

Theorizing Theory: Origins and Orientations of Commodity Chain Analysis

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Abstract: Commodity chain analysis, derived from world-systems theory, is a useful heuristic for organizing thought and shaping research on global political economy. Commodity chain analysis narrows in on individual commodities and analyzes the organizational processes of production, consumption and disposal of these commodities within the world economy. This approach is particularly appropriate for highlighting the roles of materiality and governance structures in shaping globalization. Nevertheless, commodity chain analysis, by positioning itself as oppositional to traditional economics, undertheorizes the price mechanism, misses issues of terms of trade, ignores the key role of state policy in influencing commodity trajectories, and fails to fully accommodate non-physical commodities such as services and knowledge. This review essay begins by tracing the theoretical origins and evolutions of commodity chain analysis and reviewing the key contributions to the literature. Secondly, this paper discusses weaknesses of the approach with a view towards broadening and enhancing this important body of research.

Keywords: Commodity Chain Analysis, World-systems Theory, Historical Capitalism, Terms of Trade, Price Mechanism

Introduction

THE PHRASE “COMMODITY chain” refers to the organizational process of production, consumption and disposal of goods and services in the world economy. Over the past two decades this concept has become an important heuristic device in development sociology for examining the organization of work within neoliberal globalization. Commodity chain analysis conceptualizes each individual commodity as a series of sequential nodes, which, when linked together, form a “chain.” Commonly, these nodes include a products’ design, the fabrication of raw materials that constitute inputs into the assembly of a product, the assembly itself (often in various stages), wholesale marketing, retail marketing, retail consumption, and post-consumption. To carry the metaphor out, when the individual strands of each commodity are woven together they create the tightly entwined global economy. The notion of the commodity chain is a powerful metaphor for organizing thought. By conceiving of the world economy through the lens of commodity chains, issues that are obscured through other theoretical frames are thrown into sharp relief. The reverse however, is also true. Other theoretical frames capture certain dynamics of global economic relations better than the commodity chain approach. This essay is concerned with exploring the commodity chain literature as a body of theory and as an analytic technique. The first section of this essay looks at the particular theoretical questions to which commodity chain analysis responds and traces the theoretical origins and evolution of the literature. The second

section discusses certain strengths of the commodity chain approach by looking at the sorts of actors within the global economy that commodity chains can examine best. The third section discusses the analytical shortcomings of the commodity chain approach in comparison with other organizing principles.

Theoretical Origins and Evolution of the Commodity Chain Approach

The commodity chains approach to researching the global economy asks and attempts to answer a number of fundamental theoretical questions. This approach stems from a rich tradition of literature on political economy from Adam Smith to Karl Marx to Immanuel Wallerstein to Gary Gereffi. The key theoretical issues taken up by this literature include 1) the social underpinnings of the processes by which things acquire value in the global economy, 2) the relational dynamics of economies of distinct scalar levels, 3) the mechanics and logic of the global division of labor, 4) the logic of firm organization and behavior and inter-firm relations, 5) the historical and ongoing origins of underdevelopment, and 6) the organization of work in economic production.

Commodity chain analysis has been adopted by sociologists from a range of theoretical persuasions, but it originated in the late 1970s and early 1980s as an offshoot of world-systems theory. World-systems theory is predicated on the labor theory of value; a set of ideas originally developed by Adam Smith in the late 1700s and subsequently fleshed out by David Ricardo and then by Karl Marx nearly a century later.



Though Smith and Marx bequeath very different legacies on contemporary political economy, today's labor theory of value, considered Marxist and eschewed by conventional economics in favor of the theory of marginal utility and general equilibrium, owes its origins to both thinkers. By extension, commodity chain analysis begins with the theoretical contributions of Smith and Marx in explicating the process by which a commodity is imbued with value.

