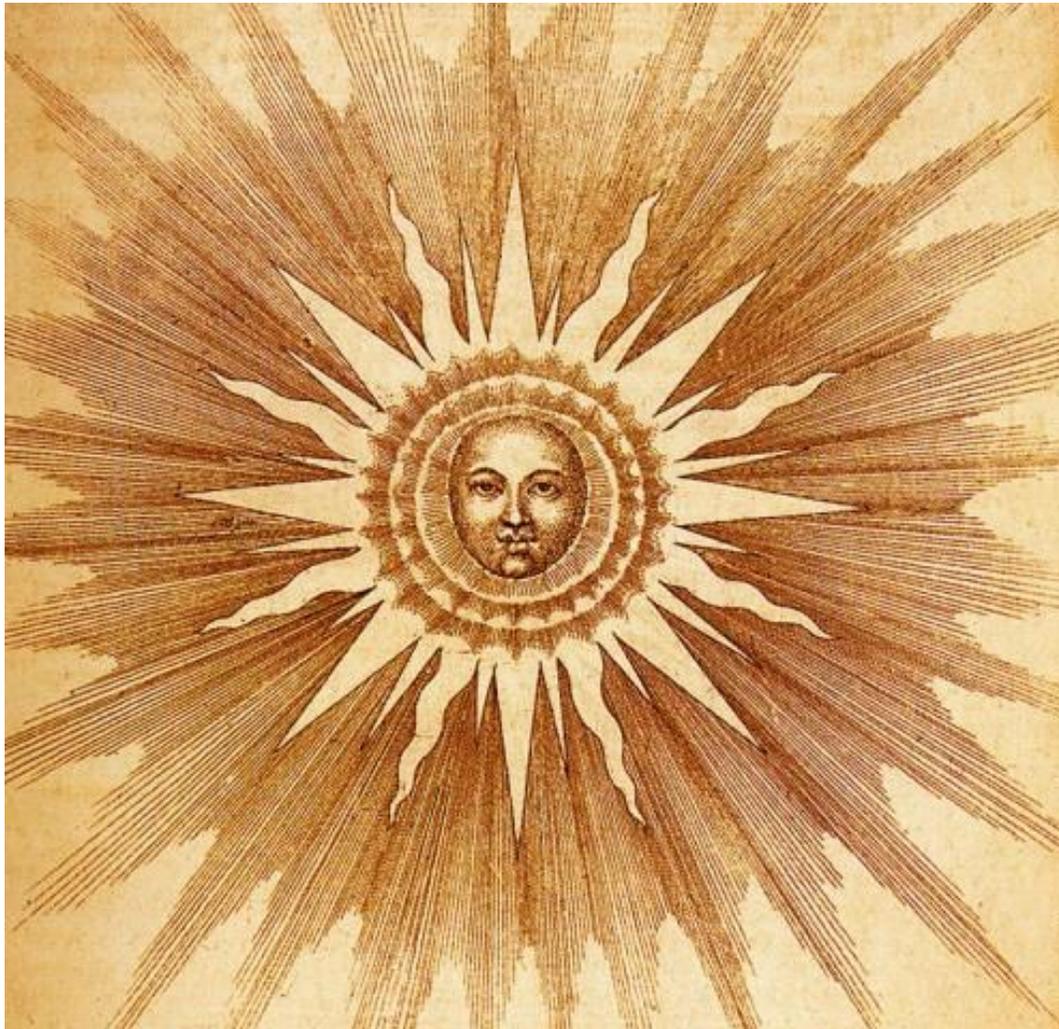


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Editor's Introduction: Commodity Chains in and of the World-System

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In the two decades since the publication of Gereffi and Korzeniwicz's (1994) ground-breaking edited volume, *Commodity Chains and Global Capitalism*, scholars have conducted a vast quantity of research on international production networks.¹ Today there are voluminous literatures on constructs that are or would appear, at least morphologically, to be similar to the structure that Hopkins and Wallerstein defined as a "network of labor and production processes whose end result is a finished commodity" (1986: 159). Although the commodity chain, or one of its later variants, has been widely mobilized to address concerns quite distinct from those of its creators, the provenance of the concept in world-systems analysis is often noted (Raikes, Jensen and Ponte 2000; Leslie and Reimer 1999; Le Heron and Stringer 2012; Fernandes 2010). The term was first introduced by Hopkins and Wallerstein in a 1977 article outlining a research program to study patterns of development of the modern world-system. Specifically, they proposed to follow the production networks of particular commodities as a way to trace the incorporation of new areas into an emergent worldwide division of labor during the long sixteenth century. Observing that the sequential steps involved in the creation, cultivation, and transportation of a particular good could be conceived as a commodity chain, they and their colleagues studied several specific chains to ascertain where these activities were carried out, and how the unequal returns to these activities created a stratified world-system.

During the 1990s, in the context of growing academic and popular interest in what was perceived to be a novel and/or intensified phase of globalization, the commodity chain concept grew in popularity as one of the few analytical methods available for studying the growing complexity of international production networks. A new set of scholars—many of whom were unfamiliar with the macro-historical tradition of commodity chain research—embraced the chain construct to analyze changing industrial geographies, the rise of organizational practices such as outsourcing and off-shoring, and the implications of these developments for both core economies and developing countries.

As the commodity chain concept gained currency, it began to circulate far beyond the community of PEWS scholars that coined it, complicating the relationship between commodity chain analysis and world-systems analysis. The clearest indication of this growing estrangement was a marked change in the conceptualization of commodity chains as potential pathways for development or upward mobility. Accepting that all commodity chains include a combination of "core" activities (those earning relatively high returns) and "peripheral" activities (those earning relatively low returns), commodity chain analysts nevertheless observed that the mix of activities

¹ This special issue grew out of a paper session at the 37th Annual Political Economy of the World-System Conference at the University of California-Riverside in April 2013. In addition to the authors, I would like to thank, the conference organizers and the referees for the collection, who graciously provided insightful and constructive reviews of the manuscripts under a particularly tight deadline. I am also grateful to *JWSR* editor Jackie Smith for providing a home for this collection.

occurring within the borders of a particular territory could change over time. Hence, national economic development could be defined as increasing the ratio of core to peripheral activities occurring within a given unit. This formulation, which posited commodity chains as “potentially dynamic learning curves” that economic actors could use to “upgrade” (Gereffi 1999: 39), reoriented the central research question from how commodity chains structure global inequality at a systemic level to how they facilitate development at a unit level. Because the world-systems perspective recognizes that mobility within the world-economy is possible, as individual countries move up or down, this developmentalist turn in commodity chain research did not necessarily require a radical break with world-systems analysis. However, it did shift the object of inquiry from the structural dynamics and aggregate consequences of commodity chains to the properties of a *particular* chain (such as its “governance structure”), and the developmental (or “upgrading”) prospects of actors within in it (Gereffi 1994).

By the early 2000s, the commodity chain terminology was frequently being used interchangeably with other constructs, such as global production networks (GPNs). In recent years, one such alternative nomenclature—global value chains (GVCs)—has become hegemonic, especially within more applied or policy-oriented studies of global industries. Global value chain analysis has even been taken up enthusiastically by international financial institutions, including the World Trade Organization and the World Bank, as well as bilateral development agencies, such as the Department for International Development in the United Kingdom and the U.S. Agency for International Development (Nielsen 2013; Gereffi 2013).

On the one hand, readers of this journal might find it gratifying that a concept—or at least a variation on a concept—proposed and developed by world-systems scholars has resonated so widely with a diverse constituency composed of activists and organizers as well as academics and policymakers. Yet the profusion of chain and network constructs, and the veritable flood of research employing one or more of these terms, creates a complicated intellectual and analytical landscape, populated by neighboring and sometimes overlapping camps. Elsewhere (Bair 2005), I and others (Coe, Dicken and Hess 2008) have argued that there are salient conceptual differences among these constructs that merit consideration, even if there are considerable similarities across them in terms of how scholars approach their study empirically (Nielsen and Pritchard 2009; Levy 2008). But rather than revisit the relationship between these various chain-inspired approaches to the study of globalization, the question I want to pose here is the following: can one still identify a distinctly world-systems perspective on commodity chains?

Although the intent of this special issue is not to propose a litmus test or a set of evaluative criteria for deciding what ‘counts’ as world-systems analysis, I do believe the articles gathered here provide an affirmative answer to this question. Collectively, they suggest that what distinguishes the world-systems approach to commodity chain analysis is the use of the chain construct to illuminate the complex and concrete determination of a capitalist world-economy. Perhaps more than any other concept in world-systems analysis, commodity chains render the social system of modern capitalism tractable as an object of study. The contributions to this special issue, while displaying a methodological pluralism and substantive diversity characteristic of the broader field of world-systems research, are exemplary of the way in which commodity chain analysis can be mobilized to illuminate the contours, composition, and character of the modern world-system. Specifically, they address four questions that are at the core of a world-systems-inspired commodity chain research agenda:

- By what methods do states seek to shape commodity chains?

- What is the relationship between commodity chains and the stratification of the world-system, and how, if at all, does this change over time?
- Where does the surplus in commodity chains come from, and how are the returns to participation distributed among the actors in the chain?
- What kinds of structural and/or discursive openings do different commodity chains create for political organization and/or resistance?

States and Commodity Chains

The study of commodity chains provides a window into one of the structural tensions of the modern world-system (and one of the orienting concerns of world-systems analysis): that between the political organization of the globe into units called states, and the worldwide division of labor that is created by linked labor and production processes transcending the boundaries demarcating these units. But to point out that most commodity chains are not contained within a single state does not imply that states play no role in their configuration or operation. Indeed, the opposite is true, since, as Wallerstein notes, the fact that virtually all chains cross national borders means that they are “subject to interference by state authorities, because states have the sovereign right within the interstate system to establish rules about what crosses their frontiers” (2009: 83).

One of the many ways that states, at least core states, shape commodity chains is by fostering institutional contexts that instantiate their particularistic interests as the formal rationality governing trade and production networks. Their ability to do so, however, may be threatened by changes in the relative power and position of particular actors within the world-system. In her contribution to this special issue, Amy Quark interrogates the potentially destabilizing effects of such shifts, and how dominant actors respond to them, via an analysis of the cotton commodity chain. Quark draws from Arrighi’s (1994) work on hegemonic cycles in the world-system to consider how newly powerful states can emerge to challenge embattled hegemonies. Specifically, in applying this model to commodity chain analysis, she proposes the concept of *sectoral* hegemony to highlight how states, in (sometimes fraught) coalitions with other actors, seek to maintain the Gramscian legitimacy of these institutional contexts, and thus ensure their own privileged position within key sectors.

Quark’s analysis of sectoral hegemony focuses on cotton. One of the world’s most traded agricultural commodities, cotton is also one of the most contentious. Subsidies to U.S. cotton farmers have been at the center of a protracted dispute between the United States and a coalition of cotton-growing nations that includes major exporters such as Brazil as well as several African countries whose far smaller volumes of cotton shipments are nevertheless an important source of export revenue. While its *domestic* agricultural policy on cotton has subjected the United States to considerable international criticism, U.S. hegemony in the *global* cotton market has been maintained via its governance of the cotton commodity chain, and specifically its role in defining both the standards that determine cotton quality and the procedures used to verify them. But as Quark explains, China’s economic rise is posing a serious challenge to the stability of this system. Since 1995, the gradual phase-out of import quotas on textile products has permitted a rapid expansion of China’s global market share for apparel. China has required enormous volumes of cotton to fuel this growth in textile and clothing production; it is now the world’s largest domestic producer of cotton as well as the world’s largest cotton importer. The Chinese

government has sought to flex this newfound muscle by challenging the United States' sectoral hegemony over the cotton commodity chain. While it has not succeeded in dislodging the United States from its dominant position, China has nevertheless achieved significant concessions in the form of revised standards and a more inclusive system of sectoral governance. Perhaps most significantly, the struggle over the cotton chain has weakened the coalition on which U.S. hegemony rests, insofar as the transnational cotton merchants that have allied historically with the U.S. government are now preparing for the possibility of a shift to Chinese hegemony.

In showing that the struggle for sectoral hegemony takes the form of a contest over commodity standards that involves both states and firms, Quark diagnoses the interrelated nature of commodity chain governance and the institutional contexts within which 'private sector' governance is exercised. In so doing, she fills an important lacuna in the existing literature. Studies of global commodity chains, and more recently global value chains, have tended to focus on how lead firms control, coordinate, or 'drive' chains, largely bracketing the role of states, or inter-state conflicts, in enabling or sometimes constraining lead firm governance. Although scholars identified with the global production networks (GPN) 'camp' emphasize this deficit, for the most part they consider the influence of regional or local institutions on commodity chains, and the degree to which institutions encourage synergistic forms of "strategic coupling" that embed economic activities in delimited territories. In contrast, Quark's analysis centers on the macro-institutional context of commodity chain governance. In addition to highlighting the tension between the global accumulation processes that structure the world-system and the geopolitical units that demarcate that system into states, her article suggests that struggles over sectoral hegemony provide a window into how shifts in the epicenter of these accumulation processes might occur.

The Returns to Commodity Chain Participation and World-System Stratification

Just as world-systems analysis challenges the centrality of the nation-state as the primary unit of analysis in historical social science, so too does commodity chain analysis provide an alternative way of understanding the relationship among these units. From a world-systems perspective, the core-periphery relationship emerges from a series of linked "economic activities structured in commodity chains that cut across state boundaries" (Arrighi and Drangel 1986:11). Some of these activities—those which are protected by higher barriers to entry—command relatively greater returns, while other nodes in a commodity chain—those which are more globally dispersed and characterized by higher degrees of competition—are remunerated less well. In their pioneering discussion of commodity chains as stratification mechanisms, Arrighi and Drangel (1986) referred to these activities as "core-like" and "periphery-like," while global value chains analysts more commonly use the language of "value-added" to describe the unequal returns to different links in the chain.² These activities are not distributed randomly across space, but rather tend to cluster such that some areas have a greater proportion of "core-like" activities relative to "periphery-like" ones, while in other parts of the world, the reverse is true. When the geopolitical map of states is superimposed on this global distribution of commodity chain links,

² As Ben Brewer (2011) has pointed out, this formulation of the relationship between the commodity chain activities occurring within a country and that country's position in the world-system position was largely tautological—a weakness addressed to some extent by later research (Arrighi, Silver, and Brewer 2008; Mahutga 2014).

it becomes clear that the varied combinations of “core” and “peripheral” links in the totality of commodity chains reflect and reproduce a stratified world-system.

The relationship between commodity chain dynamics, the stratification of the world-economy, and the composition of the particular strata comprising this system is fundamental to our understanding of global inequality. As noted earlier, the developmentalist turn in global commodity (and later global value) chain analysis put the last of these concerns at the center of the research agenda—that is, how “upgrading” trajectories might permit countries to improve their relative position. But this work typically does not address how the upgrading of one chain participant affects the distribution of returns to others, nor does it address how, if at all, mobility within the commodity chains comprising the world-system might alter the structure of that system diachronically.

Matthew Mahutga enters this debate by in some sense turning the question on its head. That is, he departs from both orthodox world-systems theory and the developmentalist turn of global value chain analysis by making no assumptions about the relationship between the positional power of states and the returns to their participation in global production networks (or GPNs, a terminology he prefers to the chain metaphor). Instead, he treats this question as the explanandum of a macro-comparative commodity chain analysis. Using trade data to infer the positional power of countries within particular commodity chains—i.e. the degree to which the firms located within states occupy “core” (lead) or “peripheral” (captive) positions within these networks—Mahutga evaluates three contending hypotheses regarding the implications of GPN participation: cooperation (mutually beneficial outcomes), exploitation (lead firms benefit at the expense of captive ones), or differential gains (captive firms experience absolute gains that are nevertheless smaller than the gains made by lead firms). To adjudicate among these possibilities, he examines returns to commodity chain participants in two well-studied commodity chains—the “producer-driven” auto industry and the “buyer-driven” garment industry—via panel regression models of hourly wage rates in these sectors across a sample of 96 countries.

Mahutga finds that returns to labor—as measured by the wage rates of workers in each commodity chain—do not support the cooperation hypothesis. In both the auto and apparel industry, returns to participants are uneven, as wages in countries containing more lead/core firms exceed those in countries where captive/peripheral firms predominate. This result supports the view that commodity chain dynamics increase polarization within the world-system. However, he also finds that only in the apparel industry do participants in the captive/peripheral position experience *absolute* declines in the form of falling wage rates, and only during the latter period (post-1980) of Mahutga’s analysis. Following Gereffi (1994), he explains the divergent fortunes of apparel workers with the diffusion of the buyer-driven model of network governance, or what he calls the entrenchment of this particular “organizational logic” (p. 17). In other words, it is only once lead firms succeed in externalizing production to subcontractors in lower-cost countries, and then use their buying power to stimulate completion among these globally dispersed suppliers, that the returns to participation approximate a zero-sum logic in which the states containing core/lead firms (and the consumers within these states) gain at the expense of the states containing peripheral/captive firms (and the workers within these states). Mahutga concludes that this variation across industries suggests that commodity chains express multiple, sector-specific logics, and as such, cannot be treated as a single, homogenous stratification mechanism.

Surplus Creation and Value Capture in Commodity Chains

If Mahutga's article focuses on the distribution of returns to commodity chain participation, the contributions by Wilma Dunaway and Donald Clelland explore, in distinct but complementary ways, where this surplus comes from. Dunaway's provocative essay begins by underscoring the dearth of attention given to gender in commodity chain analysis. Initially, this claim may seem surprising; after all, the relationship between patriarchy and capitalism is the subject of a large, interdisciplinary literature that addresses the implications of gender subordination for the exploitation of female labor, and since the 1980s, scholars have recognized the feminization of employment within the export sectors of developing countries as a constitutive feature of the new international division of labor (Elson and Pearson 1981; Fernandez-Kelly 1983; Mies 1986; Wolf 1991). But although much of this research has focused empirically on the contributions that women workers make to what are often deeply gendered commodity chains, the nexus between gender and commodity chains has not been theorized as such.³ Consequently, and with a few important exceptions (Ramamuthy 2001; Werner 2012), feminist scholars have rarely considered what their research might tell us about commodity chains; Gender, likewise, is rarely at the center of commodity chain analysis. This continues to be true today despite the fact that Hopkins and Wallerstein gestured towards the importance of gender and households in their original formulation of commodity chains more than three decade ago, noting that among the labor and production processes linked through these networks is "the reproduction of the labor forces involved in these productive activities" (1977: 127-138).

As an important corrective to the overwhelming emphasis in commodity chain analysis on economic units in the formal economy, Dunaway points out that commodity chains routinely incorporate multiple forms of labor, including non-wage, unfree, and non-compensated work, much of it done by women. Female (but also feminized) labor is critical for commodity chain dynamics because it generates part of the surplus that fuels accumulation, even as it is naturalized as "women's work," and thus rendered invisible (including, Dunaway would suggest, to commodity chains scholars). This essentialist characterization of gendered labor further conditions the distribution of surplus and the unequal returns to commodity chain participants. Dunaway's essay underscores three of the false analytical divides that have marginalized the study of gender within commodity chain analysis: 1) that between production and reproduction; 2) that between household and market; and 3) that between the informal sector and the commodity chain. Overcoming these divides is necessary if we want to understand commodity chains as the "warp and woof of [the capitalist world-economy's] system of social production" (Hopkins and Wallerstein 1994: 17).

In his contribution to this special issue, Donald Clelland also examines the varied sources of commodity chain surplus, though he does so via an intensive analysis of the commodity chain for a particular product: Apple's well-known electronic tablet, the iPad. Apple's dedication to Schumpeterian innovation and its ability to develop sleek and sophisticated products that revolutionize the way consumers use technology is often presumed to explain its vaulted status as the world's most admired company for (as of March 2014) seven years running. Yet through his analysis of the iPad commodity chain, Clelland provides a distinctly different take on Apple's

³ This lacuna in the commodity chain literature is not limited to gender. Marion Werner and I have proposed the concept of disarticulation to grapple with the varied ways in which multiple forms of difference—social as well as spatial—enable and condition commodity chains (Bair and Werner 2011).

success—one that draws insights from the global value chain camp (e.g. Gereffi, Humphrey and Sturgeon 2005) while remaining resolutely committed to an overarching world-systems perspective. Noting that Apple has externalized to independent suppliers virtually all of the “tangible” activities in its chain, as well as some of the “intangible” ones thought to be the source of much value-added for contemporary manufactures (Gereffi et al. 2001), Clelland sets out to determine the distribution of value-capture along the nodes of the iPad production network. In so doing, he starts with publicly available product teardowns for the iPad, which reveal the cost of specific components and the identity of some of the firms supplying them. Clelland shows that Apple is able to capture the lion’s share of the surplus in this chain by constructing degrees of monopoly in various areas, including 1) product development and design; 2) supply chain governance; and 3) marketing and retail. Additionally, he identifies Apple’s monopsonistic power over suppliers as an additional source of the company’s profitability.

But while a conventional value chain analysis might end there, Clelland is only getting started. Transcending what Dunaway describes as the false analytical divides that unduly narrow commodity chain analysis, Clelland examines the relationship between “bright value”—the surplus whose capture and distribution can be quantified (however imperfectly)—and “dark value,” which Clelland defines as “unpaid labor and uncosted externalities that are not transformed into bright value but are embedded in commodities as value beyond price that benefits consumers” (p. 103). Clelland identifies several sources of dark value in the nodes of the iPad commodity chain, including the under- or unpaid labor of wage workers employed in Asia by Apple’s suppliers, unremunerated reproductive labor provided in these employee households, and uncosted externalities in the form of environmental damage caused by the production process. He also estimates dollar values for each of these, arriving at a total dark value of \$1,077. The difference between this revealed value and the retail price of the iPad leads Clelland to conclude that the principal beneficiaries of this surplus drain are consumers, including workers in core countries whose ability to purchase Apple’s products is contingent on the international division of labor embodied in the iPad commodity chain.

Commodity Chains as Political Opportunity Structures

Contemporary commodity chains, like the one analyzed by Clelland, contain numerous layers of contractors and subcontractors, including companies that have their headquarters in one country and their factories in others. This organizational and spatial complexity has a political as well as an economic logic, as Immanuel Wallerstein has pointed out: “The opacity of the distribution of the surplus-value in a long commodity chain is the most effective way to minimize political opposition, because it obscures the reality and the causes of the acute polarization of distribution that is the consequence of the endless accumulation of capital, a polarization that is more acute than in any previous historical system” (2001: 58). But critical scholars and activists of various stripes are, in a sense, reverse-engineering these long commodity chains in order to reveal where and by whom decisions regarding how and under what conditions particular activities, including those that may compromise the well-being of workers, consumers, or the environment, are carried out (Anner 2007; Munro and Schurman 2009).

The final paper in this collection by Elizabeth Sowers, Paul Ciccantell, and David Smith explore commodity chains as political opportunity structures. Combining commodity chain analysis with the new historical materialism (Bunker and Ciccantell 2005), these authors examine what they term “lengthened” commodity chains” in two critically important sectors:

transport and oil/gas. The transport sector can be conceived as its own commodity chain, as well as a critical link in many globally fragmented commodity chains. The rise of inter-modal transportation and containerization permits unprecedented volumes of merchandise to flow (in a mostly westerly direction) across the globe, but this transformation also creates vulnerabilities in the form of chokepoints at which a relatively small number of mobilized workers can disrupt the movement of vast quantities of goods. The second commodity chain Sowers et al. examine is that for oil and gas—another sector that is undergoing profound transformation, as fracking enables the exploitation of new energy sources, and, at least potentially, the internalization of an energy commodity chain within North America.

But while the authors identify opportunities for labor and other civil society actors to leverage these chains, they also observe the challenges and constraints confronting activists. On the labor side, an increasingly variegated workforce within both sectors complicates the possibility of coordinated actions and mobilizations, since it requires that differently-situated workers achieve solidarity across the divide of a segmented labor market. In the oil and gas chain, the prospects for environmental activists in the United States to disrupt the commodity chain, perhaps in a “blue-green” alliance with energy sector workers, is limited by the potential for raw material flows to be redirected towards a different end market. In particular, China’s enormous demand for natural resources does not augur well for the likelihood of preventing or slowing the exploitation of North America’s oil and gas. In this sense, our discussion of the political economy of commodity chains comes full circle: A collection that begins with Amy Quark’s exploration of China as an emergent rival challenging U.S. sectoral hegemony in the cotton chain concludes with Sower et al.’s suggestion that China’s rise may also shape future prospects for commodity chain resistance.

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Global Production Networks and International Inequality: Making a Case for a Meso-Level Turn in Macro-Comparative Sociology

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Abstract

In this article, I extend recent macro-comparative empirical research on the developmental implications of global production networks. I draw from theories of commodity/value chains, global production networks and economic sociology to identify three contending theoretical perspectives for exactly how the developmental returns to network participants should be distributed—cooperation, exploitation and differential gains—and derive testable hypotheses for each. Adding to recent empirical advances for measuring the average network position of firms at the country level, I evaluate these hypotheses by way of dynamic panel regression models of hourly wage rates in the garment and transportation equipment industries. The results suggest that macro-sociological theories linking underdevelopment to the structure of the world-economy, as well as theories of the distribution of the gains from network participation, miss important variation at the industry level. Cooperation provides a poor account of the distribution of the gains from network participation. Instead, both industries appear to distribute the gains from network participation differentially across network participants. However, the extent of this inequality increases, and the garment industry transitions to exploitation, when global production networks become entrenched organizational logics. Variation in the distribution of the returns to network participation is explicable only by accounting for production-network governance as it varies across industries and over time. I conclude by highlighting the analytical utility to macro-comparative sociology of a turn toward the meso-level of global industries.

Keywords: Commodity chains, value chains, production networks, international inequality, development

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One of the more fundamental transformations taking place in the world economy is the dis-embedding of production from within the confines of vertically integrated firms, and the re-embedding of production in networks of coordinated exchange between formally independent firms. One of the most coherent and well-documented lines of inquiry on global production networks (GPNs) is the global commodity chains literature and its various offshoots. This literature suggests that a key strategy for economic development is industrial upgrading, and the first step to industrial upgrading involves integrating into GPNs as a subordinate manufacturer—that is, as a supplier to the lead firm that coordinates the network (Gereffi 1999; Bair and Gereffi 2003). However, some contend that subordinate integration may be far from optimal from the perspective of economic development (Arrighi et. al. 2003; Kaplinsky 2005; Schrank 2004). As documented recently elsewhere, the key source of the ambivalence of GPNs for economic development is a theoretical paradox: because economic activity is increasingly networked, countries must develop ways to encourage their firms to become embedded within these networks, but “the returns to these networks accrue unequally among firms...” (Mahutga 2014a: 186).

Empirical research on GPNs has done much to advance our understanding of precisely how GPNs are organized globally, and the way these organizational forms vary across industries. It also adds to the ambivalence regarding economic development insofar as “cases of successful firm level upgrading can be read alongside cases of failure, and even cases of successful upgrading at the level of the firm can have ambivalent implications for development in a particular location if, for example, upgrading occurs at the expense of wages and working conditions for workers, or negatively impacts the viability of other domestic firms who compete for access to a given network (Mahutga 2014a: 165). Recent research thus draws from the empirical and theoretical literature to derive general propositions about the possible developmental consequences of GPNs, and “develop an empirical framework to advance basic research on the link between globally networked forms of economic organization and national economic development” (Mahutga 2014a: 157; also see Mahutga 2014b).

In this article, I extend this research in two distinct ways. I begin by outlining three understandings of global production relationships that follow from this more recent research. First, *cooperation* is most closely associated with conceptualizations of the “embedded network” from economic sociology. Second, *exploitation* is most closely associated with original conceptualizations of commodity chains from World-Systems analysis. Finally, *differential gains* represents an intermediate hypothesis regarding the distribution of the developmental returns to network participation. The key difference across these three understandings is that each predicts different patterns of both the *absolute* and *relative* effects of network power and subordination on economic development. I then advance the new empirical framework by deriving cross-nationally and temporally comparable measurements of the extent to which a country’s firms occupy *subordinate* GPN positions; I refer to this subordinate status as “network captivity.” This allows me to compare the developmental returns to network power and subordination.

To adjudicate between cooperation, exploitation and differential gains, I estimate dynamic panel models of average wages in the garment and transportation equipment industry. The results suggest that the returns to network participation vary critically by the governance of the production network in question. I conclude with an argument for a meso level turn in macro-comparative sociology in which the relevant unit of analysis shifts from the whole world economy to globalized industries.

The Returns to Global Production Network Participation: Cooperation, Exploitation or Differential Gains?

In a recent article on the relationship between global commodity/value chain/production networks (GCC/GVC/GPN) and economic development (Mahutga 2014a), I argue that “the most powerful and unique contribution of both the GCC/GVC and GPN approaches [is that] positional power matters for the developmental consequences of globalized production” (182). By “positional power,” I intend an exchange theoretic understanding of power, in which the power of a focal actor depends on (1) the extent to which other actors value his/her resources, (2) the number of exchange partners available to the focal actor and (3) the number of alternative exchange partners available to the focal actor’s alters. In the context of GPNs, I argue lead firms possess disproportionate degrees of bargaining power because of factors 1-3, and they use this bargaining power to build production networks that maximize their own economic returns. That is, the network structure of the *possible GPN ties* among firms in global industries is such that the “power” of lead-firms over suppliers stems from the limited exchange possibilities enjoyed by the latter relative to the former. Subordinate firms are “captive” to leading firms because, *ceteris paribus*, they face a probability of successful GPN integration equal to L/S , where L is the number of leading firms seeking partners, S is the number of capable suppliers, and $L < S$ by orders of magnitude.² In these early works I do little more than speculate as to the precise distributional consequences of asymmetric inter-firm power relations in GPNs, but one can derive at least three kinds of hypotheses (e.g. Mahutga 2014a; 2014b; 2012).

I call the first kind of explanation *cooperation*, which is most closely associated with theories of the network form of economic organization from economic sociology (Granovetter 1985; Powell 1990; Uzzi 1996). For economic sociologists like Granovetter, Powell and Uzzi, the network form of economic organization is defined by a distinct governance logic characterized by “long-term cooperative relationships” that shifts actor’s motivations “toward the enrichment of relationships through trust and reciprocity” (Uzzi 1996: 693; 677). In the context of GPNs, powerful leading firms do provide captive firms with access to foreign markets, and transfer technology and know-how in order to increase the quality of the final goods (Humphrey and Memedovic 2003; Gereffi and Memedovic 2003; Memedovic 2004; Kessler 1999; Gibbon 2001). Thus, cooperativists argue that initial captivity leads to “upgrading” as captive firms undergo incremental competency increases, which allows them to move into higher value-added nodes within production networks (Bair and Gereffi 2003; Gereffi 2002; 1999). Moreover, cooperativists argue that upgrading in one network can generate new competencies that allow firms to transition into new types of production networks (Gereffi 1999; Humphrey and Schmitz 2001). In short, initial captivity may be “a necessary step for industrial upgrading because it puts firms and economies on potentially dynamic learning curves” (Gereffi 1999: 39).

² This usage of the term “captive” should not be confused with that of Gereffi et al. (2005), which seems to presume a significant degree of fixed investment by the leading firm and thus a different motivation for exchange. The *ceteris paribus* interpretation here is important to bear in mind. The probability of success equals L/S if the variation in resource desirability among firms in L is equal to zero and asset specificity is such that lead-firms source a given input from just one supplier. Thus, the probability of success goes down in inverse proportion with the variability in resource desirability among the firms in L , because fewer lead firms will be sufficiently attractive exchange partners. The probability of success goes up if leading firms source a given input from more than one firm, but, holding lead-firm demand constant, this would also reduce the absolute economic output for any one successful supplier.

At the other extreme, some argue instead that leading firms in GPNs use their powerful positions to extract gains from other firms, and that the high returns to leading firms are a function of the concessions made by weaker firms (Heintz 2006). For example, dominant firms require captive manufacturers to regularly reduce the cost of the goods they supply leading firms, but simultaneously improve quality (Kaplinsky 2005; Schrank 2004; Humphrey 2000; Maxton and Wormald 2004). Others point to something of a “glass ceiling” to industrial upgrading. Andrew Schrank characterizes this process in garment production networks as follows:

“While buyers encourage and take advantage of competition in the relatively low-return preassembly, assembly, and finishing sectors, they are intolerant of competition in the highly profitable design, marketing and distribution sectors, and relegation to low-return manufacturing activity may therefore constitute the inherent price of participation in the apparel commodity chain” (Schrank 2004: 138).

These problems are not limited to labor intensive buyer-driven industries. For example, in a case study of the Malaysian auto industry, Jason Abbot (2003) shows that the Japanese TNC Mitsubishi was instrumental in the development of the national automobile program Proton through a joint venture program. Mitsubishi’s motivation remained strong as long as Proton was primarily geared toward servicing the local market for low-end passenger vehicles, because it presented Mitsubishi with an opportunity increase its share in that market. However, Mitsubishi resisted Proton’s move to penetrate the export market in the ASEAN region, since it “did not want the Proton to compete with other vehicles that it produced for export elsewhere in the Asia-Pacific region” (Abbot 2003: 133). Thus, Mitsubishi was happy to joint venture with Proton in the production of lower end vehicles for the Malaysian market, but resistant to the encroachment of Proton into Mitsubishi’s core market of more sophisticated vehicles.

In addition to these relational mechanisms, exploitationists also argue that the returns to captive manufacturing decline as GPNs become entrenched organizational logics, globally. One mechanism is that the rapid diffusion of the production network model to historically poor countries increases competition between captive manufacturers trying to integrate into GPNs. That is, the entrenchment of GPNs as an organizational logic “may well be devaluing the very technical and organizational assets upon which the returns to [GPN integration] have traditionally been based” (Schrank 2004: 145; see also Arrighi et al. 2003; Kaplinsky 2005).

The forgoing cooperation and exploitation hypotheses represent opposite ends of an optimism/pessimism continuum. Between these two extremes lies a third hypothesis—differential gains. Unlike the exploitation hypothesis, both leading and captive firms can gain from participating in networks. That is, the economic performance of leading firms does not come from an ability to exploit their suppliers by extracting economic concessions. However, neither does the differential gains hypothesis suggest that leading and captive firms *gain equally* from network participation. For example, leading firms build production networks by outsourcing/offshoring aspects of the manufacturing processes subject to the most competition, and thereby reduce the competitive exposure of their own assets (Mahutga 2012: 5-9). If lead firm strategy revolves partially around the externalization of activities with low and/or declining returns, “then the distribution of returns to network participation might be skewed toward the leading firms” (Mahutga 2014b: 32-33). But, this does not necessarily imply that captive firms lose *in an absolute sense* from their incorporation into GPNs. In short, the differential gains hypothesis suggests that both dominant and captive actors *can* gain from the diffusion of production networks in an absolute sense, but that leading firms will gain *more than their captive counterparts*.

Table 1. Hypothesized Absolute and Relative Effects of Cooperation, Exploitation and Differential Gains

	Network Power		Network Captivity
Cooperation	+	=	+
Differential Gains	+/-	>	+/-
Exploitation	+	>	-

To recapitulate, Table 1 summarizes the cooperation, exploitation and differential gains hypotheses in terms of their predictions for the absolute and relative gains from network participation that should accrue to actors in leading and captive GPN positions. The cooperative hypothesis depicted in the first row is “win-win” in that it suggests that both dominant and captive actors gain by participating in GPNs, and that these gains are equal. The second row in Table 1 depicts the differential gains hypothesis. Lead firms source manufacturing capability to captive firms, but the returns to these capabilities are either low or falling. The differential gains hypothesis is agnostic about the absolute gains to leading and captive positions, but suggests definitively that firms in leading network positions gain more than those in captive ones. Finally, the exploitation hypothesis is depicted in the last row of Table 1. This hypothesis is “win-lose” in the sense that firms in leading network positions gain from participating in GPNs at the expense of those occupying captive positions. Not only are relative gains to network participation greater for firms in leading network positions, but the absolute gains are negative for firms in captive positions.

A Parallel Path of GCC/GVC/GPN Research: Global Production Networks and Macro-Comparative Analyses of Economic Development

In addition to the theoretical ambivalence regarding the developmental implications of the entrenchment of GPNs as an organizational logic globally, the extant empirical literature poses “a bit of a methodological challenge in drawing conclusive links between networked production and economic development [because] statistics on both development and economic behavior are compiled cross-nationally, and ‘development’ is by definition a concept that must go beyond the performance of any single firm” (Mahutga 2014a: 164). GPN analysts argue convincingly that economic activity is increasingly organized via inter-firm networks that are transnational in scope. Thus, the predominant methodological strategy is “the case study, where authors provide detailed accounts of the way in which particular firms or geographical sub-regions are integrated into a larger production network” (Mahutga 2014a: 165). While this methodological approach yields a significant degree of analytical leverage, the panoply of empirical work creates a parallel sense of ambivalence to the theoretical issues addressed above:

“...cases of successful firm-level upgrading can be read alongside cases of failure, and even cases of successful upgrading at the level of the firm can have ambivalent implications for development in a particular location if, for example, upgrading occurs at the expense of wages and working conditions for workers or negatively impacts the viability of other domestic firms that compete for access to a given network” (Mahutga 2014a: 165).

To push this research program further, I propose a parallel path of chains research “that implicates global models of network organization in macro-comparative analyses of economic development” (Mahutga 2014a: 157). Here, I synthesize the macro-comparative tradition of network analysis with that of case-study researchers who utilize industry-specific trade data to infer the production network position of the firms located within countries. In particular, I utilize international trade data for two industries with ideal-typical governance “to measure the average positional power of resident firms for a large sample of countries in a way that is both cross-nationally and temporally comparable” (Mahutga 2014b: 17). That is, if industrial performance at the country level is a function of the network position of firms within that country, then one need simply assess the average network position of a given country’s firms, and compare industrial performance across these assessments.

To facilitate the analysis, I begin with the garment and transportation equipment industries. I select these industries because they are archetypical cases of “buyer” and “producer-driven” governance, respectively (see Gereffi 1994; Gibbon and Ponte 2005; Mahutga 2012; 2014a; 2014b).³ This allows me to draw from the organizational literature on these two industries to derive network indices of power that are high when a focal country engages in trade relations that are indicative of what one would expect of a country with many leading firms. Because leading firms perform very different functions in the two industries, the indices I derive—buyer and producer-driven power—vary computationally between industries. Through a triangulated process of validation, I demonstrate that these measures capture what they intend. They (1) correlate strongly with the actual location of leading firms in the two industries, (2) successfully explain cross-national variation in manufacturing specialization in the two industries, (3) vary over time in ways that correspond to the historical record of the rise and fall of specific national industries, and (4) correlate positively with wages in the two industries (Mahutga 2014a; 2014b).

However, testing the cooperation, exploitation and differential gains hypotheses requires not only measurements of the average degree of power among a country’s resident firms, but also the average degree of subordination. Part of this previous research provides insight on how to proceed insofar as the network analyses in one paper show that “subordination at the firm level implies import/export dependency at the national level” (Mahutga 2014a: 187). Unlike the case of leading firms, subordinate firms in both industries play a similar role. First, subordinate firms are manufacturing suppliers. Second, subordinate firms are dependent upon leading firms as the sole “market” for their manufactures. Thus, while buyer- and producer-driven power accrue to countries who either import from or export to a geographically diffuse set of partners, as well as capture a significant share of the imports from or export markets of these partners, network captivity should accrue to countries who export a significant share of their manufactures *to a single partner*. Analogous to the classic “dependency” variable *export partner concentration*, then, one can begin to capture industry-specific network dependency with the percentage of industry-specific exports captured by the single largest importer. I call this variable *network captivity*.

To summarize, the theoretical ambiguity regarding the developmental consequences of GPNs congeals into three distinct hypotheses: cooperation, exploitation and differential gains. Each hypothesis has a distinct empirical expectation about the absolute and/or relative effects of network power and captivity. Building upon recent empirical work, I argue that buyer- and

³ I have pointed out elsewhere that, according to the publication repository at Duke’s Global Value Chains Initiative, publications on these two industries accounted for approximately 45% of all publications listed, even though there are 72 industrial categories within which publication could be classified (Mahutga 2014b: note 2, page 34).

producer-driven power can be combined with *network captivity* to assess the validity of each of these three hypotheses. To proceed, I employ this empirical approach of treating industry-specific wages as a key developmental indicator, because

...wages are a key indicator of economic development insofar as they capture not only the gains to an individual firm or industry, but also the workers who engage in productive activity in these firms/industries. Moreover, rising wages increase demand for goods and services produced domestically and, therefore, have tremendous implications for economic development economy-wide. Indeed, wages are of keen interest to GCC/GVC and GPN analysts who explore the implications of chain/network dynamics for economic development (Mahutga 2014a: 174).

Thus, testing each of the three hypotheses is relatively straightforward in this approach: it requires comparing the wage effect (or wage premium) of network power to network captivity.

A Note on History: Periodizing Networks as Organizational Logic

In the above discussion of the possible distribution of returns to GPNs, there is a dynamic component that is implied but that should be made explicit. GPNs are historical phenomena that stand in stark contrast to the organizational structures that Chandler (1977; 1990) or even Williamson (1981) might have envisioned in the not so distant past. The process of de-verticalization, where firms separate aspects of a given production process and outsource some or all of these aspects, began sometime after the golden age of post-war growth and then increased over time. In 1980, for example, Froebel et al. published what became a classic, *The New International Division of Labor*. Here, Froebel et al. (1980) drew on data from the 1970s to document the proliferation of export platforms in the global South, and suggested that this was indicative of a new organizational trend whereby firms headquartered in the global North move manufacturing capability offshore. This “export-processing” model, in which big buyers engaged in limited amounts of manufacturing and used suppliers for simple assembly, represented an intermediate stage in the development of various models of network governance.

Eventually, production networks became entrenched (and varying) organizational logics among northern firms, by which I mean that some form of globalized production became a key part of the organizational strategy of both Northern and Southern firms. In the garment industry, export processing zones led to deeper linkages between Northern buyers and Southern producers such that supplier functions became a “large enough component of [Southern] economies that they shaped the organization of the entire economy” (Hamilton and Gereffi 2009: 153). Similarly, innovations in network-based “lean production” techniques by Japanese firms quickly spread to other Northern firms, which adopted networked models in response to “systemic difficulties” brought on by a lack of competitiveness vis-à-vis Japanese rivals (Whitford 2005: 15). Thus, while it is impossible (and unnecessary) to pinpoint a precise year by which networked forms of economic organization had become entrenched organizational logics, most point to the 1980s as a critical decade. Bair suggests that, by the 1980s, “the ‘denationalization’ of apparel production was well underway in many higher wage economies,” which in turn was driven by the activities of “retailers and branded clothing companies...” (Bair 2006: 2235). Analysts of the auto industry concur, noting that by the 1980s, this industry made a full transition “from a series of discrete national industries to more integrated global industrie[s]” (Sturgeon et

al. 2008: 302). Mahutga (2012) finds that offshoring skyrocketed after 1980 in not only the garment and auto industries, but also electronics. This historical reading of GPNs is important because it highlights that networked forms of economic organization should matter for the organizational and developmental trajectories of countries “as *production networks become the predominant organizational logic in manufacturing industries over time*” (Mahutga 2014b: 9). In the present context, this suggests that the relative and absolute wage premiums to network power and captivity should depend on the extent to which buyer- and producer-driven models of network governance have become entrenched on a global scale. In what follows, I describe the remainder of my empirical strategy.

