns of property rights – the distinction between the public domain and private property – underpin the organization of SOEs. By forming a business enterprise, the state enters into an activity in which it interacts in business transactions with other economic agents. Its partners, customers and competitors do not have the same the powers as the state-owned enterprise to command resources, benefit from explicit or implicit subsidies, regulate practices, set prices or allocate output.[58]

In the case of Brazilian iron ore, the emergence of the state as an entrepreneur solved multiple organizational problems of capital accumulation and technological

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[54] L. Galambos and W. Baumol, 'Conclusion: Schumpeter Revisited', in *The Rise and Fall of State-Owned Enterprise in the Western World*, ed. P. A. Toninelli (Cambridge and New York: Cambridge University Press, 2000), 303-10.

[55] P. A. Toninelli, 'The Rise and Fall of Public Enterprise: The Framework', in *The Rise and Fall of State-Owned Enterprise in the Western World*, ed. P. A. Toninelli (Cambridge and New York: Cambridge University Press, 2000), 7-8; E. S. Reinert, 'The Role of the State in Economic Growth', in *The Rise and Fall of State-Owned Enterprise in the Western World*, ed. P. A. Toninelli (Cambridge and New York: Cambridge University Press, 2000), 75. The determination of economic justification is an empirical question that requires examination on a case-by-case basis.

[56] M. M. Shirley, 'Bureaucrats in Business: The Roles of Privatization versus Corporatization in State-Owned Enterprise Reform', *World Development* 27, no. 1 (1999): 116.

[57] This factor functioned very differently for the case of Vale. Because Brazilian sovereign debt was in default at the time of the US Export-Import Bank financing, the foreign loan to Vale may actually have helped to re-establish sovereign creditworthiness when the Treasury emerged from default in 1945.

[58] These are the preferences that many believe to allow state-owned enterprises to overcome the market failures that motivate their formation.

coordination, without challenging nationality sensitivities or deep-seated institutional arrangements with respect to asset indivisibility and partible inheritance sensitivities for entrenched holders of private property. State-owned enterprise substituted for foreign ownership and for private domestic capital, technology and organization. This intervention drew heavily on deeply rooted precedents in property rights and centralized governance from the colonial and imperial periods of Brazilian history. Further, it did so without challenging long-embedded institutions that governed the control of property in other activities. Institutional practices of state capitalism emerged to reconcile a complex set of goals.

State-ownership of the nation's largest industrial enterprises was not a foregone conclusion and strong arguments had prevailed against that outcome for at least two decades. This arrangement offered crucial advantages through protections and subsidies offered to Vale (and CSN) with respect to capitalization infrastructure development. The economic rents captured by the state, the ability to set prices and to allocate supply of basic goods, as well as distributing policy support[59] firmly established the state at the pinnacle of the economic hierarchy. Organizing the firms as limited-liability joint-stock companies, in which the state was the majority shareholder, inextricably tied public and private interests.

Conclusion

The long-term effort to mine iron ore on an industrial scale led to the formation of the Companhia Vale do Rio Doce in 1942. As a state-owned enterprise the firm became a financial mainstay of the state[60] and the world's largest producer of iron ore by 1974 [check]. Analysts have consistently pointed to the firm as an exception to standard expectations for state-owned enterprises; Vale has been characterized as profitable and well managed.[61] Since privatization in 1997, the firm has emerged at the beginning of the twenty-first century as a privatized firm and one of the largest mining and metals conglomerates in the global economy. Nevertheless organizational mechanisms and investment patterns remain in place to ensure continual mutual support between the state and the firm.[62]

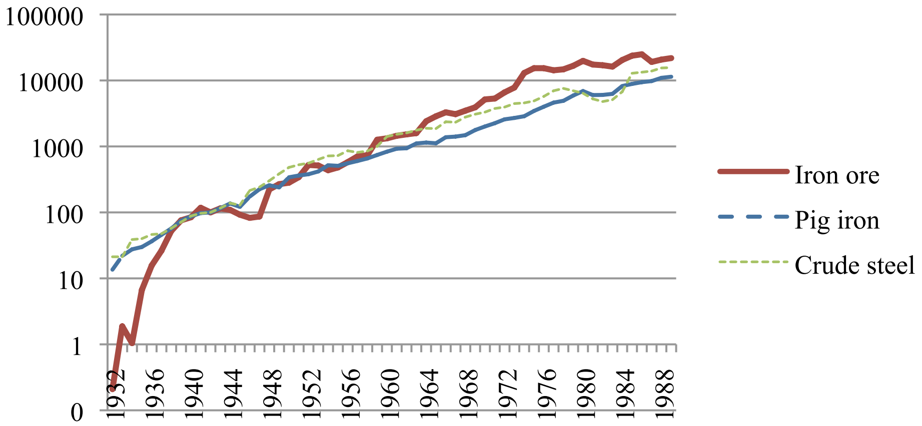
The conjoined experiences of producing iron ore and steel for commercial markets initiated the Brazilian state's extensive presence as an industrial producer through the second half of the twentieth century. It set a precedent for state interventionism in the spheres of entrepreneurialism and production that was crucial for the evolution of governance within Brazil; state-owned enterprises for production of basic goods became an accepted strategy during the twentieth century.[63] These practices