Both Smith and Marx conceptualized commodities as possessing two types of value: use value and exchange value. Use value refers to the relative utility of a product to an individual, and is quite independent of exchange value. The use value of wood for example far outweighs the use value of gold. Gold is too scarce to serve as a practical material for constructing houses, furniture and other items that are highly useful (fundamental) to the human enterprise. In exchange value terms, however, the relative worth of these two commodities is quite different. Because of gold's scarcity and wood's abundance, a unit of gold is much more valuable than a comparable unit of wood.

The notion of exchange value is derived from the labor theory of value. Smith claims that a commodity acquires its value based on the amount of labor hours embedded in the production of that commodity. This calculus includes the labor hours embedded in creating the non-labor inputs (e.g., raw materials) of a given commodity. The notion that commodities are comprised of other commodities plus additional labor is the theoretical precursor to the concept of the "node" in the commodity chain approach." Smith saw a problem with his mechanism, however, in that some labor was proportionally more valuable than other labor. Rents accrue to owners of stock (stores of inputs) through the investment of their stock in production. But ownership is not traditional labor, and yet the costs of ownership are embedded in the price of the commodity. Smith came to terms with this dilemma by arguing that education and skill enhanced the value of labor and by making a case for inspection and direction (ownership) as a skilled enterprise. This is the point at which Marxian, and by extension World-systems, labor theories of value depart from Smith. Marxian theory sees value-added not as proportional to education or skill level, but as proportional to effort, and considers a skill-dependent value calculus to be exploitative. This notion of exploitation is at the root of world-systems theory, which holds that the explanation for "underdevelopment" in the global south is not a failure or unwillingness to modernize, but rather the product of an externally-imposed system of exploitation in which inputs from southern economies are combined with capital and expertise from northern economies to create profits and rents which accrue disproportion-

ately back to northern countries. In such a system undeveloped countries are kept indebted through negative terms of trade despite the fact that the bulk of labor value embedded in commodities is generated in these nations. This set of ideas enables commodity chain analysts to deal with theoretical questions concerning how different economies within the world economy interact with one another. In short, commodity chain analysis unmask the dynamics of power relations between economies.

World-systems theory is an offshoot of dependency theory, which emerged as a critique of modernization theory. Modernization theory, based on W.W. Rostow's (1960) *The Stages of Economic Growth*, held that development was a linear process equally accessible to all national economies, and that all economies were at different stages on a deterministic path to modernization. Further, went this line of argumentation, the reasons for a country's failure to industrialize come from anti-modern cultural traditions or lack of capital investment. Implicit in this set of ideas was the prescription that countries should emulate the United States and Western Europe if they wished to develop. Andre Gunder Frank (1967) and Fernando Cardoso and Enzo Faletto (1971) launched dependency theory as a critique of modernization theory. Dependency theory argued that development was not equally accessible to all national economies as modernization theory had assumed, but rather that underdevelopment was a condition imposed upon economies of the south by the north through the mechanism of colonialism. World-systems theory emerged in the late 1970s, through the early work of Immanuel Wallerstein (1976), as an effort to enhance dependency theory's somewhat simplistic formulations. World-systems theory introduced the concept of division of labor within a world-system comprised of core (developed), semi-peripheral (middle income) and peripheral (underdeveloped) nations as a way of better explaining the dependency that Frank had crudely ascribed to colonialism. Division of labor as the organizing principle for world-systems theory has persisted and become the organizing principle for commodity chain analysis as well. Thus commodity chain analysis is well-suited to address questions of the mechanics (how) and the logic (why) of the division and distribution of labor in the global economy.

Wallerstein's (1980) work, *Historical Capitalism*, contains the first use of the phrase "commodity chain." Prior to the advent of historical capitalism there was no labor market. Labor was arranged in cottage industry, slavery, feudalism, or some other mode where individual laborers did not sell their labor in an open market to the highest bidder. Prior to historical capitalism labor was fixed. Therefore, even if factor owners wanted to accumulate capital,

it could not be accomplished easily because there was seldom an available workforce. Once labor became freely bought and sold in a market--once labor and the circuit of capital had been commodified--historical capitalism took root. For historical capitalism to thrive, not only did social processes have to be commodified, but production processes and exchange processes as well. The commodification of production enabled these processes to be "linked to one another in complex commodity chains" (p. 16). In historical capitalism, goes Wallerstein's argument, the simplistic market where the single producer and the consumer meet is replaced by a system where

most transactions involve exchange between two intermediate producers located on a long commodity chain...the struggle over price in these intermediate markets represented an effort by the buyer to wrest from the seller a proportion of the profit realized from all prior labour processes throughout the commodity chain." (p. 29).