Data and Methods

Wages

I measure hourly wages in each industry with wage and employee data I obtain from UNIDO (2006). I use variable 05 (wages and salaries paid to employees), which is equal to the total yearly wage bill, for industries 322 (Clothing) and 384 (Transportation Equipment), and divide it by variable 04 (number of employees) for the same industries, for each country. This results in the yearly wage per employee. I then divide this by a forty hour work week (40*52) to arrive at the hourly wage. This estimate of the hourly wage probably overstates the actual hourly wage in poor countries, where work weeks are often longer than 48 and thus provides a rather conservative indication of the difference in hourly wage between countries with high and low network power, which is correlated (imperfectly) with development. This transformation allows for descriptive simplicity, but has no bearing on the subsequent analysis because it is linear. In effect, the dependent variable is *yearly wage per worker*. These dependent variables were measured one year after the independent variables (1966, 1971, 1981, 1991 and 2001) and logged for skewness.

Explanatory Variables

Positional Power

Two key explanatory variables in the regressions that follow are buyer and producer-driven power, as defined in the following equations Mahutga (2014a; 2014b):

$$P_j^B = \sum_{i=1}^n \log(Y_{ij} / X_i \cdot +1) \quad (1)$$

$$P_j^P = \sum_{i=1}^n \log(X_{ji} / Y_i \cdot +1) \quad (2)$$

In (1), Y_{ij} is the import received by country j from country i in the garment industry, $X_i \cdot$ is the total garment exports of the sending country i and \log is the base 10 logarithm. High ranking countries have many dependent import partners, and scores increase with the absolute dependency of each import partner thereafter. In (2), X_{ji} is the exports from country j to country i in the transport equipment industry, $Y_i \cdot$ is the total imports of receiving country i . High ranking

countries have many dependent export partners, and scores increase with the absolute dependency of each export partner thereafter.

The trade data come from UNCOMTRADE and are categorized according to Rev.1 of the Standard Industrial Trade Classification (United Nations 2006; 1963). I employ trade in category 84 (clothing) and 71 (transportation equipment). In both cases I build the network with reported imports collected at five points in time over a thirty-five year period with a balanced set of countries to preclude biases owing to partner attrition/addition (1965, 1970, 1980, 1990 and 2000). The year-on-year variation in which countries report restricted the networks to the 96 countries listed below in Table 2, which nevertheless account for between 95.5 and 98.6 percent of world trade and 92.5 to 96.8 of world GDP over the period. Both variables were logged for skewness.

Table 2. Countries Appearing in Garment and Transport Equipment Networks

Algeria	Czechoslovakia	Jamaica	Poland
Angola	Denmark	Japan	Portugal
Argentina	Ecuador	Jordan	Qatar
Australia	Egypt	Kuwait	Romania
Austria	El Salvador	Libya	Samoa
Bahrain	Ethiopia	Madagascar	Saudi Arabia
Barbados	Finland	Malawi	Senegal
Belgium	France	Malaysia	Singapore
Benin	Gabon	Mali	South Korea
Bolivia	Gambia	Malta	Spain
Brazil	Germany	Mauritius	Sri Lanka
Brunei	Ghana	Mexico	Sweden
Darussalam			
Burkina Faso	Greece	Morocco	Switzerland
Cameroon	Guatemala	Netherlands	Thailand
Canada	Honduras	New Zealand	Togo
Central African Republic	Hong Kong	Nicaragua	Trinidad/Tobago
Chad	Hungary	Niger	Tunisia
Chile	Iceland	Nigeria	Turkey
China	India	Norway	UK
Colombia	Indonesia	Pakistan	Uruguay
Congo, Dem Rep	Iran	Panama	USA
Costa Rica	Ireland	Paraguay	Venezuela
Cote d'Ivoire	Israel	Peru	Yugoslavia
Cyprus	Italy	Philippines	Zambia

Network Captivity

As I describe above, network captivity is measured as the percentage of a focal country's exports captured by the single largest importer. For captivity in the garment industry, I utilize data on UNCOMTRADE category 84 (clothing). For captivity in the transport industry, I utilize data on UNCOMTRADE category 71 (transportation equipment).

Control Variables

Human Capital

Standard economic explanations for wage differentials evoke differences in human capital. Workers with higher levels of education possess greater stocks of knowledge, which increases productivity (Becker 1993). Thus, I control for secondary education enrollment rates, which are standard in cross-national models of economic development (Barro 1997; data from World Bank 2002). This variable was logged for skewness.

Entrenchment of the Network Form

As I discussed above, the two models of network governance became increasingly entrenched organizational logics over the latter decades of the 20th century, and the 1980s appear to be a key decade during which there is a consensus that these network forms had become globally predominant. This development constitutes a temporal "shock" that is common to all countries. Thus, I control for the period when these two network forms became the predominant organizational logics in the industries with a dummy variable that = 1 in 1990 and 2000, and zero otherwise. To test the hypothesis that the wage premium to network power and captivity depends on the extent to which the network form has become entrenched globally, I interact network power and captivity with this dummy variable. Zero-order correlations among all variables appear in Table A1.

Dynamic Panel Regression Models

In order to compare the wage premium of network power to that of network captivity, I regress average hourly wages in the garment and transport equipment industries on buyer- and producer-driven power, and network captivity. The data are pooled across the five time periods in which the independent variables were observed: 1965, 1970, 1980, 1990 and 2000. Pooling these data allows me to account for omitted variables that vary across countries but not over time (unit effects). Panel data such as these often result in serially correlated errors. I rejected the hypothesis that the error terms are serially uncorrelated at conventionally modest levels of significance. Some treat serial correlation as a nuisance parameter to be removed, where others see serial correlation as substantively meaningful. Treating serial correlation as a nuisance involves generalized least squares (GLS) approaches that remove the serial correlation prior to estimation, or the implementation of a variance/covariance matrix that is "robust" to serial correlation. Treating serial correlation as substantively meaningful implies modeling it with a lagged dependent variable (LDV) in a dynamic panel model context.

In the absence of definitive statistical guidance, I adopt the latter approach by estimating Arellano-Bover/Blundell-Bond dynamic panel models. This dynamic estimator is substantively strategic because it allows for the simultaneous estimation of the short (β) and long $\beta/(1-\beta_{LDV})$ term effects of network power and captivity, and corrects for the natural association between

current and past wage rates cross-nationally. To eliminate the problem of unobserved time invariant country effects, the estimator applies the first difference transformation to both sides of the equation. Differencing leads to correlation between the lagged dependent variable and the unobserved country effect and thus to bias estimates of the parameter on the former. To address this source of bias, Blundell and Bond (1998) developed a Generalized Method of Moments (GMM) system estimator that uses additional moment conditions to those proposed by Arellano and Bond (1991). In the original “Arellano-Bond” estimator, the lagged dependent variable is instrumented by all available lagged levels of the dependent variable, as well as the standard instruments in the first stage regression. Blundell and Bond (1998) create a more efficient estimator by exploiting additional moment conditions—all available lagged *differences* of the lagged dependent variable are included as additional instruments in the first stage. The primary models reported below are estimated with this dynamic estimator, but I also estimate and report in reduced-form regression models that treat serial correlation as a nuisance term by implementing fixed-country effects and applying a Cochrane–Orcutt correction for first-order serial correlation in the error term (see Table A2).

Because of missing data and the application of the first-difference transformation, less than the full set of countries appearing in the trade networks also appear in the regression models. The panels are also unbalanced, with countries yielding a varying number of observations across time. The maximum number of observations is 480 for each model, but missing data and the first-difference transformation reduced this to 267 and 263 country-year observations in the garment and transport equipment industry models, respectively. All regressions were carried out with Stata 11.0.

Results

Table 3 reports bivariate correlation coefficients summarizing the relationship between network power and captivity in each industry. Our knowledge about the organization of global production networks in the garment and transportation industry should lead us to expect a negative association between network power and captivity. That is, on average, countries containing subordinate firms should contain few leading firms. The negative and significant correlations in Table 3 are consistent with this expectation.

Table 3. In-sample Correlation between Network Power and Captivity

	Buyer-Driven Power	Producer-Driven Power
Network Captivity	-.229***	-.525***

Note: Only countries appearing in subsequent models included.

Figure 1. Garment Wages by Buyer-Driven Power before and After the Entrenchment of the Network Form

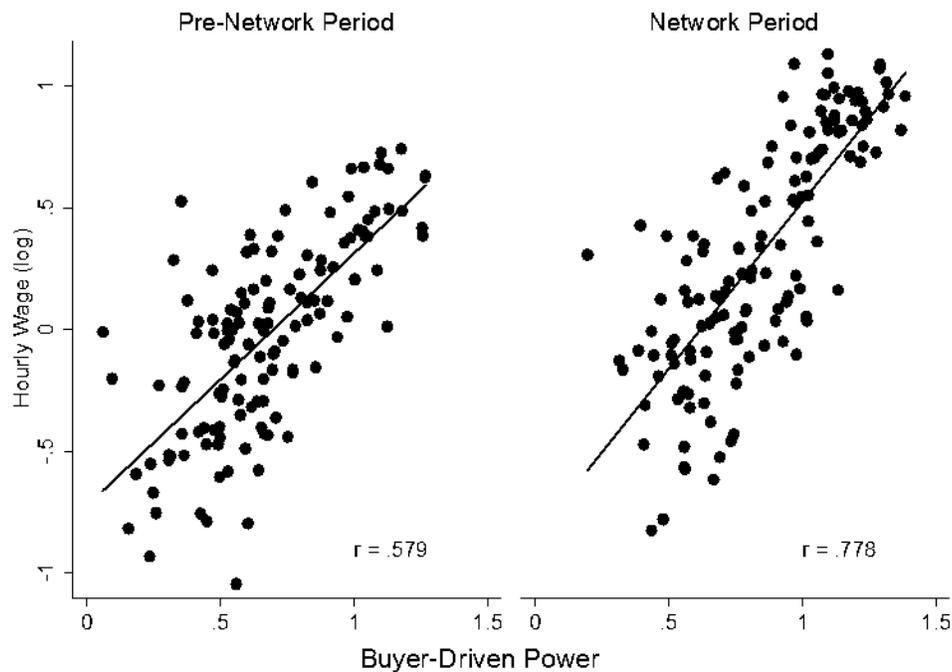


Figure 1 displays the bivariate association between buyer-driven power and the hourly wage in the garment industry across the two broad periods discussed above. Clearly, hourly wages are distributed unequally across network positions characterized by different levels of buyer-driven power in both periods. However, the association is much larger in the post 1980 “network” period than in previous periods. Figure 2 displays the bivariate association between network captivity and the hourly wage in the garment industry across the two periods. Similarly, and consistent with expectations, the association is negative in both periods. However, the association is much stronger in the network period, when it almost quadruples in size. Together, the scatterplots displayed in Figures 1 and 2 are least consistent with the cooperation hypothesis and most consistent with the exploitation hypothesis of garment production networks. On average, countries in powerful positions not only have higher than average wages, but those in captive positions have below average wages. Does this conclusion hold in the context of dynamic panel models that correct for time-invariant country-level unobservables and conventional correlates of wages?

Figure 2. Garment Wages by Network Captivity before and After the Entrenchment of the Network Form

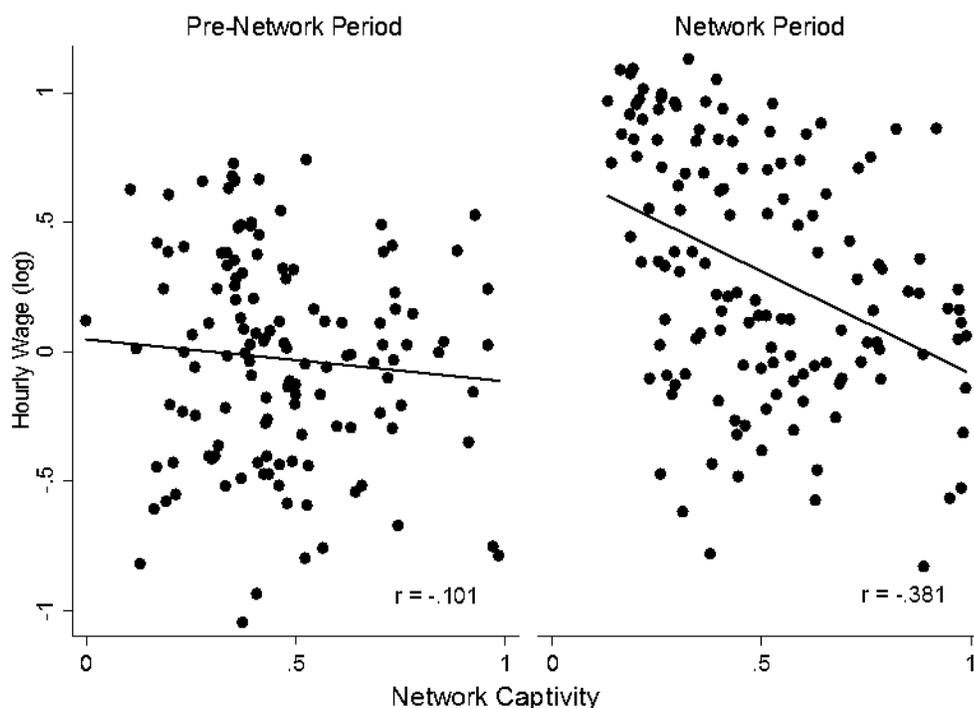


Table 4 reports unstandardized coefficients from the dynamic panel analysis of wages in the garment industry. Model 1 includes both buyer-driven power and network-captivity with secondary education and the fixed period effect. Unsurprisingly, secondary education enrollment is positive and highly significant—human capital boosts wages even in relatively unskilled production processes. Consistent with the graphics in Figures 1 and 2, the effect of buyer-driven power is positive while that for network captivity is negative. Model 2 tests the hypothesis that the wage-premium of buyer-driven power increases as buyer-driven production networks become an entrenched organizational logic world-wide. The interaction between buyer-driven power and the network period is both positive and significant. Model 3 tests the corollary hypothesis with respect to network captivity. Similarly, the interaction term is both negative and significant. In fact, the coefficient on the uninteracted network captivity covariate becomes non-significant—network captivity had no independent effect on hourly wages before the buyer-driven network form became the predominant organizational logic in the garment industry. Model 4 includes each of the covariates introduced in models 1-3. Model 4 provides rather unique and definitive evidence in support of the exploitation hypothesis. Here, the interaction term on buyer-driven power remains positive but is no longer significant, while that on the interaction term involving network captivity is both negative and significant. When comparing these results to those in models 2 and 3, model 4 suggests that *network captivity mediates the effect of buyer-driven power*. Put differently, the increasingly larger-than-average wages that

prevail in countries occupying powerful positions are explained by the lower-than-average hourly wages that prevail in countries occupying captive positions in the garment industry.

Table 4. Arellano-Bover/Blundell-Bond Dynamic Panel Regression Models of Average Hourly Wage in the Garment Industry.

	(1)	(2)	(3)	(4)
Lagged Dependent	0.360*** (6.727)	0.384*** (7.164)	0.428*** (7.612)	0.367*** (6.985)
Buyer Driven Power	0.531*** (5.378)	0.430*** (3.490)		0.470*** (3.835)
Buyer-Driven Power * Network Period		0.177* (1.987)		0.076 (0.820)
Network Captivity	-0.236** (-2.940)		-0.132 (-1.198)	-0.076 (-0.744)
Network Captivity * Network Period			-0.323* (-2.423)	-0.297* (-2.295)
Secondary Education	0.447*** (4.091)	0.447*** (4.009)	0.712*** (6.749)	0.435*** (3.964)
Network Period	-0.025 (-0.783)	-0.180* (-2.453)	0.114 (1.572)	0.057 (0.511)
Constant	-0.874*** (-5.029)	-0.908*** (-5.238)	-0.961*** (-5.102)	-0.883*** (-5.117)
N	267	267	267	267

Notes: Unstandardized coefficients, standard errors in parentheses. * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).

Figure 3 displays the bivariate association between producer-driven power and wages in the transport equipment industry. Similar to the relationship in Figure 1, the association between producer-driven power and hourly wages is strongly positive in both periods. Moreover, the association becomes stronger in the post 1980 network period, even though the change is less dramatic than is the case with respect to buyer-driven power and wages in the garment industry. Figure 4 displays the bivariate association between network captivity and hourly wages in the transport equipment industry. The association is negative but fairly weak in both periods, despite a slight increase across periods. On balance, the scatter plots in Figures 3 and 4 appear least consistent with the cooperation hypothesis and most consistent with the differential gains hypothesis of transport production networks. The wage premium to producer-driven power is positive and larger than that to network captivity. But, on average, those in captive positions have only slightly below average wages. To evaluate this conclusion further, I turn now to the results of the dynamic panel regression models.

Figure 3. Transport Wages by Producer-Driven Power before and After the Entrenchment of the Network Form

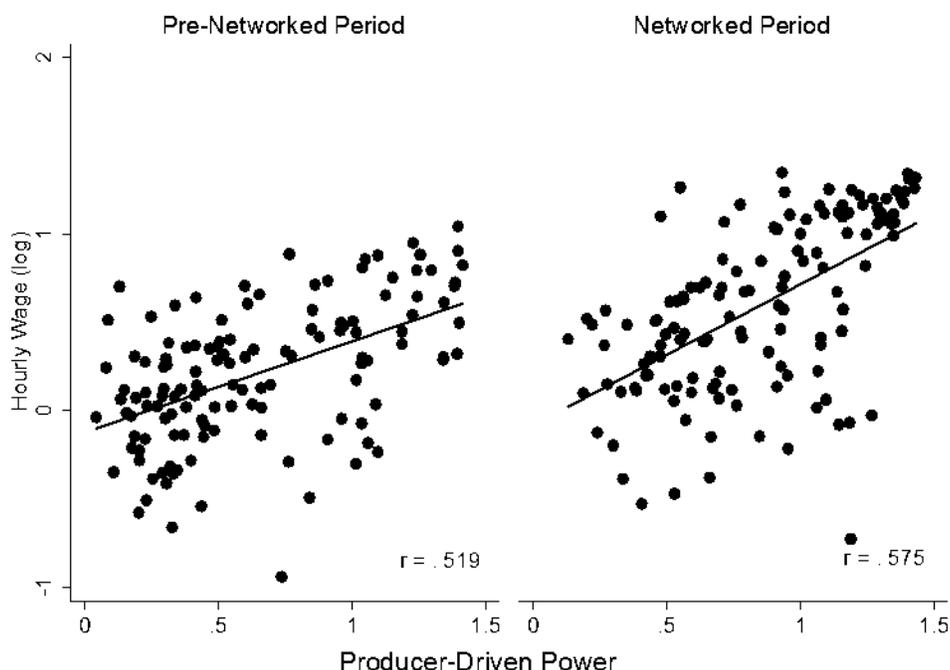
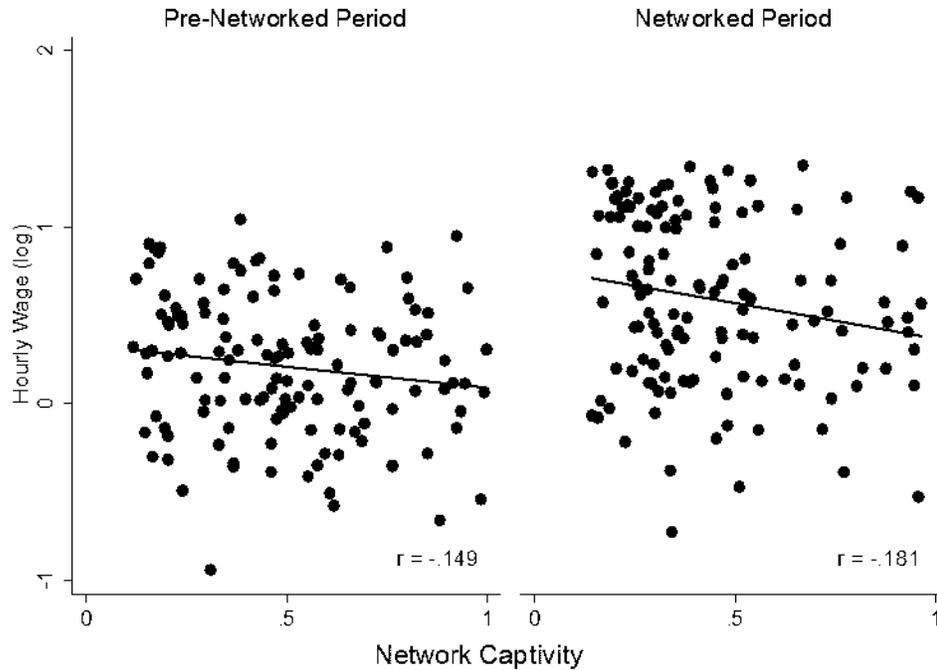


Table 5 reports unstandardized coefficients from the dynamic panel analysis of wages in the transport equipment industry. Model 1 includes both producer-driven power and network-captivity with secondary education and the fixed period effect. Similar to the results in Table 4, secondary education has a positive and robust effect on wages. And, consistent with the differential gains hypothesis, the effect of producer-driven power is positive while that for network captivity is positive but non-significant. Model 2 tests the hypothesis that the wage-premium of producer-driven power increases as producer-driven production networks become an entrenched organizational logic world-wide. The interaction between producer-driven power and the network period is both positive and significant. Model 3 introduces the interaction term between network captivity and the network period, which is negative but non-significant at conventional thresholds.⁴ Model 4 includes each of the covariates introduced in models 1-3. Model 4 provides additional evidence in support of the differential gains hypothesis. Here, the interaction term on producer-driven power remains positive, while that on the interaction term involving network captivity becomes positive but remains non-significant. When comparing these results to those in models 2 and 3, model 4 suggests that the effect of producer-driven power is largely orthogonal to network captivity in that it changes only slightly (in a *positive* direction) *vis-à-vis* model 2. In short, the positive wage-premium of producer-driven power is not a function of a reduced wage-premium to network captivity in the industry.

⁴ Even when evaluating this coefficient with a one-tailed test, the p-value is greater than .05.

Figure 4. Transport Wages by Network Captivity before and After the Entrenchment of the Network Form



In contrast to theories of the network form of economic organization drawn from the new economic sociology, the results in Table 4 and Table 5 provide no support to the cooperation hypothesis of global production networks. But, the results suggest different conclusions about the two remaining hypotheses of the distribution of the gains from network participation: exploitation (garment industry) and differential gains (transport equipment industry). Recall that the exploitation hypothesis requires (a) positive effect of power, (b) a negative effect of captivity and (c) a larger effect of power than captivity. The differential gains hypothesis requires only (c). The results in Tables A and B are less than definitive—they support propositions (a) for both industries and (b) for the garment industry, but say nothing about proposition (c). Thus Table 6 reports additional analyses of the results in Tables A and B that allow us to assess propositions a-c, before and after the two network forms became predominant organizational logics.

Table 5. Arellano-Bover/Blundell-Bond Dynamic Panel Regression Models of Average Hourly Wage in the Transport Equipment Industry

	(1)	(2)	(3)	(4)
Lagged Dependent	0.298*** (5.947)	0.253*** (5.102)	0.356*** (6.639)	0.256*** (5.098)
Producer-Driven Power	0.690*** (5.956)	0.564*** (5.131)		0.600*** (5.150)
Producer-Driven Power * Network Period		0.295*** (4.784)		0.302*** (4.138)
Network Captivity	0.104 (1.380)		0.076 (0.778)	0.062 (0.626)
Network Captivity * Network Period			-0.187 (-1.618)	0.038 (0.308)
Secondary Education	0.451*** (3.469)	0.461*** (3.653)	0.975*** (8.900)	0.446*** (3.519)
Network Period	0.016 (0.548)	-0.193*** (-3.698)	0.088 (1.332)	-0.217* (-2.104)
Constant	-0.998*** (-5.438)	-0.885*** (-5.066)	-1.380*** (-6.967)	-0.914*** (-4.885)
N	263	263	263	263

Notes: Unstandardized coefficients, standard errors in parentheses.

* $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).

Columns 1 and 3 in Table 6 report the unstandardized long-term coefficients for the network power and captivity covariates in each industry, conditional on time period. Long-term effects are calculated by dividing the conditional coefficient on either network power or captivity (β) by $1 - \beta_{LDV}$, and are expressed over the standard error that obtains from this non-linear combination ($\beta / (1 - \beta_{LDV})$). The conditional long-term coefficients in column 1 apply to the pre-networked period, and suggest that both buyer and producer-driven power have positive and significant effects, while those for network captivity are non-significant. The conditional –long-term coefficients in column three suggest that network power has a positive and significant effect in both industries during the network period, while network captivity has a negative and significant effect only in the garment industry. Returning to propositions (a) and (b), then, we can conclude that these necessary conditions for the exploitation hypothesis are met only in the garment industry, and only during the period when buyer-driven governance became an entrenched organizational logic, globally. Contrarily, “differential gains” is the only possible hypothesis left to explain the distribution of gains to network participation in both the pre-networked garment industry and the transport equipment industry in both periods. The differential gains hypothesis for the remaining industry/periods now hinges critically on proposition (c).

Table 6. Conditional Long-Term Coefficients, T-tests for Equality in the Long-Term Wage-Premium to Power and Captivity and T-tests for the Equality of Change in the Long-Term Wage-Premium to Power and Captivity Across Governance Periods.

	Pre-Networked		Networked		Change
	β^a	t test ^b	β^a	t test ^b	t test ^c
Garment Industry					
Buyer-Driven Power	.741*** (.192)	.861*** (.225)	.862*** (.156)	1.450*** (.211)	.589** (.213)
Network Captivity	-.120 (.160)	---	-.589*** (.167)	---	---
Transport Industry					
Producer-Driven					
Power	.807*** (.152)	.724*** (.165)	1.213*** (.160)	1.080*** (.164)	.355** (.136)
Network Captivity	.083 (.133)	---	.134 (.127)	---	---

Notes: ^a Long-term conditional coefficients. Long-term conditional effect is estimated with $\beta/(1-\beta_{LDV})$. Conditional standard errors in parentheses. ^b T-tests for null hypothesis that $\beta_P = \beta_C$ on long-term conditional coefficients. Standard error of the difference in parentheses. ^c T-test of the null hypothesis that $\beta_{pre-network}^P - \beta_{pre-network}^C - \beta_{network}^P - \beta_{network}^C = 0$, which reduces algebraically to $\beta_{power*network\ period} - \beta_{captivity*network\ period} = 0$. Standard error of the difference in parentheses. * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).

To evaluate proposition (c), columns 2 and 4 test the null hypothesis that the long-term coefficient on power is equal to that on captivity. Column 2 reports these tests for the pre-networked period. Clearly, the wage-premium to power is larger than that to captivity in both periods, as the test statistics are both positive and highly significant. Column 4 tests the hypothesis in the networked period, and provides identical conclusions. The evaluation of propositions (a)-(c) thus suggests that the exploitation hypothesis applies only to the garment industry, and only during the period when buyer-driven governance became entrenched. The differential gains hypothesis applies to both the pre-networked garment industry, and to the transport equipment industry in both periods. However, column 5 engages in an exercise of future casting by assessing the trajectory of change in proposition (c). That is, column 5 tests the null hypothesis that the difference in wage premium to network power and captivity in the pre-networked period is equal to the same difference in the networked period. The results are rather definitive for both industries: as the two network forms of economic organization become entrenched organizational logics, the magnitude of the difference in wage premium to network power and captivity increases in both industries. Still, the pattern of change in the long-term coefficients on network power and captivity in the two industries suggest that this rising gap is driven by different dynamics in the two industries. In the garment industry, the rising gap is attributable more to the declining wage premium to (or increasingly negative effect of) captivity than it is to the rising wage premium to (or increasingly positive effect of) power. The exact opposite holds in the transport equipment industry.

Sensitivity Analyses

The consistency of the estimated coefficients in Table 4 and Table 5, and of the estimated long-term conditional coefficients in Table 6, depends on whether or not an assumption of the Arellano-Bover/Blundell-Bond estimator holds—that there is no second-order serial correlation in the error term. I tested this hypothesis after each of the models in Table 4 and Table 5, and found that it did not always hold. The consistency problem that may arise is particularly acute for the parameter on the lagged dependent variable, which influences directly the long-term estimates that includes this parameter in the denominator. Thus, Table A2 and A3 reproduce the analysis in Table 6. In Table A2, the conditional coefficients are estimated by way of an AR(1) corrected fixed-effects regression model. In Table A3, the coefficients are the short-term conditional coefficients that obtain from the coefficients reported in Table 4 and Table 5, which do not depend on the possible inconsistent estimates of the coefficient on the lagged dependent variable in the same way as the estimates of the long-term coefficients. Comparing the coefficients reported in Table A2 to those in Table A3 thus give a sense of the amount of bias in the estimates from the Arellano-Bover/Blundell-Bond estimator—it is proportional to the variability in the coefficients in columns 1 and 3 between Tables A2 and A3. The bias does not appear terribly large. In fact, I compared these estimates systematically by way of the Hausman test. The only parameters that were significantly different across estimators were those for the garment industry. Still, Tables A2 and A3 make plain that despite some numerical differences in the parameter estimates across the two estimators, the results are nevertheless *substantively* identical: the garment industry is explicable in terms of the differential gains hypothesis prior to the entrenchment of the network form, and by the exploitation hypothesis afterward. The transport equipment industry is explicable in terms of the differential gains hypothesis in both periods. And, the wage premium to network power is increasing over time in both industries.

Two anonymous JWSR reviewers asked that I include additional control variables. One reviewer did not suggest any specific covariates to include.⁵ The other observed that it would be ideal to control for FDI in each industry, which has been shown to matter for wages in the manufacturing sector as a whole (Villarreal and Sakamoto 2011). Unfortunately, these data do not exist. This reviewer also suggested that female labor force participation in these industries might also matter for wages. To address these concerns, I conducted two additional analyses (available upon request). In the first, I include industrial production growth and export concentration in each industry. I measure the former with the Index of Industrial Production

⁵ However, this reviewer did suggest an interesting line of future research. Quite understandably, GCC/GVC/GPN analysts are increasingly interested understanding the way that local, national or regional variation in institutional practices and regulations might affect inter-firm relations and/or the developmental consequences of these relations. Mahutga (2014a) argues that macro-comparative analyses are capable of incorporating covariates that capture this variation into models of the relation between GPN integration and development. But, in the absence of a-priori knowledge about precisely what kinds of institutional/regulatory practices should matter, one could adopt a recent empirical approach in environmental sociology. Here, scholars ask to what extent the temporal association between various aspects of development and environmental degradation vary by region (e.g. Jorgenson 2014). Even in the absence of a-priori expectations for *how* these associations should vary across regions, these studies are useful because they identify regions with above and below average associations (i.e. regions that pollute more/less than would be predicted by their level of development), which could then point to comparative cases that might illuminate the institutional/regulatory practices in these regions that explain this variation. In the present case, one might use a similar approach to identify countries/regions that have above/below wage premiums to network captivity as a way to identify comparative cases with which to illuminate the institutional/regulatory practices that give rise to this variation.

(UNIDO 2006), and the latter with the ratio of garment or transport equipment exports to total exports (UNCOMTRADE 2006). The addition of these covariates reduced the sample size to 218 in each industry model. Results from the Arellano-Bover/Blundell-Bond estimator were substantively identical to those reported here, and second-order serial correlation was negligible.

In the second, I include the percent female employees in each industry (UNIDO 2006). Unfortunately, this reduced the sample size dramatically (~60%) to 90 observations, which makes both the Arellano-Bover/Blundell-Bond and AR(1) corrected estimator untenable (because they reduce sample size further). Thus, I estimated the coefficients in this model with a fixed-effects model and standard errors that are robust to serial correlation and heteroskedasticity. These results were substantively identical with the exception of the garment industry in the pre-networked period, where the wage premium to buyer-driven power was not significantly larger than that to network captivity. This could imply that, net of cross-national variation in the percent of female employment, the global garment industry was characterized by cooperation in the pre-networked period. However, this deviation from the models reported above is due instead to the dramatic reduction in sample size—coefficients that obtain in a model restricted to cases without missing data on percent female employment, but excluding female employment, were virtually identical to those that included female employment. The coefficient on female employment was negative but non-significant, probably owing to the small sample size. Thus, while some caution is warranted, we should be more confident in results that utilize more information and future research should very much consider the effect of female labor, which clearly matters in other contexts (e.g. Villarreal and Yu 2007).

Concluding Discussion

In the preceding analysis, I show that (a) the wage premium to network power is larger than that to network captivity in both industries, (b) this difference in wage premium increases as the two network forms become the predominant organizational logic in the industry, but (c) network captivity reduces the prevailing wage rate only in the garment industry, and only after the buyer-driven network form became the predominant organizational logic. For macro-comparative scholars interested in the way in which the structure of the world-economy distributes the returns to economic behavior, the implications are clear: the answer varies across industries and with temporal changes in the organizational logic of globalizing industries. In these concluding remarks, I would therefore like to contextualize these findings within this broad macro-comparative literature on international inequality, and illustrate the theoretical utility of the inter-industry variation observed here.

Many credit Hopkins and Wallerstein (e.g. 1986) for introducing the commodity chain construct. In its infancy, the commodity chain construct became to world-systems analysis what natural selection is to the theory of evolution—it provided a mechanism by which the world-system generates inequality between countries, as well as an explanation for the reproduction of the structure of the world-system itself (also see Arrighi and Drangel 1986). To commodity chains, one could also add the “feudal interaction structure” (Galtung 1971), the exchange of finished products for raw materials that led to declining terms of trade for producers of the latter (Frank 1969), or the “unequal exchange” embedded in wage differentials between core and periphery (Emmanuel 1972; Amin 1980). Crucially, none of these mechanisms anticipate that inequality mechanisms might vary across industries within the manufacturing sector. At most, the returns to participation in the world economy vary by sector. They are also incapable of

illuminating the behavior of the agents “below” the nation state who actually engage in economic activity. For the typical macro-comparative scholar, then, international inequality is driven by one of a handful of homogenous state/system level mechanisms that explain why peripheral countries remain poorer than core countries.

Quantitative macro-comparative research reflects this approach. Here, scholars use network-analysis to operationalize world-system structure, and examine the variation in developmental returns within this structure. Beginning with the seminal work of Snyder and Kick (1979), and proceeding through the work of Van Rossem (1996), Clark (2010) and Mahutga and Smith (2011), scholars used data on various kinds of inter-state relations to assign countries to world-system positions and compare the developmental outcomes across these positions. And the conclusions that can be drawn from this work are not entirely clear: “coreness” sometimes has a positive (Snyder and Kick 1979), sometimes a null (Van Rossem 1996), and sometimes a non-linear (Mahutga and Smith 2011) effect on growth. Moreover, what emerges in more recent research is the sense that world-system *mobility* seems to be more important for growth than is world-system position (Clark 2010; Mahutga and Smith 2011).

In contrast to the standard macro-comparative approaches to international inequality, the analysis presented here investigates a new unit of analysis—the globalizing *industry*. Turning to this new unit of analysis suggests an immediate point of departure: globalizing industries do not generate international inequality to the same degree or by the same mechanisms. To understand why, we must look beneath the world-economy and even the nation state. We must explain why *firms* shed certain types of economic activity (and not others), how they utilize networks of inter-firm relations to shed these activities, and why both processes vary dramatically across industries. To explain these, we must theorize *network governance* as it varies across industries and over time.

Much has already been said about chain/network governance, and there is no use recapitulating it here (e.g. Bair 2005; Gereffi 1999; Gereffi et al 2005; Mahutga 2012). What is important for the present purposes is illuminating how network governance explains the divergent findings across industries. To explain why firms externalize some activities and not others, Mahutga (2012) and others (Gibbon and Ponte 2005) evoke the notion of barriers to entry. Entry barriers come in many forms, but they all limit the number of firms participating in a given economic activity. When the number of competitor firms is reduced, so is the amount of economic competition with respect to the focal economic activity. Lead firms externalize economic activities subject to low and/or declining barriers to entry because doing so protects them from competition. And, because entry barriers restrict the number of competitor firms, they also yield a significant degree of bargaining power to lead firms, which they can use in negotiations with suppliers. In short, economic activities protected by low barriers to entry get externalized by a lead firm. Those that are protected by high barriers to entry often correspond to a scarce resource that makes a leading firm attractive to potential suppliers, and also yield a disproportionate degree of bargaining power to lead firms in their negotiations with suppliers. To explain why garment networks have become exploitative, while transport equipment networks lead only to differential gains, one must explain where barriers to entry are highest in the two networks, how this leads to different kinds of inter-firm relations between networks, and why these relations matter for the returns to network participation.

In the garment industry, entry barriers are lowest around the manufacturing functions and leading firms thus engage in almost zero manufacturing. Instead, manufacturing is carried out by geographically diffuse suppliers. In the transportation equipment industry, entry barriers are

relatively high around manufacturing functions. Thus, leading firms engage in a significant amount of manufacturing, and rely on suppliers for a smaller (if growing) proportion. However, the number of potential suppliers available to leading firms in the garment industry is much larger than that available to the leading firms in the transport equipment industry (Mahutga 2014a). Moreover, because of issues related to process complexity and supplier capability, suppliers in the garment industry are more likely to reside in the global South than are suppliers in the transport equipment industry (Mahutga 2012; 2014). Because there are fewer transport-equipment than garment suppliers, and because transport-equipment suppliers often work in close collaboration on issues of design and engineering with leading firms (often in the same country), “linkages between lead and subordinate firms appear ‘thicker’ and suppliers less expendable in producer-driven networks than in buyer-driven ones” (Mahutga 2014b: 31). Leading firms in the garment industry appear willing and able to extract harsher concessions from their suppliers than do those in the transport-equipment industry, which leads to exploitation in the former and differential gains in the latter. And, while the entrenchment of the two forms of network governance facilitated exploitation in the garment industry and differential gains in the transport equipment industry, it actually increased, to a very modest degree, the returns to network captivity in the latter (see Table 6).

In fact, Tables 6, A1 and A2 provide (tentative) evidence that inter-industry variation in network governance matters for the developmental implications of these networks. The relative wage premium to both network power and captivity is significantly larger in the transport equipment industry than in the garment industry after the two network forms become predominant organizational logics. That is, we can reject the null hypotheses that $\beta_{pb} = \beta_{pp}$ and $\beta_{cb} = \beta_{cp}$ in the network period, where P is power, C is captivity, b is buyer-driven and p is producer-driven, and the standard error of the difference is equal to the square root of the sum of the variance of each parameter. This suggests that not only are the gains from network participation distributed unequally across positions *within* GPNs, but the wage premium to both power and captivity may vary by the mode of governance *between* GPNs. Larger returns to both power and captivity in the transportation equipment industry could be explicable by the greater degree of interdependence that characterizes the inter-firm linkages. In turn, this would suggest that the degree of cooperation in networks does matter for the developmental returns to network participation, even in the presence of enduring (and increasing) inequality.

By way of summary, macro-comparative analyses of international inequality appear increasingly incapable of grasping the distributional dynamics at work in a global economy where production networks link firms together across space in ways that pay little attention to national borders and vary dramatically across industries. Because manufacturing is increasingly embedded within globalized production networks, we must understand how these networks work if we are to understand how they contribute (or not) to international inequality. And it is clear that these networks contribute in different ways—totalizing theories of exploitation in the world-economy simply will not do. Instead, I advocate a unit of analysis that is more modest than the whole world economy—the *globalizing industry*. While such a transition in focus would leave open a space for theories at the level of the whole world economy, it would also provide a more expedient set of analytical tools to do so. That is, if we can make progress in understanding globalizing industries one at a time and comparatively, theorizing at the macro level becomes an exercise in meta-analysis. Shifting to the global industry as a unit of analysis may thus reduce the opacity of macro-comparative theories of international inequality.

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Appendix

Table A1. Zero-Order Correlation Coefficients

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Transport Equipment Wages							
(2) Garment Wages	0.963						
(3) Buyer-Driven Power	0.756	0.769					
(4) Producer-Driven Power	0.595	0.580	0.776				
(5) Captive Garment Production	-0.191	-0.196	-0.229	-0.322			
(6) Captive Transport Equipment Production	-0.204	-0.203	-0.307	-0.525	0.263		
(7) Secondary Education	0.563	0.569	0.652	0.645	-0.106	-0.261	
(8) Network Period	0.402	0.376	0.316	0.275	0.054	-0.128	0.345

Table A2. First-Order (AR(1)) Serial Correlation Corrected Fixed Effect Estimator Conditional Coefficients, T-tests for Equality in the Wage-Premium to Power and Captivity and T-tests for the Equality of Change in the Wage-Premium to Power and Captivity Across Governance Periods.

	Pre-Networked		Networked		Change
	β^a	t test ^b	β^a	t test ^b	t test ^c
Garment Industry					
Buyer-Driven Power	.451*** (.115)	.491*** (.136)	.633*** (.107)	.891*** (.137)	.400*** (.123)
Network Captivity	-.040 (.083)	---	-.258** (.098)	---	---
Transport Industry					
Producer-Driven Power	.572*** (.118)	.524*** (.123)	.824*** (.129)	.741*** (.132)	.217* (.083)
Network Captivity	.048 (.068)	---	.084 (.073)	---	---

Note: These statistics are derived from a serial-correlation corrected fixed effects estimator, but are otherwise identically estimated to those in Table 6. See notes to Table 6.

Table A3. Conditional Short-Term Coefficients, T-tests for Equality in the Short-Term Wage-Premium to Power and Captivity and T-tests for the Equality of Change in the Short-Term Wage-Premium to Power and Captivity Across Governance Periods.

	Pre-Networked		Networked		Change?
	β^a	t test ^b	β^a	t test ^b	t test ^c
Garment Industry					
Buyer-Driven Power	.470*** (.122)	0.545*** (3.750)	.546*** (.099)	0.919*** (7.140)	0.373** (2.850)
Network Captivity	-.076 (.102)	---	-.373*** (.103)	---	---
Transport Industry					
Producer-Driven Power	.600*** (.117)	0.539*** (4.310)	.902*** (.122)	0.803*** (6.080)	0.264* (2.550)
Network Captivity	.062 (.099)	---	.099 (.093)	---	---

Note: See notes to Table 6.