[59] This support included benefits derived from tax, tariff and monetary (especially during the 1940s-60s, multiple exchange rates) policies.
[60] Triner Ch 5
[61] A.D. Novaes, "Rentabilidade e risco: empresas estatais *versus* empresas privadas," *Revista Brasileira de Economia* 44, no. 1 (1990); S. Raw, "The Making of a State-Owned Conglomerate: A Brazilian Case Study," (South Bend IN: Kellogg Institute, University of Notre Dame, 1987).
[62] See, for example, Lazzarini, *Capitalismo do laços: Os donos do Brasil e suas conexões*.
[63] Though not the subject of this paper, all of the arguments and many of the actors reappeared in the late 1940s and early 1950s at the center of the controversy that led to the nationalization of petroleum and the formation of Petrobras. Chemicals, concrete and paper were among other basic materials in which the state consolidated its leadership in production.

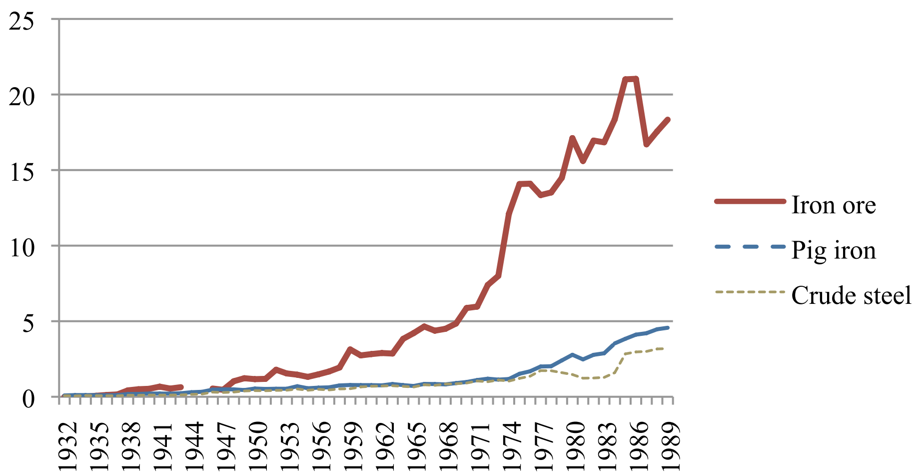
ensured that important influence of economic policies determining production, allocation and prices remained with the state, and those with access to policy making.

This paper has delineated important historical dynamics that contributed to shaping a hierarchical market economy within Brazil. The inherent conflicts between the integrity of real assets and the mandated partibility of personal estates have been permanent features of the Brazilian business landscape. These institutional constraints left a vacuum that resulted in a hierarchically organized business system. And, they shaped the logical trajectory by which the state occupied that vacuum. While highlighting these conflicts as an underlying constraint on the formation of large enterprise capitalized by depersonalized markets, the paper also focuses on the heightened barriers that these constraints posed for the exploitation of one of Brazil's most accessible resources, iron ore. By the middle of the twentieth century, a small group of industrial entrepreneurs and the military formed a cohesive and powerful interest group with strong influence in the Vargas regime; they kept the state focused on important externalities of iron and steel that private entrepreneurs could not capture. Re-allocating both property and activity from the private to the public domain, with respect to iron ore, and determined an environment for the political economy that continues to resonate. Finally, the paper demonstrates that market structure and its varieties are not static. Firms and their activities, as well as such other actors as individuals and the state, constantly re-shape the contours of markets and defy unchallenged categorization.

Appendix Figure 1 **Index of Production 1942=100; log-scale**



Appendix Figure 2 **Production, Brazil % Global**



Source: UN Statistical Yearbook, various years

Production measured in metric tons (000)