Wallerstein goes on to show that firms contrived a variety of schemes such as monopoly and vertical integration, which rendered supply and demand inadequate to explain prices. Thus, by conceiving of the architecture of the economy as a struggle over rents, not only can commodity chain analysis treat questions of how economies interrelate, but it can similarly treat theoretical questions of firm behavior and the power dynamics within inter-firm relationships.

The creation of commodity chains expanded the notion of uneven exchange from individual transactors to nation states. Commodity chains overwhelmingly originate in the developing world and terminate in the developed world. Wallerstein, seeking to explain this empirical fact, argues that unequal exchange is a function of scarcity and abundance. World regions with more abundance of an item on the market received a lesser return than the same item moving the other direction. This created a hierarchy of nodes where certain processes were more valuable (less abundant) than others, and these nodes were disproportionately located in developed countries. Scarcity was often artificially manipulated through vertical integration and force, thus the circuit of capital imparts its benefits unevenly to the developed and developing world. Therefore, commodity chain analysis, as the progeny of world-systems theory, responds to theoretical questions regarding the origins and the nature of persistent underdevelopment as well.

The final set of theoretical questions which commodity chain analysis undertakes involves the organization of work in commodity production. While the concept of the commodity chain was developed in *Historical Capitalism*, the "commodity chains" ana-

lytic approach was first put forward by Terence Hopkins and Immanuel Wallerstein (1986). The first step in commodity chain analysis, as they described it, was to delineate the various nodes starting with the finished product and moving backwards. The second step, broken down into four processes included identifying 1) "commodity flows to and from the node and those operations that occur immediately prior to and after it, 2) the relations of production within the node, 3) the dominant organization of production, including technology...and 4) the geographic loci of the operation in question." (Hopkins and Wallerstein 1986 cited in Gereffi and Korzeniewicz 1990). Ten years after the first use of the term commodity chain in *Historical Capitalism* Gary Gereffi and Miguel Korzeniewicz (1990) expanded the commodity chain model by explicitly introducing the role of marketing and product differentiation to further explain the concentration of capital in the developed world. Gereffi and Korzeniewicz further consolidated and institutionalized the commodity chain approach to political economy analysis in an edited volume (Gereffi and Korzeniewicz 1994) of papers from the 1992 Political Economy of the World-System Conference. Here, the approach was described as helping to clarify processes of globalization by distinguishing "cyclical patterns from new trends" while also dealing spatially and relationally with the processes of globalization (Gereffi, Korzeniewicz and Korzeniewicz 1994).

Gereffi (1994) attempts to develop an overarching organizational framework for the wide variety of commodity chains in the world economy. To accomplish this, he looks to the textile and automotive industries as ideal types. Here, he draws a distinction between buyer-driven and producer-driven commodity chains. Buyer-driven chains (embodied by textiles) are geographically dispersed, favor less-developed countries, and extract high rents in the transition from factory to retail. The producer-driven chain, on the other hand, is embodied by heavy manufacturing industries such as automobiles. In this model, the factory itself (typically owned and operated by the same firm that gets the commodity to market), engaged in the technologically demanding act of transforming many small and simple parts into sophisticated machines, exerts primary influence within the chain. These chains tend to be much more vertically integrated than buyer-driven chains and tend to be located in middle income countries, where workforce dynamics are more suitable. The normative prescription that emerges from commodity chain analysis is the idea of upgrading. This is a simple value added story. The more national economies are able to upgrade; that is, increase the amount of processing of a commodity taking place within the national borders, the better off that economy will be in

terms of profits as a percentage of final retail price and the greater the likelihood that such a state can exert influence over the chain as a whole. In short, states develop, per the commodity chain framework, by upgrading. Gereffi's typology has been influential, but has also been criticized. Clancy (1998) demonstrates how service sector industries in particular don't fit Gereffi's framework. Gibbon (2001) suggests that in the chains of many primary products the central governance lies with international trading houses (intermediaries) rather than with producers or buyers *per se*. Talbot (2004) using the coffee chain as the basis for his analysis, suggests that coffee possesses elements of all three governance structures, but that ultimately there is no one governance structure which predominates.