Private Governance, Hegemonic Struggles, and Institutional Outcomes in the Transnational Cotton Commodity Chain

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Abstract

Transnational firms have rolled out new forms of private governance at the same time as the rise of new economic powerhouses like China has fomented growing inter-state tensions. This points to critical questions: how does inter-state competition shape private governance of transnational commodity chains and how does private governance shape inter-state rivalries? I explore these questions by tracing the construction and dissolution of sectoral hegemonic coalitions that govern commodity chains. Drawing on the case of cotton quality governance from 2000-2012, I argue that a coalition of the U.S. state and transnational merchants has reconstituted its sectoral hegemony to allow expanded accumulation and accommodate their main rival—China. The U.S. state created standards with Chinese characteristics, while transnational merchants made the authority structure of their institutions more inclusive. However, this reconstituted hegemony remains unstable. Facing continued regulatory competition from China, the U.S. state has constructed new forms of meta-governance that could facilitate a shift to Chinese-led sectoral hegemony but under U.S. oversight. Moreover, these sectoral hegemonic struggles compelled Western transnational merchants to fracture their long-standing relationship with the U.S. state in the hegemonic coalition in order to position their private institutions as geopolitically neutral and thus compatible with the hegemonic leadership of either the U.S. or Chinese states in the sector. By tracing struggles among coalitions of leading firms and states for hegemony over the institutions governing particular commodity chain sectors, we can shed light on possible trajectories within broader world-system level hegemonic struggles that at once constitute and are constituted by these sectoral dynamics.

Keywords: Commodity chain, hegemony, hegemonic rivalry, private governance, China

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Recent scholarship points to two major transformations in the governance of the global economy. On one hand, scholars emphasize the growing role of transnational corporations in constructing private institutions to govern transnational commodity chains (Bartley 2007; Cutler 2002, 2003; Cutler et al. 1999; Dicken 2003; Dolan and Humphrey 2000; Gereffi 1994, 1999; Haufler 2001, 2003). On the other hand, scholars claim that the emergence of economic powerhouses such as China and the deterioration of U.S. hegemony signal a period of hegemonic struggle (Beeson 2013; Gills 2010; Pieterse 2011; *Review of International Political Economy* 2013; *Third World Quarterly* 2013a,b; Vanaik 2013). While much scholarly attention has been devoted to each of these phenomena, less attention has been given to their intersection. This raises critical questions. How does inter-state competition shape private governance of transnational commodity chains? How does private governance shape inter-state rivalries?

The original conceptualization of the commodity chain in world-systems analysis was designed to capture the intersection of these two phenomena. Hopkins and Wallerstein introduced the commodity chain to analyze how transnational production and inter-state competition intersect in the (re)creation of the dynamic, hierarchical world-economy. However, the bulk of the recent work on commodity chains, and particularly the influential work of Gary Gereffi (e.g. 1994, 1999; Bair and Gereffi 2001; Gereffi et al. 2005), has departed significantly from these concerns. In this paper, I follow Bair's (2005) call to return to the roots of commodity chain research in world-systems analysis. I link the study of commodity chains to the broader dynamics of hegemonic struggle and transition as outlined in the work of Giovanni Arrighi and his colleagues (e.g. Arrighi 1994, 2007; Arrighi and Silver 1999). In doing so, I argue that the intersection of private governance and inter-state rivalries can best be understood by tracing the construction and dissolution of sectoral hegemonic coalitions. By tracing struggles among coalitions of leading firms and states for hegemony over the institutions governing particular commodity chain sectors, we can shed light on the trajectories of sectoral level governance which are constituted by and constitutive of broader world-system level hegemonic struggles.

Empirically, I explore these ideas through the case of quality governance in the transnational cotton trade from 2000-2012. In the early 20th century, a coalition of the U.S. state and Western transnational merchants established hegemonic state and private institutions to govern quality and dispute settlement for the sale of U.S. cotton abroad. These hegemonic institutions, however, came to be challenged in the early 2000s. At this time, the U.S. state and U.S. cotton producers claimed a 40 percent market share of the global import market for cotton, and a handful of the largest Western transnational merchants, who linked buyers and sellers around the world, likely controlled 45 percent of all transnationally traded cotton. However, the liberalization of the apparel and textile trade through the WTO made China the largest producer of textiles and apparel—and the largest importer of cotton—in the world, with a 35-40 percent market share of cotton imports. With this new market power and distinct preferences vis-à-vis quality governance, textile manufacturers in China and the Chinese state challenged the state and private institutions of the U.S. coalition, destabilizing their hegemony.

Through an analysis of this struggle over cotton quality governance, I argue that the U.S.-led coalition has reconstituted its sectoral hegemony by retooling its institutions to both expand accumulation and accommodate its main rival—China. The U.S. state created standards with Chinese characteristics, while transnational merchants made the authority structure of their private institutions more inclusive to increase Chinese membership. However, this reconstituted hegemony remains unstable. Facing continued regulatory competition from China, the U.S. state has constructed new forms of meta-governance that could facilitate a shift to Chinese-led

sectoral hegemony but under U.S. oversight. Moreover, these hegemonic struggles compelled Western transnational merchants to fracture their long-standing relationship with the U.S. state in order to position their private institutions as geopolitically neutral and thus compatible with the hegemonic leadership of either the U.S. or Chinese states. Although this struggle is ongoing, these competitive institutional innovations have generated a new track along which subsequent struggles will unfold.

Commodity Chains and Hegemonic Struggles

One of the basic, orienting concerns of the world-systems approach is to understand the tension between inter-state competition and the organization of production on a world-scale. These phenomena are inherently contradictory, Hopkins and Wallerstein explain, as “the economy is primarily a ‘world’ structure, but political activity takes place primarily within and through state-structures whose boundaries are narrower than those of the economy” (1977:127). The concept of the commodity chain was introduced as a way to trace the effects of these contradictory tendencies on the organization of the capitalist world-economy. Hopkins and Wallerstein defined the commodity chain as “a network of labor and production processes whose end result is a finished commodity” (1986:159). Tracing the network of the commodity chain allows one to capture processes of accumulation that traverse state borders as part of the ongoing impulse towards economic integration. At the same time, through competition to capture the benefits of capital accumulation, states restructure the organization of production and thus the distribution of surplus value in the world-economy (Hopkins and Wallerstein 1977:120-22).

Although a vast literature on commodity chains exists, most of this work does not follow the world-systems approach and its guiding concerns, particularly in the study of contemporary commodity chains (for exceptions, see Ciccantell and Smith 2009; Quark 2008, 2013; Talbot 2004).² Rather, much of this scholarship follows the work of Gary Gereffi on global commodity/value chains (GCC/GVC) (Gereffi 1994, 1999; Gereffi and Korzeniewicz 1994; Bair and Gereffi 2001; Gereffi et al. 2005). Emerging out of the world-systems tradition, Gereffi’s (1994) early work offered a methodological approach for mapping spatially dispersed and organizationally complex production networks. A key contribution of this work was its focus on the role of transnational capital—and especially commercial capital—in the organization of production on a world-scale. His more recent work attempts to explain variance in the forms of coordination used across distinct value chains, focusing primarily on three sectoral-level variables: the complexity of transactions, the codifiability of information, and the capability of suppliers (Gereffi et al. 2005). Overall, while offering some key insights into the governance of contemporary commodity chains, Gereffi’s evolving agenda narrowed the scope of research in comparison to the original guiding concerns of world-systems analysis. As Bair (2005:154) argues, Gereffi and his followers have focused on “the meso level of sectoral dynamics and/or the micro level of firm upgrading” while de-emphasizing “the larger institutional and structural environments in which commodity chains are embedded.” Bair (2005) thus calls for a return to the broader orienting concerns of world-systems analysis.

To this end, I argue that there are gains to be made from linking the study of institutions governing individual commodity chains to the Gramscian-inspired work of Giovanni Arrighi and the dynamics of hegemonic struggle and transition that he traces (see also Talbot 2004). Arrighi

² For recent work on historical commodity chains guided by world-systems analysis, see Moore 2010; *Review* 2000; Tomich 1990.

follows Gramsci (1971) in seeing the capitalist world-economy as an institutionalized social order (*cf.* Wallerstein 1984). That is, the capitalist world-economy is (re)constructed through struggle and in large part through efforts by economic and political elites to instantiate their interests in the institutions that allow capitalism to operate. Arrighi (1994) argues that the world-system develops through periods of stable capital accumulation in which institutional power is held by a hegemonic coalition of state and business agencies. These periods of stable accumulation are followed by periods of crisis and “discontinuous change” in which rival coalitions compete to create new institutions that at once reorganize the world-economy on new and enlarged foundations and capture the lion’s share of the benefits for the new hegemonic coalition (Arrighi 1994:1). According to Arrighi and Silver (2001:258), the crisis of overaccumulation that began in the 1970s and the concomitant deterioration of U.S.-led hegemony signaled the beginning of a period of crisis characterized by “uncertainty and unpredictability” as actors compete to establish new institutions to govern the capitalist world-economy.

Arrighi’s framework of systemic cycles of accumulation and hegemonic transition addresses shifts at the macro-scale. However, Gramsci (1971) understood power as diffuse; the hegemony of the ruling class is constructed through a web of institutions, social relations, and ideas operating through a plurality of sites of governance (Overbeek 2005). From this view, any macro-level hegemonic transition is constitutive of and constituted by struggles over myriad institutions governing the world-system, not least of which are the institutions governing commodity chains. As such, studying hegemonic struggles within particular sectors can help trace the contours of a broader (possible) hegemonic transition, which is as yet unclear. Arrighi insists that the current “crisis has more than one possible solution, and which particular solution will eventually materialize depends on an on-going process of struggle” (2005:67). Although potentially ascendant hegemonies like China exist, Hung sees “a cacophony of possible trajectories of global change” (2009:17).

To be sure, we see crisis dynamics destabilizing existing governance institutions in contemporary commodity chains. Periods of hegemonic crisis, according to Arrighi, are characterized by three distinct processes: “the intensification of inter-state and inter-enterprise competition; the escalation of social conflicts; and the interstitial emergence of new configurations of power” (2005:63; see also Arrighi and Silver 1999). In the 2000s, and particularly after the financial crisis of 2008, firms in emerging economies backed by powerful states such as the BRICs (Brazil, Russia, India and China) have intensified competition with Western-led firms (Appelbaum 2009; Gereffi 2013). Along with intensifying inter-state and inter-firm competition, we see growing social conflict in the proliferation of efforts to reform the governance of commodity chains to address social and environmental concerns (Bartley 2007; Jaffee 2007; Seidman 2007), as well as broader challenges such as the World Social Forum and Occupy Wall Street.

What is of particular interest here is how the intensification of struggles within commodity chains are generating new configurations of power and new institutions to instantiate them. Arrighi (1994) argues that the instability and uncertainty created by periods of crisis are only solved when a leading complex of governmental and business agencies is able to establish hegemony. Arrighi (1994) follows Gramsci’s (1971) definition of hegemony as rule by consent, backed only in the last instance by coercion. Institutions are central to the construction of hegemony. Complexes of governmental and business enterprises secure a hegemonic role by fostering new forms of inter-state and inter-firm cooperation within institutions to overcome “the

tendency of the separate states [and firms] to pursue their national interest without regard for system-level problems that require system-level solutions” (Arrighi 2005:63).

These hegemonic functions can also be understood to exist on the sectoral level for the governance of commodity chains. While Gereffi’s work focused on the governance role of transnational firms, I conceptualize the hegemonic coalition on a sectoral level as consisting of one or more states and lead firms that take the lead role in providing a constellation of state and private institutions which allows expanded accumulation in the sector—institutions such as quality standards and rules for contracts and dispute settlement. While much of the work on commodity chains has focused on the *dominance* of lead firms, I focus on the additional power accrued to lead actors—both firms and states—by achieving hegemony or *consent* to their rule.

Gramsci (1971) suggests that rival coalitions use two main strategies to develop the cooperation required for hegemony. First, they can provide material concessions to potential challengers. In sectoral institutions, elites provide material concessions primarily through the procedures their institutions use to make, apply and enforce rules (Chorev and Babb 2009). For example, as Chorev and Babb (2009) argue in their study of the World Trade Organization (WTO) and the International Monetary Fund (IMF), the resiliency of these different institutions of U.S. hegemony depends on whether their procedures encourage “exit” or “voice” among challengers. Second, rival coalitions can provide moral and intellectual leadership by claiming that the institutions privileging their interests also represent the collective interest (Arrighi 1994; Gramsci 1971). While this claim is always more or less fraudulent, following Gramsci (1971) and Arrighi (1994), hegemony only occurs when the claim is at least partially true—when the new institutions provide a collective benefit while also expanding the power of the dominant group.

Challenges to Achieving Hegemony in Periods of Crisis

From this view, we can conceptualize the institutions governing commodity chains as sites of hegemonic struggle. Both the existing hegemonic coalition and new rival coalitions can draw on these hegemony-building strategies. However, different actors face distinct challenges in their efforts to claim their position in the sectoral-level hegemonic coalition.

Since the postwar period, a range of agencies of the U.S. state has assumed a lead role in constructing the institutional foundations for expanded trade for a wide range of commodity chains. This has involved providing state regulation that creates a calculable environment in which transnational firms could expand and develop complementary private governance institutions. However, these U.S. state agencies now face several difficulties in their attempts to maintain their power during a period of hegemonic rivalry. First, emerging rival states seek to challenge or even supplant the leadership role of U.S. state agencies in order to privilege “their” firms and to capture greater benefits of global capital accumulation for their territory. Second, U.S. state agencies face difficulties balancing growing divergence among the domestic class fractions that form the core of their hegemonic coalition, particularly as transnational firms develop interests that do not align as easily with other, less mobile, domestic groups.

In addition to state agencies, periods of crisis also create new and distinct challenges for leading firms in the hegemonic coalition and can destabilize existing private governance institutions. In the current period of crisis, hegemonic rivalries are creating new challenges for Western transnational firms. First, their own governance roles within the hegemonic coalition are being challenged by geographically differentiated firms, and particularly increasingly powerful

firms in China (e.g. Appelbaum 2009). Second, Western transnational firms are challenged by the declining ability of U.S. state agencies to deliver a stable institutional foundation for expanded accumulation, given the intensification of state rivalries. Historically, Western transnational firms have relied on U.S. state agencies to create and maintain the institutional foundations necessary for their transnational expansion and for the operation of their private governance arrangements. However, as the legitimacy of U.S. state agencies deteriorates, Western transnational firms risk either growing instability in a global trade without the necessary institutional foundations or the emergence of new institutions generated by a rival state that may privilege the interests of different firms.

This leads to the third, related challenge facing Western transnational firms: they must also secure consent to their rule from other states and particularly from emerging state rivals who seek a prime position in a new hegemonic coalition. While Western firms might prefer to see the hegemonic role of U.S. state agencies reproduced, they must also navigate the possibility that these U.S. state agencies may no longer be able to perform these functions and that they will need independently to ensure their own hegemonic position. These firms are dependent on state regulation to undergird their private governance, but to reproduce their private institutional power transnational firms may need to be flexible regarding *which* states provide the institutional foundations for their expanded accumulation.

Finally, while new rival complexes of states and firms may be gaining economic leverage, they also face difficulties in their efforts to challenge the sectoral governance institutions of the ruling hegemonic coalition. Perhaps most critically, they face the problem of institutional dependence. That is, rivals are reliant on the institutions of the declining hegemonic coalition even as they attempt to replace or reconstitute them to serve their interests. This mirrors earlier scholars' insights regarding technological and financial dependence in the global South (Cardoso and Faletto 1979; Smith 1993). As Steinfeld argues, the ability of Chinese firms and the Chinese state to change the rules of the game to better serve their interests is complicated by the fact that their economic and political power has grown within "a game created and defined by the world's advanced industrial economies, most notably the United States" (2010:24). Actors construct governance institutions to solve the problems they face given their historically and spatially-specific position within processes of accumulation. These institutions then carry with them complex and historically-specific constellations of knowledge/expertise, technology, materiality, discursive legitimations, social roles, and relationships that cannot be cast aside, transplanted elsewhere, or redirected to serve different interests in a simple and straightforward way.

New Power Configurations and Novel Institutions

As these different contenders for a position in the sectoral hegemonic coalition engage in hegemony-building strategies, their competitive efforts can generate new configurations of power and novel institutions that depart significantly from those characterizing the declining hegemonic coalition. As Arrighi and Silver (2001:261) describe for the world-system as a whole, emergent hegemonic coalitions act as "tracklaying vehicles" which lead the system in a new direction and, in doing so, transform it. "Far from proceeding along a single track...", they argue, "the formation and expansion of the world capitalist system has thus occurred through several switches to new tracks laid by specific complexes of governmental and business agencies"

(Arrighi and Silver 2001:261). In this messy period of transition, we must assume that the nature of any emergent coalition is still in the process of formation. That said, we can evaluate the contours of an emergent coalition along six key axes:

- 1) The leading state apparatus: Arrighi (1994) traced the transformation of state apparatuses from the city-states of Italy to the trans-statal and inter-statal organizations that upheld U.S. hegemony. On a sectoral level, we can trace how state bodies transform and transnationalize their operations in efforts to construct their hegemony over sectoral governance functions. In the current period, any emergent leading state apparatus will necessarily be mediated by new and existing international organizations that can provide the institutional foundation for expanded accumulation.
- 2) The leading fraction of capital: Each coalition is led by a different fraction of capital, be it mercantile, industrial or financial capital, or, in Gereffi's (1994) terms, by firms at different nodes in the commodity chain. These lead firms construct private governance institutions that advance their interests, although the concessions required to construct consent to their rule can create some limits to the inequalities among different fractions of capital. In the current period, although Western transnational firms face new challengers, the growing transnational integration of capital through joint ventures and mergers suggests that any new coalition of lead firms is unlikely to simply supplant highly flexible and mobile Western capital.
- 3) The geographical centering: Each coalition is geographically-specific in that, by constructing their own institutional advantages, the coalition generates inequalities across geographic regions of the world-system. The concessions required to gain consent to one's rule, however, can dampen these geographic inequalities to a degree.
- 4) The state-capital nexus: This refers to the division of governance labor between state and capital. Van Apeldoorn et al. (2012:468) suggest that the state-capital nexus has undergone deep transformations in the history of capitalism "from the nexus between mercantile capital and the absolutist state in the seventeenth and eighteenth centuries to the liberal state and early industrial capital in the nineteenth century, to the nexus between late industrial capital and the emerging welfare state in the phases of monopoly capitalism and corporate liberalism in the first three quarters of the twentieth century, to finally the nexus between financial capital and the neoliberal state in the last four decades." We would thus expect a hegemonic transition to further reconstitute the state-capital nexus, particularly as novel state-capital relationships that depart significantly from the neoliberal model have powered the rise of many of the emerging economies (see *Review of International Political Economy* 2013).
- 5) The geographic reach of the institutions: As hegemony-building can involve creating new allies and persuading potential rivals to accept one's preferred institutions, these processes can transform the geographic reach or jurisdiction of the state and private institutions governing the sector.
- 6) Legitimizing discourse: As each hegemony-building project involves crafting a discourse that can cast the narrow concerns of the leading firms and states as collective concerns of the sector as a whole, we would expect temporally, spatially and sector-specific discourses to emerge that nonetheless draw on discourses circulating in the world-economy more generally.

Table 1. The Transformation of Sectoral Hegemonies in the Transnational Cotton Trade

	U.S.-led Hegemony, 1923-2001	Reconstituted U.S.-led Hegemony, 2002-?	Threat from Chinese-led Coalition, 2002-?
State apparatus	U.S. national state agency (USDA) with advisory role for buyers of U.S. cotton	U.S. national state agency operating through inter-state organization representing cotton buyers and sellers (ICAC) and backed by procedural standards approved in international standards developing organizations	Chinese national state agency (<i>strong threat</i>)
Fraction of capital	Western transnational merchants in <i>national</i> trade associations	Western transnational merchants in <i>transnational</i> trade association but with increasing role of textile manufacturers	Textile manufacturers in <i>national</i> trade association (<i>weak threat</i>)
Geographical centering	U.S.-centered	U.S.-centered but with increasing <i>Chinese characteristics</i>	Chinese-centered
State-capital nexus	State control of definition of quality and benchmark cottons Private control of dispute settlement	State control of definition of quality and benchmark cottons Private control of dispute settlement	State control of definition of quality and benchmark cottons Private control of dispute settlement with role for the state in verification of contract terms
Geographic reach	Formal jurisdiction over trade of U.S. cotton	Formal jurisdiction over trade of cotton generally (although incomplete)	Formal jurisdiction over trade of cotton into China
Legitimizing discourse	Scientific validity Liberal economic view of contracts	Scientific validity Neoliberal business ethics	An “alternative” for the cotton trade

The remaining segments of the paper use these axes of analysis to examine the transformation of sectoral hegemonies over quality governance in the transnational cotton trade. The analysis is summarized in Table 1. Following a discussion of methodology, I introduce the institutional arrangements that were established in the early 1920s to solidify U.S.-led hegemony and that would govern the cotton sector, largely unchanged, until the early 2000s. The characteristics of this sectoral hegemony are summarized in the second column of Table 1. After establishing this historical baseline, I explore the intense contestation that emerged as this U.S.-led sectoral hegemony faced new challenges from an increasingly powerful Chinese-led coalition at the turn of the 21st century. While this contestation has not been fully resolved, the third and fourth columns in Table 1 summarize the two key dynamics identified in this period. On one

hand, given the threat from the Chinese-led coalition, the U.S.-led coalition has attempted to reconstitute its sectoral hegemony by offering concessions to incorporate its new rival. On the other hand, the Chinese-led coalition continues to pose a threat to the stability of this reconstituted hegemony.

Methods

This study is based on multi-sited structural fieldwork, using the commodity chain as a methodological tool to track actors that are at once linked in the global cotton trade and embedded in place-specific constellations of labor, technology, culture, and business practices (see Collins 2005; Gellert and Shefner 2009). I collected and analyzed three types of data using this approach: 1) primary documents including news articles, annual reports, meeting minutes, and policy documents; 2) statistics on changes in cotton production, consumption and trade globally from 1970 to the present from a dataset I obtained from the International Cotton Advisory Committee (ICAC); and, 3) qualitative data gathered via multi-sited research, including approximately 80 semi-structured interviews and observation at four international cotton industry conferences.

Following the commodity chain methodology, my sampling strategy for interviews aimed to capture variation both within different nodes of the commodity chain and across different geographic locations. To this end, I interviewed actors in each of the key nodes or positions within the cotton trade—cotton producers, transnational and local cotton merchants, and yarn/textile manufacturers—and/or officials from trade associations representing these actors. I also sought to maximize geographical diversity by interviewing actors during field visits to China, Benin, Brazil, Britain, and the United States, as well as during the cotton industry conferences I attended. As these actors involved directly in the trade are further embedded in webs of social relations, I also interviewed government officials, fiber scientists, and various firms that provide services to the cotton trade (i.e. inspection firms, shipping firms, insurance firms, etc.).

The U.S.-led Sectoral Hegemony of the Transnational Cotton Trade

The governance of cotton quality involves three key governance tasks: the definition of quality, or determining what characteristics of the cotton should be evaluated to determine its price and establish grades (categories used to implement the standards); the creation of benchmark cottons, or the highly manipulable process of making physical representations of the ‘true’ value of the different grades; and, the settlement of disputes. For much of the 20th century, these governance tasks for the transnational trade in cotton were controlled by a U.S.-led hegemonic coalition. The institutional centerpiece of this sectoral hegemony was the Universal Cotton Standards Agreement. Established in 1923, this was an agreement between the U.S. government, representing U.S. cotton producers, merchants, and textile manufacturers, and foreign, private trade associations representing merchants and textile manufacturers in cotton-importing countries abroad, over who would govern quality standards for the transnational trade of U.S. cotton. Through this agreement, the USDA controlled two of the three quality governance tasks: the definition of quality and the creation of benchmark cottons. To gain consent to its institutional power, the USDA legitimated its standards through a discourse of scientism, or the belief that policy is best dictated by science (Tenny 1925). Moreover, the USDA gave material

concessions, offering foreign, private trade associations, as well as representatives of U.S. cotton producers, merchants, and textile manufacturers, an advisory role, which involved voting on revisions to the definition of quality and inspecting the benchmark cottons (USDA 1924). The third quality governance task—the settlement of disputes—was delegated to private, nationally-based trade associations and legitimated through a liberal economic discourse that posited a limited role for the state (Tenny 1925; USDA 1924). Domestic and/or foreign merchants largely dominated these trade associations, the most prominent of which were the Liverpool Cotton Association in the U.K. and the American Cotton Shippers Association in the U.S. The private arbitral bodies of these trade associations would settle contract disputes by determining the quality of cotton through comparison to the USDA benchmark standards. These arbitration decisions were enforced through private mechanisms such as blacklists of recalcitrant parties. In addition, at least domestically, arbitration awards were enforceable in U.S. courts. These governance arrangements forged by the U.S.-led hegemonic coalition governed the cotton sector until a challenge from China emerged at the turn of the 21st century.

The WTO, China, and New Configurations of Power

While tensions within the U.S. hegemonic coalition emerged in the 1970s, the formal establishment of the World Trade Organization (WTO) in 1995 was the critical turning point that intensified inter-state and inter-firm competition over quality governance. The WTO solidified the rise of China as a dominant player in the global cotton trade through the Agreement on Textiles and Clothing, which liberalized the long-protected apparel and textile trade between 1995 and 2005 (Rosen 2002). Paired with China's accession to the WTO in 2001, this trade liberalization made China the largest producer of textiles and apparel—and the largest importer of cotton—in the world. Chinese firms were able to radically increase their apparel exports, the value of which skyrocketed from \$24 billion in 1995 to \$120 billion in 2008 (Gereffi and Frederick 2010). Although China was the largest producer of cotton in the world, industrial cotton consumption outstripped domestic cotton production by 30% from 2003-2008 (ICAC 2008). Thus, as the value of China's apparel exports increased, its share of world cotton imports also rose steeply from approximately 2 percent to 43 percent from 2001 to 2005 (ICAC 2008). China became the major player in the cotton import market as the next largest importers, Turkey and Indonesia, claimed just 8% and 10% market shares, respectively from 2003-2008 (ICAC 2008).

The establishment of the WTO, however, also reinforced U.S. cotton producers' position as dominant cotton exporters. The flip side of this tremendous growth in textile and apparel manufacturing in China was, of course, the continued decline of textile manufacturing in the United States and around the world. While U.S. textile manufacturers' use of cotton peaked in 1997, it fell by 70% by 2008 as demand for cotton shifted even more decidedly to Asia and to China (USDA 2011). The competition among exporters in this growing transnational trade was supposed to unfold in a liberalized agricultural market as states had agreed to reduce government intervention in agriculture through the 1995 Agreement on Agriculture (AoA) (McMichael 2004). In particular, the AoA threatened to undermine U.S. cotton producers' positions as major exporters. Analysts estimated that the removal of U.S. production and export subsidies in line with the AoA would reduce U.S. cotton production by 20 percent and U.S. exports by 50 percent, which would increase the international price of cotton in the short-term and shift production and export dominance to other countries in the longer term (Baffes et al. 2004). As

such, powerful farm groups successfully lobbied to keep the U.S. government from implementing their AoA commitments. Thus, while U.S. cotton consumption decreased with the liberalization of the apparel and textile trade, U.S. cotton production and exports increased. As a result, the U.S. maintained its position as a dominant exporter with about a 39% percent share of world cotton exports from 2003-2008, compared to the market shares of about 10% claimed by its closest competitors (India and Uzbekistan) (ICAC 2008).

Finally, the expansion of production and trade following the end of the Multi-Fiber Arrangement (MFA) further solidified the role of transnational cotton merchants as middlemen in the global market. Large U.S. and European merchants had extended the transnational scope of their operation in the 1980s and 1990s, particularly with the privatization of state trading enterprises in many countries through structural adjustment programs (Baffes 2001). These Western transnational merchants were well-positioned to take advantage of the post-MFA boom in transnationally traded cotton. While precise data on firm market share is difficult to obtain, some estimate that the ten largest companies handled more than two-thirds of the annual transnational cotton trade during the 2000s (Çalışkan 2010:61), and that by 2009 four firms controlled over half of the transnational trade (Carpenter 2009). In short, competition over the governance of the cotton trade shaped up to be a battle of giants.

The Threat of Rival Quality Governance Institutions

With the rise of China as a new rival, the U.S.-led coalition faced new challenges to its sectoral hegemony. A coalition of the Chinese state and textile manufacturers in China had different preferences for quality governance than the U.S.-led coalition (see, e.g. CSITC Task Force 2007:4; WTO 2002). Indeed, they saw the state and private governance institutions dominated by the U.S.-led coalition as privileging the interests of Western actors and their distinct factor endowments and technological choices. For example, from the perspective of textile manufacturers in China, the U.S.' quality classification system had been developed to meet the needs of U.S. and Western European textile manufacturers who used capital-intensive rotor spinning technology, and not those of textile manufacturers in China who used the more labor-intensive ring spinning technology. Textile manufacturers using different technologies privileged different fiber characteristics—particularly fiber length vs. fiber strength—and thus had different interests in quality standards (Estur 2004; Perkins et al. 1984). As the U.S. system had been designed to reflect the interests of Western manufacturers, it did not measure additional fiber characteristics, such as short fiber content, or the ratio of short to long fibers in a sample, which would be particularly useful for ring spinning.

Similarly, textile manufacturers in China and the Chinese state viewed the transnational merchants' trade association, the Liverpool Cotton Association (LCA), as an institution instantiating U.S. and European interests and the interests of merchants over textile manufacturers in dispute settlement. While Western transnational merchants saw their trade association as the legitimate arbitral body for the settlement of contract disputes in the transnational trade, textile manufacturers in China preferred that disputes be arbitrated by the Chinese arbitral body, the China International Economic and Trade Arbitration Commission (CIETAC). Private arbitral bodies can vary significantly based on their historical development in relation to the domestic legal professions, practices, and legal systems of particular countries and/or sectors (Dezalay and Garth 1995). The LCA, for example, developed out of the Anglo-American arbitration tradition and legal systems and was steeped in the private rules, norms, and

culture of the merchant community. CIETAC, in contrast, was developed in relation to the legal rules and cultural norms in China. While Western ideas of contract law privileged freedom of contract, in China, state courts and legal norms remained highly embedded in *guanxi*, or networks of personal relations (Chung and Hamilton 2001).

Given their distinct preferences, textile manufacturers in China and the Chinese state aimed to challenge the USDA's authority over these three tasks of quality governance: the definition of quality, the creation of benchmark cottons, and the settlement of disputes (see, e.g. Fang 2009; CSTIC 2007; WTO 2002). In doing so, however, the Chinese state faced the problem of *institutional dependence*. The Chinese standards agency, the China Fiber Inspection Bureau (CFIB), had largely been using *manual* fiber evaluation as the basis for domestic quality governance (Keyes et al. 2005). In contrast, the USDA had upgraded to a system of *mechanized* fiber measurement, which provided more precise and reliable measurements desirable to textile manufacturers (Perkins et al. 1984). Thus, in order to take control of the definition of quality and the creation of benchmark cottons, the Chinese state would need to upgrade its domestic quality classification system to rival that of the USDA. To this end, the Chinese state contacted the USDA in 2003 and asked if it would help the Chinese cotton standards agency replicate the U.S. system for the classification of its domestic crop (Laws 2005b). The Chinese state's request was not primarily about technology adoption, as the measurement instrument could be purchased from private companies. What the Chinese state wanted to import and replicate were the USDA's institutional arrangements. To actually use instrument classifications to buy and sell cotton, the measurement instruments must be embedded within institutions that ensure the accuracy and precision of measurement instruments across time and space.

As U.S. industry and USDA representatives explained to me, they agreed to help the Chinese standards agency on the condition that it adopt the USDA benchmark standards, hoping this would reduce the possibility that the Chinese state would introduce rival quality governance. The Chinese state agreed to the deal and in late 2003 announced the launch of the five-year Chinese Cotton Quality Classification Reform Plan (FAS 2004). To this end, officials from the Chinese standards agency, as well as Chinese marketing and agriculture ministry officials, traveled to Memphis in February 2004 to study the U.S. instrument measurement system (Keyes et al. 2005; Laws 2005b). This initial exchange was followed by a number of follow-up visits that involved "intense, detailed information exchanges" (USDA official, as cited in Laws 2005b). With the USDA's help, the CFIB aimed to have a fully functioning mechanized classification system by 2010.

The Chinese state and textile manufacturers in China further faced the problem of *institutional dependence* in their effort to challenge transnational merchants' hegemony over dispute settlement. Given their commitments at the WTO, their challenge depended on a successful bid for private authority through private trade associations, which were underdeveloped in China. Historically, the Chinese state had strictly controlled cotton imports and exports through the China National Textiles Import and Export Corporation (Chinatex). However, through its accession agreement to the WTO, the Chinese state was compelled to open up cotton import and export trading to private firms. Chinatex remained a state trading enterprise but had to make room for private firms, and particularly a growing group of private and foreign-invested textile manufacturers, to import cotton.

The Chinese textile sector itself was undergoing a radical transformation in ownership patterns in this period. In 2000, twenty percent of textile firms were state-owned or state-controlled (i.e. partially privatized); by 2005, this fell to just four percent. With a shift from state

to private ownership came an influx of new textile manufacturers. The number of cotton textile manufacturers tripled, from 2,692 firms in 2000 to 7,632 firms in 2005 and 10,098 in 2007 (Alpermann 2010:164).³ Thus, rather than a single state trading enterprise buying on behalf of state-owned textile industries, a vast array of private textile manufacturers and private trading agencies were now in the importing game.

Thus, to rival Western transnational merchants, the Chinese state established a rival trade association, the China Cotton Association (CCA), under the supervision of the Ministry of Civil Affairs. This trade association was ostensibly a private body that would bring together diverse interests in the cotton trade, including cotton farmers, farmers' cooperatives, merchants, and cotton textile industries, and advise the government on policy matters (China Cotton Association 2011). In addition, as a private body, it could negotiate dispute settlement arrangements as an alternative to Western transnational merchants' private arbitration in an environment that saw the state's role as illegitimate (see Fang 2009). While it could not mandate contract terms or use of their arbitral body, the CCA decided to develop a standard contract that would serve as an industry "best practices" model that textile manufacturers in China could use. Given textile manufacturers' significant dependence on transnational merchants, the CCA allowed transnational merchants to negotiate over the standard contract.

Industry players report that negotiations over the CCA's standard contract were contentious. When the CCA released its official version of the contract in May 2006, it was clear it had engaged in some hegemony-building around its new rules by offering Western merchants concessions. The CCA allowed parties to choose either CIETAC or LCA arbitration and to give equal weight to Mandarin and English interpretations of the contract in case of disputes (China Cotton Association 2006). In the dispute over key quality terms, however, the CCA refused to compromise. To protect textile manufacturers' interests, the CCA maintained the requirement that the quality of all cotton entering China must be certified by the state agency, China Inspection and Quarantine (CIQ) and that CIQ certifications were final in contract quality disputes (China Cotton Association 2006). That is, despite merchants' preference for private quality verification, the Chinese state would maintain its authority to verify import quality. Through the construction of the CCA, the Chinese state-led coalition had thus introduced a rival set of rules for dispute settlement, centered in China.

Reconstituting U.S.-led Sectoral Hegemony

For the U.S. state and Western transnational merchants, the threat that the Chinese-led coalition would successfully challenge their hegemony over the governance of quality was palpable. In this context, both the U.S. state and transnational merchants sought to amass allies in the cotton trade more broadly in order to reconstitute their hegemony. Their goal was to persuade others involved in the transnational cotton trade around the world to support their governance arrangements before the Chinese state and textile manufacturers in China developed the scientific, technological and institutional capacities to launch their own hegemony-building campaign, which would be backed by the coercive power of being the largest cotton market in

³ Alpermann (2010:163) notes that these figures underestimate the number of firms involved in textile production in China. These figures refer only to the "cotton textile industry", or firms that use only cotton as a fiber input in processing. This thus excludes a vast number of textile manufacturers that blend cotton with other fibers such as synthetics, silk, or wool. In effect, the transition from a single state-owned importer/exporter to a vast number of private importers/exporters is likely more significant than these numbers suggest.

the world. To this end, the USDA and transnational merchants were compelled to reconstruct their existing institutions in order to give concessions both to the Chinese state and to other potential allies and to craft legitimating discourses that would present their institutions as serving the collective interest of the transnational cotton trade.

The USDA thus attempted to provide intellectual leadership, claiming that it operated the only scientifically valid mechanized classification system that could be used transnationally (see Laws 2005a). To demonstrate this, the USDA created a collective good: a new transnational institutional infrastructure into which cotton-producing countries around the globe could be integrated, that could verify the reliability of mechanized classification systems transnationally. At this time, cotton-producing countries were becoming increasingly interested in adopting mechanized classification to meet the demands of textile manufacturers. Indeed, at the International Cotton Advisory Committee (ICAC), an international commodity organization that brought together cotton-producing countries around the world, a number of cotton producing countries had begun to discuss the creation of an international definition of quality and benchmark standards for use with mechanized classification (ICAC 2003). The USDA attempted to co-opt this process to ensure that all mechanized classification systems adopt the USDA definition of quality and benchmark standards. Within the U.S., the USDA had constructed procedures to verify the reliability of its domestic classification labs. Through the ICAC, the USDA reconstructed these procedures to integrate measurement labs around the world. The USDA, in partnership with the Bremen Fibre Institute, designed quarterly round trials in which the USDA would send cotton samples with known values to the measurement labs around the world, who would measure them and send the results back for verification. By 2007, they had secured the participation of 50 classification laboratories globally (CSITC Task Force 2007). In short, by reconfiguring its quality governance institutions on a global scale and integrating other cotton-producing countries, the USDA began to recast the *state apparatus* by exercising its power through an inter-state organization and to reconstitute the *geographic reach* of its standards and benchmark cottons, if not the fractions of capital and geographic regions privileged within them.

Adopting a similar tactic, Western transnational merchants also launched a campaign to recreate the hegemony of private dispute settlement within their trade association among textile manufacturers and regional merchants around the world. First, as the LCA was perceived as a biased organization, transnational merchants endeavored to construct its impartiality by changing some of its rules and procedures. For example, the LCA replaced their adversarial arbitration system, which tended to be influenced by whomever could pay the best arbitrator, with a tribunal system that included a neutral chairperson on each arbitral panel who made the final decision in the dispute (LCA 2003:26-27). Second, the LCA offered moral and intellectual leadership by using these rule changes as the basis of a discursive campaign to claim its legitimate leadership over dispute settlement. In 2004 the LCA re-branded itself as the ICA, the *International Cotton Association* and cast transnational harmonization around its rules as the only way to ensure “ethical” trading practices in the uncertain global economy (LCA 2003; ICA 2004). To promote this message, the ICA launched an educational campaign to familiarize textile manufacturers and merchants, particularly in countries in the global South, with the newly revised ICA rules. In addition to posting its rules in five languages (ICA 2005, 2006), the ICA held interactive workshops and presentations across five continents (ICA 2006, 2007a, 2009).

Finally, the ICA tackled concerns that its authority structure was unrepresentative by diversifying its directorships and its Rules Committee. In addition to its officers and ordinary

directors, the ICA added a new category of “associate director” who would be “especially appointed to represent the interests and concerns of international members of the ICA and the principal overseas cotton producing and consuming regions” (ICA 2007b). By 2007, the ICA had appointed associate directors to represent a range of cotton and textile associations around the world (ICA 2007b). In perhaps its most significant concession to establish greater representation, the ICA decided to strategically diversify its Rules Committee, giving every trade association that adopted the ICA rules a seat on this key committee that debated rule changes and drafted proposals to be approved by the membership. In sum, the ICA reconstituted its existing institutions, giving concessions and claiming to represent the collective interest in an effort to persuade other trade associations to support its transnational authority over dispute settlement.

These changes did increase support for the ICA’s authority over dispute settlement. The ICA membership increased by thirty-four percent from 2010 to early 2012 (ICA 2012d). Perhaps most importantly, numerous Chinese firms joined the ICA in 2011 and 2012 (ICA 2011b,c,d,e,f; 2012a,b,c,e), and a representative from a state-owned firm, the China National Cotton Group Corporation, was appointed as an Associate Director to represent the interests of the Chinese cotton industry (ICA 2011h). This signaled the growing success of the ICA’s efforts to diffuse the challenge from China and integrate Chinese firms into the existing institutional arrangement.

The Instability of Reconstituted Hegemony

These efforts by the USDA and transnational merchants to reconstitute their hegemony would prove unstable. In terms of the first two governance tasks—the definition of quality and the creation of benchmark cottons, the Chinese state did not intend to simply adopt the U.S. system but preferred to create its own institutional arrangements to challenge those dominated by Western actors. By 2007 evidence was growing that the Chinese state was preparing for a bid to control standards, and particularly that it was considering developing its own benchmark standards for a Short Fiber Index (SFI) (CSITC Task Force 2007:4). Not only would this change the definition of quality by introducing a previously excluded measurement, but it would shift the key coordinating function, the production of benchmark standards, to China, at least for this measurement.

This perceived threat created a new challenge for the USDA: it created a divergence of interests within the domestic core of its hegemonic coalition. The USDA was concerned that U.S. cotton producers would face price discounts on the market if new fiber measurements, such as a Short Fiber Index, were added to the classification system. However, U.S. and European transnational merchants were less interested in preserving advantages for U.S. producers and more interested in ensuring that control of the classification system and benchmark standards did not shift to the Chinese state, which could weaken merchants’ influence over the system. Thus, in 2007, transnational merchants publicly supported an effort to include a Short Fiber Index, offering to petition the USDA to develop benchmark standards to this end (CSITC Task Force 2007).

This fracturing of its hegemonic coalition compelled the USDA to give material concessions to China and thus reconfigure which class fractions and geographic regions were privileged in its institutions. In 2009 the USDA announced that it had begun a collaborative study with the Chinese standards agency, the China Fiber Inspection Bureau, to develop benchmark standards for a Short Fiber Index (CSITC Task Force 2009:6). In short, the growing

pressure from the Chinese state had begun to shift the focus of research to the inclusion of those measurements of most importance to textile manufacturers in China. The new transnational system of quality governance established by the USDA would increasingly have *Chinese characteristics*.

In addition, the USDA created a set of procedural standards to verify the validity and reliability of benchmark cottons and had them approved through a private standards development organization (ASTM International) to serve as a form of meta-governance, or standards to govern the standards. The USDA developed the procedural standards such that “other bodies (like in China) have the option of developing their own quality infrastructure and calibration [benchmark] cottons without deviating from the USDA quality and result level” (ITMF 2008:5; see ASTM International 2012). These standards did not preclude the Chinese state from introducing new measurement instruments or creating its own benchmark standards – indeed, they facilitated such developments. These standards did, however, demand transparency, as defined by the USDA. If new instruments or standards were introduced, the USDA could use such procedural standards as the basis of a WTO challenge to guard against manipulation in classification and to ensure that the USDA ultimately played a key role as arbiter of what would count as a legitimate standard. In this way, the USDA acknowledged that, if the Chinese state did supplant its sectoral hegemony, the U.S. coalition would at least position itself hierarchically in the institutional environment to demand transparency.

This new threat from China also compelled Western transnational merchants to develop a new form of meta-governance. The ICA worked with the Bremen Fibre Institute to create an international laboratory certification scheme. The ICA would audit classification laboratories around the world using the USDA’s reliability standards to ensure standard levels of quality assurance, regardless of whether they were operating on U.S. or Chinese standards and benchmark cottons. The ICA would maintain a list of these qualifying labs that could be used to resolve quality disputes in line with the ICA Bylaws and Rules (ICA 2011a). If a quality classification was challenged, the ICA Bremen classification laboratory would make the final judgment (CSITC Task Force 2008; ICA 2011a). This can thus best be understood as an effort to at once solidify a particular *state-capital nexus* that ensured the role of private actors, and especially the ICA, in quality dispute settlement and position private authority on neutral ground—that is, able to perform this role regardless of whether the production of benchmark standards remained in the U.S. or shifted to China.

Conclusion

The case of quality governance in the transnational cotton trade from 2000-2012 offers a lens through which to explore the intersection of two key dynamics in the global economy: the growing governance roles of transnational firms, and intensifying inter-state competition with the decline of U.S. hegemony and the rise of China. In particular, I demonstrate the utility of conceptualizing hegemony-building functions at the sectoral level as a way to map the intersection of these two phenomena. By linking Arrighi’s work on periods of crisis and hegemonic struggle with the study of the institutions governing commodity chains, we can chart the destabilization of hegemonic coalitions of states and firms and the state and private institutions that undergird them, as well as the contingent struggles that generate new configurations of power.

In the cotton trade, intensifying inter-state and inter-firm competition, largely due to the rise of China, has destabilized the hegemonic state and private institutions established by the USDA and transnational merchants. What has ensued is a struggle over which firms and states would successfully provide new institutions that would at once instantiate their interests and provide a collective good to the transnational cotton trade as a whole. The U.S.-led coalition has, to this point, prevailed by successfully reconstituting its leadership in the sector through a process of hegemony-building. Both the USDA and Western transnational merchants in the ICA recast their existing institutions to better facilitate expanded trade, while at the same time giving material concessions and providing moral and intellectual leadership to persuade others to accept their state and private institutions for quality governance.

While reconstituting the U.S.-led coalition's leadership, however, the process of hegemonic struggle in the sector did significantly recast the institutions governing the trade along the six axes discussed above (see Table 1). First, the state apparatus leading the U.S. coalition transformed through these struggles as the USDA shifted from operating largely as a national state agency, albeit in a formal agreement with private trade associations abroad, to wielding its power through an inter-state organization, the ICAC. Similarly, Western transnational merchants recast their governance institutions, transforming what were largely national trade associations attempting to govern transnational trade to an increasingly transnational trade association that integrated new fractions of capital, particularly textile manufacturers.

These competitive dynamics also shifted to a degree the geographical centering of the reconstituted U.S.-led hegemony. The U.S. was compelled to create *standards with Chinese characteristics*, including new fiber measurements that privileged the preferences of textile manufacturers in China over those of U.S. cotton producers. Western transnational merchants reconstituted the authority structure of their dispute settlement institutions to make them more inclusive and transparent. This strategy of accommodation may reflect a broader strategy being pursued by the U.S. state. In 2005, the U.S. government posted a dedicated standards attaché in Beijing, making it only the fourth embassy with such an official (in addition to Mexico, Brazil and the European Union). Moreover, some prominent U.S. standards organizations, such as the American National Standards Institute, have deepened their interaction both with Chinese standards bodies and with the U.S. Congress and the executive branch (Kennedy 2006). This suggests a deepening of competitive cooperation that, if replicated more broadly, could aid a stable transformation to a new hegemonic order. As Arrighi (2005:69) argues, "U.S. adjustment and accommodation primarily, but not exclusively, to the rising economic power of the East Asian region is an essential condition for a non-catastrophic transition to a new world order."

Moreover, the efforts of Western transnational merchants to create more inclusive institutions by integrating transnationally-oriented firms from around the world into their trade association suggest new modes of transnational class formation. Some scholars have attempted to measure quantitatively the emergence of a transnational capitalist class through the existence of interlocking boards of directors (Carroll 2010; Carroll and Carson 2003; Carroll and Fennema 2002, 2004; Kentor and Jang 2006; Nollert 2005; Staples 2006). While critical, this study suggests that qualitative work focusing on the processes through which transnational class consciousness is constructed can yield new insights. Van Apeldoorn (2003) has done useful work on this topic in the European context but more work is needed to address the new Asian epicenters of global capitalism.

Despite the reconstitution of the institutions by the U.S.-led coalition, the evidence demonstrates that this reconstituted sectoral hegemony remains vulnerable, particularly as the threat of rival Chinese governance institutions has not been put to rest. It is here that we see the effects of the intersection of private governance and inter-state competition. Transnational merchants shaped inter-state competition by destabilizing U.S. state governance and compelling the USDA to pursue new strategies. Fearing continued competition from China and loss of merchant support, the USDA constructed a form of meta-governance by establishing procedural standards to govern any rival effort to produce benchmark standards. This lays a new “track,” as any future effort by China to impose new benchmark standards would face challenges if it did not adhere to these internationally accepted procedural standards. This speaks to both the opportunities and constraints on the potential rise of Chinese-led sectoral hegemony. On one hand, a Chinese-led coalition is seen as a credible threat, as evidenced by its ability to secure the assistance of the U.S.-led coalition in developing institutional infrastructure to facilitate its power. On the other hand, the Chinese state faces technological and institutional obstacles that must be overcome before it could credibly challenge the USDA and engage in its own hegemony-building campaign in the sector.

Western transnational firms face distinct challenges in their effort to maintain their position in any hegemonic coalition into the future, given the declining ability of the U.S. state to provide the institutional foundations for their expansion and for the operation of private governance. Indeed, inter-state competition over state governance functions shaped the decision-making structure of and tasks conducted by private governance institutions. Western transnational firms were compelled to recast their private governance functions as geopolitically neutral and compatible with either U.S. or Chinese sectoral hegemony. This points to new insights regarding our conceptualizations of private governance. Too often private governance has been theorized as separate from—and even replacing—state governance (see Bartley 2005; Seidman 2007), and inter-state competition has been seen as largely facilitating the rise of private governance through regulatory undercutting (Collins 2003). This case demonstrates not only that private and state governance institutions overlap and intertwine (Bartley 2005, 2011; Cutler 2003; Seidman 2007), but also that geopolitical competition over state governance functions significantly shapes the strategies used in the struggle over private governance institutions.

Despite these transformations, several elements of the U.S.-led hegemonic institutions remained rather stable. The Chinese state made only a weak challenge to the prevailing state-capital nexus, which is somewhat surprising given the attention focused on the Chinese state as pursuing a more state-centered approach. Similarly, the legitimating discourses of scientific validity and liberal/neoliberal economics were largely unchallenged through these struggles. While the Chinese-led coalition framed its efforts as providing “alternatives” for the cotton trade, it did not offer a competing legitimating discourse for this alternative. To the contrary, its efforts were in many ways straight-jacketed by the institutionalization of scientism and neoliberalism within the WTO, which compelled it to seek a scientific approach to standards and to create a private trade association to address dispute settlement.

Overall, although this struggle is ongoing, it appears that a new sectoral hegemonic coalition, which would likely prominently feature both the Chinese state and transnational merchants, remains a plausible trajectory. The possibility that the Chinese state could take control of the definition of quality and the production of benchmark standards is relatively strong, in part because the U.S. has facilitated its expertise and in part because the Chinese state

enjoys coercive power as the largest cotton buyer. If the Chinese state were to introduce new benchmark standards, cotton-producing countries around the world would be likely to support the standards of their largest buyer rather than their export competitor—the U.S. That said, the leadership of the Chinese state would likely remain under a degree of U.S. oversight, given the internationally-approved procedural standards that the U.S. has created. The Chinese threat to dispute settlement is weaker, largely because Western transnational merchants have achieved some success in integrating Chinese buyers into their existing governance institution and positioning their institution as geopolitically neutral. Moreover, these merchants still largely hold the coercive advantage in terms of market share. This suggests that Western transnational merchants would be likely to maintain a lead role in a Chinese-led sectoral hegemony.

From the perspective of potential transformations of hegemonic coalitions at the level of the global economy as a whole, these findings raise critical comparative questions—that is, are we seeing similar processes occurring in other commodity chains/sectors? While this question is beyond the scope of this article and warrants further research, some comparative observations can be made. The Chinese coalition’s ability to compel Western actors to aid its efforts to control standard-setting is not unique to the cotton trade. Indeed, foreign technological and institutional know-how has been an important component in a number of more prominent Chinese standards initiatives. For example, when the Chinese state and Chinese firms began to develop a home-grown third generation (3G) wireless standard (TD-SCDMA), the German multinational Siemens provided technology that helped Chinese standards development. This standard was ultimately approved in 2000 by the International Telecommunication Union (ITU), the key international standardizing body for information and communications technology (Suttmeier et al. 2006; Zhan 2010; see also Suttmeier and Yao 2004). Similarly, the Chinese coalition’s increasing ability to leverage its economic power to reshape sectoral governance is further evident in Richard Appelbaum’s work on the apparel industry. Appelbaum (2009:66) argues that Chinese government policies emphasizing indigenous innovation and competitiveness have facilitated the emergence of “giant transnational contractors” in China whose vertically-integrated supply chains could challenge the power of U.S. and EU-based retailers to govern the apparel commodity chain.

At the same time, however, the ability of the U.S.-led coalition to reconstitute its sectoral hegemony is consistent with findings in other sectors. Both the USDA and Western transnational merchants have sought to give concessions and expand their coalition in order to diffuse the threat from the Chinese coalition. Such efforts to establish a broad, inclusive coalition have proved successful in limiting other standards initiatives in China. For example, China’s effort to create national standards for mobile security (WAPI) in 2004 largely failed. In part due to security interests, the coalition in support of WAPI was rather narrow and exclusively China-based. Moreover, this narrow coalition faced a large and firmly unified group of U.S. and European multinationals, their Chinese partners, and a range of industry associations in the U.S., the European Union, and Japan that mobilized to challenge it (Kennedy 2006). As Fomin, Su and Gao argue, “a competing standard in the presence of a dominant one is a highly costly and risky endeavor” due to the “switching costs—the interests of consumers, manufacturers and service providers are vested in the installed base of the dominant standard” (2011:749). This suggests that the efforts of the USDA and particularly of transnational merchants to construct a broader global coalition in support of their rule-making authority could be a critical factor into the future.

Overall, the study of sectoral hegemonies offers an approach for making sense of broader struggles during periods of crisis and transition. Through struggles over sectoral hegemonies, both state and private institutions governing a commodity chain are transformed, as competitive hegemony-building projects fracture old alliances, generate new power configurations, and begin to shape the contours of new hegemonic coalitions that are constituted by and constitutive of broader hegemonic struggles.

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Bringing Commodity Chain Analysis Back to its World-Systems Roots: Rediscovering Women's Work and Households

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Abstract

Globally between 1980 and 2000, women's economic activity rate expanded, narrowing the gender gap in labor force participation. Thus, females now account for one-third or more of the "officially-counted" personnel of export industries (UNICEF 2007), and export agriculture is now feminized (Deere 2005). Today women account for one-third of the manufacturing labor force in developing countries, and females hold more than one-half of the industrial jobs in Asia (Barrientos, Kabeer and Hossain 2004). In much of the global South, females account for a majority of the waged labor force in export agriculture, and they are more heavily concentrated than men in service jobs that provision the supply chains of global production. As a reflection of fewer opportunities for males, women are now less likely to withdraw from the labor force during their childbearing years. In addition, females account for a majority of the income earners in the informal sectors of a majority of global South countries, generate a significant proportion of global commodities through subcontracted work they complete in their households, and provide most of the unpaid family labor needed to support household-based farms and businesses that are dominated by males (United Nations 2003).

Keywords: Reproductive labor, scientific gender-bias, feminist methods, household economies, non-waged labor

The Glaring Absence of Women from Commodity Chains

Despite the centrality of women to global production, the accumulated published work of scholars who have "gendered" commodity or value chain analyses represents less than two percent of the total accumulated research.¹ Since the 1980s, commodity chain analysis has developed along three divergent intellectual directions: the radical world-systems approach, the mainstream global commodity chains generated by Gereffi and his associates, and the industry-

1. I spent two years researching the three threads of commodity chain research to identify scholars who have integrated gender, women or households into commodity or value chain analysis (even at minimal levels). Since this is not a massive publication area, I reviewed every article or book that is grounded in any of the three strands of chain analysis. While contemporary scholars might prefer to believe that gender/women are routinely integrated into this field, I found only a small number of authors who gendered commodity/value chain analyses between 1980 and 2012. For example, only 1.6 percent of the works included in the massive publication database as of July 31, 2013 of the Global Value Chain website (www.globalvaluechains.org) include gender, women or households in their titles, keywords, or abstracts. For more extensive discussion, see Dunaway (2014): 1-4 and bibliography.

centric global value chains (Bair 2009: 7-14).² While there are significant differences among these variants, what they have in common is that a majority of the accumulated research in each of these perspectives has “de-gendered” analyses of global production (Clelland and Dunaway 1995; Dunaway 2001; Dunaway 2014: 1-25).³ Throughout the 1980s when commodity chain analysis was emerging as a field of study, feminists drew attention to the ways in which the widening of capitalism in the global South was integrating females into commodity production through non-waged labor mechanisms (e.g., Elson and Pearson 1981) and into export agriculture through paid and unpaid labors (e.g., da Corta and Venkateshwarlu 1999). Feminists provided additional clues in the 1990s that capitalist enterprises in the global South were targeting and expanding female non-waged, casualized, temporary, contract and informal labor mechanisms in both industry and agriculture (e.g., Prugl 1999; Clermont and Aligsakis 1995; Collins 1995).⁴ Even though feminist evidence about the significance of women’s work to global production has continued to mount since 2000 (e.g., Beneria 2001; United Nations 2003; Deere 2005; Caraway 2007), gender, women and households have not been represented in a majority of commodity or value chain analyses produced since 1985. In the second decade of the 21st century, feminists are still alarmed that “the gendered questions at the heart of international political economy continue to be neglected” (Bedford and Rai 2010: 2).⁵

With respect to households, the track record of all three intellectual threads is even worse, for these important structures of the capitalist world-system very rarely make an appearance in commodity chain analyses (Dunaway 2001, 2014: 1-25). When their ground-breaking book was published, Gereffi and Korzeniewicz (1994: 12) admitted that the researchers had failed to assess the linkages between households and commodity chains. As Nicola Yeates (2004: 378) has observed, a majority of analysts “have neither positioned the household as a site of production within commodity chains nor theorized the relationship between household production and the transformation of commodity chains.” In her seminal overview of the three scholarly threads of chain analysis, Bair (2009: 14-34) assesses the state of the field by calling attention to three predominant debates that cut across all three approaches. Gendered labor strategies, gender inequality and worker households are absent from those debates.⁶ Subsequently, Bair (2010: 205, 224) called for feminist analyses of the gendered nature of globalized production, indicating that

2. Throughout this essay, the term “commodity chain analysis” is meant to refer cumulatively to the knowledge production of all three of these directions.

3. Indeed, researchers often ignore the gender of workers even when the agricultural or industrial workers they are describing are disproportionately females. I am not the first to notice the gender blindness of commodity chain analysts; see Salzinger (2003), Barrientos, Kabeer and Hossain (2004), and Yeates (2004).

4. There is insufficient space to list a full bibliography of this relevant literature; please contact the author if you need citations.

5. On the feminist side of this problem, numerous investigations of women’s work in global production have been published since 1980, but very few of these analyses utilize commodity or value chain analysis.

6. Bair (2009) provides empirical evidence that the vast majority of GCC/GVC analysts ignore gender, women and households. The editor defined her goal to be that of assessing the state of the field, so she did not find gender, women or households evidenced strongly in the cumulative research agendas of the field. In her overview of the state of the field, Bair neither identifies gender or women as an area of GCC/GVC research nor pinpoints any GCC/GVC analysts who routinely integrate gender. All the references to women in the index refer to one chapter that provides brief empirical information about female workers but does not employ chain analysis.

a satisfactory approach will “look to how gender, as a set of context-specific meanings and practices, intersects the structure of global capitalism and its systemic logic of value extraction and capital accumulation.”

I have three goals for this article. First, I argue that the radical world-systems roots of commodity chain analysis integrated women and households in ways that subsequent scholarship has not. Second, I explore intellectual sexism as a cause for the gender biases of commodity chain analyses. Third, I examine the false analytical divides that underpin gender-blind commodity chain analysis. Throughout, I offer questions and research exemplars that can provide guideposts to scholars who want to avoid the intellectual pitfalls of gender-biased analysis.

Returning to the Radical Roots of Commodity Chain Analysis

Commodity chain analysis originated in the world-systems perspective, but the field has largely lost sight of those radical roots. In the words of Jane Collins (2014: 28), I seek to return the field to “a critical and liberatory direction that is distinct from the mechanistic approaches to commodity chain analysis that have gained popularity since the 1990s.” Except for a few world-systems analysts, most commodity chain researchers turn this approach away from the critique of capitalism reflected in the radical roots of this approach. For example, preoccupation with the ways in which capitalists “add value” at various nodes of a product chain is the political and economic antithesis of the *labor exploitation*, *sexism*, *surplus drain*, and *surplus extraction* that are emphasized by foundational thinkers of the world-systems perspective. While Hopkins and Wallerstein (1977: 127-28) envisioned a commodity chain to be “a network of labor and production processes” as so many chain analysts emphasize, they also stressed that the chain map needs to reflect “the reproduction of the labor forces involved in these productive activities.” The chain network was conceived to be grounded in sexism, racism and surplus drains from worker households.

Their concept emphasized (a) intermingling of several forms of waged and non-waged, free and unfree labor; (b) extraction of visible and hidden surpluses from households; (c) gendered and racial exploitation of workers; and, (d) economic devaluation of household-based work, especially that of housewives (Hopkins and Wallerstein 1977, 1986, 1994; Smith et al. 1988; Wallerstein 1995a, 1995b). Hopkins and Wallerstein (1994: 49) focused sharply on the pivotal question that should be asked: “If one thinks of the entire chain as having a total amount of surplus value that has been appropriated, what is the division of this surplus value among the boxes of the chain?” It was obvious to them— in ways that were not pursued by subsequent scholars— that worker households “routinely produce real surplus, which is in fact fed right into the world-economy” (Hopkins and Wallerstein 1977: 60, 68, 100). They argued that commodity chain analysis needs to take into account the surpluses that capitalists derive from two hidden inputs supplied by worker households: (a) the reproduction of labor forces and (b) the provisioning of low-paid waged workers. Consequently, they cautioned scholars to conceptualize a commodity chain in terms of multiple levels of surplus extraction from worker households at every spatial node of its lengthy network.⁷

7. In the 1970s and 1980s, world-systems thinkers conceptualized households in the modern world-system. See *Review of the Fernand Braudel Center* 5(3), 7(2), 8(3), 10(1), available through JSTOR. I have broadened and

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“How is it possible not to notice that commodity chains are gendered?” Immanuel Wallerstein (2014: xii) queries. “There is an incredible amount of foot-dragging and resistance to introducing gender into commodity chain analysis,” he insists, even though “gender is itself a principal constitutive feature of the commodity chains.” This intellectual anomaly derives from the larger crisis in the capitalist structures of knowledge that Wallerstein (1991) has been warning about for two decades. Broadly, there has been “political, economic and scholarly resistance to incorporating gender into the structures of knowledge” of the modern world-system (Wallerstein 2014). Evelyn Fox Keller (1984: 3-5, 178; 1987: 80) points out that gender biases have shaped the production of scientific theory. Vandana Shiva (1993: 26) argues that Western scientists discard women’s questions from their research agendas and reject female knowledge constructions through their “patriarchal logic of exclusion.” However, the myth of intellectual objectivity insulates the scientist from social responsibility for dismissing women (Keller 1983: 16).

There is empirical evidence that Wallerstein and these feminist scientists are correct. Bluntly put, men do not study women in either the hard sciences or the social sciences (Woolston 2001). In fact, they often fail to incorporate females into their research questions, even when women are impacted more severely (or differently) by the phenomenon being investigated (Wilson 2012). Because of this gender clustering, research about women is overwhelmingly conducted by females, whose projects face gender discrimination in scholarly prestige and funding allocations (Ferree 2005; Ritchie 2009).

Complexity scientist Isabelle Stengers (1997) is concerned that scholars construct knowledge through a process that authorizes and rewards *exclusion* of many worthwhile questions. What gets produced as knowledge depends on the consensus reached in scientific communities (Keller and Longino 1996: 274), but their rankings are determined by funding and publishing marketplaces in which a few problems have the greatest value (Stengers 1997: 128). Wallerstein (1995a: 84, 130) is more explicit. He contends that scientists form a fraternal order that protects the interests of the world’s accumulators of capital. Thus, pro-capitalist scholars determine “what scientific questions are asked” and “what scientific risks are worth taking.” Consequently, the practice of science is grounded in criteria of “value-added” to economic interests. Keller (1982) and Stengers (1997) point to the centrality of the selection process to knowledge production. Choice of theoretical model and research methodology is politically motivated by the training of scientists “to devalue and to scorn” research about questions that are not rewarded by the scientific community. In this way, Stengers (1997: 74, 116) says, capitalist science is “imagination in the service of power.” Keller argues that scientists adhere to ideological and economic criteria that guide them away from the closed box of gender investigations (Keller and Longino 1996: 252). Thus, capitalist science is “haunted,” Stengers (2010, vol. 2: 285, 398) insists, “by the ghosts of those who have [been] reduced to silence or ridicule” by such biased scientific reasoning.

So what can we do to avoid these traps? Stengers (1997: 113) and Keller (1982) advise us to *stop giving ourselves permission to ignore* research directions that focus on groups or questions that are typically ignored. In this regard, Marxist Daniel Singer (1999: 221-22) argues

that the Left needs to engage in collective introspection about its failures with respect to women. "We men in particular must proceed with a deep self-examination," he says, "to discover the prejudices inherited for generations and the extent to which they condition our behavior." When defining topics of study and research questions, Stengers (1997: 51-52) advises us to ask ourselves: "Who are the 'excluded others' whose relevance and significance I am denying?" In simpler terms, I would add that researchers (both male and female) need to ask themselves this question: "If I look out at my subject matter and never see women, why is that?" The answer is very rarely going to be that there are no women there. Intellectual silencing of women is grounded in the same forms of ideological sexism that underpin economic subordination of females and capitalist devaluation of women's work. What are the questions that scholars should explore to overcome such scientific sexism?⁸

1. To what degree do women supply the paid and unpaid labors that are embedded in the commodity chain?
2. How does the commodity chain transform and reshape women's work and household survival?
3. To what degree do surplus extractions from households and women subsidize the production process (through non-waged inputs and labors)?
4. To what degree does the commodity chain externalize material, political, social and ecological costs to households and to women?
5. To what degree do households and women at lower nodes of the commodity chain subsidize households, laborers, or consumers at higher nodes (effecting cheaper prices in distant markets)?
6. To what degree does the commodity chain structure gender inequality and/or sustain patriarchy within and among the households that comprise its entire labor force?
7. To what degree do women and households shape and resist commodity chain structuring and impacts?

The False Analytical Divide between Production and Reproduction

Degendered commodity chain analyses are grounded in a false analytical divide between production and reproduction. Among the most fundamental challenges to conventional economics and economic history posed by a gender perspective is the importance that one might attach to everyday life," argue Bettio and Verashchagina (2008: 32-34). Preoccupied with "productive" activities as represented by commodified labor and market exchanges, Western economists marginalize the reproductive (Peterson 2003). In this same vein, most commodity chain analysts have treated market/production and household/reproduction as discrete and disconnected spheres. By following that sexist approach, these scholars deny that capitalists

8. For research exemplars that embed these questions into commodity chain analysis, see the articles and the bibliography of Dunaway (2014).

benefit greatly from externalization of the costs of reproduction and maintenance of the labor force to households and communities (Wallerstein 1995b).

More than three decades ago, Lourdes Beneria (1979: 216) pointed out that economic change needs to be “analyzed from the perspective of the different effects on the sexes, a dimension that has often been neglected.”⁹ Analyses should concentrate on two levels, she argued: (a) how the transformation alters the productive and reproductive functions and the gendered division of labor of households and (b) how economic restructuring impacts communities and societies by imposing new conditions under which social reproduction must occur. In line with Beneria’s thinking, questions about three types of reproduction are relevant to commodity chain analysts: (a) how unpaid biological reproduction subsidizes the chain, (b) whether the chain threatens or supports household reproduction and maintenance, and (c) whether the chain threatens natural reproduction of affected ecosystems. Marx (1867, vol. 1) suggested a fourth type of reproduction that should concern scholars: the degree to which the chain constructively reproduces (or contributes to structural crises of) the infrastructure and processes of the capitalist world-system.

Mainstream economists recognize that capitalists are only able to keep their prices competitive because they do not have to pay for reproduction (Terleckyj 1975: 230-231). However, economists have dismissed the structural relationship between the production of commodities and social reproduction of the labor force, by treating reproduction artificially as though it is *not* a factor of production (Mies 1986). Since production and reproduction are far more intertwined than economic theory admits (Terleckyj 1975), there is need for more compelling questions and deeper insights about the ways in which the productive and the reproductive are inextricably linked and overlapping (Clough and Halley 2007). For help with rethinking, we can return to the intellectual roots of the world-systems conceptualization of commodity chains. Hopkins and Wallerstein (1977: 127-28, my emphasis) stressed that the chain mapping needs to reflect “the *reproduction* of the labor forces involved in these productive activities.” In reality, “no production system operates without a reproductive system,” and reproductive mechanisms are the “intimate Others” of globalized production systems (Truong 1996: 47).

There are five ways in which reproductive labors are routine elements of commodity chains. First, it is in the reproductive sphere that workers are socialized in the characteristics of a “productive” laborer. Learned skills, such as time management, work ethic, and inter-human relationships, are essential to efficiency, productivity and profitability in the capitalist workplace.

Second, production and reproduction share the same material and social bases, even though theorists artificially separate them. In the neoliberal period, a disproportionate share of fiscal resources has been allocated toward global productive systems, eliminating historical public expenditures for social reproduction (Katz 2001). When production absorbs, pollutes or destroys too many of a society’s ecological and social resources, reproductive spheres are threatened. As a result, poverty and hunger have expanded at the same time that global productive systems have created greater wealth than has ever existed in the world (Sehgal 2005). In similar fashion, ecological resources have been disproportionately allocated to (or polluted/wasted by) global productive systems, withdrawing them from reproductive uses. In

9. See *Feminist Economics* (No. 3, 1996) for a special issue about the links between production and reproduction.

these two contexts, the reproductive needs of laborers and communities have been “unhinged from production” (Katz 2001) to such an extent that much of the reproductive value of shared material resources is exported away from the people and communities that need them most for survival. Consequently, hunger and malnutrition are common in developing countries that export vast amounts through food commodity chains, and medicines are not applied where they are most needed because people cannot afford them (United Nations 2004). In reaction, households develop extra-market survival strategies to overcome the shortfalls in basic needs caused by productive systems that are no longer synchronized with reproductive systems.

Third, much of the labor required to generate the commodities that fill chains crisscrossing the globe takes *non-waged* forms that are closely tied to reproductive spheres. Many household activities have been incorporated into markets and commodity chains, including artisan crafts, agricultural crops, fishing and aquaculture. Thus, household members simultaneously complete household tasks and produce for the market, and a researcher cannot easily see where reproductive activities end and productive ones begin. Much of this activity occurs in informal sectors where two-thirds of the people of the global South earn livelihoods. Commodity chains routinely integrate informalized and casualized labor forms with factory production, and much of this work is household-based. Family members, especially females, supply unpaid labor to capitalist enterprises that are based in households (e.g., farms, textile workshops), and these forms of women's work represent a gray zone in which the females themselves do not demarcate boundaries between reproductive and market-oriented activities (United Nations 2003). In this context, a woman's reproductive labors are extended to the capitalist enterprise, as is the case with wives who provide cleaning, food preparation and family networking functions for their husband's export textiles shops or commercial fishing/aquaculture operations (Dedeoglu 2008; Ferolin and Dunaway 2013). When she subcontracts commodity production, the female homemaker further clouds the demarcation between reproduction and production, especially since she draws from her accumulated pantry of reproductive resources and child labor to complete the work for which she will earn income. Typically, most of her work—both productive and reproductive—is rendered invisible from public records and from commodity chain mapping.

Fourth, “the market” has broken down the analytical distinction by commodifying traditional reproductive functions. Monetization of subsistence resources generates household reliance on wages to be used to purchase survival needs from markets. Thus, reproductive resources must be secured from markets supplied by productive systems that generate commodities for exchange (Wallerstein 1995a). Households “move their unpaid reproductive labour into the commodity and services market, earning wages with which to purchase goods and services which replace unpaid domestic service” (Pearson 2000: 223). In addition, markets commodify reproductive functions to such an extent that all forms of domestic work and biological reproduction can be purchased. Hospitals and health care personnel sell health and reproductive services, and women's bodies are controlled by commodities that regulate or prevent reproduction. Even the human conception and birthing process can be profitably replicated through market mechanisms that do not require women (Mies and Shiva 2001: 174-95). To complicate matters, the world economy has structured an *international division of reproductive labor* in which domestic servants, nurses and sex workers migrate from poorer countries to sell their services in richer countries (Yeates 2004). In this global marketing of transnational laborers, the distant consumers shift their reproductive work to transnational

migrants. In this way, the costs of social reproduction are externalized to the labor-exporting country, keeping expenses low where most of the benefits accrue (Katz 2001). At this point, the reader should seriously question that there is any clear division between production and reproduction. If the analytical distinction were as great as economic theory suggests, reproductive labors would stay outside the market and not become economically valuable commodities.

Fifth, the contradictory narrow space between reproductive sphere and workplace threatens the efficiency and profitability of productive systems. The burdens of unpaid household labor and childcare deter the entry of females into waged labor and many forms of productive self-employment at exactly the time when commodity chains are targeting such females for low-paid production. When they do increase their labor force participation and their income-earning activities, “women’s increased role in the labour markets of the global economy has not been matched by an increased participation of men in unpaid domestic work” (Pearson 2000: 228). It should be of concern to capitalists seeking cheap female laborers that women spend more time than men on unpaid work. Indeed, women spend 50 to 70 percent as much time as men on paid work, but almost twice as much time as men on unpaid work. On an average day, a woman in the global South will allocate 2.5 hours more than men to reproductive basic needs (United Nations 2003). The murky space between reproductive and productive labors is further confounded by dangerous behaviors that females encounter when they enter the workplace. Who is responsible for the safety of women and girls who face harassment or physical threats on the way to workplaces (Prieto 2009), especially in societies where females are just beginning to enter the public labor force? Why do male workers inappropriately harass female peers for “reproductive” services in workplaces, if the division between the two spheres is so clear?

The operations of commodity chains are not separate or shielded from a mythological sphere to which “the reproductive” or the “gendered” are consigned, so as not to contaminate “the economic.” Instead, markets “embody gender hierarchies as they are found in society and its institutions” (UNRISD 2005: 65). Every node of every commodity chain is shaped by the gender and patriarchal relations of its geographical and social space, and the sexual division of labor in households is often replicated in productive nodes of commodity chains. Jennifer Bair (2010: 209) observes that export-oriented production “depends on the intersection of social organization. . . and a set of patriarchal ideologies and practices, which together create a particular opportunity structure for exploiting female labor.” Consequently, capitalist labor strategies (especially in the form of lowered remuneration for females) benefit from the gender inequalities and patriarchal constraints that characterize the societies in which production and distribution occur (Werlhof 2007). Because the labor market is segmented by gender, race and ethnicity, women are concentrated into fewer, lower-paying occupations that are characterized by poor working conditions and few prospects for advancement. In short, “there are reasons for caution in equating women’s paid work with empowerment” (UNRISD 2005: 68).

The False Analytical Divide between Household and Market

If we are to engender the commodity chain, we must investigate how and by whom surplus is produced and extracted at every node of a commodity chain. To accomplish this task, we must enter through the doorway of the household. It is beyond this portal that we find the forgotten woman, and we will find her working longer paid and unpaid hours than men, to contribute

surpluses that do not appear in the account books of the capitalist enterprise or in the government's tally of the Gross National Product. Fernand Braudel (1979: 16, 28-29) argues that we cannot understand the economy unless we investigate how people's everyday lives are intertwined with it. Similarly, feminist economists contend that one of the "most fundamental challenges to conventional economics and economic history posed by a gender perspective is the importance that one might attach to everyday life" that "encompasses the daily tasks of reproduction" situated within households and local communities (Bettio and Verashchagina 2008: 32-34). However, everyday life of workers, their households and their communities has been "the great absentee" from much of economic history (Braudel 1979: 16), from measures of economic growth (Perelman 2011), and from a majority of commodity chain analyses (Raworth 2004).

At the macrostructural level, a commodity chain is the global mechanism that insures the inequitable *division of surplus* among the core, semiperiphery, and periphery. Long before those expropriations can occur, however, the commodity chain structures the maximal exploitation of under-paid and unpaid labor. If we are to engender the commodity chain, we must investigate how and where surplus is produced by women at every node of the network, for females are the *invisible* workforce of global commodity networks. However, it is in the analysis of women's work that commodity chain mappings are probably weakest. Conceptually, we need to stop being blinded by over-simplified stereotypes about women being trapped in housebound labors outside the reach of market forces. If we search only for "manifestations of their private roles as housewives and mothers," we miss the "multigridded" nature of women's work (Hansen and Philipson 1990: 139-40), as well as the complex "dialectics of waged and unwaged labor" that characterize most women's resource accumulation (Collins and Gimenez 1988). Finally, we need to move away from the naive and outdated notion that all work done by women in households is *without* economic value and is *outside* the market. We need to investigate how women's work is embedded within a gendered division of labor that allocates different tasks and statuses to women and men. It is not enough, however, to search out "women's work" as a distinct category from "men's work." That can only lead us toward silencing and homogenization of much of women's work that is disguised behind class and racial junctures among women. An effective examination will pinpoint women's and men's differential access to and control over material resources, alongside the structural inequalities that exist among females.

Moreover, we must take special care when analyzing the work done inside women's households, for much of that work is aimed at the marketplace (Dunaway 2001). To varying degrees depending on their class and racial positions, women in the global South engage in a complex portfolio of agricultural and nonagricultural labors that are embedded in commodity chains, including: (a) unpaid labors to sustain the household, clan or family; (b) unpaid labors associated with biological reproduction and child rearing; (c) unpaid labors that subsidize household-based male-dominated market farming or businesses; (d) waged or salaried labor in formal documented contexts; (e) waged or salaried labor in informal sectors; (f) production and/or selling of goods or services in the informal sector; (g) business operation inside or outside the household; and, (h) income-earning homework that is subcontracted by exporters. Even though commodity chains exploit numerous visible and concealed female labors, gender inequality and patriarchy have not been broken down by their income earning. Men are more likely to be concentrated in formal, more closely regulated occupations, consigning females to more precarious informal and casual jobs (Barrientos, Kabeer and Hossain 2004). In comparison

to men, women are still more likely to experience temporary jobs, lower pay, precarious subcontracting, excessive overtime, denial of rightful benefits, higher unemployment and extreme levels of health risk (UNRISD 2005).

These disparities make it clear that commodity chains structure, preserve and exploit gender inequalities. These chain networks are grounded in sexism, racism and economic devaluation of household-based work, especially that of females (Hopkins and Wallerstein 1977, 1986). In addition to several visible (but undervalued) contributions by females, commodity chain analyses need to take into account the surpluses that capitalists derive from two hidden inputs: (a) the reproduction of labor forces and (b) the household provisioning of low-paid waged workers. We need to envision commodity chains as more than over-simplified material boxes, for every node of a lengthy commodity chain encompasses:

1. multiple levels of surplus extraction from worker households and from women;
2. patriarchal mechanisms that lead to public invisibility and economic devaluation of women's diverse portfolio of labors;
3. several non-material and/or cultural manifestations of the local impacts of globalized production and consumption systems; and,
4. activism and resistance by households and by grassroots organizations.

In addition to these complexities, it is important to recognize that households "add value" to commodity chains. Indeed, households are centers of both productive and reproductive labors that are essential to commodity chains. The linkages that women forge between households and commodity chains are hydraulic, shooting out in multiple directions. It is a conceptual mistake to draw an analytical distinction between the household sphere and production, for the household is just as much a capitalist unit of production and reproduction as are the farm, the factory, and the marketplace (Mies 1986). To detect the entire surplus that is generated by and extracted from the workers who produce and move goods within commodity chains, we must examine households where the labor forces of all commodity chains are created and sustained. Furthermore, much of the production of global commodities now occurs *within* households, not in factories. As feminist scholars have argued for three decades, much of global production is structured within households in both *paid* forms (e.g., contract piecework) and *unpaid* forms (e.g., wife's support of a husband's export farming or textiles sweatshop) (Carr, Chen and Tate 2000; United Nations 2003; Dedeoglu 2008).

Thus, scholars need to integrate households because they are now increasingly the sites of activities that feed into (or challenge the continuation of) production systems. Moreover, household laborers often produce supplies and provide services that provision the formal production process (Beneria 2001; United Nations 2003). By the mid-1990s, half the global garment industry workforce consisted of home-based workers who "feed productive profit-making output from their homes into the more formal manufacturing companies" (UNRISD 2005: 82). At the turn of the 21st century, 70 to 80 percent of these homeworkers are females (United Nations 2003) whose economic inputs have been excluded from national GDPs and from scholarly commodity chain analyses. Peasants comprise about half the population in the global South; they ground their export agriculture, fishing or aquaculture within households, and their reallocation of labor triggers conflicts between household subsistence needs and commodity

marketing.¹⁰ More than two-thirds of the population of South Asia, Sub-Saharan Africa and all the least developed countries is still concentrated in rural areas, and this geographical distribution impacts females disproportionately. Women account for a majority of the world's poor, and they are concentrated in rural areas.¹¹ While 70 percent of the world's poor reside in rural areas, 60 percent of the world's land is urbanized. Even though they produce half the world food supply, women own only 1 percent of world land.¹² Women are over-represented in the rural populations of much of Africa and Asia because males migrate to find employment (Alvarez and Stloukal 2008), and females provide a majority of the paid and unpaid agricultural labor in all regions of the world (United Nations 2003). To complicate matters, peasant debt bondage supports export production while endangering household reproduction (Ferolin and Dunaway 2013).

Households provide a second significant service that “adds value” to commodity chains. Capitalists maximize profits by externalizing costs of production to households (e.g., costs assumed by home-based contract workers) and to the ecosystems that provision them. In addition to shifting costs of laborer reproduction to households, capitalists externalize many of the real costs of commodity production to households, communities and ecosystems. These externalized costs are not unusual or extraordinary, for they are “part and parcel of normal capitalism, and they are to be found at every node/link of every commodity chain” (Wallerstein 1995b). Within a commodity chain, externalities serve three critical functions. Capitalists are more competitive when they keep labor costs low by externalizing costs to households, and they maximize profit-taking through externalized costs that lower consumer prices. Hidden labor and inputs that are unpaid or acquired at below global market value provide the capitalist a “degree of monopoly” in relation to competitors (Clelland 2014). However, these externalized costs place social reproduction at risk in much of the world, as ecological resources, foods and public funding are captured by export chains (Sehgal 2005).

There is a third way in which households are crucial to capitalism, for they are the structural end points of commodity chains. Without households, consumer goods would have far fewer arenas for marketing and profit-taking. Disproportionately, women collect and process the capitalist goods (and dispose of the associated waste) that are utilized by households. “In the modern world-economy the organization and composition of households embodies the construction of consumption” (Gereffi and Korzeniewicz 1994: 12). However, consumption is no more gender neutral than production of a commodity. Key transnational corporations control the development and distribution of new consumer goods and define the spatialities and target groups that will be the markets for commodities. Consequently, consumption is structured around and reinforces gender inequalities, as well as the polarization between rich and poor countries. Men and women do not equitably consume commodities, and there are significant disparities in consumption by females of different national, racial, ethnic and class positions. Global South workers do not just produce commodities for others to use, for they actively seek to be consumers in ways that conflict with existing gendered institutions (Ramamurthy 2003).

10. The transition to urbanization is not occurring very rapidly in a great number of countries. In 54 countries, two-thirds of the population is rural while 50-61 percent of the population is rural in another 26 countries. See www.nationmaster.com/graph/peo_per_liv_in_rur_are-people-percentage-living-rural-areas.

11. See <http://data.worldbank.org/indicator/SP.RUR.TOTL/countries/1W?display=default>

12. <http://www.trickleup.org/poverty/women.cfm?gclid=COeMpKatrwCFUcV7AodRS4ALw>

Increasingly, poor households in the global South are targeted to be the “new markets” for imported consumer goods. Consumption of modern commodities leads to alteration of traditional labor strategies and to cultural norms, and these changes are gendered in impacts on households. Dialectically, consumption stimulates change in such a way that gendered inequalities can be minimally altered while patriarchy is reconsolidated (Werlhof 2007). Consumption of cheap goods can simultaneously “improve” the living conditions of worker households and threaten household survival labor strategies and resources. Metaphorically, then, consumer goods are simultaneously “the good, the bad, and the ugly” in their impacts on households.

Finally, households are key institutions within commodity chains because they form spatialities of resistance. Households can threaten productivity and profits within commodity chains, for they often are the locations for nurturing and educating laborer activism and resistance, most especially in contexts in which public meeting places are limited and government or employer repression is high. Especially during economic downturns, households are loci of antisystemic resistance. Workers resist the “lean” policies within production systems to try to insure that waged employment “is remunerated minimally at the level of household reproduction” (Wallerstein 1995b: 1). In addition, householders challenge the commodification of their provisioning resources and of their informal sector production. Historically, peasants and indigenous peoples have resisted when their ancestral lands have been threatened by capitalist encroachment. Social movements resist decline in livelihoods caused by capitalist expansion and press for land reforms when natural resources become concentrated into the hands of agrarian capitalists. Women’s activism is often organized within households where they combine income-earning with resistance and employ household resources to mobilize their movements (Mills 2005; Agosin 2008).