More recently, Gereffi, Humphrey, Kaplinski and Sturgeon (2001) updated this terminology to be more inclusive, moving from the term "commodity chain" to the term "value chain". The former of these phrases, they felt, had privileged production over the consumption of manufactured goods, and, as a model, had failed to adequately address trade in services, information and primary products. Commodity chains, which emphasized "the internal structure of supply chains and [the] role of diverse lead firms in setting up global production and sourcing networks" became "value chains" which "highlight the relative value of those activities that are required to bring a product or service from conception through a different phase of production (involving a combination of physical transformation and the input of various producer services) delivery to consumers and final disposal after use." (Gereffi et al 2001: 3).

Actors and Issues in Focus under the Commodity Lens

"Commodity chain" is only a metaphor, but it is a powerful metaphor in its ability to highlight phenomena that are cast in shadow under other political economy models. Essentially, there are three broad sets of issues within global political economy that commodity chain analysis illuminates particularly well. These are 1) understanding national borders as actors in commodity production and development, 2) understanding the points of leverage and power in economic relations, and 3) integrating materiality into development discourse.

All of us are consumers. In our workaday lives we encounter a wide variety of commodities; durable goods, consumer non-durables, fresh food, television programs, etc. The advantage of the commodity chain analysis is that it allows us to deconstruct these commonplace objects and unpack the social relations embedded in them. Karl Marx wrote that commodity fetishism masks the social relations between individu-

als. That is to say, as commodities lose their novelty for us, we lose our sense of the social and political conditions under which they were produced. The commodity chain approach allows the researcher to dismantle the "black box" of social relations by deconstructing commodity fetishism.

The first technique that commodity chain analysis has bequeathed us to deconstruct commodity fetishism is exploring how goods cross borders and the implications of these processes for labor and national economies. This attribute of commodity chain analysis is the purest manifestation of its world-systems theory patrimony. Commodity chain analysis lets us break down a finished commodity into unit processes and lets us locate each of these unit processes within a national or local territory. We can then chart which types of processes tend to congregate in which types of countries, and in so doing, we can illustrate the way that the elaboration of commodities privileges wealthy countries over poorer ones (Wallerstein 1980). This phenomenon expresses itself in terms of technology and learning spillovers that developing countries miss out on by typically not encompassing the information technology, marketing and design nodes of commodity chains. This phenomenon also expresses itself in terms of the differential rent margins that accrue to the different nodes along a commodity chain. Typically the costs of raw material production and product assembly (commonly nodes located in developing countries) are high and the returns on abundant and unrefined goods are relatively low. On the other hand, the input costs for marketing are low and the returns on these "finishing touches" are disproportionately high. Though labor is more expensive by unit around the finishing nodes, it is less intensive, thus less expensive in aggregate terms. Thus, not only do poorer countries miss out on learning and technology opportunities, but despite having invested more in bringing the same finished commodity to market, their costs are greater and profits lower than those of wealthier countries. This technique enables the researcher to see geography and national boundaries as actors in the unfolding of global economic processes.

The commodity chain is uniquely suited to cast these dynamics of the world-system into relief. Other paradigms don't provide the conceptual vocabulary to make these connections. For example, when we invoke terms of trade as a heuristic for understanding economic relations we conceive of exports and imports as finished goods. We are able to assess whether the terms are positive (aggregate price of exports greater than net cost of imports) or negative. But the causal mechanism is obscured. In contrast, with the commodity chain approach, one can never conceive of raw material as a finished good, but rather as an input into some product to be further

refined. This technique enables the researcher to transcend the convention of national-level comparison and understand how countries are hierarchically positioned within the world-system.