Is bringing in households and women an impossible task? No, it is not! The inputs of women and households into commodity chains are publicly visible (though often not officially counted), and they are being increasingly documented by states and by international development agencies. Females now constitute a majority of the workforces in global South areas of capitalist expansion, and those females typically suffer greater degrees of income inequality, poverty, malnutrition and health problems than their male counterparts (Selwyn 2012: 108-126). In addition, a high proportion of commodity chains structure putting out and subcontracting systems that require productive labors to be undertaken within households (Barrientos 2011). Moreover, it is not impossible to quantify unpaid, non-waged and informal sector labor. Since the 1920s, some mainstream American economists, including Nobel Laureate Simon Kuznets (1941, vol. 1: 10), have argued that several forms of unpaid household labor need to be taken into account in measures of economic growth and GDP. Moreover, the contribution of household labor to economic growth is routinely covered in undergraduate textbooks (Perelman 2011: 200-212).

For two decades, mainstream international organizations have been prioritizing research about these undocumented labors and about the linkages between households, gender and commodity production. In the 1990s, the United Nations and the World Bank began to fund national time use surveys to quantify unpaid household labor (Clermont and Aligisakis 1995).¹³

13. Since the 1970s, feminist scholars have measured the time inequalities in the allocation of unpaid household labors (Antonopoulos and Hirway 2010) and proposed approaches for integrating the value of unpaid household labors into national GDP (e.g., Beneria 1992; Himmelwitt 2002; Luitzel 2005).

As a result, 23 global South countries and two Western nations now report an economic value for unpaid household labors within their GDP. The United Nations Statistics Division (2011) recently published guidelines for integrating unpaid work into national accounting procedures. A current United Nations project focuses on the “political and social economy of care” in order to articulate this unpaid household labor “with the commodity economy” (Budlender 2007). Similarly, the World Bank has encouraged global South countries to develop methods for documenting the economic value of their informal sectors. Since 1995, the Bank has fostered more than 5,000 working papers about statistical approaches to measure the informal sector, and Bank databases include a wide array of statistical information for most global South countries.¹⁴ In addition, private scholarly projects have developed strategies for measuring time allocation in households of the global South (cf. Antonopoulos and Hirway 2010).

The False Analytical Divide between Informal Sectors and Commodity Chains

Most commodity chain analysts practice their art as though there is a sharp divide between “formal” labor and inputs and the informal sector. Consequently, these investigators treat informal inputs into global commodity chains as though they never occur. However, the 21st century world-economy is stimulating fewer formal waged workers than informal sector livelihoods. Informal sectors absorb the vast majority of workers in the global South, and women are more concentrated in these jobs than males. As a result, most of the workers in commodity chains are off the books and hidden, and capitalists prefer it this way because it allows them to keep production costs lean, consumer prices low, and profit margins wider.¹⁵ Every commodity chain that originates in the global South is supported by thousands of laborer households, but these workers and their families acquire only a minority of their survival needs from formal wages in capitalist sectors. On average, a single multinational corporation does not employ enough waged or salaried workers to account for more than one percent of the total available labor force in a global South country (UNRISD 2005). To conceptualize the full role of reproductive labors and households in commodity chains, scholars must assess the extent to which capitalists derive labor, inputs and services from the informal sector, where women are concentrated.

Rather than adapting a form of commodity chain analysis that only describes the easily discerned waged workers and a few managers, scholars need to assess the ingenuity of capitalists at using household-based informal sector goods and services, subcontracting and outsourcing, as well as informalized workers on their productive sites (UNRISD 2005). Such informal labor is an historical and a contemporary feature of capitalism that is much more common than waged labor (Tabak and Crichlow 2000). Consequently, such “non-waged labor is a condition of—and not coincidental to—the so-called productive economy” (Peterson 2003: 14). For that reason, commodity chain analysts who ignore such workers will describe only a small proportion of the

14. A search of the Bank website calls up 486 projects funded since 2000 to develop a model that can be used in the Global South to define and quantify the informal sector.

15. The term “off the books” is not meant to imply that all these workers are fully undocumented or that it is extremely difficult for researchers to locate and to observe their labors as part of commodity chains.

productive laborers and will have a misunderstanding of the degree to which the formal sector is dependent upon the informal sphere.

Looking to the Future

It is intellectually short-sighted to continue to ignore gender, women and households in the analysis of commodity chains. Even though it has been inadequately applied in this way, commodity chain analysis can be utilized to reveal the multiple forms of exploitation of women's work that are embedded in globalized products. For that reason, the commodity chain concept is one of the most promising tools through which world-systems analysis can be translated into activist praxis. If we return to the radical world-systems roots of commodity chain analysis, we will "recover some of what neoclassical economics makes us forget: living, breathing, gendered and raced bodies working under social relations that exploit them" (Collins 2014: 27). Because commodities are "containers of hidden relationships" (Willis 1991: 52), we need to demystify them in order "to uncover in whose interests and in what ways realities are hidden, and then justified as normal, as inevitable" (Wallerstein 2014). This is the goal that commodity chain analysis needs to seek to achieve.

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The Core of the Apple: Dark Value and Degrees of Monopoly in Global Commodity Chains

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Abstract

The capitalist world-economy takes the form of an iceberg. The most studied part which appears above the surface is supported by a huge underlying structure that is out of sight. Unlike the iceberg, the world-economy is a dynamic system based on flows of value from the underside toward the top. These include drains of surplus (expropriated value) that take two forms: visible monetarized flows of bright value and hidden un(der)costed flows that carry dark value (the unrecorded value of cheap labor, labor reproduction and ecological externalities). Commodity chains are central mechanisms for these surplus drains in the world-economy. At each node of the chain, participants attempt to maximize their capture of bright value through wages, rent and profit. They do this by constructing differential degrees of monopoly (control of the markup between cost and sale price) and degrees of monopsony (control of markdowns of production costs). However, this process depends upon the transformation of dark value into bright value for capture. Via an examination of the Apple iPad commodity chain, I show how the bright value captured by Apple depends on the dark value extracted by its suppliers. Dark value is estimated by measurements of the value of under-payments for wage labor, reproductive labor and environmental damage in Asian countries, especially China. Surprisingly, most dark value embedded in the iPad is captured by final buyers (mostly in the core) as consumer surplus.

Keywords: Apple, Chinese labor, consumer surplus, dark value, monopsony, unequal exchange, value capture

We should think of the modern world-system as an iceberg economy in which uncosted labor and resources comprise the thicker submerged ice layers that are blocked from view beneath a thin top stratum that is counted as the visible official economy (Mies, Bennholdt-Thomsen and Werlhof 1988). From this vantage point, we realize that the total world surplus is far greater than the cumulative GDPs. We also realize that commodity chains are far more than networks in which “value is added” at nodes.² From a world-system perspective, these networks are exploitative structural relationships in which a vast array of unequal exchanges occurs among nodes of the chain and across zones of the world-economy (Wallerstein 1983). Indeed,

¹ I would like to thank Wilma Dunaway and three reviewers for their suggestions about ways in which I could tighten and strengthen this essay. I would also like to thank Jennifer Bair for her encouragement and support.

² I use the world-system conceptualization of commodity chain, although the careful reader will recognize the influence of later variants. See Bair (2009) for an explanation of differences among these approaches.

capitalism is grounded in *surplus extraction chains* through which powerful firms exercise degrees of monopoly to capture massive transfers of what I term *bright value* and *dark value*.³ Using world-systems analysis, this study examines one of those chains. After a brief methodological discussion, I explicate my conceptual framework of bright and dark value extraction and of degrees of monopoly in commodity chains. In the fourth part, I examine the differential expropriation of *bright value* through degrees of monopoly in the iPad commodity chain. In the fifth part, I offer an empirical investigation of the expropriation of *dark value* in the iPad chain through (a) extraction of hidden labor surpluses, (b) appropriation of unpaid inputs from laborer households and communities, and (c) surplus extraction through ecological externalities.

Methods of Inquiry

Between mid-2010 and mid-2011, Apple sold a little more than 100 million iPads, all assembled in China. This study explores the commodity chain for that product. In 2011, Apple integrated 748 suppliers of materials into its production network (82 percent of them based in Asia, 351 of them in China) (Apple 2012). Despite this array of input sources, final assembly is centralized at seventeen plants. This form of commodity chain is governed by a lead firm that sets strict design and production standards for each component of its finished item (Gereffi, Humphrey and Sturgeon 2005). As shown in Figure 1, there were at least six tiers of first generation iPad suppliers: (a) one assembly firm, (b) twenty manufacturers and sub-assemblers of major components, (c) producers of subcomponents used to manufacture components, (d) subcontractors to those material producers, (e) firms that extracted and processed raw materials, and (f) ancillary inputs into production and management processes. Due to lack of corporate transparency, however, I can analyze closely only the first three tiers. Headquartered in the United States, the European Union, South Korea, Taiwan, Japan, and Singapore, lead suppliers outsourced most of the manufacturing to China.⁴ I emphasize this aspect of the supply chain because previous research underestimated the degree to which the iPad and its components were manufactured in China.⁵ In concentrating iPad assembly and component manufacturing in China, Apple and its suppliers have followed the global trend.⁶

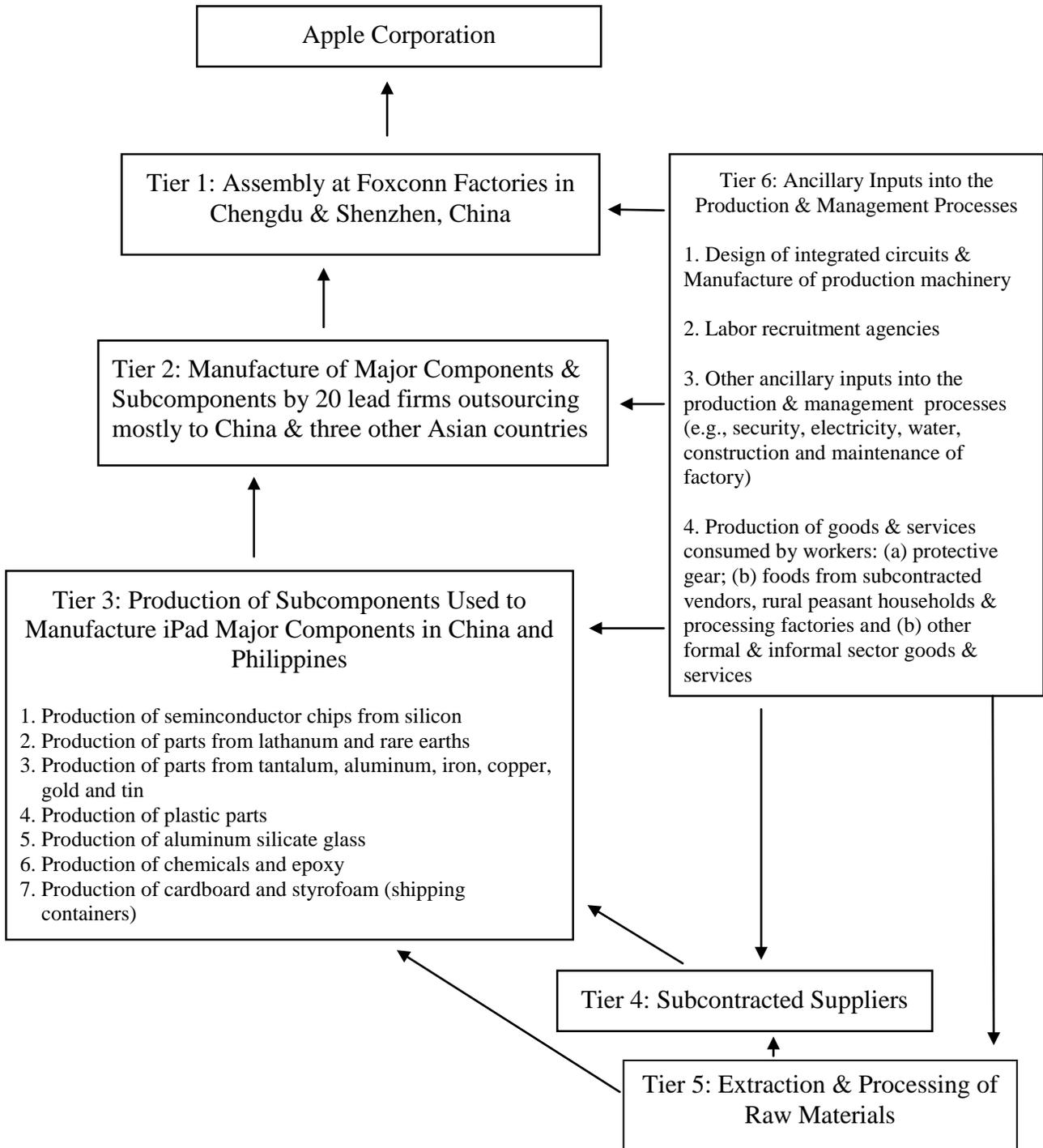
³ My concept of dark value is an extension of Emmanuel's (1972) theory of unequal exchange, but I challenge his assumption of international equal rates of profit (cf. Amin 1976, 2010). It is a basic argument of the original world-systems conceptualization (Wallerstein 1983, Hopkins and Wallerstein 1986) that commodity chains are surplus extraction chains based on unequal exchange.

⁴ Contact the author for a list of first generation iPad suppliers.

⁵ Kraemer, Linden, and Dedrick (2011) assigned estimates to firm headquarter countries or to an "unidentified" category, failing to document the extent to which production sites were located in China or other Asian countries.

⁶ There are more than 15 million workers in the global electronics industry, with China as the production hub (Sustainable Trade Initiative 2011).

Figure 1. Supply Chain for First Generation Apple iPad, April 2010- March 2011



Sources: Analysis of Apple (2012), iPad teardowns, numerous NGO and company websites, newspaper accounts.

I utilized iPad product teardowns, Apple’s supplier list for 2011 and extensive searching of corporate websites to identify suppliers and to determine estimates of worker compensation

levels.⁷ The ground-breaking Apple iProduct research of Kraemer, Linden, and Dedrick (2011) and Linden, Dedrick and Kraemer (2011) was useful in my operationalization of measurements of key global commodity chain concepts, as well as estimates of direct waged labor costs. In addition, their research suggested to me the possibility of an extension to surplus drain analyses. While I utilized their estimates as starting points, I moved beyond their research in four key ways. Since I had the advantage of several forms of information that were not available to these earlier researchers (e.g., Apple 2012), I was able to document that lead suppliers of the first generation iPad outsourced most of their production to China. Second, I extended their estimates of waged labor costs to encompass salaried professional/managerial staff that they did not analyze. Third, I expanded their work to include the third tier of the commodity chain (see Figure 1) that they ignored. Fourth, I radicalized the analysis by exploring world-systems questions and by introducing my own conceptualizations. While I provide some methodological explanations in the narrative, I have situated many details about quantitative sources and approaches in the notes for each table.

Conceptual Model

Physicists now estimate that imperceptible dark matter and dark energy account for 96 percent of the universe and that dark energy determines the degree to which expansion can occur (Panek 2011). By analogy, I argue that invisible human and natural energy flows are converted into the dark value that forms part of the basic structure of the world-system. Like other surplus transfers that are embedded in all commodity chains, this dark energy flows from some locations and accumulates in others. It is such relationships that allow us to identify some places, organizations and groups as core, others as periphery (Wallerstein 1983, 1987). Arrighi and Drangel (1986: 11-12) contend that: “Core activities are those that conquer a large share of the total surplus produced within a commodity chain, and peripheral activities are those that command little or no such surplus.” In the following two conceptual sections, I will offer my central theoretical arguments about how commodity chains operate (a) to extract bright and dark value and (b) to structure degrees of monopoly.

Bright and Dark Value Extraction in Commodity Chains

In addition to analyzing the inequitable core-periphery relationship, commodity chain analyses should integrate Braudel’s lowest layer of the world-economy, “material life,” upon which capitalism depends (Arrighi 1994: 10-11, 25-27). However, analysts typically ignore this material life which includes the unpaid reproduction of labor within households (Dunaway 2014: 1-15).⁸ For that reason, I move away from the industry/firm-centric analysis of value-added (e.g.,

⁷ Specialized companies (e.g., iSuppli and iFixit) develop *teardowns* for electronic products in which they identify components, their costs, and some of their manufacturers. In 2010 and 2011, Apple iProducts were the center of much of that interest.

⁸ As Brewer (2011: 213-14) indicates, “the commodity chain concept within world-systems analysis was created, first and foremost, as a means of explaining the polarized distribution of wealth within the modern capitalist world-system” (also cf. Parnreiter 2012). Nevertheless, actual analysis of distribution of surplus, value-added or value

Gereffi, Humphrey and Sturgeon 2005) to focus sharply on the forms of hidden value that capitalists expropriate from laborers and from the costs they externalize to households, communities and ecosystems. In other words, I invert the question of how value is added to a commodity by pinpointing the concealed value generated by workers and by several types of externalities. I will argue that these dark inputs account for as much or more value than any firm contributes to a commodity chain. Dark value is integrated into every economic transaction or commodity, making it the silenced partner that renders every bright value drain more profitable. Unlike visible bright value that is directly accumulated by the capitalist (Clelland 2012: 199-200), this second type of surplus drain is externalized from economic accounting. Dark value subsidizes capitalists, but it also benefits consumers, mostly in the core, thus legitimizing the structure of the system.

At each node in a commodity chain, we begin with supply of materials, to which is added costs of direct production, management, overhead costs, and profit. The total monetarized value of these factors equals the sales price. The total value of the three factors beyond the material inputs is termed *value-added* at that link in the chain. The portion of this added value that is not paid out in costs is *value capture* (i.e., profit). All of these components, combined with sales price, become a portion of material costs at the next node in the chain, at which point the construction of new value is repeated. Since all this cumulation of value is monetarized (and measured with transparent accounting techniques), I refer to this set of ideas as the description of the *bright value* in a commodity chain (Clelland 2012).⁹

At each node of a commodity chain and within each of its constitutive elements, there are hidden inputs in the form of externalized costs that often contribute greater value than the visible elements. Wallerstein (2009: 7) points out that “the basic effort of capitalists is to externalize costs, that is, to not pay the full bill for the inputs they use.” Such externalized costs are found at every node and every link of every commodity chain. Even though these factors are “uncosted” by the capitalist, they can be made visible in the money form. When a capitalist lowers wages to challenge competitors, the value of the reduction in labor costs becomes a form of dark value. If all the other costs of competitive firms are equal, the reduced labor cost has been *captured* as profit. In other words, dark value has been transformed into bright value. Should the capitalist cut the price to outmaneuver competitors, (s)he passes on the dark value to buyer(s) in the next node of the chain. The value of the labor input to the buyer is embedded in the product (e.g., a component part for the iPad) as dark value that can be captured by the buyer. However, the decreased wages are externalized to laborers as the need to undertake additional work hours to replace lost income that may be critical for household survival.¹⁰ This argument of dark value capture can also be applied to necessary costs of production for which the capitalist pays nothing (e.g., environmental damage).

The goal of the capitalist is to capture dark value from as many sources as possible and to transfer it into bright value.¹¹ In a purely competitive system, all captures of dark value would quickly be matched by competitors, but this does not happen in real capitalism (Braudel 1981,

captured has been rarer among world-systems analysts (cf. Talbot 2004 as an unusual case) than among business scholars (e.g., Kaplinsky and Morris 2001).

⁹ The model presented in this and the following section is an ideal type from which I would expect variations.

¹⁰ Since the unpaid costs are externalized to households, Mies, Bennholdt-Thomsen and Werlhof (1988) and Dunaway (2012) conceptualize this process as *housewifization*.

¹¹ This is an expansion of Marx’s (1993, vol. 1) analysis of the capture of surplus value from labor power.

vol. 2: 228, 413-22). Consequently, those capitalists who capture significant levels of dark value utilize it in three ways. First, they can apply the hidden value to roll-back prices in order to attract a greater volume of consumers than their competitors. Second, the capitalist might transfer some portion of the dark value into bright value in order to expand accumulation through reinvestment. Third, the capitalist can employ the dark value to attain protection from competitors through degrees of monopoly. In order to understand the appropriation and capture of dark value, we must examine the role of degrees of monopoly within commodity chains.

Degrees of Monopoly in Commodity Chains

By *degree of monopoly* (Kalecki 1954), I mean the control of any mechanisms that can expand a participant's share of a surplus in variance from a fully competitive market. Most discussions of monopoly point to (a) collusion among potential competitors in setting high prices in order to collect high profits and/or (b) state protection as a source of monopoly. In contrast, I emphasize that degree of monopoly is more commonly based on advantage of scale, productivity, barriers to entry, product innovation and/or design, intellectual property rights, advertising and marketing—i.e., the real-life actions that capitalists take to secure an advantage. These processes are mechanisms for establishing control over mark-ups in sales prices (Kalecki 1954). While they are sought by all participants in commodity chains, actual capture is related to the capitalist's hierarchical position in the chain. This structure is based in the reality that degree of monopoly (control of price markets) is highly dependent upon *degree of monopsony*, the ability to control “mark-downs” in the costs of inputs. At each node, every firm attempts to attain power over markups by constraining its supply costs. Within any node, full capture of the surplus is constrained by the relative *monopsony* power of the buyer (Robinson 1993). In order to cut costs deeper than the competition, each firm tends to externalize the least profitable elements of production and circulation to suppliers and distributors who face more intense competition. The firm to which production is outsourced “sells semi-dear,” by passing on part of its potential surplus in the form of a reduced price, allowing the capitalist with a high degree of monopoly to “buy cheap.” Obviously, this relationship is not between equals (as in the abstract model of neoclassical economics). Rather, the relationship is one of surplus extraction through unequal exchange, for capitalists construct their degrees of monopoly through unequal exchanges with producers and sellers who hold less market power.¹² I am convinced that commodity chains have always tended to be organized in this manner, but today, even more so. Lead firms increasingly organize and govern commodity chains as degree of monopsony chains and mark-down chains in order to maximize their capture of value.¹³

¹² I expand upon Wallerstein's (1983: 31-34; 2004: 17-18, 26-30) notion of unequal exchange.

¹³ I am convinced that the “global value chain” approach is mistaken in its emphasis on value-added. The whole point of the chain is *value capture* in the narrow sense of distribution of the surplus.

Table 1. Flow of Bright Value in the iPad Commodity Chain, 2010-2011

Activity	A Cost in US\$	B % Factory Price
Retail Price	499	181.5
Wholesale Price	425	154.5
Factory Price	275	
Gross Profit Margin (GPM) (Total “value capture”)	238	
Apple Gross Profit Margin (Design, Marketing, Chain Governance, Operating Profit)	150	54.5
Manufacturing GPM (Tiers 1 and 2)*	88	32.0
Taiwan	27	9.8
Korea	26	9.5
United States	23	8.4
European Union	5	1.8
Japan	4	1.4
China	3	1.1
Direct Labor to assemble iPads & to manufacture its major component parts (Tiers 1 and 2) **	33	12.0
China	25	9.1
Korea	4	1.5
Taiwan	2	0.7
Philippines	2	0.7
Material Inputs for Major Components	154	56.0

Sources and Notes: The model of the iPad examined is the 16GB Non-3G version (2010), the simplest, least expensive model. The starting point for the figures provided is a “teardown” by iSuppli Corporation (Rassweiler 2010) that identifies the major components, most suppliers, and the estimated costs. It is likely that these estimates are somewhat high, failing to take into account Apple’s strong bargaining position (degree of monopoly) (EPT Newsletter 2010). Additional suppliers and component costs have been identified from teardowns, Wikipedia (2013) and internet searches. The gross margin of each supplier is available in annual reports and is reported by stock trader internet sites. The country shares of gross margin are the cumulative shares of the suppliers with headquarters located in that country. The country shares of direct labor are the cumulative shares allocated to actual production sites. Data in column A are derived from Kraemer, Linden and Dedrick (2010: Table 1) with adjustments for my revised list of iPad suppliers. Data in column B are calculated by dividing data in column A by the factory price (\$275).

* Includes Singapore (less than 1%) represented in the rounded total. ** Includes Singapore (less than 1%). Numbers have been rounded.

This approach to commodity chains as gradational, hierarchical degrees of monopsony is in accord with a monopoly capitalism approach to world-systems analysis. Braudel directly assaulted “the conflation by classical economists (including Marx) of the market and capitalism” (Wallerstein 2004: 18). Indeed, Braudel (1981, vol. 2: 228, 413-22, vol. 3: 620) drew a sharp distinction between the competitive market facing most firms and the “anti-market” sphere of “real capitalism,” the realm of the monopolists who have shaped and dominated the capitalist world-system.¹⁴ As Wallerstein (2004: 26) observes, capitalists “always prefer a monopoly, for then they can create a relatively wide margin between the costs of production and the sale price,” thereby securing profit shares well above the market average. The capitalist world-economy is a degree of monopoly system because capitalists seek to avoid market competition through “competitive advantage.” Building upon Braudel and Wallerstein (1983: 17, 29, 33-34, 55), I contend that the struggle for degrees of monopoly is an historical driving force of capitalism but

¹⁴ Talbot (2011) examines the relationship of Braudel’s three layers within the historic coffee commodity chain.

that, of necessity, few firms capture high degrees of monopoly. The system is sharply gradational, following a steep curve of degrees of monopoly. As a result, most capitalists in the market sphere are subjected to exploitation by the minority of capitalists in the anti-market sphere who hold strong degrees of monopoly.

Empirical Analysis of Apple Degrees of Monopoly

It is common knowledge that Apple products have generated massive profits, but how is value added and captured within its commodity chains? Table 1 draws attention to the bright value in the iPad commodity chain and allows us to see how visible surplus is distributed. Note that 45 percent of the retail price is added *after* production, i.e., the \$224 difference between factory price and retail price. Apple collects two-thirds of this difference. Most directly, this large number reflects Apple's buying power, its ability to drive down the input costs shown in Table 1 (Column A, below Apple's Gross Profit Margin, GPM). Moreover, Apple obtains greater profits from the proportion of sales through its own stores (see later discussion). The payoffs exhibit some rather stunning inequalities. First, the manufacturing GPM (\$88) of the total value captured by all of the Tier 1 and Tier 2 firms that produced the iPad barely exceeds one-half of the GPM of the non-producer Apple. Firms headquartered in Taiwan, Korea and the United States corner 8 to 10 percent each of the factory price. Second, the direct labor cost (\$33) is astonishingly low, less than 40 percent of the firms' gross profit share. The disparity is based partially on the outsourcing of production to cheap labor in China. While China accounts for three-quarters of all direct labor costs, only 3 percent of the total gross profit margin (\$238) stays in that country. Only 12 percent of the factory price is retained by waged workers, so Apple captures 4.5 times more of the surplus than its offshored iPad working class.

Empirical Measures of Degrees of Monopoly in the iPad Chain. One crude measure of degree of monopoly is the *gross profit margin* (GPM), i.e., the proportion of corporate sales revenue that remains after payment of costs of materials and waged labor involved in production (see Tables 1 and 2).¹⁵ Apple is an advanced example of a "fables" company, a corporation that designs, patents and sells complex innovative integrated circuit systems, the manufacture of which it outsources (i.e., fables = fabricationless). Plant, equipment and production labor costs are turned over to independent subcontractors (Kumar 2008). Four of Apple's Tier 2 core suppliers are fables companies that outsource to Taiwan or China. Of necessity, such firms have high gross margins, as salaried research and development costs are large compared with the costs of labor and material inputs. Apple's 35 percent gross profit margin is not highly unusual among industries characterized by rapid innovation and maintenance of patent rights (see Table 2). The

¹⁵ GPM is sometimes termed "value capture" in global commodity chain analyses. GPM (often called gross margin) is not what the rhetoric makes it seem. It encompasses research and development (including operating systems and software), capital investment, and the salaries of engineers, supervisors, managerial and administrative personnel at production sites, as well as headquarters managerial and sales personnel. Firms like Apple and a few of its suppliers that focus on innovation and design have high gross margins because of the high salaries of technical employees. Firms whose production regimes are based on expensive high-tech plants and equipment must also have high gross margins.

high GPMs enjoyed by most of Apple’s core suppliers are based on their provision of innovative, patented components for which Apple is unable to drive prices down. Still, their unique high-cost components garner only a \$59 share, roughly 20 percent of the production costs. Most of the value added by component prices is generated by firms located in the Asian semiperiphery other than China (\$199 for manufacture and assembly). These suppliers score 80 percent of the GPM of only \$53 (i.e., 60 percent of the \$88 GPM captured by Tier 1 and 2 suppliers). The lower mean GPM of these firms represents their relatively weak bargaining positions in setting component prices. In these cases, Apple can locate alternative sellers. Consequently, the average GPM of Tier 2 Asian suppliers is 21 percent, reflecting their lower degrees of monopoly in relation to Apple and a few of its core suppliers (see Table 2).

Table 2. Corporate Degree of Monopoly as Represented by Gross Profit Margins and Operating Profit Margins of Apple and Its iPad Suppliers, 2010-2011

Corporations	A	B	C	D	E
	\$US Share of Wholesale Price	Corporate % Gross Profit Margin (GPM)	GPM Share of iPad Unit Price \$US	Corporate % Operating Profit Margin (OPM)	OPM Share of iPad Unit Price \$US
Apple	150	35	150	25	106
Assembly by Foxconn	24	6	16	3	8
Suppliers head-quartered in core countries (US, EU, Japan)	59	54	32	22	13
Suppliers head-quartered in semi-peripheral countries (Korea, Taiwan, Singapore)	175	21	37	7	12
Suppliers head-quartered in China	17	18	3	6	1
Totals			238		140

Sources and Notes: Column A shares are derived from analysis of iPad teardown data and extensive Internet searches for iPad component pricing. In Columns B and D, the 2010-2011 GPMs and OPMs of Apple and its core/semiperipheral iPad suppliers are derived from corporate and/or investment brokerage websites. The share of Chinese suppliers is an estimate derived from analysis of data in Dedrick et al. (2009: 81) and estimates of the costs of local uncounted inputs in the assembly of Nokia phones (Ali-Yokko et al. 2011). Grouped GPMs and OPMs for core and semiperiphery are averages of supplier headquarters weighted by the cost of the components supplied. Column C is calculated by multiplying Column A by Column B, with the exception of Apple (GPM is based on the wholesale price). Column E is calculated by multiplying Column A by Column D. Contact the author for a list of the iPad suppliers. Numbers are rounded.

A much stronger measure of differential degrees of monopoly is the corporate *operating profit margin* (OPM), which is the proportion of a company's revenue that remains after all costs are paid, including *direct production costs* (labor, material inputs), *indirect production costs* (managerial and professional salaries, factory operational expenses), and *corporate headquarter costs* (general and administrative expenses, marketing expenses, product design, research and development, supply chain management, infrastructure expenses and depreciation, taxes and interest on debt). As shown in Table 2, Apple’s OPM (25%) reflects its high degree of monopoly

in regard to governance of the supply chain, but other core firms do almost as well (22%).¹⁶ In contrast, suppliers headquartered in Korea, Taiwan and Singapore average an OPM of 7 percent, and the assembler's OPM is only 3 percent. As Column E shows, Apple's OPM share of each iPad is \$106, but the total profit accruing to semiperipheral Asian firms is \$21, of which only one dollar is retained in mainland China. For each iPad, the total OPM share for these firms is lower than direct labor costs of \$33 (Table 1) and one-fifth of Apple's OPM share, a much worse ratio than for the GPMs. Asian suppliers do not achieve such low profit shares because they are located in the semiperiphery or because they are small. Rather they suffer from their disadvantageous relationship with a monopsonistic core firm.

Even though I have just used profit rates as an indicator, degrees of monopoly are, in practice, established in several ways. Apple constructs its supply chains to insure that it will retain a stronger degree of monopsony than its suppliers, even though some of them are larger corporations. First, it is important to emphasize that degrees of monopoly are not determined by corporate size. When iPad production began, its assembler and three of its Tier 2 suppliers were larger corporations than Apple, and four of its Tier 2 suppliers ranked in Fortune's Global 500. In 2011, Apple ranked 111 in the Global 500 while one of its key suppliers (Samsung) ranked 22, and the iPad assembler (Foxconn) ranked 60.¹⁷ How then has Apple constructed such a strong degree of monopoly? In the case of the iPad, Apple's degree of monopoly lies in its track record at:

1. designing innovations that attract a wide share of the global market,
2. controlling intellectual property rights,
3. governing the commodity chain through oligopolistic relations with suppliers,
4. control of product distribution and marketing, and
5. externalization of costs to suppliers.

Apple's Degree of Monopoly through Product Innovation and Design. Within world-systems analysis, Arrighi and Drangel (1986: 19) emphasize the importance of a firm's innovation to its establishment of a monopolistic position in a commodity chain. In this way, innovative design has led to Apple's technological primacy. Many technical specialists celebrate Apple as "the Rolls Royce of the technology and design world," claiming that the company pioneered "features of standard operating systems and computer systems" and "reinvented the design standards" (Hangen 2012). On the one hand, the company has developed new computer operating systems and new technologies by combining existing and new components and processes into an original patented commodity. On the other hand, Apple's designs are shaped by

¹⁶ Four of the core-based firms exceed Apple's profit rate, an indicator of their degrees of monopoly over small but essential components.

¹⁷ Apple ranked 111 in Fortune's Global 500 largest corporations (by gross revenue). iPad suppliers that ranked in the Global 500 were Broadcom (343), Foxconn (60), LG Display (440), Qualcomm (222), Samsung (22), Texas Instruments (175), and Toshiba (89).

See http://money.cnn.com/magazines/fortune/global500/2011/full_list/ and http://money.cnn.com/magazines/fortune/global500/2013/full_list/.

knowledge of the availability and capabilities of its suppliers (Dedrick, Kraemer and Linden 2009). Apple designs its products for offshoring of engineering, management, production and assembly to subcontractors who can keep costs low. Moreover, Apple maximizes its degrees of monopoly through “a closed ecosystem” in which it “exerts control over nearly every piece of the supply chain, from design to retail store” (Satariano and Burrows 2011: 2).

By itself, innovation is not enough to cement degrees of monopoly. What Apple needs is a set of barriers to limit competition, as in the case of its design patenting and legal protection of intellectual property rights. In an interview with his biographer, Steve Jobs emphasized that the three most fundamental strategies of his business philosophy were “to innovate,” to establish patent rights to protect designs and “to use litigation to maintain Apple’s monopoly” with respect to those patents (Thompson 2012). In the public arena, Apple “is known for and promotes itself as actively and aggressively enforcing its intellectual property interests” (Wingfield 2012). Since 2005, Apple has been tied to 60 percent of all major electronics patent lawsuits (Wieland 2012).¹⁸ Furthermore, Apple has been accused of pushing beyond protection of its own innovations to “use the legal process to prevent others from innovating, by engaging in competition by litigation” (Wilcox 2011).

Apple’s Degree of Monopoly through Supply Chain Governance. Satariano and Burrows (2011: 1-2) contend that “operations expertise is as big an asset for Apple as product innovation or marketing.” Apple tightly governs a supply chain that provides it as great (perhaps greater) a degree of monopoly than does its product innovation. Accolades like “the genius of Apple’s supply chain” and “world’s best supply chain” have been applied to the corporate production network. Most analysts are convinced that Apple achieves profit margins (both gross and operating) that are much greater than most electronics companies because of *operational advantage* through the tactics in which it organizes, governs and polices its supply chain. Between 2008 and 2013, Gartner’s Supply Chain Top 25 annually ranked Apple first because the judges were convinced that its high profits are due to its orchestration of a tightly managed global supply chain (Ellinor 2013).

Apple’s supply chain takes the *modular form* (Gereffi, Humphrey and Sturgeon 2005) in which components and assembly are outsourced to separate subcontractors that are governed by the company’s strict design standards. Moreover, Apple holds sufficient governance power that it can require quick response to design changes and to consumer demand (Dedrick, Kraemer and Linden 2009: 104). Apple’s supply chain management involves *turnkey* governance in which the outsourcing firm maintains “thick” information flow and close supervision of the design to production process (Sturgeon and Lee 2005). For example, Apple engineers “sometimes spend months living out of hotel rooms in order to be close to suppliers and manufacturers, helping to tweak the industrial processes that translate into mass-produced devices” (Satariano and Burrows 2011: 2).

The point of this governance system is to obtain a high degree of monopsony, the ability to mark down costs beyond what would be possible in a purely competitive system. In Braudelian terms, Apple acts as an “anti-market” player to exploit a chain of “market” players who are vulnerable because of their competition with each other. Because bargaining power is shifted to the buyer/financier, the supplier has limited control over price-setting and profit-taking

¹⁸ For an overview of Apple litigation, see http://en.wikipedia.org/wiki/Apple_Inc._litigation.

(Robinson 1993). Apple generates inter-firm competition among potential suppliers and leverages that situation to its advantage. It promotes competition among suppliers by contracting with several producers of the same components, by constantly searching for alternative subcontractors, and by threatening to terminate suppliers who do not comply. Consequently, the rate of exploitation of capitalists by capitalists is high, and the value of the producer's contribution to output is far greater than the price received.

Why would suppliers concede to Apple's demands? According to a small Taiwanese supplier,

A contract with Apple can send a supplier's stock share soaring or even represent most of its revenue. But working with Apple is not easy. Its engineers are uncompromising and it imposes a code of silence enforced with financial penalties for product leaks. And its history of cutting suppliers in a heartbeat helps create a "love-hate relationship" between Apple and the companies that build its products.... Still, when the world's undisputed leader in consumer technology comes calling, company executives often order their engineers to work around the clock (Boudreau 2012: 2).

In addition to its corporate culture of secrecy (Thomke and Feinberg 2010), Apple extends credit/financing to some key suppliers in exchange for long-term commitments (Satariano and Burrows 2011). Financial advances place a producer in a dependent, exploitable position because it permits Apple (1) to obtain material inputs and labor at below market prices, (2) to shift more of the risks and costs to producers, and (3) to capture labor and outputs over a longer term.

Apple's Degrees of Monopoly in Marketing. All the mechanisms for obtaining degrees of monopsony in production generate no super-profits unless the firm holds a high enough degree of monopoly in marketing to pass high price markups onto consumers.¹⁹ While Apple has played a strategic role in constructing brand recognition (not to mention cultish fetishism) for its products (Thomke and Feinberg 2010), key independent actors have reinforced its degree of monopoly in marketing. Some university business schools and investors idealize Apple as "an iconic brand, as well as a Wall Street darling" (Thomke and Feinberg 2010; Yoffie and Kim 2011; Zeiler 2012). Since their assessments are not precisely factual, technology specialists and business journalists help to construct a degree of monopoly for Apple by withholding such mythological acclaim from its competitors. Despite widespread criticism of its labor and ecological practices between 2008 and 2013, *Fortune* awarded Apple the number one spot in its list of the "World's Most Admired Companies."

Between 2000 and 2013, Apple developed a national and global market position that reflects a stronger degree of monopoly than any of its competitors. Between 2008 and 2012, Apple received the annual CMO Survey Award for Marketing Excellence, and business journalists point to three approaches that give Apple a degree of monopoly in comparison to the marketing strategies of competitors. First, Apple has built its own "marketing moat" through 407

¹⁹ Here I am influenced by Marx's (1858) discussion of the *realization process*.

stores in fourteen countries that sell only Apple products, thereby allowing a higher markup than received through wholesaling. Carefully recruited and trained sales associates are described as “customer-obsessed” in their abilities to interpret how customers will react (Wathieu 2010). The degree of monopoly that Apple achieves through such marketing strategies is reflected in its success. Its stores exhibit the highest retail sales per square foot among U.S. retailers, netting \$12 profit per visitor per quarter and average annual revenue per store of \$52 million (Dediu 2013). Second, Apple’s products “are communicated to customers through novel and provocative advertising” that emphasizes a renegade, nonconformist image (Moorman 2012). Apple’s marketing strategies are couched around the notion that consumers can have a “love affair with the only company that can make technology cool, relevant and transformative.”²⁰ Third, Apple has developed a “hardcore fan base” (Hangen 2012), partially through “rumors and clearly-deliberate leaks about future products” that establish public perception of Apple as a customer-oriented innovator (Wilcox 2012).

By underpricing its competitors, a lead firm like Apple can use the cumulative benefits of the serial monopsony power within the commodity chain it governs to enhance its degree of monopoly in its sales market. Dialectically, it is just such monopoly power that increases that firm’s monopsonistic ability to exploit subcontractors. Many of the mechanisms to exploit subcontractors are designed to maximize *dark value* accumulation.

Apple’s Monopsonistic Externalization of Costs

Up to this point, I have focused on the visible strategies that Apple employs to ensure high accumulation of bright value. However, I argue that Apple’s profits are just as (if not more) dependent on strategies through which costs are externalized to accumulate unreported dark value. Through its supply chain governance, Apple utilizes its degrees of monopsony to externalize as many costs of production as possible to suppliers and, thereby, to extract dark value from them. All the suppliers in the iPad supply chain obtained their position by providing components that exceed their competitors in meeting Apple price, quality and design standards. Either they controlled some patent rights significant to production (e.g., Samsung), or they sell at near-cost for the sake of revenue through sheer volume (e.g., Foxconn), or they hope for better future outcomes (i.e., some of the smaller Tier 2 and 3 firms and most of the Tier 4 and 5 firms). In all these cases, firms are driven to cut costs. To do so, they must expand their financial margins by darkening the accounting system through the externalization of costs. Indeed, this Apple commodity chain achieved a quantum leap in such externalizations. Suppliers pass on to Apple the dark value embedded in their capture of low-paid labor power, low-cost natural resources, and the externalization of costs to ecosystems and households. Indeed, a common feature shared by most of the suppliers is their expertise at finding and maximizing cheap inputs and at externalizing costs (see later discussion). Monopsonistic chain governance is intended to structure the flow of dark value to the lead firm, Apple.

²⁰ See www.marketingapple.com (23 January 2013).

Apple's Dark Value Extraction

At every node of the chain, dark value arises from the “dark energy” of low-paid and unpaid labor and natural resources. By the time a commodity has gone through numerous nodes of a global chain to arrive at the doorstep of the consumer, it has incorporated not only the embedded inputs of Marx’s (1993, vol. 1) paid labor power but also massive amounts of under-paid and unpaid labor and ecological inputs. My argument is that capitalism is dependent upon, even driven by, a micro-structure of “dark energy” in the form of such externalities. Since these factors never appear in the accounting of production costs, they are invisible “gifts” to capitalists and to buyers. These concealed subsidies bubble up the commodity chain to keep the price of the finished product more appealing to the budgets of distant richer consumers. In the sections that follow, I will explore the ways in which the iPad commodity chain is grounded in the extraction of dark value from (a) waged and salaried laborers, (b) from unpaid household labor, (c) from informal sector labor, and from (d) unpaid ecological externalities.

Apple Exploitation of Chinese Migratory Workers

In the neoliberal era, core deindustrialization has been stimulated by labor arbitrage, the global search for lower-waged labor to produce items to be sold at high prices in distant zones where wages are higher (Roach 2004). After the initiation of “capitalism with Chinese characteristics” in 1978 (Huang 2008), China doubled the size of the world-system’s working class over two decades. This project is an historic combination of development by means of (a) a vigorous program for attracting foreign direct investment, (b) expansion of export-oriented industries, and (c) the semi-proletarianization of its rural surplus labor, following the path advocated by Arthur Lewis (1954).

China’s labor-intensive industrialization is disproportionately supported by the country’s most vulnerable class of workers who are recruited from rural areas.²¹ Apple suppliers keep wages low because of China’s intentional construction of a segmented labor market (the *hukou* system of household registration) in which migratory temporary peasant workers are legally and structurally inferior to urbanites (Pun and Huilin 2010). These migrant workers are classified as nonresidential workers who form a “split labor market” (Bonacich 1972) of lower-paid temporary workers with few legal rights (Selden and Jieh-min 2011: 4). “Without social insurance and labor rights infrastructure, the migrant labor regime is a safe haven for urban and industrial employers that thrive on cost-minimization” (Fan 2004: 288). This “floating population” makes up 70 percent of manufacturing workers, is paid wages below national averages, works 50 percent longer hours than other urban laborers, and is concentrated in massive industrial compounds that usually deduct from wages the cost of housing, food and health services (Foster and McChesney 2010).

²¹ Until recently, a majority of workers were young women (Pun 2007). In the case of iPad assembly by Foxconn, two-thirds are young males (Fair Labor Association 2012). However, I have been unable to find gender ratios for Tier 2 and 3 suppliers.

Apple is quite aware of the concealed value that it captures through exploitation of migratory workers by its suppliers. In line with its Supplier Code of Conduct (Apple 2005: 1), Apple conducted audits of 356 of its suppliers in 2010 and 2011, documenting wages lower than government standards, delayed payment of wages, wage deductions to discipline workers, and failure to pay overtime. With respect to worker wages and benefits, Apple documented that 2.6 times more suppliers were in violation of corporate standards in 2011 than in 2010. Interviews with former Apple executives explain the lack of corporate willingness to implement strategies to improve labor conditions. Commitment to increase worker income “falters when it conflicts with crucial supplier relationships or the fast delivery of new products.” Labor exploitation continues because “the system works” for Apple, and “a radical overhaul would slow innovation” (Duhigg and Barboza 2012: 4).²²

Between 2010 and 2012, NGOs and media heavily criticized Foxconn assembly factories (Duhigg and Barboza 2012; Fair Labor Association 2012) while ignoring the labor forces in the other tiers of the iPad supply chain. Such public preoccupation with Foxconn assembly creates a smoke screen for the cheap labor philosophy that pervades Apple’s supply chain. China Labor Watch (2012b: 1) points out that multinational electronic manufacturers treat labor as the elastic factor of production. “Because most production costs, including distribution and physical materials, are to a great extent inelastic, the only way factories are able to offer a competitive advantage is to lower... labor costs” (Lin 2004: 180). Apple suppliers employ several strategies to lower costs below officially-recorded wage rates. First, workers are kept in probationary status in order to evade government regulations about wage increases. Second, a laborer who fails to meet the daily production quota is often required to complete the work after regular hours without pay. Third, disappearance of pay slips and under-reporting of work hours is common (Fair Labor Association 2012). Fourth, many workers are subject to a “dormitory labor system” in massive company towns (Pun 2007) where they are daily subjected to several forms of unpaid labor extraction (Fair Labor Association 2012; China Labor Watch 2012a).

Dark Value from Undercompensated Waged Labor

In Table 3, we move from the bright value analyzed in Tables 1 and 2 to the dark value that is embedded in the iPad commodity chain. Dark value is estimated by comparing actual production costs with estimated “negative opportunity costs” of production in the United States. In Column B, dark value is derived from the multiplier effect embedded in the wage compensation differentials (Bureau of Labor Statistics 2010) among the various countries in which the lead firm and its outsourced suppliers are situated. Indeed, the wage gap is much greater than it appears at first sight. Most core workers receive compensation beyond direct wage payments (e.g., health and retirement benefits) that are worth more than half of the basic wage. Chinese workers producing the iPad receive no such benefits, a major basis for its cheapness. It is the context of comparative compensation in which we can most clearly see the interconnectedness of unequal exchange and dark value. Basic to the theory of unequal exchange is the claim that wage inequalities cannot be explained away by differences in productivity. Simply put, iPad workers

²² In 2012, Apple Corporation commissioned the Fair Labor Association (2012) to investigate working conditions at Foxconn’s Chinese factories. Apple (2013) agrees with much of that report and adds additional information about some forms of labor exploitation.

are not paid less because their productivity is lower than that of core workers. Indeed, the cheaper workers are probably more productive. This Apple supply chain is grounded in labor practices and productivity standards that exceed or equal those that would occur in the core. First, assembly or component manufacturing must meet strict quality standards set by the lead firm to achieve a designated design. Second, suppliers in the first two tiers of the supply chain are world leaders in productivity, as suggested by earlier information about their rankings in the Global 500. Third, workers in the first two tiers employ state of the art technology. Fourth, managerial personnel drive these workers through Taylorist speedups, shift quotas and longer work weeks that are not legally tolerated in the core. Suppliers organize schedules to intensify worker productivity, with daily shifts of twelve hours and tight speedup supervision being routine (SACOM 2011: 8-9). Work weeks surpass sixty hours because workers are required to work overtime hours that exceed legal regulations (Fair Labor Association 2012).

Table 3. Partial Accounting of Dark Value in the First Generation iPad Supply Chain, January 2010 - March 2011

Basis	A \$ Cost per Unit	B U.S. Multiplier	C \$ Cost if produced in U.S.	D \$ Dark Value
<i>Part A. Dark Value Extractions from Waged Labor</i>				
Tier 1: Assembly	8	14	112	104
Tier 2: Production of Major Components	25	Range: 2-12	246	221
Tier 3: Production of Subcomponents	12	Range: 2-12	84	72
Totals	45		442	397
<i>Part B. Dark Value Extractions from Professional, Managerial, and Indirect Production Costs</i>				
Tier 1: Assembly	5	8	40	35
Tier 2: Production of Major Components	20	Range: 3-8	123	103
Tier 3: Production of Subcomponents	10	Range: 3-8	47	37
Totals	35		210	175
<i>Part C. Totals for Both categories of Workers</i>				
All Workers	80		652	572

Sources and Notes: iSuppli estimates the direct labor cost of assembly in China at \$9. Some experts (Lasky 2010; Dediu 2012) contend this is a serious under-estimation. I estimated the average 2010 Foxconn assembly worker's wage as \$1.50 per hour (zero benefits) or \$3,000 per year (Economix Editor 2010). This estimate is high since it was based on the Foxconn Shenzhen complex rather than to the inland Chengdu plant where most iPads are assembled at much lower labor costs. The U.S. rate is "the median expected salary for a typical Electronics Assembler I": \$29,000 basic wage plus \$16,000 in benefits, thus \$45,000 per year (Salary Wizard 2013). I adjusted this estimate downward to \$42,000 to account for raises since 2010, thus \$21 per hour, arriving at a multiple of 14. The salaries of managers and engineers involved in production are "indirect production compensation" that encompasses about 40 percent of gross profit margin (Miller and Vollman 1985). The indirect production compensation measure is based on the assumption of three-quarters Chinese engineers. The multipliers are derived from Linden et al. (2011: 229). Column D is calculated by subtracting Column A from Column C. For details about calculation and methods for Tiers 2 and 3, see Appendix, Table 6. Numbers are rounded.

The waged labor costs for Tiers 1, 2 and 3 of iPad suppliers (see Figure 1) were \$45 per unit (Table 3, Part A). Assembly labor (Tier 1) is separated out because of widespread discussion of the possibility of returning this last production stage to the United States (e.g., Goldman 2012; Diedrich 2013). By application of a reasonable multiplier for assembly, I demonstrate that the dark value from assembly labor is equal to the iPad operating margin (see Table 1). The most

significant input of dark value from labor is in the manufacture of major components by Tier 2 and 3 suppliers, reflecting the vast gap between the wages of Asian and core workers. Moreover, most of the Tier 2 component manufacturing is done in China at a cost of \$196 less than it could be accomplished in the United States. Thus, the dark value extracted from Tier 2 labor is \$221, and an additional \$72 of dark value is expropriated from Tier 3 labor.²³

At a 2011 White House dinner for CEOs, President Obama asked Steve Jobs, “What would it take for Apple to bring its manufacturing home?” The Apple CEO replied: “Those jobs aren’t coming back” (Duhigg 2012). These empirical data help us understand Jobs’ response to the President. Bringing iPad assembly and production to the United States would eliminate Apple profits and/or raise the iPad retail price significantly. The Apple success story of design innovation is dwarfed by the financial significance of its capture of underpaid waged labor. Whatever the value created by design, it can hardly match the significance of cheap labor. The waged workers in the top three tiers of suppliers add \$397 of embedded dark value to each iPad. Without those inputs, Apple’s \$106 operating profit margin would not be possible because the hidden savings from cheap labor is nearly four times greater.²⁴

Dark Value from Salaried Workers

Apple benefits from a second category of underpaid Asian laborers who are not visible in the direct labor costs reported in Table 1.²⁵ To assess the full labor cost, we need to take into account the professional and managerial workers (including cheap Asian engineers) who organize, supervise and provide administrative support services to the waged labor forces. Although much lower than that extracted from waged workers, the dark value generated by cheap managerial and engineering labor remains significant. Even though these costs nearly match wage compensation to production workers, very few researchers analyze the savings generated from the efficiency and low remuneration of these workers. Therefore, I faced the daunting task of determining how to develop estimates about these labor cadres. To my surprise, I discovered that these salary costs are hidden in the gross profit margin. Miller and Vollmann (1985) and Tu and Zhang (2010) provide leads in their breakdowns of overhead costs included in gross margins. They indicate that about 40 percent of the gross margin is allocated to these “indirect production salary costs.” Thus, I applied this ratio to the gross margins for Tier 1 and 2 firms (Table 1) to arrive at a measure of the payments to these workers at production sites. I then estimated that three-quarters

²³ A small part of this dark value is supplied by workers in South Korea, Taiwan and Singapore, so non-Chinese components of dark value also contribute to unequal exchange. This relatively small Tier 3 amount reflects the degree to which earlier production is based in Korea and Japan. For a breakdown, see Table 7, Appendix.

²⁴ The Fair Labor Association (2012) reports several forms of unpaid labor that are stolen from these waged workers. However, I have not attempted to estimate the additional dark value of such theft. For an extended discussion of these forms of unpaid labor, see <http://filebox.vt.edu/users/wdunaway/Clelland/-SurplusDrain/Missing.pdf>. If I could quantify a value for those unpaid labors, the full accounting of dark value would be much higher.

²⁵ See Appendix for methods used to estimate this form of indirect production costs and its related dark value. Previous Apple supply chain research (Kraemer, Linden and Dedrick 2011) failed to take these workers into account. The salaries of the managers, engineers and supervisors in factories are not reported by accountants with direct labor costs but are included in the gross profit margin. Many academic studies render these workers invisible by integrating them in the category of “indirect production costs,” a component of GPM. Linden, Dedrick and Kraemer (2011) is a rare exception.

of these payments (about 30 percent of gross margins) was paid to local supervisors, managers and engineers.²⁶ Table 3 (Part B) shows that the cost per unit (\$35) added by these salaries is 78 percent of the wages paid to a much larger labor force of production workers (\$45). Moreover, my conservative estimate of dark value benefits of \$175 per unit is an indicator of the economic significance of these workers. These “hired-hand” capitalists are proficient at (a) organizational efficiency and time management, (b) problem solving, (c) recruiting cheap waged workers, (d) expropriating hidden unpaid labor from them, and (e) speeding up worker productivity. Moreover, they are quite effective at externalizing costs that squeeze downward the profit margins of lower-tier suppliers. While cheap in Asia, the dark value of their work at U.S. rates exceeds Apple’s operating profit margin per iPad by \$69.²⁷

Combined, the dark value embedded in all iPad labor costs is a stunning \$572, an amount that exceeds the retail price and is five times greater than Apple’s operating profit margin. If these hidden costs were paid, the price of an iPad would double, vastly diminishing Apple profits from a more limited consumer base. Consequently, Apple’s Jobian innovation nirvana means little without cheap labor. The company’s degrees of monopoly at maximizing Chinese dark labor value are as crucial as innovation to its ranking as the second most profitable company in the Fortune Global 500.

Dark Value from Unpaid Household Labor

Behind the vast army of the low-paid world labor force is an even larger network of unpaid support workers. World-systems scholars have emphasized the centrality of unpaid household labor to the world-economy, and feminist economists have exerted much effort to measure the economic value of women’s unpaid household labor (Beneria, 1999).²⁸ While Marx (1993, vol. 1: 176) claimed “the secret of profit making” lay in exploitation of waged labor that occurred in the hidden abode of the factory, we commodity chain analysts need to enter the hidden abode of labor reproduction, the household, to find that secret. The starting point of a commodity chain is the extraction of surplus from unpaid household work, and that unpaid labor contributes to the “expanded value” of a commodity at every production step in the chain. The household reproduces and partially provisions itself, allowing waged labor to be generated for the capitalist below its paid costs (Mies et al. 1988). Hidden unpaid household labor is embodied in every waged laborer. In other words, the household provides vast benefits for each employer within a commodity chain. Thereby, all the capitalists that exist within the full span of a commodity chain extract from thousands of households the production of this unpaid value, but they conceal its embodiment in the finished product.

²⁶ The method for estimating Tier 3 costs is found in notes for Table 7, Appendix.

²⁷ One-quarter of indirect production salary costs is paid to managerial workers on assignment from firm headquarters to work abroad. There is a lower multiplier for these cheap salaried workers because much of this work is done by Koreans and Taiwanese professionals, and the Chinese engineers are relatively less exploited than wage workers. See Appendix, Tables 6 and 7 for details.

²⁸ For foundational world-systems background, see *Review*: vol. 3 (2), vol. 5 (3), vol. 7 (2), Smith et. al. (1984), and Smith and Wallerstein (1992). For recent scholarship about household linkages to commodity chains, see Dunaway (2012, 2014). See Clelland (2014) for analysis of the dark value of household labor in a coffee commodity chain.

Table 4. Underpaid and Unpaid Externalities in the iPad Supply Chain (China Only)

Basis	A \$ Cost per Unit	B U.S. Multiplier	C Dark Value: \$ Cost if produced in U.S.
Part A. Household Labor Externalities			
Household Production of Labor	7	9	63
Daily Household Unpaid Reproduction Costs	12	9	108
Total	19		171
Part B. Underpaid and Unpaid Informal Sector			
Informal Sector Services	16	9	144
Part C. Unpaid Ecological Externalities			
Pollution Externalities	19	10	190

Sources and Notes: Multipliers in Parts A and B are based on minimum wage rates. In China, the informal sector wage is close to the minimum wage (Yu et al. 2008), which in China varies by region. I used Shanghai's rate \$0.80/ hour which is roughly one-half the manufacturing wage. The multiplier of 9 is the multiple of the U.S. minimum wage (\$7.25) compared to the minimum wage for China. My multiplier for household production of labor is much lower than one based just on expenditures of the lowest of three income categories in the U.S. (ca. \$9,000 per year), a multiplier of 15 (Lino 2012:10). Additional details are supplied in the text. Numbers are rounded.

Think of human labor power as a material good that must be (re)produced like any other commodity. But how can we measure the value for capitalists and consumers of the dark energy involved? For estimates of household labor production in China, I began by assuming that the worth of the labor time in raising a child to worker status is at least that of the minimum wage (\$0.80 per hour). Then, I assume that an extended household spends twenty unpaid hours a week in this endeavor, worth half of a weekly minimum wage. Next, I add one-quarter of the household income of two minimum wages as child-rearing expenditures, once again worth half a minimum wage. These two factors total to one minimum wage, which is more than 2,000 hours or at least \$1,600 per year. If costed over fifteen years (many Chinese children end schooling at that age and enter formal work), the unpaid benefit to the employer of this free human capital is \$24,000. If the producers of this human capital were remunerated without interest over a 40 year work life for this labor commodity, they would receive a payment of \$600 per year. Assuming an average wage of \$2 per hour or \$4,000 per year, each year of labor is a provision of a 15 percent dark value bonus to the employer. I applied this ratio to the total Chinese labor costs embedded in an iPad.²⁹ In Table 4 (Part A), I conservatively estimate that the unpaid cost of household production of Chinese labor is about \$7 per Apple iPad. Since the human production of the same amount of labor power in the core would be worth at least nine times more, the dark value for Apple and the core consumer is expanded to \$63.³⁰

In addition to these forms of labor reproduction, dark value is extracted through the household provisioning that subsidizes low and erratic wages (Dunaway 2012). How might the value of this dark energy be measured? For estimates of household unpaid reproduction

²⁹ I drew data from Table 1 (Tier 1), Table 3 (Tier 2), and Table 7 (Tier 3).

³⁰ This number would more than double if we added dark value estimates for Korea and Taiwanese unpaid labor production, plus that embedded in Tiers 4, 5 and 6.

externalities in Part A, I began with Qi and Dong (2013: 27) who report thirty hours per week of unpaid work (two-thirds by females) in Chinese households. Because of the widespread use within the Chinese export-oriented commodity chains of “the dormitory labor system” (Pun 2007), I assumed that many workers in the iPad commodity chain live in company dorms and are independent from the unpaid reproductive support of households (i.e., they are more fully proletarianized than is usually the case). For that reason, I conservatively reduced the estimate of the hours of unpaid household labor by one-third (to 20 hours weekly per household). In contrast to the standard variety of higher valuation measures for unpaid household work (Budlender 2002), I use the Chinese minimum wage, which is roughly half the average wage. Thus, my conservative estimate of unpaid daily reproduction cost is one-quarter of the estimated wage/salary costs (one-half the wage times one-half the official work week). As a result, I estimate that there is \$12 of unpaid household reproduction costs embedded in each iPad. Since this labor power would cost nine times more in the core (using the U.S. minimum wage as the multiplier), the dark value for Apple and the core consumer is expanded to \$108. Combined, there is \$171 worth of unpaid household labor embedded as dark value in each iPad, an amount that exceeds Apple’s gross profit margin.

Dark Value from Informal Sector Labor

The economic significance of the informal sector has been recognized by world-systems scholars (Portes 1983; Tabak and Crichlow 2000) and by mainstream international development organizations (International Labour Organization 2001; United Nations 2003). Dark surplus drains from informal sector labor feed into all commodity chains. These supply chains are “invisible” because capitalists and consumers seek to deny that they are beneficiaries of surpluses extracted from semi-proletarianized workers who are concentrated in the informal sector (Tabak and Crichlow 2000). Informal sector workers subsidize global commodity chains through exchanges in which their labor time is under-valued. On the one hand, they pass dark value through goods and services that are embedded into the production processes of commodity chains.³¹ On the other hand, these hidden workers provide local dark value to low-paid waged workers who, in turn, embed that dark value into the export commodities they manufacture. The daily life of the peripheral wage earner entails unequal exchanges in which one hour’s earnings are used to purchase goods or services that require greater labor time from cheaper producers. At iPad factories, Asian workers expand their income by purchasing cheap meals, goods and services from lower-paid informal sector vendors that ply the streets near their factories (Pun and Chan 2012).

How might we estimate the value of these hidden externalities? I began by deriving key information from previous studies. For the United States, Baker and Lee (1993) and Blivens (2003) identify the modal estimate of the employment “responding multiplier” tied to paid labor as 50 percent of the spender’s wage. In Tiers 1 to 3 of the commodity chain, approximately \$48 is paid to Chinese waged and salaried workers out of the total cost of an iPad. Because of the

³¹ Such informal sector inputs are documented in a limited fashion for Chinese iPad factories (China Labor Watch 2012a, 2012b; Pun and Chan 2012).

extraordinary high savings rate in China, I reduced to 33 percent the income multiplier that funds extended employment. Consequently, the \$48 paid out to Chinese iPad laborers generates another \$16 payment to other Chinese workers. However, these laborers are situated in the informal sector, earning about the minimum wage, or about one-half the country's average manufacturing wage. In buying the labor power of these underpaid workers, the Chinese purchaser receives a 100 percent bonus in dark value. This bonus is a capture of local dark value from the hidden sub-economy of Braudel's "material life," and it is a necessary pillar of waged work in the market economy. In this way, the underpaid labor power of cheaper support work is embedded in the iPad, now as globalized dark value. By applying the minimum wage ratio between China and the United States as a multiplier, we see that \$144 of veiled value is added to the iPad. Even though most scholars would consider them to be outside the commodity chain, the savings from the unpaid services of this Chinese underclass contributes dark value to that chain that is nearly equivalent to Apple's gross profit margin for each iPad.

Dark Value from Ecological Externalities

Ecological degradation and depletion comprise a significant array of externalities through which Apple suppliers extract dark value. Each iPad uses 33 pounds of minerals (some of which are rare and limited in supply), 79 gallons of water and enough fossil-fuel based electricity to generate 66 pounds of carbon dioxide (Ecolibris 2012). Moreover, the first generation iPad generates 105 kilograms of greenhouse gas emissions (Apple 2011b). Apple has been attacked for failing to alleviate numerous environmental problems throughout its Asian supply chains (China Watch 2012a; Ecolibris 2012; Friends of Nature 2011). A comparison of Apple (2011a, 2013) factory audits in 2010 and 2012 shows little or no improvement with respect to supplier management of hazardous substances, wastewater, air emissions, solid waste, or required governmental environmental permits and reporting. Moreover, Asian NGOs accuse Apple suppliers of causing chemical emissions, heavy metal discharges, air pollution, and water degradation that endanger the lives of people in areas adjacent to factories. NGOs also pinpoint worker exposure to hazardous substances that cause life-threatening illnesses and cancers (Friends of Nature 2011).

Unfortunately, there are no studies of the monetary value of such ecological costs. In order to obtain a rough measure, I began with the World Bank (2007) estimate that the total cost of air and water pollution in China is 5.78 percent of the GDP.³² Since the electronics industry is an extremely heavy polluter and ecological cleanup is highly expensive, I assumed that the percentage cost of pollution per iPad would be greater than that found for the GDP, or roughly 9 percent. Multiplying that ratio by the costs of production in China (\$207) leads to an estimate of \$19 per unit (reported in Part C, Column A).³³ To estimate what ecological cleanup would cost at

³² I arrive at a very conservative estimate because several types of ecological degradation are not covered by this World Bank estimate.

³³ This estimate is conservative as it is based only on production in Tiers 1 and 2. The figure represents the share of the factory price (\$275 in Table 1) of the components produced in China. I have not estimated the unpaid environmental costs of the remaining \$68 worth of components produced elsewhere in Asia.

U.S. rates, I employed a multiplier of ten.³⁴ In Table 4 (Part C), I very conservatively estimate that the dark value savings to Apple of not paying for some ecological externalities is \$190 per iPad. This ecological unequal exchange (cf. Jorgensen and Rice 2012) is nearly double Apple's operating profit margin.

Table 5. Summary of Dark Value Embedded in Each iPad Unit

Sources of Dark Value Extraction	US\$ Dark Value
Waged Labor	397
Professional, Managerial, & Headquarters Office Labor	175
<i>Labor Subtotal</i>	572
Household Labor Externalities	171
Underpaid and Unpaid Informal Sector	144
Unpaid Ecological Externalities	190
<i>Externalities Subtotal</i>	505
Total	1,077

Sources: Tables 3 and 4

Conclusion

The world-economy operates on a large base of unmeasured, uncosted and unrecognized dark energy. The task of economic elites is to transform a small portion of that dark energy into bright value that can be sold, accumulated and further expanded. However, much of the expended dark energy occurs in the forms of unpaid labor and uncosted externalities that are not transformed into bright value but are embedded in commodities as value beyond price that benefits consumers. Although commodity chains differ in specifics, this passage from dark energy to dark value is a basic component of all such chains.³⁵ In this sense, such chains can be viewed as *global dark value chains*. I have examined the Apple iPad as an example of the ongoing incorporation of dark energy into a material commodity. The estimated total dark value embedded in each iPad is \$1,077 (see Table 5), an amount that is ten times greater than Apple's operating profit margin and more than twice the retail price (see Table 1).³⁶

³⁴ I assume that the costs of pollution are roughly equivalent to cleanup costs and that the cleanup costs can be measured roughly in terms of wage/salary costs. This multiplier is the average of multipliers reported for waged workers and engineers in Table 6, Appendix.

³⁵ Dark value analysis can also be applied to countries, subnational regions and class hierarchies. For example, the Chinese household registration system generates a national class-based dark value system independent of its role in global commodity chains. See earlier discussion of migratory workers.

³⁶ My dark value estimates are quite conservative because so much of the commodity chain is still concealed from public view. The full calculation of dark value in any commodity chain would necessitate public transparency about transactions that capitalists keep deeply concealed. Capitalists do not intend for us to be able to demystify all the levels at which they benefit from costed and uncosted surpluses, for public revelation would diminish their capacity to extract dark value. Consequently, I have been unable to quantify a great deal of dark value that is embedded in the iPad, including public subsidies and costs externalized to rural communities and women. In addition, Apple externalizes numerous short-term and long-term costs to workers that are not captured in my dark value estimates.

Even though such dark value is concealed from scholarly and accounting calculations of “value-added” and gross/operating profit margins, this real value is nearly 32 times greater than the total operating margin of all the capitalists other than Apple in Tiers 1 and 2 of the production chain (See Table 2). Apple’s operating profit margin of \$106 (Table 2) can be explained by its ability to extract \$572 worth of dark value of cheap labor from its supply chain (Table 5), about the same as the bright value retail price. Without cheap labor, the retail price would double, possibly reducing profit to zero. The extension of the dark value concept beyond low-paid labor to include the informal sector, household labor and ecological degradation is meant to demonstrate the significance of unpaid externalities to commodity chains. The total value of these uncoded inputs is \$505 (see Table 5), an amount that is 3.4 times Apple’s operating profit margin (see Table 2). Moreover, this embedded dark value exceeds the retail price (Table 1). Thus, we are enlightened about why Steve Jobs was confident that production will never return to the United States.

While I have focused on the Apple iPad commodity chain, it is important to recognize that the mechanisms of dark value drain that are manipulated so effectively by Apple are replicated in every global commodity chain. What the Apple iPad supply chain shares with other forms of export-oriented industrial commodity chains is its use of surplus labor to comparative advantage. Arthur Lewis (1954) would be astounded at the successful use of his model in China, going beyond selling surplus labor power at give-away levels. The Chinese state uses its monopolistic control of its labor surplus to provide a degree of monopoly to entrepreneurs who, in turn, sell this advantage to core capitalists. The scope of the sale of cheap labor is so great that it allows for both a large external surplus drain and a large semiperipheral accumulation, an historical economic precedent still under-theorized. It represents a new regime of global accumulation, but it has in common with previous core-periphery relations the gift of cheap labor. Apple’s iPad price is based on this gift. It is the core of the Apple, and the core of the Apple is the historic core of the world-system: the drain of surplus from the (semi)periphery, largely through the drain of the value of labor power.

Like other capitalists, Apple gains its profits through the strong degrees of monopoly it garners from its design, production and marketing strategies. In addition, Apple extracts enormous levels of dark value that both widen profit margins and keep consumer prices low. Since Apple has the advantage of such dark energy, it can expand sales by applying a large portion of these unpaid production costs to lower prices. We should not underplay the wonders of the capitalist world-system for the workers in the core, and we should not underestimate the importance of the *consumer surplus*.³⁷ Most dark value is passed on to distant consumers in the

For an extended discussion of the elements of dark value that I have not been able to include in these estimates, see <http://filebox.vt.edu/users/wdunaway/Clelland/SurplusDrain/Missing.pdf>.

³⁷ My argument is a radical variant of the neo-classical economic concept of consumer surplus. My use of the concept *consumer surplus* differs from most other scholars who focus on subjective utility, the difference between real price and what an individual would be willing to pay (see www.businessdictionary.com/definition/consumer-surplus.html). My usage points toward the objective reality of the hidden value of unpaid costs to consumers. The passage of such a large proportion of dark value suggests that most analyses underplay the advantage of North-South trade to the core consumer. It is true, however, that this unrecorded advantage of consumer surplus is vaporous. It disappears with consumption, so it does not directly provide the advantage of bright value, i.e., availability for expanded investment.

form of lower prices than would have been possible had production taken place in the core. This question arises: Does the transnational capitalist class, through the international division of labor, often provide more benefits for the core working and middle classes than it captures for itself? In the case of the iPad, most of the expropriated dark value is realized, not as corporate profit, but as consumer surplus in the form of cheaper goods. Consequently, the core citizen becomes an unwitting beneficiary of this exploitative system when (s)he uses one waged hour to purchase a product that embodies many more lower-waged and unpaid hours and many under-valued material and ecological inputs. In this manner, core citizens become a global consumerist aristocracy.³⁸

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³⁸ This is a word play on the "aristocracy of labor" debate (Communist Working Group 1986; Cope 2012).

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Appendix

Table 6. Dark Value from Underpaid Labor in the iPad Tier 2 Suppliers

Basis	A		B		C	D
	\$ Cost per Unit		U.S. Multiplier		\$ Cost if produced in U.S.	\$ Dark Value
Waged Labor in Direct Production	China & Philippines		19	12	228	209
	Korea		4	2	8	4
	Taiwan		2	5	10	8
Engineers & Management in Production Facilities	China & Philippines		12	8	96	84
	Korea		5	3	15	10
	Taiwan		3	4	12	9
Totals		45		369	324	

Sources and Notes: The direct production wage (\$25) is taken from Kraemer et al. (2011: 11) who estimate that only about \$2 of this is paid to Chinese labor. On the basis of Apple (2012) and internet reports by each of the direct suppliers about factories near the iPad assembly sites, I located probable production sites. I allocated \$16 to Chinese labor and \$3 to Philippine workers, the location of a Toshiba factory. The difference between these estimates is largely based on distinguishing between subassembly in China and component production in countries other than China in 2010. “Many components, such as batteries and touchscreens, receive their final processing in China in factories owned by foreign firms” (Kraemer et al. 2011: 8). I estimate the Chinese wage at \$2 per hour (2010), a generous upgrading of the \$1.36 reported by the Bureau of Labor Statistics for 2008 (Bannister and Cook 2011) and the cost reported for Samsung’s Chinese factories, \$1.30 to \$1.60 base pay in 2012 (China Labor Watch 2012b). The Korean wage (\$23) and the Taiwanese wage (\$10) are from BLS (2013); the multipliers are 2 and 5. The U.S. rate that I use is the “median expected wage” for a typical Electronics Assembler II: \$35,000 basic wage, plus \$17,000 in benefits, thus \$52,000 year (Salary Wizard 2013). I adjusted this number downward to \$48,000 to account for raises since 2010, thus \$24 per hour, leading to a multiplier of 12. For the basis for estimating the salary costs of engineers/management, see Table 3. The measures and multipliers are derived from Linden et al. (2011). Numbers are rounded.

Table 7. Dark Value Extracted from Underpaid Labor in Tier 3 (Non-Core Production of Subcomponents)

Basis	A	B	C	D
	\$ Cost per Unit	U.S. Multiplier	\$ Cost if produced in U.S.	\$ Dark Value
NIC Waged Labor in Direct Production	6	Range of 2 to 5 for Korea and Taiwan	15	9
Chinese Waged Labor in Direct Production	6	12	72	66
NIC Engineers & Management in Production Facilities	7	Range of 2 to 5 for Korea and Taiwan	23	16
Chinese Engineers & Management in Production Facilities	3	8	24	21
Totals	22		134	112

Sources and Notes: NIC refers to Korea and Taiwan. In order to estimate the dark value contribution from these tiers, it is necessary to continue the process of “teardown” or reverse engineering. I traced the likely main suppliers of Tier 2 by home and production locations. Much of the production in this tier is by subsidiaries. The supply chains of Korean firms are largely in Korea. Other firms that have subassembly plants in China tend to have immediate suppliers there. In Part A, the estimated costs of materials for Tier 2 suppliers (\$154) is the received sales price for the Tier 3 sub-component suppliers. This \$154 must be allocated in four ways: for previously obtained materials, direct labor, gross margin (overhead and profit), and value added taxes, 17%, if collected, in China. After deducting the tax cost, the other costs were distributed in accordance with patterns found in Tier 2. The basis for the estimation of wage and salary rate and multipliers is found in Table 6 notes. Indirect costs have been estimated in the manner previously indicated. The multiplier for cheap labor zones direct production wages and NIC compensation costs from overhead are carried over from Table 6. The multiplier for cheap labor zones compensation costs from overhead is derived from the Linden et al.’s (2011: 229) estimate of engineers’ average salaries in the U.S. and China.

Comparing Critical Capitalist Commodity Chains in the Early Twenty-first Century: Opportunities For and Constraints on Labor and Political Movements¹

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Abstract

There have been a number of critical historical opportunities for labor to exert power by interrupting long distance flows of commodities at the extraction, processing, and transport stages. This vulnerability has been used by workers in these industries to gain higher wages and better working conditions and to achieve political goals in national and international arenas. In this paper, we compare two commodity chains that are critical components of the global economy. The first, which we describe as transport, is a broad category involving a range of manufactured goods, whose delivery to customers around the world was fundamentally changed in the past fifty years via “containerization” and “the logistics revolution.” The second is oil and gas, which also has experienced recently dramatic changes in both extraction (via “tar sands” and “fracking”) and transportation. In each case, we discuss possibilities and challenges for labor and political organizing to disrupt capital in these key commodity chains. We identify the “stakes” in each commodity chain by demonstrating the vulnerabilities on which labor and political organizations/movements could capitalize, which usually stem from the capital intensity and global integration of each critical commodity chain. These vulnerabilities are the factors which form the most basic opportunities for organizing in these sectors. Our analysis further suggests that while transport and raw materials remain vulnerable nodes in capitalist commodity chains, there are also constraints and challenges to be faced by labor and social movement organizations (SMOs) that might attempt to leverage power over these circuits of the world-economy.

Keywords: New historical materialism, environmental activism, labor unions, logistics, oil and gas extraction

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There are a number of instances in the past when labor used opportunities to interrupt long distance flows of commodities at the extraction, processing, and transport stages. This vulnerability was sometimes successfully exploited by workers to gain higher wages and better working conditions or to achieve other political goals. Australian coal miners, railroad workers, and dockworkers repeatedly gained higher wages and benefits by leveraging their role in facilitating (or impeding) coal exports to Japan during the 1960s and 1970s (Bunker and Ciccantell 2007), while the 1934 West Coast Longshoremen's Strike led to the unionization of all West Coast ports and set in motion a long period of rising wages for workers in this industry (Selvin 1996). In these and many other instances, workers at key chokepoints of critical global commodity chains seized opportunities to gain significant benefits for themselves. In an earlier paper (Ciccantell et al. 2012), we began an examination of the opportunities for and constraints on efforts by labor and other organizations to take advantage of these vulnerabilities in commodity chains, focusing particularly on containerized manufactured goods, coal, and iron ore, and on how these commodity chains are affected by potential conflicts in these industries resulting from growing hegemonic rivalries.

We build on our earlier analysis by comparing two particularly important commodity chains in the contemporary global economy and discussing possibilities and challenges for labor and political organizing to disrupt capital in these key chains. The first is what we conceive as the transport chain, which involves a range of manufactured goods whose delivery to customers around the world was fundamentally changed in the past fifty years via “containerization” and “the logistics revolution.” In effect, this network of links underlies all the other “globalized” commodity chains that now increasingly dominate the sinews of the world-economy in an era of pervasive “outsourcing” and internationalization of various types of production. The second is oil and gas, which also has experienced recently dramatic changes in both extraction (via “tar sands” and “fracking”) and transportation (in more increasingly extensive pipeline infrastructure and larger “tankers” on both land and sea). Contemporary urban-industrial societies are extremely dependent, of course, on these fossil fuels – indeed, oil and gas are the literal “fuel,” not only of most agriculture, extraction and manufacturing, but also of the crucial logistics chain introduced above.

With our focus on opportunities and constraints on various types of organizing/“resistance” to corporate power, here we attempt to identify the “stakes” in each commodity chain by demonstrating the vulnerabilities and points of weakness. There are nodes or links in these chains that are particularly conducive for the efforts of labor, social movement organization (SMOs) and other political activists to disrupt critical flows. These vulnerabilities often arise in globally integrated commodity chains where there are crucial nodes of physically concentrated and/or capital intensive production. Such nodes constitute chokepoints in the circuits of global capitalism over which activists may be able to gain leverage. We also note some salient *differences* between the specific opportunities and constraints in these chains for workers as opposed to other kinds of activists (for example, environmental activists mobilizing *vis-à-vis* oil and gas mining and, especially, the transport of these materials). As such, we identify key factors within each commodity chain that pose challenges to organizing efforts. Our analysis culminates in an overall assessment of whether or not the contemporary moment is one where labor or other popular groups can capitalize on interrupting flows of commerce at points of extraction, processing, or transportation, and we suggest some directions for future research.

In the following section, we provide an overview of the theoretical model and empirical methods employed in our analysis, as well as a brief discussion of key findings from our earlier

work. In the third section, we examine key aspects of the global logistics industry that are particularly relevant for labor and political movements, building from our analysis of containerization into a more general consideration of the development of the Third Party Logistics (3PL) industry. In the fourth section, we turn our attention to another critical commodity chain, the oil and gas industry, focusing on a growing trend toward North American energy independence and the potential deconstruction of the *global* commodity chains that have long characterized this industry. Then, we compare these two commodity chains in terms of their opportunities and constraints for activists.

Theory and Methods for Comparative Analysis of Global Commodity Chains

Our theoretical model of comparative global commodity chains brings together the global commodity chains literature from the world-systems tradition (Hopkins and Wallerstein 1982; Gereffi, Korzeniewicz and Korzeniewicz 1994) with new historical materialism (Bunker and Ciccantell 2005, 2007) to examine what we term “lengthened” commodity chains. It reworks the global commodity chains approach in four ways. First, beginning our analysis with primary products forces the examination of various modes, techniques and technologies of extractive regimes, as well as of the key role of transportation systems that move these often heavy, bulky materials from remote agricultural and mining locales to urban and metropolitan places where manufacturing and consumption take place. Second, focusing on this “longer chain” raises new questions about spatially-based disarticulations and contestations over the shape of the future of the capitalist world-economy. Starting at the beginning of a commodity chain not only provides a more comprehensive and complete story of contested transformation sequences, but it also reveals new ways in which geographic and spatial disarticulation and inequalities are integral to the global economy. Third, we explicitly focus on tightly integrated social and natural processes across a wide range of industries. Our analysis allows us to make comparisons across industries and over decades (potentially even centuries) in our effort to understand the relationship between society and nature and long term change in the capitalist world-economy. Fourth, by grounding our comparative analysis in the material and social characteristics of global commodity chains, we are able to identify both opportunities for and constraints on the efforts of labor and political organizations to find nodes in these commodity chains in which they can gain leverage to achieve their goals (Ciccantell and Smith 2009a, 2009b; Ciccantell, Smith and Doyon 2010).

Global Commodity Chains

In the foundational work on global commodity chains in world-systems literature, Hopkins and Wallerstein define a commodity chain as “a network of labor and production processes whose end result is a finished commodity” (1982:159). In its initial formulation, this analytic approach sought to link mining, logging, agriculture, and other forms of raw materials extraction from nature, typically in the periphery, to the industrial processing and consumption of these materials, most commonly in the core, in order to understand the mechanisms that created and reproduced systematic inequalities in the capitalist world-economy (Hopkins and Wallerstein 1982). This approach brought together analysis of the impoverishment of extractive peripheries, their economic and political connections to the core that enriched the core, and incorporated an explicit focus on consumption, particularly of final consumer goods, into world-systems analysis.

Building on this initial work, Gereffi, Korzeniewicz and Korzeniewicz (1994) defined a global commodity chain as “sets of interorganizational networks clustered around one commodity or product, linking households, enterprises and states to one another within the world-economy...(it is) the sequential stages of input acquisition, manufacturing, distribution, marketing and consumption” (1994:2). Their work and that of others who used this global commodity chains (GCC) approach examined key processes of change in the capitalist world-economy in the late twentieth century including how and where surplus or profit accrues in points where commodity chains touch down. They also explored whether “industrial upgrading,” a popular policy prescription in the periphery and semiperiphery, was possible at different nodes in the chain. Studies of “upgrading” looked for evidence that actors could increase the value of local transformation, capture more of the surplus/profits from the chain, and ultimately promote economic development. Many studies in this tradition (Gereffi 1994, Appelbaum, Smith and Christerson 1994; Bair and Gereffi 2001; Gereffi and Memdovic 2003; Schrank 2004; O’Riain 2004; Bair 2005) focused on the efforts of non-core nations to industrialize based on textiles, electronics, and other consumer goods manufactured for sale in core markets. This research yielded valuable insight into contemporary globalization, development policies, firm strategies, and the evolution of the world economy in the late twentieth century.

The GCC model provides an excellent tool for examining “development” and how production and consumption vary across natural and social space. How and where do GCCs “touch down” around the world? How do GCCs affect local people and places? The fundamental insight of GCC analysis, that industries should be analyzed as a linked set of activities that often cross multiple national boundaries in a globalized economy, became an integral part of international management standards, such as the ISO 14001 standards, life-cycle assessment models, and supply chain management (ISO 2006). The prevailing focus on consumer goods industries meant, however, that analysis of the upstream end of the chain in raw materials extraction and processing received much less attention.

More recent work in this tradition introduces the theoretical concept of disarticulations into global commodity chains (Bair and Werner 2011; Bair 2005). While the GCCs literature often took for granted that, once established, commodity chains would continue to exist, Bair and Werner emphasize the frequency of disarticulations of these chains, or how particular activities and places are incorporated, maintained, and then removed from these chains. As we will discuss in the section on the oil and gas industry in North America, this concept of disarticulation opens the door for understanding how global commodity chains may be changed, disrupted, or even consciously deconstructed in support of firm, state, geopolitical, labor, or even social movement interests.