The concept of points of leverage, or “power nodes,” is another issue which commodity chain analysis is uniquely suited to explore. These power nodes are what Gereffi (1994, 2001) has referred to as “systems of governance.” “Governance,” in this context, is the assumption of responsibility by certain actors within the chain for maintaining the division of labor between firms and assigning opportunities to upgrade (Kaplinsky 2000). Usually, power nodes lie in developed countries. This observation lends credibility to the claims of world-systems theoreticians. Commodity chain research, because it is able to make the black box of commodity production more transparent to consumers, is a useful tool for activists who seek to pressure firms. Conducting a commodity chain analysis can help activists identify where the governance structures lie within a commodity chain, thus illuminating which actors can facilitate the outcomes activist groups may desire.

Materiality is an important actor in political economy that most other approaches miss. Materiality can take the form of perishability in the case of food commodities, the constraints of topography in getting goods to market, soils and climate in agricultural production, or the geological distribution of minerals in the earth’s surface. Perishability has been a material actor of great import in the institutional elaboration of many agricultural commodity chains. Robert Thomas (1985), for example described how lettuce, because of its seasonality and perishability, required a flexible, readily-available, hardworking and exploitable workforce. This helped institutionalize migrant farm work in lettuce. Friedland (1994) describes the synergy between transportation, refrigeration, and breeding technologies that allowed the fresh fruit and vegetable industry to become global by overcoming the limitations of perishability. DuPuis (2002) similarly illustrates that material qualities of fluid milk were fundamental in fashioning the regional character of production and distribution systems in milk (milksheds). Coffee has a much longer shelf life than lettuce or milk; therefore, while perishability is not a major factor in the coffee chain, other material factors do matter. Talbot (2004) demonstrates how the five year delay between planting and first harvest in coffee (like in other tree crops) means that supply and demand are perennially out of sync causing cyclical market gluts which sink prices and bankrupt farmers. This fact led to the establishment of trade agreements between coffee producing and consuming nations, which set the course of the commodity chain for many decades.

Mineral resource commodity studies, like food studies, also argue that materiality has a significant impact on a variety of features of the commodity chain. Commodity studies of mineral resources have favored minerals that serve as key industrial inputs like bauxite for aluminum (Barham, Bunker and O’Hearn 1994) and iron for steel (Bunker and Ciccantell 2005). This is likely the case because the control of in-ground reserves of industrial metals implicates states as well as firms in concerted competition. Barham et al. discuss three geological factors that shape industry composition: mineral scarcity, distribution and location. Scarcity, by facilitating struggles over resource rents, attracts a “complex web of participants into various levels of the industry operation (p. 22).” Relative geographic concentration/dispersion of a mineral influences the degree of oligopoly and state control of resource reserves. Additionally, resource location (both in geographical and ecological terms), while bringing less to bear on industry makeup, influences settlement patterns and infrastructure networks. Bunker and Ciccantell, building on Barham et al., refer to the iron reserves in the Carajás area of the Brazilian state of Pará to illustrate how the need for tremendous economies of scale to make up for low value-to-volume ratios in industrial metal mining influence industry organization. In this story, a Japanese firm, in collaboration with the Japanese state, was able to bring iron ore from the Amazon to market in Japan below cost despite seemingly insurmountable spatial constraints by exploiting extreme economies of scale through state-of-the-art extraction and transportation technologies.

In sum, while “commodity chain” is simply a metaphor, it is a useful organizing principle for analysis of actors and issues as diverse as national borders, firms, governance structures within industries and materiality.