New Historical Materialism

In contrast to the GCC approach, new historical materialism (Bunker and Ciccantell 2005, 2007) focuses attention on the upstream end of the commodity chain, highlighting the critical role of raw materials extraction, processing and transport in shaping the evolution of the capitalist world-economy. In any rising economy, strategies for economic ascent must respond to and take advantage of contemporary technological, geopolitical, environmental, and market conditions in the rest of the world and of the nation's position and location within that particular historical moment in the evolution of the world-system. These strategies employed by the state and firms in a rising economy must also coordinate the physical characteristics and location in space and in

topography of the various raw material resources actually or potentially available with the rest of the national territory. The beginnings of economic ascent require successful coordination of domestic technological advances, particularly in heavy industry and transport in a rising economy, with the external solution of access to cheap and steady sources of the raw materials used for heavy industry. The raw materials used in greatest volume present the greatest challenge and best opportunity for economies of scale. These economies of scale, however, drive a contradictory increase in transport cost, as the closest reserves of raw materials are depleted more rapidly as the scale of their industrial transformation increases (see Bunker and Ciccantell 2005 for an extended discussion).

The tension of this contradiction between the economies of scale and the cost of space foment technological innovation in transport and in chemical and mechanical means of reducing component inputs per unit of output. It also encourages improvements in the control of heat, pressure and the mixes of chemicals that make the unit material inputs stronger, and thus enable smaller, lighter amounts to perform the same work. All of these technological fixes drive each other, and they all tend to generate increases of scale, thus exacerbating over the long term the very contradiction between scale and space that they are designed to solve (Bunker and Ciccantell 2005).

The national economies that most successfully initiated technological and organizational solutions to this contradiction simultaneously generated their own rise to economic dominance, restructured the mechanisms and dynamics of systemic and hierarchic accumulation, and expanded and intensified the commercial arena of raw materials trade and transport. Solving the raw materials problem—the tension between increasing economies of scale in raw materials extraction and transport and the accompanying diseconomies of the increasing cost of space—is daunting. It requires the coordination of multiple physical and social processes across geopolitical and physical space with domestic relations between firms, sectors, the state, labor, and new technologies. Rising economies resolve these problems at the same time as, or even before, they increase industrial competitiveness. These solutions stimulate complex processes of learning and of institutional change that fundamentally mould the organization of the national economy at the same time that they change international markets and the rules binding participants in them (Bunker and Ciccantell 2005).

The challenges and the opportunities presented by the basic raw materials industries and by the transport systems on which they depend foster generative sectors. These sectors, beyond creating the backward and forward linkages that underlie the concept of a leading sector, also 1) stimulate a broad range of technical skills and learning along with formal institutions designed and funded to promote them; 2) contribute to vast and diversified instrumental knowledge held by interdependent specialists about the rest of the world; 3) produce financial institutions adapted to the requirements of large sunk costs in a variety of social and political contexts; 4) lead to specific formal and informal relations between firms, sectors, and states; and, 5) shape the form of legal distinctions between public and private and between different levels of public jurisdiction (Bunker and Ciccantell 2005).

Generative sectors are more numerous, more easily observed, and more efficacious in those national economies that are growing so rapidly that they must achieve massive increases in throughput and transformation of raw materials. In an established hegemon, rates of economic growth are slower and therefore demand for raw materials grows more slowly; this in turn means that an industry that serves as a generative sector in a rising economy (e.g. steel in the United States and Germany in the late 19th century) has far less impact in a more slowly growing

hegemon (in that period, Great Britain) (Bunker and Ciccantell 2005). The concept is relational, however, within a world-systems perspective, and thus implies that generative sectors in a rising economy will have significant consequences for other economies that export raw materials or trade in other kinds of goods (Bunker and Ciccantell 2005).

Generative sectors are not necessarily those in which profits are highest, even though high profit sectors (whether gold and silver in the seventeenth century or computer technology in the twentieth century) are those that typically attract the most analytical attention (see, e.g., Arrighi 1994; O'Hearn 2001). Instead, generative sectors provide the material building blocks, cost reductions across many sectors to increase competitiveness, and patterns of state-sector-firm relations and other institutions that combine to drive economic growth and ascent. They become the "drivers" of economic development, with spin-off effects on other parts of the economy. Generative sectors incorporate a much broader range of linkages and thus have impacts that are more significant and farther reaching than the examples of putative "industrial upgrading" emphasized by Gereffi and his colleagues and other commodity chain scholars. Rather than simply adding a stage or two of processing to a labor intensive manufacturing process or one additional stage of processing of a raw material into a more concentrated form, generative sectors form lengthened chains that link raw materials through technology and capital intensive processing to the sale of final products in the leading industries of a particular systemic cycle of accumulation.

How can rapidly growing economies acquire the raw materials essential to sustain these generative sectors, particularly in the face of domestic raw materials depletion and the resulting diseconomies of space, as these raw materials must be brought from more distant areas outside the political control of the ascendant state? One critical strategy to accomplish this task has been to wrest control of raw material-producing peripheries from earlier ascendant economies via direct corporate investment in extraction, the creation of new forms of transportation or energy infrastructure to monopolize processing or export, or, in some cases, "old-fashioned" colonialism via political control. This strategy is tantamount to "theft" of these extractive peripheries, since another power had already undertaken the difficult and expensive tasks of building the necessary infrastructure, creating political, organizational, and legal forms that promote international trade and investment relations between a particular raw materials-producing state and the world economy, and incorporating these peripheries economically and politically into the world economy. Earlier processes of economic ascent progressively globalized the world economy and brought new raw materials peripheries into the global trading system to supply the earlier ascendants' industries, so new ascendant economies and states can initially purchase raw materials from this established supply system (Ciccantell 2009). In this sense, the role of the rising economy might be described as "stealing" these raw materials peripheries from earlier ascendants by redirecting their raw materials exports away from those economies that fomented the creation of this exporting capacity, and toward itself and its rapidly growing need for raw materials.

The newer ascendants' rapid growth, however, means that their demand is increasing dramatically, necessitating a substantial increase in supply if these growth rates are to be sustained. The combination of the existing social and material infrastructures in the raw materials peripheries established by earlier ascendants, rapid demand growth in the ascendant economy, and the willingness of the newer ascendant economy to pay higher prices for raw materials in order to sustain their domestic growth creates an opportunity. Higher prices for rapidly increasing volumes of exports (in contrast to slower demand growth in the mature economies of

earlier ascendants) motivate firms and domestic elites in the periphery—and even existing core powers with fewer opportunities for profitable investments—to invest in production for export to the new ascendant. States in raw materials-exporting regions typically support this investment with subsidies for transport and extraction, both in an effort to promote economic development and in hopes of gaining better returns and more political freedom from the power of the existing hegemon. This is particularly apparent in postcolonial situations in which newly independent states seek to break free from neocolonial ties, and in situations of resource nationalism in which states seek greater control over and benefits from raw materials exports. Firms, elites, and states in raw materials peripheries come to see the new ascendant as a potential ally in their attempts to promote political independence and economic development (Ciccantell 2009).

From the perspective of the new ascendant, building these relationships with existing raw materials peripheries is much less expensive and difficult than creating their own new peripheries. One of the most important benefits is that most of the cost and the risk of expanding extraction and transport are borne by firms and states in the extractive periphery and often by firms from the earlier ascendant. At the same time, these investments in mines and transport systems also often create opportunities for exports of industrial products from the ascendant economy to the periphery to support the development of these extractive industries and for consumption by the owners of and workers in these industries. “Stealing” these peripheries from earlier ascendants thus further enhances the rapid growth of the new ascendant by reducing costs and risks while simultaneously creating significant new opportunities for profit from trade and investment (Ciccantell 2009).

The combination of the GCCs framework with new historical materialism also brings to the forefront the potential for contestation over the creation, maintenance, and disarticulation of lengthened commodity chains. In particular, we identify key historical and current episodes in which particular nodes of these chains can become locations of conflict between capital, states, and labor and political organizations that seek to promote their economic and/or political interests.

Comparative Methods for Studying Lengthened Commodity Chains

Our analytic approach follows a long tradition in world-systems theory of making multiple comparisons across time and space within the context of an evolving global system (see, e.g., Wallerstein 1974; Chase-Dunn 1989; Arrighi 1994; Bunker and Ciccantell 2005). The GCC approach is often utilized to make comparisons between parts of the same commodity chain in different nations and between different commodity chains (see, e.g., the case studies in Gereffi and Korzeniewicz 1994). We follow this approach, while focusing particular attention on the upstream stages of these GCCs and on their role in the long term evolution of the capitalist world-economy, including their roles in economic and geopolitical competitions. Our analytic strategy also includes making multiple comparisons within one commodity chain over time and between different commodity chains in different industries in order to examine processes of social and environmental change.

Grounding these chains in particular places, times, and natural environments is the critical first step to studying lengthened commodity chains in our analysis. This grounding will then allow us to make comparisons of apparently dissimilar chains. Our first step is thus to focus on particular nodes to examine the developmental, socioeconomic, and environmental

consequences of incorporation into these chains, and then to examine these lengthened chains as constitutive of the evolution of the capitalist world-economy by driving long term change. Our analytic method combines quantitative and qualitative data on each GCC and its key nodes along five dimensions: industry characteristics, economic characteristics, social characteristics, natural characteristics, and environmental impacts (see Figure 1).

Figure 1. Key Factors for Five Dimensions of Data on GCCs

1. Industry Characteristics

Degree of concentration at each stage
Integration vs. separation of stages
Ease-cost of separating stages
Importance of marketing/branding
Scale of production
How difficult is it to globalize
Role of transport
Share of transport in total costs
Share of labor costs in total costs
Capital intensity
Technology intensity
Profitability
Role of information technology/infrastructure
Length in space
Impacts of labor organization
Buyer driven vs. producer driven
Technologies employed

2. Economic Characteristics

Economic sustainability
Employment generation
Backward linkages
Forward linkages
Fiscal linkages
Tax/royalty revenues
Role in capital accumulation
Share of world trade
Contribution to GDP growth
Role as a driver of economic development
Actual/potential role as a generative sector
Articulation into/disarticulation from GCC and world economy

3. Social Characteristics

Role of NGOs
Role of social movements
Social sustainability
Degree of domestic integration
Differential gendered impacts
Differential racial/ethnic impacts
Impacts on indigenous groups
Impacts on local populations
Need for military intervention/protection
Degree of conflict/violence
Degree of labor organization
Political characteristics and history of location

4. Natural Characteristics

Geographic location
Quality of ore
Chemical composition of ore
Geologic characteristics of deposits
Topographic characteristics of deposits

5. Environmental Impacts

Impacts at each stage
Environmental sustainability
Energy intensity at each stage

The Global Logistics Industry

Containerized Manufactured Goods

This category of chains, defined by transportation mode rather than the product that is being transported, represents many of the key characteristics that differentiate the world economy of the early twenty-first century from that of earlier eras, and includes commodities such as textiles, shoes, consumer electronics, and toys. These products and industries share a number of characteristics. Their high labor intensity led firms to globalize these industries in search of lower-cost labor. This globalization contributed to a deconsolidation of production stages both spatially and organizationally, creating complex networks of core firms that carry out tasks such as design and marketing, and globally dispersed subcontracting firms that produce the components and finished products under the direction of the core firm. Capital intensity is relatively low, as is the degree of technological sophistication in much of this production. These buyer-driven commodity chains span thousands of miles and rely on sophisticated electronic communications technologies for coordination of just-in-time delivery systems that minimize capital investment and inventory costs for the core firms. These products are easily and cheaply transported thousands of miles in containers and constitute a large and rapidly growing share of global trade in volume and especially in value terms (Bonacich and Wilson 2008; Cudahy 2006; Bair 2009).

The dispersion of global production activities around the world is a development made possible by the advent of containerization, the process through which products are easily and cheaply transported across thousands of miles. These goods can remain in the same metal container throughout all phases of this transportation process, often traveling via a combination of ships, railroads, and trucks, thus minimizing the labor costs associated with loading/unloading at each juncture (Bonacich and Wilson 2008; Cudahy 2006). The import of containerization as a widespread transportation method and a booming industry cannot be overstated. In fact, scholars often emphasize the impact that containerization had on the global economy at large, noting that it “changed the world” by facilitating the expansion of global trade, with far-reaching consequences for workers and consumers all around the world, not simply those working within the transportation industry (Donovan and Bonney 2006; Levinson 2006). Table 1 demonstrates the massive growth of seaborne trade over the past few decades: in 1970, 2,566 million tons traveled internationally by sea, but by 2010, this figure had risen to over 8,000 million tons.

Table 1. International Seaborne Trade (*millions of tons loaded*)

	Oil	Main Bulks	Other Dry Cargo	Total
1970	1442	442	676	2566
1980	1871	796	1037	3704
1990	1755	968	1285	4008
2000	2163	1288	2533	5984
2010	2752	2333	3323	8408

Source: UNCTAD 2012: 7.

Tables 2 and 3 demonstrate the expansion of the world's container ship capacity as well as cargo traveling by container, respectively. Measured in twenty-foot equivalent units (TEUs), the world's container ship fleet boasted only 16 TEUs in 1965 but over 8,000 TEUs by 2005 and 12,800 TEUs by 2010. Similar increases are evident in containerized cargo figures, which rose from 127 millions of tons in the mid-1980s to 1,134 millions of tons in 2006. Taken together, these data indicate the incredible and sustained increases of global trade in recent decades facilitated by containerization of global trade flows.

Table 2: World Container Ship Capacity

Year	Thousands of TEU Total Capacity of the World's Container Fleet
1965	16
1975	366
1985	1189
1995	2492
2005	8116
2010	12800

Source: Stopford 2009: 508; UNCTAD 2011

Table 3. Container Cargo

Year	Millions of Tons
1983	127
1985	160
1990	246
1995	389
2000	628
2005	1017
2006	1134

Source: Stopford 2009: 516.

Containerization also paved the way for what Bonacich and Wilson (2008) refer to as the “Logistics Revolution,” which includes the integrated management of transportation, warehousing, and inventory control across an entire supply chain, in an effort to mediate the tension between supply and demand. Containerization and the logistics revolution are so important to the world economy that China and other rapidly growing economies in the periphery and semiperiphery of the capitalist world-economy use these industries as critical sectors in their economic development strategies, often with geopolitical and economic support from the existing hegemon, the United States. Table 4 depicts large increases in the millions of TEUs transported through container trade routes, especially those flowing from the Far East

(including China) to the West. While East-West and West-East trade routes transported roughly equal amounts of cargo in the mid-1990s, the data from 2000 forward demonstrate that the East-West trade routes now move much more cargo than the West-East routes, attesting to the importance of China and other countries in the Far East to the world of containerized transport. Although these sectors have limited capacity to generate economic linkages within the producing economies, and are very unlikely to serve as generative sectors, they are key loci for creating employment and generating export revenues.

Table 4. Cargo Flows on East-West Container Trade Routes (Millions of TEUs)

Year	Far East - N. America	N. America - Far East	Far East - Europe	Europe - Far East	Europe - N. America	N. America - Europe
1995	3.974	3.535	2.400	2.021	1.678	1.691
2000	7.308	3.525	4.650	2.461	2.694	1.707
2005	11.893	4.479	9.326	4.417	3.719	1.986
2009	10.621	6.116	11.361	5.458	2.738	2.046

Source: UNCTAD 2012: 23.

Labor organization in the factories producing these goods is typically nonexistent or carefully controlled by the state, despite sometimes extensive and risky efforts by local and international unions to organize workers, making these sectors seem highly unlikely to be points of leverage for labor unions or social movements. However, in the transport mode of containerized goods movement, there are potential opportunities for labor organizations and social movements to take advantage of industry characteristics, most notably global production networks and reliance on just-in-time delivery systems, as Bonacich and Wilson (2008) argue in their analysis of the ports of Los Angeles and Long Beach, two ports that are separated by only a few miles, and together comprise the principal U.S. entrepot for containerized manufactured imports from Asia. A port workers' strike in the early 2000s and a disruption of smooth operations due to organizational and technical problems in 2004 illustrate the potential vulnerability of the port nodes of this global containerized shipping system (Bonacich and Wilson 2008). In 2011 the Occupy movement attempted to revise this tactic by seeking to disrupt flows of goods through U.S. port facilities owned or utilized by Wall Street firms linked to the recent financial crisis, though with limited success (Romney, Murphy and Linthicum, 2011) (see below in Conclusion for more on Occupy). But more recently, in 2013, less than 500 dock workers at Hong Kong International Terminal, where a large volume of the U.S.-bound China trade begins its trans-Pacific journey, went on strike and managed to "cripple" the world's third largest port and win significant pay raises (Davies and Noble 2013; McCafferty and Pang 2013). This worker action, which garnered support from both student organizations and pro-democracy politicians in Hong Kong, shows that labor clearly still *can* exploit these logistic commodity chain vulnerabilities, if conditions are right and there is popular solidarity.

The Hong Kong success notwithstanding, the structure of the workforce in the broader port complexes presents several challenges to those seeking to organize these nodes in the global economy to cause economic disruption. Many different groups of workers participate in transportation work, and they experience varied working conditions and levels of union

organization. They are also spatially segregated from each other, all of which is problematic for efforts to unite these workers in a common struggle. Workers at U.S. port complexes can be broadly defined to include those working on the ships transporting containers from other parts of the world, those who work as longshoremen loading and unloading the container ships at the ports, the truck drivers who move unloaded containers from the ports to distribution centers, railroads, or retail centers, the warehouse workers who unload and process container goods for reshipment, as well as other transportation-related jobs. It may be that U.S. port workers who are at the terminus of the trans-Pacific trade, moving and preparing it for transport and distribution to disparate customers across the North American continent may have a bit less power over the flow than the Hong Kong dock workers, who could exercise critical leverage at a major shipping “choke point” for outward bound Chinese cargo

On the one hand, transportation work, as described above, includes the highly paid and heavily unionized longshoremen whose work and wages are heavily protected by an active union presence. On the other hand, transportation work also includes truck drivers, many of whom are independent contractors rather than full-time employees of an actual company, and warehouse workers, many of whom are part-time or temporary workers hired through employment agencies. These two groups of transportation workers receive relatively low wages for their work in addition to being excluded from many unionization efforts (Bonacich and Wilson 2008; Bonacich and de Lara 2009; Monaco and Ritter 2009). It is clear that transportation workers experience distinct working lives, are engaged in different parts of the transportation project, and work in physically distinct environments. This makes organizing at these port nodes a complicated project that must account for the contours of the workforce. All of these characteristics of the transportation chain present challenges for those seeking to capitalize on the vulnerability of the port nodes in the globalized container shipping system. But the potential is certainly significant, if the necessary coordination and cooperation can be achieved between labor organizations representing various groups of workers, the creation of labor organizations to represent currently unorganized sectors linked to containerized transport, and the creation of broader national and international labor and political networks.

Integrated Third Party Logistics (3PL) Firms

Containerization, the increasing economies of scale of air transportation, the global expansion of communications networks, and the expansion of binational and multinational trade agreements encouraged the creation of firms that specialize in coordinating and moving a growing volume and variety of goods around the world. These Integrated Third Party Logistics (3PL) firms have taken over transportation and management tasks that traditionally were handled within the producing and/or selling firm. Prior to 1980, manufacturers relied on liner shipping, commercial airlines and freight forwarding firms to move their products to distributors and retailers. Over the last three decades, however, 3PL firms took over these roles from many manufacturers, distributors and retailers. This shift began with a few firms, led by UPS, FedEx, and smaller European firms serving local markets, moving very high value packages. As these services expanded and customers recognized their value, the firms began to promote them more aggressively to customers. During the 1990s, 3PL firms took over a larger and larger share of the movement of manufactured goods, with lower-value goods moving in containers by sea and high-value manufactured products moving by air (Lobo and Zairi 1999a, b, c; Bowen and

Leinbach 2004, 2006; Hertz and Alfredsson 2003; Klaus 2011; Anderson et al. 2011; Bhatnagar and Viswanathan 2000; Taylor and Hallsworth 2000; Bowen 2012). The volume of high value goods carried by air expanded rapidly, as Table 5 shows.

Table 5. Global Air Shipping Volume (Millions of Ton-Kilometers)

Year	Volume
1973	15,568
1980	26,825
1990	56,145
2000	118,257
2010	189,325

Source: World Bank

As firms recognized the dramatic economies of scale and speed possible in this industry in the 1990s, a series of mergers and acquisitions, restructurings of existing firms, and a convergence of firm strategies toward providing integrated logistics led to the creation of an increasingly concentrated industry. Four main firms—UPS, FedEx, DHL and TNT—have emerged as the largest global 3PL firms. All four firms have a similar structure of operations, relying on a limited number of hub locations for air transport, warehousing, and further processing for manufacturers. There are a number of smaller firms that continue serving market niches for moving high-value manufactured goods, including commercial airlines, liner shipping, and small and medium size freight forwarders (Lobo and Zairi 1999a, b, c; Bowen and Leinbach 2004, 2006; Hertz and Alfredsson 2003; Klaus 2011; Anderson et al. 2011; Bhatnagar and Viswanathan 2000; Taylor and Hallsworth 2000; Bowen 2012).

In terms of opportunities for labor organization, this sector shows an interesting mixture of conditions. Some firms were unionized years ago (e.g. UPS), while others remain unorganized (e.g. FedEx), despite otherwise very similar structures and operations. These firms are the links in GCCs that span multiple countries and thousands of miles, but this linking role creates some important opportunities for labor and social movement organizations, in part because these logistics jobs are inherently tied to a particular location and cannot be offshored (Sheffi 2012). The large amount of capital invested in the products being carried in each cargo makes any disruption potentially very costly to the 3PL firm and its clients. The limited number of hubs utilized by the four major 3PL firms presents labor and social movements with a small number of key targets. The importance of economies of speed in transporting these high value cargoes means that manufacturers and customers depend on quick and reliable movement of cargoes to sustain just-in-time delivery and production systems, again making them vulnerable to disruption. As recently shown on a number of occasions, strikes such as those at the port of Hong Kong in 2013 (Gough 2013) can impose very high costs on 3PL firms and their clients, giving workers a significant amount of potential leverage to achieve improved wages and working conditions.

However, several qualifications are in order. The existence of four global firms and a number of smaller competitors provides shippers and customers with alternatives if only one firm's operations are disrupted. Government regulations prohibiting or constraining the

organization of the logistics workforce in many Asian nations make labor organizing difficult in many locations. Further, the highly varied classifications of logistics workers, noted earlier, similarly constrain efforts to affect the operations of 3PL firms.

Oil and Gas in North America: Deconstructing a Global Commodity Chain

The stereotypical view of conventional oil and gas production is of drilling into the ground until an underground reservoir is punctured. The oil and/or gas in the reservoir is pushed up through the drill hole by the pressure of the rock and earth above the reservoir and of the stored oil and gas in the reservoir itself, with the image of the “gusher” on the surface representing successful exploration drilling. This view is reasonably accurate for many deposits of oil and gas, but oil sands and shale oil and gas are very different naturally-occurring forms of these raw materials that are referred to as “unconventional” deposits. Although oil sands and shale oil and gas ultimately feed into the same industrial and consumer uses as conventional petroleum, the natural characteristics of their deposits and the technologies used to extract these resources make them from the perspective of lengthened GCCs two distinct commodity chains within the global oil industry. The following two sections highlight a few of the key material characteristics of these two unconventional forms of oil that shape their use and their growing role in the North American and global oil and gas industries. We then look at the changing nature of the global oil and gas industry and the potential for North American “energy independence,” which, if realized would deconstruct the currently *global* commodity chain in this industry via increased reliance on these two relatively new *regionalized* commodity chains. This trend may create significant new opportunities for labor in the sector, but the prospects for other political organizations, such as environmental groups, to affect this sector are less evident, as the current political debate over the Keystone XL pipeline for oil sands oil demonstrates.

Canadian Oil Sands

The best analogy for an oil sands deposit might be to describe it as an oily version of a peat bog. The oil is mixed in a layer of sand, clay and water with a consistency similar to tar; critics of the massive growth of the oil sands industry typically refer to this as “tar sands” because of the power of this image of a tarry sludge. The first challenge is to collect the oil sand, and the second is to separate the oil from the sand and other contaminants. The existence of these oil sands deposits in northern Alberta has been well known for more than a century, but finding ways to economically extract and process the oil into useful forms is a tremendous technological challenge. Proposed solutions to this challenge range from surface mining to exploding nuclear weapons underground to “cook” the oil sands and separate the oil using the heat and pressure from the nuclear explosion. The Canadian government and Canadian and international energy firms invested billions of dollars over the last several decades in search of economically competitive methods for extracting and separating the oil sands. The two most important solutions that were developed are large scale surface mining and *in situ* processing (Nikiforuk 2010; Marsden 2007; EIA 2012b).

Perhaps the single most important factor in transforming the Canadian oil sands from a heavily subsidized and globally uncompetitive curiosity in the 1970s and 1980s to a viable investment option for a rapidly growing number of the world’s largest oil companies was the

development of large scale truck and shovel mining technology in the British Columbian coal industry. These technological and organizational innovations reduced the cost and labor intensity of surface mining of coal dramatically in the 1980s and 1990s. Global coal oversupply, falling coal prices, and repeated rounds of restructurings and layoffs in the British Columbia coal mines made hundreds of skilled equipment operators available to the oil sands operations across the border in Alberta; these workers and the truck and shovel technologies and organizational operations were brought into the oil sands, leading to dramatic cost reductions. In combination with increased oil prices, the oil sands finally became globally competitive and thousands of acres of northern Alberta wetlands and forests were rapidly redefined as locations for oil production and the site of a boom in investment and extraction in this new link in the global oil commodity chain.

In situ extraction, typically used for deposits lying too far below the earth's surface to be removed in a cost effective manner via surface mining, uses large amounts of energy to heat water into steam that is pumped into the ground, which then carries the oil to the surface for collection and further refining. This energy-intensive process is typically powered by natural gas; a great deal of this raw material is needed to extract oil from these oil sands deposits. The use of relatively cleaner-burning natural gas to extract more highly polluting oil from the oil sands has been sharply criticized, but a rapidly growing number of these projects are being planned and built in northern Alberta (Nikiforuk 2010; Marsden 2007; EIA 2012b).

The "heavy" oil extracted from these deposits using either of these methods (surface mining or *in situ* extraction) requires further energy-intensive processing in upgraders located close to the deposits that heat and filter the oil sands oil to remove sand and other impurities, as well as a more complex refining process at the oil refinery itself than is necessary for oil from conventional deposits (termed "light, sweet crude"). Upgrader operations create a variety of formidable negative environmental impacts in the oil sands region, including air pollution, water pollution, and the release of a variety of toxic materials into the environment as part of the process of this initial stage of removing impurities, and these environmental impacts have been shown to cause a wide range of human health problems (Nikiforuk 2010; Marsden 2007; EIA 2012b).

The massive investments in these facilities and the resulting employment are also driving an economic boom, including high demand for labor and high wages, in the oil sands region. Workers in the oil sands industry have been able to earn very high wages in recent years because of the difficulty of attracting and retaining skilled workers in the remote areas of northern Alberta. Some workers, particularly those who maintain their permanent residences outside the oil sands region and fly or drive in for their work shifts, are able to use these high wages to fund a very comfortable lifestyle. However, other workers, including those providing services to the oil worker population, face a very high cost of living and serious social problems such as drug abuse and high crime rates in the Fort MacMurray region, and are thus benefiting much less from this booming generative sector. In short, the rapid growth associated with the exploitation of the oil sands creates a wide range of economic, social, and human health problems in the region (Nikiforuk 2010; Marsden 2007).

While the environmental impacts of the oil sands have become central concerns for national and international social movement organizations, the negative social and human health impacts have mainly been concerns for local community organizations and individual activists. Environmental groups, indigenous rights groups, and local citizens' organizations have had very limited success in challenging the dominance of the oil sands firms in the region, particularly in

the context of the provincial government's longstanding support for the oil firms and the overriding goal of maintaining this booming industry. The remote, difficult to access extraction areas make it very challenging for activists from “outside” to have any leverage whatsoever over these physical sites – and the high worker wages and local business boom near the mines also make the prospect of “solidarity” between tar sands workers and many local residents, on the one hand, and environmentalists, on the other, even more unlikely.

Alberta has a great deal of refining capacity that was developed to serve the conventional oil production in the province during the 20th century. A rapidly growing share of the oil sands output is being refined outside the province, however, constraining the developmental benefits to the region from this production boom (Marsden 2007). Even after upgrading, oil from the oil sands does not flow well through pipelines. Oil sands producers bring in light crude via pipeline to mix with oil sands oil so that it will flow through pipelines to refineries in the United States or to ports on the Pacific Coast (Nikiforuk 2010; Marsden 2007; EIA 2012b), making this a highly unusual type of petroleum commodity chain. The proposed Keystone XL pipeline would transport oil sands oil to refineries on the U.S. Gulf Coast, but the future of this pipeline remains in question because of environmental and political opposition in the United States and Canada.

An alternative commodity chain for the oil sands has emerged during the uncertainty over the Keystone XL pipeline. Chinese firms are investing billions of dollars in the oil sands and pipeline firms, while the Canadian government is developing plans to both expand existing pipelines and construct new ones linking northern Alberta to the Pacific coast. This would, in effect, create an “alternative” commodity chain linking Canadian oil to China, the world's fastest growing petroleum market. China's rapid ascent over the last three decades and the resulting rapid growth in Chinese raw materials consumption and imports, and particularly of oil, have led many analysts to emphasize rivalry between China, the U.S., India, Japan and Europe for access to oil around the world. Some even predict a future of resource wars (Klare 2012, 2008, 2004, 2001; Moyo 2012; Hiscock 2012). The Keystone XL debate, regardless of its outcome, may simply help redirect the oil commodity chain to Canada, rather than slowing the rapid development of the oil sands, as environmental activists and organizations hope.

The U.S. Energy Information Agency (2012b) estimated oil sands reserves at 170 billion barrels of oil, 98% of Canada's total oil reserves. Total oil sands production increased from 114,000 cubic meters in 1967, the first year of production, to 1.9 million cubic meters in 1970, 8.0 million in 1980, 19.9 million in 1990, 35.4 million in 2000, and 92.5 million in 2011 (CAPP Table 3.2a). Canada is now the largest source of oil imports for the United States, virtually all from the oil sands. Canadian oil account for 25% of total U.S. imports, with 2.2 million barrels per day of crude oil flowing from Canada to the United States (EIA 2012b). Clearly, the oil sands have had a profound impact on U.S. oil supplies and reduced this country's dependence on distant and often volatile sources in the Middle East and elsewhere.

Although up to this point, the oil sands have been incorporated into a U.S.-focused commodity chain, this could change as the result of environmental opposition in the United States to consumption of this oil, given its disproportionate contribution to climate change. Many environmental groups have mobilized in opposition to the Keystone XL pipeline (including the Sierra Club, the Natural Resources Defense Council, the National Wildlife Federation, Greenpeace, and Friends of the Earth, among many others), organizing large scale protests against its construction in Washington (Strasser 2014), Chicago (Sobol 2013), and San Francisco (Lee 2013). The U.S. State Department's final environmental impact statement on the Keystone XL pipeline released in early 2014 concluded that there will be no significant negative impacts

from the pipeline. Environmental organizations and the oil industry are pushing the Obama administration to issue a final decision on the project quickly, with environmental organizations increasing protest activity across the United States in February and March of 2014. Given the Obama administration's continued support for an "all of the above" energy strategy, the final decision is still uncertain. But as noted above, it is highly likely that the oil sands boom will continue, regardless of the decision reached in the United States. The only question is the ultimate destination of this commodity chain.

North American Shale Oil and Gas

Rather than accumulating in the reservoirs typical of most light, sweet crude oil and natural gas, shale oil and gas are contained in formations of shale rock. Shale oil and gas are unconventional because these deposits are "tight," meaning that the oil and gas do not easily flow out of the shale when a drill enters the deposit. Instead, oil producers drill into the shale formation and then use hydraulic fracturing ("fracking"), a mix of water and chemicals whose exact composition is protected as a trade secret, to break up the shale and free the oil and/or gas. Fracking has become a politically contentious issue in some parts of the United States because of the environmental and social impacts of this form of extraction, but the volumes of oil and natural gas being produced using this technology are growing rapidly. One key difference from oil sands oil is that the oil produced from shale is typically light, sweet crude that can be refined using conventional refining technology; shale natural gas is indistinguishable from natural gas from conventional deposits (EIA 2012a; DOE 2009).

The extraction of oil and gas from shale was technologically possible but uneconomic for many decades. One irony of the celebration of private investment in shale oil and gas during the 2012 presidential debates is that much of the technology that made this investment viable resulted from the partnership between the federal government and some oil and gas firms during the Carter Administration's efforts to promote energy independence during the 1970s. These innovations were utilized by first one and then by a growing number of firms to extract oil and gas from a shale formation in Texas; their pioneering efforts then became the model for the increasingly large scale boom now underway in other areas of the United States and increasingly around the world (EIA 2012a; DOE 2009).

U.S. shale gas reserves increased from 23,304 billion cubic feet in 2007 to 97,449 billion cubic feet in 2010 because of the boom in shale gas exploration, and production of shale gas increased from 1,293 billion cubic feet in 2007 to 5,336 billion cubic feet in 2010.² Shale oil reserves and production have undergone a similar but smaller scale boom. U.S. total imports of crude oil and oil products fell from 11.45 million barrels per day in 2008 to 7.8 million barrels per day in 2012 because of reduced demand and increased domestic production; U.S. shale oil production increased from 600,000 barrels per day in 2008 to 3.5 million barrels per day in early 2014 (The Economist Feb. 15, 2014). U.S. crude oil prices are now US\$10-20 per barrel below prices for the international benchmark Brent crude oil from the North Sea (Kingston 2012), evidence of the partial decoupling of the U.S. market from the global oil market.

The shale boom has brought a high demand for skilled labor and resulting high wages for workers in this industry. However, since the majority of labor demand is concentrated in the drilling phase of the industry and only a small number of workers are needed for ongoing

²US EIA, http://www.eia.gov/dnav/ng/ng_enr_shalegas_a_EPG0_R5302_Bcf_a.htm

production, the industry relies largely on an itinerant labor force that works on drilling in an area for a few months and then moves on to the next area to be drilled. As a result, local businesses providing services to the industry experience a temporary boom but little sustained benefit or demand for local labor.

Many environmental organizations and local residents' groups have emerged in opposition to the shale oil and gas industry, ranging from national groups such as Greenpeace, Friends of the Earth and the Rainforest Action Network to dozens of local groups in at least 28 different states, and many have succeeded in securing substantial amounts of media attention. Unlike tar sands deposits, fracking sites are more dispersed and many are located close to homeowners and local environmental groups. This creates opportunities for picketing, blocking of access roads, etc. Recent examples of this sort of "direct action" activism include occupation of a site near Manchester, UK by several dozen camping protesters in early 2014 (Slater and Heward 2014) and an even larger protest in late 2013 by 400 Romanian villagers to block Chevron from installing the equipment for shale gas exploration in their community (Besliu 2013) – in both cases, large urban street protests supporting the anti-fracking activists followed.

In the United States, environmental activists, thus far, seem to prefer demonstrations urging politicians to oppose fracking, with the governors of both New York and California recent targets (Mehta and Finnegan 2014; Katz 2014). Yet we would argue that the potential for the sort of direct action/occupations seen elsewhere is present here because some characteristics of this industry seem to favor resistance by activist organizations, including the close proximity of producing and consuming regions within one nation's political boundaries, the use of pipelines to transport products, and the high degree of unionization along the commodity chain. However, other factors sharply constrain opposition to the industry, including the division of workers into a large number of distinct unions in the United States and Canada, the perceived geopolitical and economic value of North American energy independence, and a framing of this industry as a "jobs versus the environment" debate that creates significant cleavages between labor and environmental groups; these factors seem to be combining to overwhelm the opposition to this industry, despite its significant environmental and social costs and risks.

Consequences of the Potential Reshaping and Disarticulation of the Oil Commodity Chain

The oil industry and its commodity chains are longstanding examples of globalization, with changes in one area directly affecting all other regions (Yergin 2012); examples range from geopolitically created production shortfalls to natural disaster-caused disruptions of production and transport infrastructures to regulatory shifts that change relative costs and profitability, among many others. However, the growth of Canadian oil sands and North American shale oil and gas may serve to disrupt this global market by at least partially separating the North American market from the broader global market.

For the present analysis, the opportunity that the growing extraction and consumption of the oil sands and shale oil and gas in the United States presents for the decoupling of the North American and global energy markets is the first central issue. U.S. oil imports are falling and the United States may become an important exporter of oil products and of natural gas. The political rhetoric of North American energy independence may become a reality, making it possible for the United States to escape the need for competition and potential conflict over access to energy

resources around the world. The existence of this opportunity does not guarantee that appropriate policies will be formulated and implemented. It simply means that a door is opening to fundamentally restructure U.S. resource access and hegemonic strategies in ways that could support a resurgence of U.S. economic competitiveness and potentially serve as the foundation for a new era of U.S. hegemony, much as the steamship and undersea telegraph opened the door for renewed British hegemony in the late nineteenth century.

For labor organizations, booms in oil sands and shale oil and gas production offer significant opportunities to organize rapidly growing numbers of workers in these sectors. There are various accounts of how well paid workers are, both in the Alberta tar sands project (Wood 2013) and in the “fracking”-led oil boom in North Dakota, where, according to Briody (2013) workers in the oil fields are earned an average annual wage of \$112,462 in 2012. Given current conditions, it may be much cheaper and less risky for firms to agree to relatively generous terms for labor in order to avoid delays and disruptions of construction and production during a period of high prices and high profits. Concessions to labor may even a good corporate strategy insofar as it underlines the “jobs versus the environment” framing of energy exploitation and discourages solidarity between labor and environmental activists.

Strong labor organizations already exist in some areas of this industry in the United States and Canada and they could potentially expand their membership and power in the current context. United States and Canadian labor unions have successfully worked together in the auto industry and may be able to do the same in the oil industry. There are, however, several constraints on this potential for labor, including the less favorable public view of unions in many parts of the U.S., the geographic dispersion of workers in the industry, and the very divergent skills and backgrounds of workers.

The potential reshaping and disarticulation of the global petroleum commodity chain created by the growth of the oil sands and shale oil and gas in North America present a mix of opportunities and constraints for environmental and community SMOs. On the positive side, concern over the negative environmental impacts of these resources has generated a great deal of public attention and debate and brought many new participants into SMOs opposing the growing use of these resources. However, the influence of SMOs at the local, national and international level up to this point has been relatively limited. U.S. and Canadian environmental groups, despite shared opposition to the growth of the oil sands, have not effectively coordinated their efforts. Geopolitical benefits of moving toward North American energy independence and maintaining China's rapid economic ascent and business interests in sustaining these booms and resulting high profits may trump these mobilization efforts.

Comparing Opportunities and Constraints for Activists across Critical Commodity Chains

In this article, we extend our previous analyses of a number of key historical and current episodes in which particular nodes of GCCs can become locations of conflict between capital, states, and labor and political organizations by applying this line of analysis to new economic sectors: the global logistics industry and oil and gas. We focus particular attention on the upstream stages of these GCCs and on the transportation links that are so critical to the long-term evolution of the capitalist world-economy. But what can be said by way of comparison? What similarities and contrasts can we observe within one commodity chain over time, and between different commodity chains in different industries, in terms of the opportunities for and

constraints on labor and political organizing? And how do these comparisons allow us to examine the broader processes of social and environmental change?

We focused on two critical capitalist commodity chains, and it is this “criticality” that constitutes the key opportunity for labor and political movements in each of our examples. Each chain under consideration here is notable for its high degree of capital-intensity and global integration, and both are seen as key sectors to spur development and growth. The garment industry that fills thousands of containers every day and the oil industry both served as generative sectors in earlier periods, and governments in countries as diverse as Viet Nam, Pakistan, Azerbaijan, Nigeria, Canada and the United States all hope that these sectors can drive economic development today.

Major capital interests (multinational firms, backed by huge financial clout and supported by wealthy investors) dominate the global logistics industry, operating on a “just-in-time” basis that requires uninterrupted functioning, and as recent strikes and work stoppages demonstrate, these capital interests can experience significant losses due to effective labor and political organizing. For example, when Hong Kong dockworkers shut down terminals there, they were directly challenging the Hutchinson Whampoa group, controlled by billionaire Li Ka-shing (listed by Forbes as the 20th richest person in the world with net assets of US\$ 31 billion) and costing his company over \$640,000 per day during the shutdown (McCafferty and Pang 2013). Logistics is based on rapid, seamless flows of goods, and this tends to create very high “stakes” for businesses and investors: this is why these commodity chains are potentially critical nodes for organizing.

Where oil and gas are concerned, the opportunities for organizing created by the characteristics of these critical commodity chains are enhanced by the interplay of economic, social, natural and environmental factors. The economic importance of oil and gas, coupled with the geopolitical considerations around potential North American energy independence, constitute a key vulnerability to be potentially harnessed by labor and political movements. Indeed, these factors and boom times in the oil and gas industries may make capital interests more likely to provide gains to labor as a means to minimize disruptions to the commodity chain.

If the importance or “criticality” of logistics and oil/gas tend to make them vulnerable to organizing at chokepoints, there are other factors that work against the sort of “disruption” that might lead to successful labor or political organizing. Three particular challenges stand out as obstacles to this sort of activism: issues of workforce variation and segregation; the availability of alternative nodes and networks and/or sources of supply in these chains; and the spatial articulation and disarticulation of the commodity chain.

First, the logistics and oil and gas sectors are both comprised of workforces that are spatially segregated, highly variegated and include large numbers of temporary workers. In the logistics industry, this is evident in the wide variety of logistics workers spread out over the globe, the distinct material conditions of their work realities, and the different legal classifications of workers that position some outside of the purview of traditional labor and community organizing efforts. For the oil and gas sector, this is a clear issue for shale oil and gas extraction, which largely relies on a small core workforce supported by a greater number of transient workers spread out over a wide geography.

Organizing such diffuse groups of workers presents an immense challenge. How can such varied groups of workers, separated by job types, legal classifications and geography, become unified in an organized struggle against the interests of capital? Though the contours of the workforces in both commodity chains examined here prevent simple conclusions from being

drawn where activism efforts are concerned, recent developments in the logistics sector may offer evidence for some cautious optimism. Port truck drivers and warehouse workers, two segments of the logistics workforce whose classification as independent contractors and temporary workers poses significant challenges to labor organizing, have not only been actively participating in organizing efforts; they have also achieved some successes. Certain groups of port truck drivers in Southern California recently won legal victories that overturn their “misclassification” as independent contractors, paving the way for them to pursue labor organizing campaigns. For instance, truck drivers at the twin ports of Long Beach and Los Angeles employed by the company *Toll Group* now boast the first union contract among Southern California port truck drivers in decades (*Coalition for Clean & Safe Ports* 2013b). Critically, *Toll Group* is an Australian logistics company, and truck drivers in Australia provided vocal support for the organizing efforts of their Southern California counterparts (*Coalition for Clean & Safe Ports* 2013a), demonstrating a nascent potential for global connections even among workers separated by distance and constrained by legal classifications of their work.