Analytical Limitations of the Commodity Chain Approach

Though commodity chain analysis is a helpful analytical technique, it is not without its shortcomings. This section describes five sets of actors and issues within political economy that the commodity chain literature underprivileges or is not adept at analyzing. First, commodity chain analysis, though ideal for understanding value and value-added, does not incorporate price. By positioning itself as oppositional to neoclassical economics, commodity chain analysis undertheorizes commodity prices. Second, commodity chain analysis, by focusing in only on one commodity, misses issues of terms of trade and macroeconomic state behavior. In so doing, it risks telling misleading stories about core-like and peripheral

behavior. Third, with a few key exceptions, the commodity chain literature has undertheorized the role of the state in influencing the shape of many commodity chains. Fourth, crude commodity chain analysis has reified notions of core and periphery to such an extent that developing economies and states are entirely stripped of their agency. Lastly, though the newer “value chains” literature seeks to rectify this, the commodity chain approach lends itself to the analysis of physical commodities and is largely incapable of dealing with commodities such as information and services.

Commodity chain analysis, rooted as it is in world-systems theory, and by extension in Marxian labor theory of value, undertheorizes price. It overlooks factors such as supply and demand which contribute to the ultimate price value of commodities in the market. By failing to properly incorporate supply and demand into their theoretical frame, the commodity chain analysts leave us with the crude notion that value, approximately equivalent to price, is determined solely by labor hours embodied in the commodity. This is partially true and heuristically important for the dependency story commodity chain analysts seek to tell. But it is not the whole story. Price convergence through the integration of markets exposes commodities to the vagaries of supply and demand (see Goldin and Reinert 2006). Gereffi’s (1994) influential emphasis on governance structures within commodity chains has perhaps kept this body of literature from incorporating the price mechanism and utility function into their analyses. Because of this limitation, commodity chain analysis has ironically become more theoretically sophisticated in understanding firms and inter-firm relations than in understanding the nature of commodities in the global market. To perfectly analyze the commodity chain, one must consider the dynamics of consumption in global terms. Commodity chain analysis, despite rhetoric to the contrary, has always been more concerned with production than consumption. In part this is because by ignoring the price mechanism and refusing to stray from a labor theory of value that only tells a partial consumption story in this era of global price convergence, commodity chain analysis has failed to fully account for consumer behavior. Commodity chain analysis’ language of vertical and horizontal integration around different nodes can help explain why profits from global prices accrue differentially to one node or another, but as we have moved from a world-system to a global economy, commodity chain analysis has been slow to adapt.

Furthermore, because commodity chain analysis focuses on one commodity and not on national economies and their positions in the world-system, it doesn’t pick up macroeconomic issues like terms of trade. The more recent literature on value chains (see

Kaplinsky 2000) has identified and sought to rectify this limitation. Analysis of a single commodity precludes a full view of the relational dynamics between different economies in trade with one another. This means that it may, in some cases, emphasize processes that when taken in their larger context, dispute the very cycle of exploitation that commodity chain analysis is concerned with elucidating. For example, an analysis of coffee production in which a developing nation exports raw beans for roasting, grinding, packaging, marketing and retailing in the developed world would undoubtedly indicate that the coffee producing nation was on the losing end of such a trade agreement. This is a typical commodity chain story. The majority of costs are in planting and harvesting (periphery) but the majority of profits come from marketing and retail (core). A commodity chain analysis tells that story well; but if that same nation were to invest its modest returns on raw coffee exportation in capturing the marketing nodes of several key agricultural commodities, then its role as price taker in the coffee market is no longer “peripheral behavior.” By not incorporating terms of trade on the aggregate national level, commodity chain analysis may misrepresent peripheral and core-like behavior. To avoid reifying core and periphery, and to avoid stripping national economies of their agency, commodity chain analysis must incorporate some knowledge of the macroeconomic context in which commodity chains are elaborated without sacrificing its intimate commodity-level focus.

Structurally, commodity chain analysis is also limited in its accounting for the role of the state in influencing the elaboration of commodity chains. In particular, early, world-systems-informed commodity chain analysis was preoccupied with the role of firms in the elaboration of commodity chains at the expense of a full treatment of roles of the nation state and supranational regulatory bodies. States have always been present in world-systems theory, but they have never been conceptualized as nodes in commodity chain processes. In fact, state regulatory policy, international geopolitics, and even the structure of national and local bureaucracies profoundly influence most commodity chains (Gellert 2003). Yet, because these actors don’t fit comfortably within the sequential metaphor of the chain, many analyses are limited by discounting these influences. By privileging firms over states, world-systems analysis has held firms responsible for the provision of life quality to citizens of nation states. Whereas neoclassical theories hold up the market as the ultimate provider and orthodox Marxism assigns this onus to the state, world-systems theory has taken a third route and blamed the firm itself for underdevelopment. This has let the state “off the hook” in such a way that, while it does not reproduce neoliberal notions of the primacy of the

market, it synergizes with neoliberal disregard for the state. In much of Wallerstein's writing (see 1982) the state is only relevant insofar as it protects domestic markets or facilitates the integration of domestic markets with external markets. Steven Topik, Carlos Marichal and Zephyr Frank (2006), in their historical account of twelve Latin American commodity chains, take issue with this limitation of the approach. They describe the important roles that taxes, tariffs, subsidies, and bureaucratic management played in influencing historical global commodity chains with origins in Latin America.

While the orthodox commodity chain approach is structurally poorly suited to nuanced analyses of the state-as-actor, not all commodity studies entirely ignore the state's role. Commodity systems methodology (see Friedland 2002) is a looser analytical framework than commodity chain analysis. Friedland's work has followed a different path than commodity chain analysis, although it has considerable conceptual overlap with the Gereffi school. Because commodity systems methodology is not bound by the chain metaphor; however, it has more fully incorporated the role of the state. Robert Thomas' (1985) study of lettuce harvesting in the United States, for example, is, to a large extent, a study about the contemporary reverberations of the US government's Bracero Program to import Mexican labor between 1942 and 1964. It is also a story about the ways that manipulating the concept of citizenship, a concept defined, delineated and enforced by the state, affected the organization of lettuce harvesting in California.

Indeed the fullest commodity chain analyses are those that pay close attention to the role of national state and supranational regulatory apparatuses in shaping of chain. Examples of this include the role of the (now defunct) multi-fiber arrangement in the global garment industry (see Collins 2003) and the role of the international coffee agreement in the global coffee chain (Talbot 2004, Jaffee 2007). John Talbot's (2004) study of the global coffee industry is a prime example of this. Talbot rendered a complex narrative in which the International Coffee Agreement (ICA) was a central actor in the global coffee commodity chain until 1989. He documents the dissolution of the ICA and the transition to a neoliberal approach within the coffee industry. Furthermore, Talbot illustrates the political underpinnings of the demise of the ICA; rather than firm-led, the process was state-led. But Talbot does not limit his analysis to an industry study. He undertakes a true commodity chain analysis demonstrating how rents accrue at each point along the coffee continuum and elucidating the governance structure. States occasionally influence the organization of nodes beyond their territorial boundaries as well. The role of the US government in propping up the United Fruit

Company in Central America from the 1880s to the 1950s is a particularly well-documented example (see Schlesinger and Kinzer 2005; Koepfel 2007)

Mineral commodities require a synergy between policy and geology for their profitable extraction. This observation is in keeping with Gereffi's (1994) assertion that producer-driven commodity chains, which tend to be heavy manufacturing, lend themselves to interventionist state policies while buyer-driven commodity chains thrive under minimal intervention. Therefore, mineral producers depend on state apparatuses in many cases. Leith (2002), for example, drawing from the case of Freeport McMoRan's Grasberg mine in Indonesia, shows how important host-state policies are for mining firms when deciding where to locate. Bunker and Ciccantell (2005) and Bunker (1994) argue that mineral deposits, when viewed as space-bound, strategic industrial inputs, can provide strategy rents to the states that control their access. If a state cannot control a deposit owing to it being located in another national territory, they can partner with private firms to control access to the minerals. This was the case with the role of the Japanese state in extracting iron ore from the Brazilian Amazon (Bunker and Ciccantell 2005). In such cases, the role of the state is not always transparent. Operations may appear to be private when they are in fact state-controlled. This suggests that in some commodity chains states and public policy are more significant actors than they are in others. Therefore, commodity chain analysis must be careful to consider states as nodes in the chain, and not only attribute agency to firms.

Another limitation of the commodity chain approach is that it reifies the notions of periphery and core and denies agency to actors within peripheral countries. Rammohan and Sundaresan (2003) propose overcoming this limitation by "socially embedding" the commodity chain. Topik et al. (2006) reach back five centuries to trace twelve key historical commodity chains which originated in Latin America and brought to bear on the architecture of the international economy. In this way, Topik et al. seek to challenge the assumptions of world-systems theory that developing countries are incapable of asserting governance in industries in which they participate. Additionally Topik et al. attempt to illustrate the long-standing role of the state in the elaboration of various commodity chains. These authors make a strong empirical case that a simplistic world-systems framework paints third world actors as "passive victims," and that the historical record does not support such a claim. In so doing, these authors illustrate the complexity of interactions between the global north and south that early world-systems theory and commodity chain analysis did not capture. For example, Miller and Greenhill's (2006) study of

the guano and nitrate commodity chains in Chile and Peru, make empirical claims regarding the way in which the contracts and learning from the earlier guano trade in these countries became the springboard for their dominance in the more lucrative and enduring nitrate trade in which they didn't necessarily have the same comparative advantage that they had in guano.

The final analytical constraint of the commodity chain approach is its privileging of physical over non-physical commodities. Industry studies tend to be better equipped than commodity chain analysis at analyzing non-physical commodities. The commodity chain approach has chosen to privilege physical over non-physical commodities in part because the global trade of information and services doesn't fit the Gereffi taxonomy of governance structures (Clancey 1998). Services, in particular, because they cannot be traded easily across space are confined to local markets. It would be very difficult, for example, to hire a landscaping company based in India to trim shrubs in upstate New York. Service markets are inherently local, which means they do not cross borders as physical commodities do, and therefore do not have the same implications for world-systems theory. Though the service industry, particularly online services (Gereffi 2001), does conform to the buyer-driven model, it does so in a way that is not in keeping with world-systems theory. It can be argued however, that while service markets do not cross borders, borders are effectively reconfigured to satisfy service markets. Emigration from Latin America to the United States has increased substantially as the service industry has grown in the United States. Where restaurants cannot efficiently ship their dishes overseas to be washed, domestic firms can create a labor market which, by importing informal and thus unprotected labor, can reduce costs as though it were operating in the developing world. Kaplinsky (2000) has made an effort to integrate trade in knowledge into value-chain

analysis by making what essentially amounts to a human capital argument: "we have observed that intangible knowledge is increasingly characterized by high barriers to entry, and that the owners of this knowledge gain most from the globalization of production and exchange" (p. 90). Kaplinsky's intent here is to make knowledge as finished commodity appear like knowledge as input into the marketing node within the chains of physical commodities. Under the buyer-driven governance model, the owner of the knowledge receives a premium for contributing value in the form of human capital to the fabrication of a finished product. But in the case of knowledge qua finished product, there is no chain to speak of. The entire commodity has been generated mentally. Thus, trade in knowledge and creativity (Florida 2002) exists outside of the processes of differential rent accrual within the world-system and therefore cannot be easily understood through the commodity chain frame.

Concluding Remarks

As discussed in the preceding two sections, orthodox world-systems based commodity chain analysis has both strengths and weaknesses as an analytic tool. It is particularly suited for unmasking the role of materiality, firm behavior, inter-economy relational dynamics, and points of leverage within industries. It is weaker on incorporating actors such as terms of trade, the price mechanism, the role of the state, and non-physical commodities. Despite these significant shortcomings, however, the commodity chain framework is an extremely useful heuristic for organizing thought about global political economy. Furthermore, sophisticated commodity studies such as Thomas (1985), Talbot (2004), and Bunker and Ciccantell (2005) have overcome many of the limitations described here while fully engaging the strengths of the approach.

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