Similarly, recent organizing efforts among warehouse workers, particularly temporary employees working at Wal-Mart, offer some evidence that the challenges posed by workforce composition and organization can potentially be overcome in the logistics sector. Capitalizing on critical moments in the race to capture consumer spending during the holiday shopping season, Wal-Mart workers staged protests around “Black Friday” shopping in recent years. Importantly, these protests were spread widely across geographical areas, within and even outside of the US, as well as across different groups of Wal-Mart workers, including those who work in retail stores as well as distribution centers (Eidelson 2013). Again, the widespread coordination of these efforts across differentiated groups of workers is an encouraging sign. Indeed, in the case of the 2013 Wal-Mart pre-holiday action, it is also significant to note that consumers and various social movement groups (including environmental organizations) also supported the workers’ protests (Dreier 2013). This is exactly the sort of coordinated effort that leading scholars of global commodity chains suggest are necessary to bring about real change (Appelbaum 2005). However, as promising as this may be, it is important to recognize that, at present, successful efforts like these remain the exception in logistics, rather than the rule.

Another key issue that constitutes a challenge to labor and political organizing across commodity chains is the existence of alternatives that could undermine the impact of commodity chain disruption. In logistics, this occurs in the form of competing 3PL providers that clients can turn to, while in the case of the Canadian oil sands, activists have to confront the possibility that other geopolitical rivals will be willing to consume the oil if the United States does not. The rationale behind organizing in commodity chains such as these is to cause a significantly large-scale disruption that capital will acquiesce to the demands of labor, environmental, or other community groups. But in both cases, the ability of the commodity chain to continue functioning via alternate avenues limits the extent and impact of the leverage that labor and political organizing efforts can wield. Successful organizing efforts in both arenas will require making a dent in the bottom-line profit of capital. Certainly, the “stakes” in each commodity chain are high, as discussed previously, and yet the existence of alternate pathways through which disruptions can be circumvented present significant difficulties for organizing interests.

While the joint action by Occupy protesters and port workers on the west coast in 2011—or the “turtles and teamsters” alliance in the protests at the WTO meeting at Seattle over a decade earlier (Cooper 1999)—might suggest that labor and other types of social movements have a high potential for collaborating to disrupt critical nodes in worldwide commodity chains,

it is important to note that this is *not* always the case. Obviously, oil and gas workers, particularly if they are well-compensated, may have a strong interest in continuing, or even intensifying, production, whether that be in Fort McMurray, Alberta, a local “fracking” site, or in a greenfield area targeted for construction of new pipelines. In these cases, the interests of labor and capital may rather closely coincide, but be diametrically opposed to social movements that want to slow or stop extraction and transport of fossil fuels. This exemplifies the “jobs versus environment” framing, which, while clearly a trope favored by corporations and investors, may be a real impediment to any real solidarity between workers and environmental activists. One can also imagine various social justice mobilizations to disrupt logistics networks (perhaps over poor labor conditions in outsourced manufacturing, environmentally degrading products/production processes, or violations of human rights overseas) that might *not* be supported by dockworkers or employees of 3PL firms. Indeed, we know from an abundant scholarship on social movements that we cannot assume that various progressive forces are automatically aligned (e.g. Clawson 2003).

Further, the disarticulation of commodity chains (which may be even more pronounced in the case of sectors like coal or iron ore, and the textile/garment industry, as well as major port complexes) is yet another challenge for organizing efforts. In the two cases we consider, observing contrasts within commodity chains over time provides a particularly illuminating view of how articulation and disarticulation provide different settings for labor and political organizing. Other historical examples similarly highlight the impacts of articulation and disarticulation. Bair and Warner (2011) document the disarticulation of one region of Mexico from the garment GCC and the severe impacts on labor and capital in that region. Some leaders of “petro states” in the Middle East already express concern about the impacts of declining U.S. oil imports from their region because of increased shale oil production (Evans-Pritchard 2013) and BP projects that North America will reach energy self-sufficiency in 2018 (Lawler and Eisenhammer 2014). Complete disarticulation of the United States from the Middle East-centered oil commodity chain could be similarly disastrous for labor and capital in that region. In one of the most rapid and complete processes of disarticulation from a GCC, the rubber “bust” in the Brazilian Amazon in the early 20th century (Bunker 1985), local labor, capital and the natural environment were rapidly devalued and labor had no opportunity to organize to even earn a survival wage.

Our focus on lengthened commodity chains and how they affect labor and other groups in particular places and times allows us to analyze both opportunities (such as high wages for oil sands and dockworkers in some times and places) and constraints (e.g. the “China alternative” to the Keystone XL pipeline that may render opposition in the United States ineffective in stopping the expanding production of oil from the oil sands) on labor and social movement organizations.

Conclusion

The recent efforts by the Occupy movement to disrupt traffic through West Coast ports in the United States provided a dramatic and timely illustration of labor’s attempt, in alliance with wider civil society protests, to exert power over leading firms in the world economy. Some contemporary commentators dismissed the entire wave of “Occupy” activism in the United States in 2011 as transient and inconsequential (cf. Sorkin 2012). Perhaps. But framed in terms of the larger crisis of global capitalism, and seen for the worldwide phenomenon it was, Occupy was a world anti-systemic movement, a reaction not only to the short-term effects of the “Great

Recession” of 2009-2010 but also a cumulative popular response to decades of neo-liberal attacks on working people and the middle class in core countries (Macpherson and Smith 2013). If that argument is correct, the “Occupy” moniker may pass from use, but the new core “precariat” saddled with enormous personal debts and increasing job insecurity may continue to pursue these seemingly less institutionalized and more “horizontalist” ways to resist. If that is the case, the “disruption” of transportation systems “choke points” (at ports and elsewhere) could be a crucial tactic of resistance to corporate dominance in the coming decades, as global capitalism experiences the trauma of “the age of transition” (Wallerstein 2000). The more recent Hong Kong dock workers strike, in which a small number of workers, with solidarity from local students and political leaders, halted traffic for days at the world’s third busiest port, shows that there is a genuine vulnerability to this sort of action at major global transportation nodes.

Our paper is not attempting to formally dialogue with the extensive literature on the sociology of social movements, but it does seem like a broad-based “Occupy-like” mobilization might help unify various anti-systemic forces; this, in turn, could make insurgent exploitation of “long,” integrated and critically important commodity chains, like the ones discussed here, more vulnerable to labor or activist disruption. Some sort of loosely confederated anti-neoliberal mobilization that could unify a variety of groups and actors in common resistance to a target as amorphous as contemporary “global capitalism,” in fact, might be a much more promising way to take on corporate power and its state-based allies than the currently anemic forces of “left” political parties or labor unions (Macpherson and Smith 2013). Though these efforts recall previous attempts of labor throughout history, the Occupy endeavors raise an important question about whether or not the contemporary moment is one where labor and other progressive forces can unite to capitalize on opportunities to interrupt flows of commerce at key nodal points of extraction, processing, or transportation. Our examination highlights those opportunities and constraints for labor and other social movement organizations across two critical commodity chains: the global logistics industry and oil and gas in North America.

In each case, we find vulnerabilities on which labor and social movement organizations could capitalize, usually stemming from the capital intensiveness and global integration of each critical commodity chain. In the case of Canadian oil sands, the potential decoupling of the U.S. and global energy markets, which could lead to North American energy independence, stands out as a particular vulnerability that could be harnessed by labor movements. However, our analysis also shows constraints on labor and social movement organizing in each critical commodity chain. In the logistics sector, for instance, this stems from the varied composition and spatial segregation of components of the logistics workforce. Our analysis suggests that while transport and raw materials remain vulnerable nodes in capitalist commodity chains, there are also constraints and challenges to be faced by labor and social movement organizations trying to leverage those linkages. Although transport and raw materials continue to be vital sectors for labor organizing, the particular configurations of political and economic power within each sector demands careful consideration.

Our article provides a detailed assessment of two sectors—the global logistics industry and Canadian oil sands/North American “fracking”—as sites for potential advances by labor and other activists (with the important proviso that these two groups may not always be “on the same page” politically). But we are also aware that other sectors present much more daunting difficulties for this sort of organizing. Future research in this area should examine contemporary organizing efforts in other sectors to determine under what conditions labor and various movement activists are able to exert power. Specifically, light industrial manufacturing, various

types of mining, and international petroleum shipping are GCCs that present steeper challenges to labor and other groups eager to “disrupt” the global flows and win concessions from capital. But doubtless there are other industries that are either more vulnerable, or more insulated from this sort of organizing, in the world economy today. Future research might focus on potential vulnerabilities in other sectors, such as business, tourism, and travel, rare earths, or other manufacturing sectors dependent on global production and transport networks.

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Book Reviews

John Bellamy Foster and Robert McChesney. 2013. *The Endless Crisis: How Monopoly-Finance Capital Produces Stagnation and Upheaval from the USA to China*. New York: Monthly Review Press. 224 pages, ISBN 978-1583673133 Cloth (\$24.95).

The economic crisis of 2007 has been the deepest and most enduring economic downturn of the past half-century. The immediate trigger for its onset seems to have been the very practices that mainstream economics endorsed, for years, as mechanisms that would ensure a further rationalization of the market. The new-fangled instruments like Collateralized Debt Obligations, Mortgage-Backed Securities, and the institutions that generated them, were all extolled by so many neoliberal economists who argued that they would further deepen financial markets and smooth out economic uncertainty. So, when the whole house came crashing down, one might have thought that it would trigger some churning within the economics profession – a criticism of the free-market fundamentalism of the past decades, and the blind faith in models based on fantastic assumptions. What did we see? Other than a momentary wringing of the hands by a few, in a very small number of media outlets, no such self-criticism occurred. Astoundingly, neoliberal economic theory is no less secure today than it was ten years ago.

Given the blind intransigence of mainstream economics, people looking for sober and realistic analyses of the crisis would do well to pick up a copy of John Bellamy Foster and Robert McChesney's latest book, *The Endless Crisis*. Foster and McChesney present one of the most arresting accounts of how the global economy descended into collapse in 2007. But even more, they embed their story in an alternative economic theory, not just of the recent past but of twentieth century capitalism.

Foster and McChesney have for years been associated with the venerable journal, *Monthly Review*, founded by Paul Sweezy and Leo Huberman, and later joined by Harry Magdoff. Sweezy was one of the shining lights of the economics profession in the 1930s, who turned to Marxism after living through the Great Depression; Magdoff was an economist working in the New Deal administration. Working closely with Stanford economist Paul Baran, they developed a theory of the modern capitalist economy that departed sharply from mainstream assumptions. Foster and McChesney draw upon that theory, and argue that this crisis was no accident. It was, instead, a direct outgrowth of the systemic weaknesses of capitalist growth.

Two claims about late capitalist development are at the heart of the argument in *The Endless Crisis*. First, and most importantly, the economy is dominated by monopolies and oligopolies, so that it systematically departs from the model of competition advertised by neoclassical economics. Second, this monopoly capitalism suffers from a chronic problem of overcapacity, and hence, a shortage of outlets for investment. The attenuated competitive drive, and the slowdown in investment naturally results in a slow choking off in growth rates, and hence in a long-term tendency for the economy to stagnate. But as economic growth settles into a lower-growth path, and firms cannot sink their funds into new plant and equipment, they turn increasingly to financial markets as a place to park their monies. This leads, in turn, to the phenomenon known as financialization, which has come to dominate the economic landscape over the last quarter century or so.

Foster and McChesney are building here on arguments by Baran and Sweezy in *Monopoly Capital*, and the path-breaking analysis of Sweezy in the 1980s, which was one of the first to point to the emergence of finance as a pillar of investment at the fin de siècle. They are able to make a credible case that the mountain of increasingly baroque financial instruments, and the mountain of debt that was built up through them, was a direct outgrowth

of the growth model of late-century capitalism, which in turn was only the most recent mutation of monopoly capitalism. In this, they provide a very valuable antidote to economic orthodoxy.

Even though the book is ostensibly a collection of previously published essays, they hang together very well. It begins with a clear summary of the main argument, so much so that readers in a hurry can get a very good idea of the core elements, just from a close reading of the Introduction. But there is a very definite benefit to be had from a leisurely perusal of the entire book. Perhaps the highlight is Chapter Five where Foster and McChesney offer a wonderful examination, and analysis, of the global reserve army of labor – the veritable ocean of the unemployed and semi-employed – who have flooded into cities across the world, sequestered into sprawling slums, living in unimaginably squalid conditions. Foster and McChesney focus on this phenomenon, pointing to it as a searing indictment of capitalism in its current guise. They surmise that when we add up the various categories of people who belong in some way to this category, it probably amounts to a staggering two and a half *billion* people. And there seems reason to doubt, they argue, that growth rates can ever reach the levels needed to absorb this army of labor into gainful employment – if we continue to stick to private profits as the motor for investment.

As a criticism of mainstream economics, *The Endless Crisis* succeeds along several dimensions. But Foster and McChesney also wish to critique recent trends in heterodox economics. They note, correctly, that the framework developed at *Monthly Review* no longer has the influence it did in the 1960s and 70s. Much of the criticism directed at it has come from within the camp of heterodox and radical economics, particularly the claims for capitalism being dominated by monopolies. While the authors present a defense against these criticisms, they will probably fail to sway their critics on the Left. The arguments they mobilize are too short, the evidence too open to counter-arguments, for it to succeed. This is understandable, for the book is not intended to be a full-fledged defense of the argument for monopoly. It is more a brief introduction to that view, and a demonstration of how it presents a coherent framework for economic analysis. In this, it succeeds admirably. Readers wishing to understand the economic rhythms of our times would do well to start with this book.

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Jack S. Levy and William R. Thompson. 2011. *The Arc of War: Origins, Escalation and Transformation*. Chicago: University of Chicago Press. 280 pages, ISBN 978-0226476292 Paper (\$27.00).

Over the last few years a number of influential books and articles have been published focusing on the dramatic and continuous decline, or even obsolescence, of war. Whereas previously intellectuals were involved in daydreaming schemes for a world without violence, many contemporary academics aim to show that we actually live in the most peaceful era of human history. Thus Steven Pinker, John Mueller, John Horgan and Joshua Goldstein, among many others, have made a case that all forms of organized violence are in steep decline. They point out that civil wars have replaced inter-state wars and that both models of warfare have experienced significant decreases, with a substantial drop in human casualties over the last four decades. Moreover they argue that there are fewer outbreaks of all types of political

violence (including revolutions, riots, genocides, terrorism, insurgencies etc.), and that most contemporary wars tend to be more localised, smaller and shorter than those fought in previous times. These findings are then used to speculate about the exceptional character of our era and about the war-free world of the near future. The main problem with this approach is that it tends to extrapolate on the basis of, historically speaking, a very short period of time. To fully understand the changing dynamics of warfare it is crucial to take a proper *longue durée* view and analyze the relationship of war and society over the millennia, and not what Michael Mann properly calls ‘the last five minutes of history.’

Jack Levy and William Thompson’s book provides exactly that kind of long-term historical analysis which makes refined generalizations on the basis of the most up-to-date research on war over the past ten thousand years. For Levy and Thompson the institution of war is characterised by periods of expansion and contraction, and what some scholars see as the unique and inevitable waning of war today is in fact just another historical episode of war’s transformation. More specifically, to understand the contemporary context one has to take a bird’s eye view of the past and explore the origins and different historical trajectories of warfare. Levy and Thompson argue that rather than being an innate human propensity, war emerges relatively late in human history with some evidence for its widespread presence ten thousand years ago and with solid and reliable proof of its global prevalence only for the past five thousand years. Furthermore they emphasise that war is historically variable, emerging in different places at different times, and has coevolved with many other social processes including changes in economy, military and political organisation, technology and the threat environment.

In this evolutionary context of constant waxing and waning, they identify three momentous periods when the institution of war experienced revolutionary acceleration: 1. The Bronze Age southern Mesopotamia (late fourth and early third millennium BCE) where intensified urbanization, greater population density and expansion of agriculture fostered proliferation of inter-city wars; 2. The early Iron Age eastern Mediterranean and China (last half of the first millennium BCE) when rising economic and political competition between states generated incessant wars and corresponding increases in army sizes, weaponry development and production and economic growth; and, 3. The early Modern and Industrial Age Europe (roughly between 1500-1945) when another wave of state competition engendered technological development, protracted warfare, large armies and mass weaponry production. In this account, the history of war is understood in evolutionary terms with the hunter gatherers experiencing little organised violence and the two agrarian accelerations giving rise to protracted and more destructive wars. Ultimately industrial acceleration generated strong states able to wage total wars with historically unprecedented killing ratios and huge environmental devastation, threatening the very existence of the human species. For Levy and Thompson the three periods of warfare acceleration are all characterized by attempts to centralize political and military power, and the expansion of war went hand in hand with the development of large scale political and military organizations, weapon systems and political economies. However this does not mean that the entire world has undergone the same type of evolutionary transformation. In fact as much of the world did not directly experience industrial acceleration, it essentially remains more agrarian than industrial and as such bestowed with quite weak state structures.

Levy and Thompson advance a complex, synthetic theory which traces the origins of war to the early generation of hunting-related military skills, the segmentation processes that helped create “identities larger than immediate families” (p. 13), agrarian-induced population growth and density, rising environmental constraints, and the expanded division of labour. They see all these factors as contributing towards simultaneous coevolution of war, political/military organizations, political economy, weaponry and threat environment. While

recognising the mutual interdependence of these different spheres of social action, they nonetheless emphasize the pre-eminence of material causes: “Ultimately, it was the interaction between political-economic complexity and scarcity that generated warfare” and hence their theory “gives priority to...the political-economic change in explaining fundamental transitions in behaviour over the very long term” (p. 13-4).

There is no doubt that this book represents a major contribution to the study of war. Despite its brevity this is a dense, complex, and sophisticated analysis that brings together Levy and Thompson’s decades of research on warfare. The book offers a compelling and original account of war transformation over millennia and the authors’ theoretical insights are very well grounded in interdisciplinary evidence from all over the world. Nevertheless as with any attempt at building a bold, grand theory in this almost Promethean fashion, it is bound to invite a variety of criticisms. Some might challenge the falsifiability of evolutionary arguments about war; others are likely to question the very notion of a unified ‘Western military trajectory,’ which, in Levy and Thompson’s understanding, encompasses geographically and culturally diverse polities such as ancient Sumer, Egypt, Persia, Cartagena, and Rome as well as modern-era European and North American states. A number of scholars will be surprised to see that Levy and Thompson attempt to revive Desmond Morris’s highly suspect idea that war originates in hunting. However there are two more substantial issues that require critical scrutiny.

Firstly although Levy and Thompson clearly recognize the significance of different causal factors in the origin and transformation of war, they still espouse an overly materialist, and more specifically economic, interpretation of warfare. In this context they explicitly downplay the role of ideology and culture, seeing them not as autonomous but as regularly embedded in material circumstances (p. 59). While it is certainly true that ideas without organizational structure are not particularly effective, one cannot simply dismiss ideological power as irrelevant for warfare. On the contrary, to fully understand the origins and dynamics of war one has to devote much more attention to the complex interdependence of ideological and organizational powers in history. Since human beings are complex creatures, and not only *hominines economici*, the strength of particular political, economic and military organizations entails also their ability to create, foster and manipulate meanings. In other words, material interest, political power and coercive capacity work best when firmly grounded in legitimizing ideological doctrines and practices. Although war is first and foremost a material event, its dramatic proliferation and acceleration is in part rooted in the ability of complex social organizations to mobilize mass support and legitimize their very existence. There is no war without ideology.

Secondly Levy and Thompson’s understanding of social processes that accompany warfare is utterly underdeveloped. For one thing they operate with essentialist and, what Rogers Brubaker calls, groupist epistemology, perceiving ethnic groups and nations as unified, coherent and trans-historical entities rather than analyzing them as malleable, dynamic and processual categories of practice. Hence we can read how Celts, Etruscans, Greeks, French, Germans, etc. wage wars on each other throughout history and how different ethnic groups are engaged in incessant competition for power and resources. So instead of identifying the specific social organizations and movements that enable such essentialist claims (i.e. we fight in the name of our ethnic group) and dissecting such views, the authors take those claims for granted. Similarly Levy and Thompson tend to project contemporary concepts on to the pre-modern world. Thus the world of unsegmented foragers is characterized as consisting of “nuclear families,” whereas the first settled populations are associated with “the construction of identities larger than immediate families” (p. 13). Anthropological archaeology has thought us well that foraging bands were nothing like our nuclear families but were instead highly flexible, mobile, fluid, unstable networks of

individuals characterized by weak ties. It is the development of social organizations that made the kinship bonds sturdy. There were no 'identities' in the universe of pre-modern humans, as an individual's place in the world was not determined by individual choice but by one's social and geographical location. To fully understand these complex processes it is necessary not only to take ideological power much more seriously but also to engage with the recent research in historical sociology.

However notwithstanding these criticisms Levy and Thompson have produced an excellent book. This book gives us some hope that the debate on the presumed inevitable decline of war will move in a new direction: one cannot understand the dynamics of warfare without taking a long and hard look into the very distant past.

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Ian Richardson, Andrew Kakabadse, and Nada Kakabadse. 2011. *Bilderberg People: Elite power and consensus in world affairs*. New York: Routledge. 256 pages, ISBN 978-0415576352 Paper (\$28.95).

Since the appearance of Kees van der Pijl's *The Making of an Atlantic Ruling Class* in 1984, a burgeoning literature has developed around the question of transnational elite formation, with an emphasis on the North Atlantic region. This book makes an important contribution to that field. Based on a doctoral dissertation completed in 2009 by Ian Richardson, this interview-based study illuminates the cultural, social psychological and in some respects political-economic practices through which a certain informal hegemony is constructed in and around the annual meetings of the Bilderberg group. 'Bilderberg people' have long been believed to exercise behind-the-scenes influence vis-à-vis national states and intergovernmental organizations. The private, low-profile character of the annual, by-invitation-only meeting has nourished conspiracy theories, which the authors disavow in favor of a reading that combines structural analysis with social-constructionist interpretations based on in-depth interviews with 13 individuals who participated in the conference between 1991 and 2008. The investigation is squarely positioned within the C. Wright Mills/G. William Domhoff tradition of elite studies, emphasizing the formative role that well-integrated economic and political elites play in a process of "policy-planning". Within this process, what is crucial is that the elite constructs a moving consensus on the broad-stroke issues of the day, while garnering some measure of legitimacy in the eyes of citizens, who are excluded from the higher circles.

Structural analyses of transnational elite networks have underlined the importance of Bilderberg as a central meeting place. What Richardson et al. contribute are thick descriptions and accompanying interpretations of how some of the key participants understand their contributions and the contributions of transnational elite policy forums to global governance in an era of neoliberal hegemony, capitalist globalization and endemic crisis and uncertainty. The study is limited of course by its small sample size, and further by the sample's homogeneity (all participants were male Europeans, equally divided among business, political, and media/academic fields). Still, given the norms of secrecy under which the Bilderberg conference takes place, the authors are to be commended for their efforts to go beyond secondary sources.

What the interviews reveal is an elite habitus which, once one gains admission to the club, bears a curious resemblance to a Habermasian ideal-speech situation, within which pluralistic beliefs, pragmatism and collaboration are valorized and dogmatism is met with the ultimate sanction – not being invited back. To be a Bilderberger, one must check one’s particularistic interests and identities at the door and engage sincerely with one’s interlocutors. Paradoxes abound in this exclusivist life-world which is at once a very private retreat and a bourgeois-cosmopolitan public sphere. One recent participant opines that “it is very much in the public interest that powerful people get together in a private environment and exchange views” (p. 74). As an open space for the transatlantic elite (if not ruling class) Bilderberg intriguingly shares some of the features of the World Social Forum. It eschews specific policy outcomes, recommendations and lobbying in favor of open discussion as an end in itself. Yet a broad consensus both underlies and issues from these discussions. A participant with expertise in European policy matters plainly observed that at Bilderberg “you’re not going to get the revolutionary communists. ... It’s not really consensus formation, I would say it’s consensus reinforcement” (p. 110). And at the center of the consensus, beyond debate, is the free market, operating globally. As Viscount Davignon, long a member of the 35-member steering committee that forms Bilderberg’s inner circle asked, “Who questions the free market today? Nobody” (p. 76). In the Bilderberg world view, the strengthening of structural economic ties through free trade and investment creates the conditions for greater harmony between states, and *vice versa*. Richardson et al. deftly explain how this specific world view and standpoint are, at Bilderberg, naturalized and universalized. Not surprisingly, it is only among the few participants from semi-peripheral states like Turkey that the agenda and discussion are recognized as slanted towards “the western view” (p. 114). The prevailing liberal-internationalist consensus is viewed by most attendees as objective, rational and “superior to the more parochial considerations of nationalists and protectionists” (p. 207).

The book is especially in its element when recounting the often subtle, even unconscious practices by which power operates in a mobilization of bias. Bilderberg appears to be an open space for wide-ranging, pragmatic discussion of global issues. Yet it is enclosed within a selection process governed by those at the heart of the network and by the explicit rule of non-disclosure as well as codes of elite conduct that function as “prerequisites for network inclusion” (p. 212). And although Bilderberg people insist that the group does not stand for anything, nor does it wield power, its steering committee and advisory group form an old boy’s club of permanent members, while its periphery, whose composition turns over regularly, is subjected to the informal dynamics of elite social control. Within the context of elite collaboration, the desire to be invited back after making a good impression carries important implications related to “the unconscious absorption and dissemination of dominant forms of consensus” (p. 137). The conferences, in short, have educative value for capitalists, politicians, journalists and academics alike. Behind closed doors, among the elect, there is openness. Indeed what is prized most at Bilderberg is the ability to think independently, differently and abstractly as well as the willingness to detach oneself from the demands of “constituents or stakeholders in order to engage in a transcendental form of discourse” (p. 120). The mobilization of bias works on attendees dialogically and affectively, not didactically. Within the conference one experiences detachment from the quotidian, conviviality, and an intimacy that bonds invited participants with established members. After the conference, attendees are free to interpret and take whatever they choose back to their local contexts and constituencies, without overt interference or manipulation by the permanent insiders to the network. “The process is extremely soft, and practically impossible to control or measure in any way” (p. 205). In tracing out this process, Richardson et al. document a specific modality of hegemony within global civil society. As they conclude,

“elite policy networks are biased at source and, consciously or otherwise, have the effect of amplifying their biases” (p. 213).

This engaging book helps dispel two myths that have been influential in narratives of transnational power: first, that of a shadowy elite, wielding power to satisfy its immediate material interests; second, that of a global civil society whose protagonists are irrepressibly opening up spaces for popular empowerment and democratic globalization. *Bilderberg People* adds texture and detail to our understanding of how transnational elite networks function as aspects of the multifarious governance apparatuses of global capitalism. Bilderberg is one of several transnational elite forums that are themselves interconnected, forming a network of networks and underwriting the development of common narratives within “a transnational policy community comprised of no more than a few hundred individuals” (p. 185). While consistent with the notion of a transnational capitalist class, and of a wider transnational historical bloc, the book’s conclusion also emphasizes the regional character of elite transnationalism. In this respect (and despite the rise of challenger states, particularly China), Bilderberg’s continuing significance lies in giving “a peculiarly Atlantic flavor to emergent global governance systems” (p. 217).

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Salvatore Babones. 2013. *Methods for Quantitative Macro-Comparative Research*. New York: Sage. 288 pages, ISBN 987-1412974950 Paper (\$70.00).

Salvatore Babones, a senior lecturer in sociology and social policy at the University of Sydney, has produced a book suitable for students and applied researchers engaging in comparison of structures and processes across nations. Although this book is about quantitative macro-comparative research (QMCR), the focus lies in the interpretation of advanced statistical methods, and explanations are kept non-technical. The goal is to improve the meaningfulness of research results by avoiding mistakes and to advance data analysis in QMCR, whereby Babones advocates an “empirically grounded, interpretive approach to model-building” (p. xii). To get there, he summarizes the main sources for country data, how to interpret, transform and organize them in a dataset, and then discusses the numerous models routinely applied in social science QMCR. Besides these very practical insights, the reader learns to think more carefully about his or her own research and the methods applied in macro-comparative research.

Babones starts by setting out the ‘one-world problem’ that is at the heart of QMCR (and world-systems theory). As there are only some 200 countries in the world, we do not have the possibility to draw a random sample from that population again and again to test hypotheses using new data. Furthermore, it is not even clear to what extent we can treat each country as an individual case, or whether it would be more appropriate to think of regions as the appropriate unit of analysis, or even the whole world as one single case. In Babones’ view, this is why QMCR has to adopt an interpretive approach, rather than a positive one, for QMCR cannot live up to the positivist standards of falsification and out-of-sample validation. In discussing these considerations, the author touches on the philosophical foundations of social science analysis, thereby familiarizing the reader with the special nature of QMCR and providing some indication of the challenges ahead when putting our hands on the data. This is

a fruitful approach from a didactic point of view, for students are obliged to think about the nature of the data and the research questions posed in the social sciences from the very beginning, something traditional (econometrics) textbooks on quantitative research often leave for the last chapter – or leave out completely.

The book, which is divided into two parts, first addresses the available data sources for QMCR, the operationalization of theoretical concepts, and measurement error in cross-national data. Built up in this manner, Babones takes the student by the hand and guides her through the main steps from a research idea to an empirical project. He starts with a valuable overview of the different country data widely used in QMCR and readily available to researchers. This will be most helpful for students new to comparative country research. Besides pointing out the advantages and caveats of different sources, such as the World Bank's World Development Indicators, OECD country data and standardized individual survey data, he discusses how the dependence on data collected by international agencies, which follow their own institutional requirements, determines the QMCR research agenda. Especially cultural data but also political data is either non-existent or very limited in scope and country coverage, thereby restricting QMCR in these areas.

Next, attention is turned to data operationalization, normalization and standardization. In a simple manner Babones explains what a well-behaved variable is, not only for continuous variables but also for indicator variables typically found in QMCR. Standardization by population and national income are illustrated using several practical examples. Normalization by log and logarithmic transformations is explained in an intuitive way along with the instance of when to use them. However, the problem of how to deal in practice with values at the boundaries of zero and one when using logarithms is not addressed. Babones devotes a complete section of the third chapter to the operationalization of national income, where he not only discusses technicalities like the use of market exchange rates versus purchasing power parities (PPP), but also the appropriateness of using national income to operationalize many concepts in the social sciences. These are questions researchers unfortunately tend to overlook in practice, often using the data prevalent in their respective fields.

Before moving on to the second part of the book dedicated to statistical modeling, Babones addresses the different measurement errors inherent in cross-national data. He points out that often information is not directly measured, or indicators are not actually measured for the particular years that are attached to them, or they are simply measured with error. These issues are problematic in QCMR models especially when errors are non-random, for example when data quality is systematically lower for poor than for rich countries. The chapter discusses the construction of datasets, weighting by population, treatment of points in time or periods, how to deal with missing observations or cases, and questions of case selection and representativeness of cases. These are all matters that should be addressed before starting statistical modeling, yet they are often left out in practice, and Babones does a good job in pointing them out. Only when explaining some of the characteristics inherent to country data, such as autocorrelation and lagged correlation (p. 100), his explanations get a bit scant, due to his effort to keep things simple.

Babones clarifies the misconception that in the QMCR context, where research normally is conducted on the whole population of relevant countries, not on a sample, it would be inappropriate to make statistical inferences. The error in regression analysis does not only come from sampling, but is also due to measurement error and omitted variables, which is why statistical inference in QMCR is just as essential as elsewhere. He lays out the implications of these two sources of error in regression models in an intuitive and non-technical way; however, the reader needs to be familiar with regression analysis and statistical inference to understand these concepts and their implications for inference. This is

why it is somewhat surprising to then find a simplistic explanation of a linear regression model, written for readers who are not familiar with simple regression analysis at all.

After an introductory discussion of the concept of causality in social sciences following Hume, different model designs for establishing correlation, precedence and non-spuriousness are presented. While the Instrumental Variable Approach is well explained in a non-formal way, the section on difference models suffers from simplicity, and briefly introducing Diff-in-Diff Models at the end of the chapter probably causes more confusion than clarity for the inexperienced reader. Time Series, Fixed Effects and Random Effects Models are presented as ways to overcome the problems arising in the context of repeated measures, where the standard assumptions made with respect to the error structure are violated. Babones gives an overview of Fixed and Random Effects Models without any technicalities, yet again it remains unclear how well someone not familiar at all with these models will understand the idea. What he describes well is the difference between Random and Fixed Effects in a QMCR setting. However, his conclusion is that in QMCR none of these methods does a satisfactory job, as they require strong assumptions, which in QMCR are normally violated. His suggestion for students and practitioners is to use Slope-Slope Models when dealing with repeated measures and trended data. This is a simple, yet so far not often applied research design, which “may point the way forward” (p.186) in QMCR research where data often are not suitable for highly refined repeated measure designs.

After reviewing the data and the different methods available in QMCR to analyze them, the question remains how to deal with the contradictory results found throughout the literature. Babones discusses this question comprehensively, mapping out different philosophical views on the existence of objective reality(ies) and on the proper way to do science, including Popper’s empirical positivism (which Babones rejects for QMCR), Comteian logical positivism seeking verification, and grounded interpretive research. In QMCR, Babones strongly advocates the last of these “based on data description and the bottom-up building of theories from data” (p. 200). He further questions the use of *ceteris paribus* interpretations in QMCR, due to the endogeneity of most variables used, which makes it impossible to implement the counterfactual model of causality in practice.

In his conclusion, Babones makes a case for the interpretive research method. He argues that space should be made to report all, not only the positive results of our research, since all results describe reality by looking at it from different angles. To advance science further, more studies of such a comprehensive scope are needed; yet negative results are hard to publish and as the academic research industry values the number of publications more than their depth, researchers have an incentive to stress the positive results of their work to get published. Nevertheless, Babones encourages social science researchers to “smuggle a paragraph or two summarizing negative initial results into a paper that publishes at least some positive results” (p. 218). I strongly agree with this recommendation.

This is a well-written book, pointing out to students and researchers alike the problems and issues in QMCR. These issues are due to both the practical implementation of statistical models and to the logic of academic productivity. The book is structured so as to make it easy to identify and understand the author’s main messages. It is appealing that a book about quantitative research is written in a non-technical manner, illustrating what the statistical models are able to explain with the data at hand, and what they cannot. However, students should be aware that statistical knowledge is required for a thorough understanding of the book. This work aims at a more intelligent implementation and interpretation of statistical models in QMCR. Even though quantitative knowledge is indispensable, the interpretive approach, coined to country-level research, adds value to the existing literature.

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Kenneth Worthy. 2013. *Invisible Nature: Healing the Destructive Divide Between People and the Environment*. Amherst, NY: Prometheus Books. 396 pages, ISBN 978-1616147631 Paper (\$19.00).

In *Invisible Nature: Healing the Destructive Divide Between People and the Environment*, Kenneth Worthy seeks to understand the historical roots of, modern iterations, and potential solutions to, what he calls our dissociation from nature. He argues that this separation mystifies humanity's dependence on the natural world. Material manifestations of our detachment from nature take the form of separation of production and consumption, divided landscapes (such as border fences), and the rationalization of labor via mechanization. All of these conditions elevate certain types of relationships and values that are counterintuitive to a healthy connection with nature. Worthy argues that these material disconnects are rooted in a particular way of thinking about the world—namely the dualisms found within the Western worldview, such as mind/body, culture/nature, master/slave, male/female, etc. These dualisms, which the author claims are inherent within Western thought, are also imbued with value judgments that elevate one position over the other. For example, nature and female exist on a lower plane than humans and males. Within this book, there exists a tension between the material forms and ideational roots of separation that contribute to the relative strengths and weaknesses of *Invisible Nature*. On the one hand, there are many fantastic insights that are invaluable for understanding the relationship between the global economy and our alienation from nature. On the other hand, though, the general framing that the roots of dissociation are within the realm of Western mechanistic thought is problematic.

Worthy begins *Invisible Nature* with an excellently crafted chapter about the “Banality of Everyday Destruction.” With perspicacity, he discusses a number of examples of contemporary detachments that are woven into our everyday existence. Changes in the organization of production and consumption are happening on a global-scale and are the result of macro-level processes. Economic and ecological consequences, Worthy notes, are disproportionately shouldered by people living in poorer areas of the world far away from the lifestyle choices and consumptive habits of people in wealthier countries (p. 36-39). The environmental degradation associated with the economic system is outside of many people's immediate and direct experience. One of the most compelling ways that Worthy shows the dissociation of humans from nature in our everyday life is through the growth of electronics and, subsequently, electronic waste.

Electronics have become ubiquitous features of daily life for a large portion of the American population. In 2010, approximately forty million laptops and twenty-three million desktop computers were sold in the United States. Furthermore, Americans purchased over two hundred million cell phones, thirty million televisions, and over twenty-nine million fax machines and printers (p. 39). Worthy asserts that electronics simultaneously organize our daily lives and experiences with nature and are shaped by the long commodity chain needed to obtain raw materials and cheap labor necessary to produce them at an ‘affordable’ price. In doing so, Worthy highlights the intense material and energy commitments necessary to make these electronic goods; however, later in the book electronics are regarded as one of the ways to increase our knowledge of nature and resolve certain dissociations, illuminating one of the

problematic aspects of Worthy's larger argument. Given the increasingly impressive computing power of smaller and smaller circuitry, more purity is demanded in the manufacturing process, leading to the intense use of energy and water, and the utilization of toxic chemicals. Throughout his discussion, Worthy examines a number of ways in which consumers and even producers are dissociated from the harms associated with electronics manufacturing.

High-tech devices are manufactured in sealed-off rooms in order to avoid contamination and the spread of toxic chemicals. Worthy highlights that workers for some electronics firms, such as IBM, are at higher risk for various cancers, injuries, and mortalities than workers in other industries (p. 43). These facts are kept within the files of companies and are rarely reported. As a result, the link between high-tech manufacturing and health risks is relatively unknown. While Worthy does not expand on the social organizations, forces, and barriers that prevent this news from becoming public knowledge, he does begin to highlight dynamics that other environmental sociologists address. By exposing these contested illnesses, it is possible to reveal social inequalities, power differentials, economic structures, and organizational dynamics that benefit the dominant economic system (Cable, Shriver, and Mix 2008).

In the electronics discussion, Worthy discusses the global dimension and unevenness of electronics recycling, or E-waste. He points out that the vast majority of electronics that are consumed in the United States are recycled outside of its borders, mostly in Asia (p. 51). As a result, people who have few opportunities, power, and protections shoulder the burden of toxic waste. For people in the United States, E-waste is truly out of sight, out of mind. The constitution and organization of space within the global economy, Worthy explains with great insight, reflects existing ideas and histories of societies (p. 218).

How space is organized is important for understanding certain types of dissociations. Worthy illuminates that space, in modern, Western societies, reflects the broken, fragmented, and compartmentalized ideas of Western thought. Relying heavily on the spatial ideas of Henri Lefebvre, Worthy examines how space is organized to alienate people from the land (p. 221). This diremption of people from the land does not allow for humans to directly experience and engage with nature, which, Worthy argues, is one of the foundational and most problematic dissociations in the modern world. Compartmentalizing space promotes certain values and practices over others. Breaking down the landscape into small, private parcels tends to reduce diversity and limits space for community engagement. By separating people from each other and nature, we reduce our ability to know and experience one another. In a cogent summation, Worthy writes, "material networks connect us like enormous tentacles out to the larger world, dispersing our consequences far and wide, mixing them with those of many other people. Nature has become an abstraction, and so, too have our social and environmental problems" (p. 241).

Although the material relations that manifest dissociations are important, Worthy argues that they reflect a hazardous philosophical tradition that is fragmentary and mechanistic. Furthermore, he suggests, the roots of Western thought teach us to create unnecessary divisions between humans and nature while reducing the importance of the natural world to simply meeting human needs. Worthy contrasts this distinctly Western way of thinking, which is relatively devoid of context, to that of Eastern thought, which tends to take larger contexts into account. In order to do this, Worthy presents a brief history of Western thought from Greek philosophers through Sir Francis Bacon and René Descartes and more contemporary thinkers. Surprisingly, his explanation of Eastern thought is limited to a few pages where he discusses its central tenets. For him, the major differences between the two philosophical orientations are that Eastern thought embraces notions of change, contradiction, and holism over Western concepts of fixity, noncontradiction, and mutual

exclusion (p. 141). Throughout this discussion, Worthy is critical of Western, mechanistic thought—and to an extent, rightfully so—however, he does not extend the same critical lens to Eastern thought. His lack of systematic engagement with Eastern thought creates an unbalanced analysis which, in some places, falls short of a sophisticated, nuanced discussion of philosophical traditions that exacerbate or diminish dissociations.

Worthy traces the roots of modern dissociations to the development of Greek philosophy. He argues that this philosophical tradition is based on a fractured understanding of the world that conceived of the world “and living in it as a profoundly disconnected place.” As a result, Greek philosophers tend to think “of themselves as completely independent” of nature (p. 164). In general, Greek philosophy is individualistic; it separates people, animals, and nature from one another, stripping away their rich interconnections. Worthy’s prime targets are Plato and Aristotle. Plato’s focus on Forms portrayed the sensual world as an illusion of a larger, invisible eternal and true world. Essentially, allegories such as Plato’s *The Cave* showed that the natural world, as we perceived it, was not to be trusted and, therefore, he placed little value on it. Aristotle, while elevating nature more so than Plato, still devalued the importance of the lived experience.

This discussion, essentially, is a rehashing of the arguments made by philosophers such as Val Plumwood and J. Baird Callicott. While it provides an investigation of the roots of Western thought, it does not seem to add much to earlier discussions of its development. Additionally, by focusing primarily on Plato and Aristotle, Worthy misses out on the complex intellectual environment of Greek philosophy. Ionian philosophy is only briefly mentioned and the entire contributions of the Atomists and of Epicurus in particular, who did not think about the world in the idealist ways of Plato and Aristotle, are missing.

In his discussion of modern dissociated thought, Worthy examines the mechanism of Bacon, Descartes and Thomas Hobbes. He argues that the mechanistic view allows thinkers to divide the world more easily by creating different categories that are imbued with power differentials. In discussing Bacon, Worthy relies on critiques developed by philosophers such as Val Plumwood and Carolyn Merchant who saw Bacon’s instrumentalism as a means of dominating nature. While there is certainly an element of truth to this, such arguments fail to take into account the larger context in which Bacon was writing and, therefore, do not see how Bacon’s position might not be as incompatible with sustainability as it is made out to be (Foster 2000). For Descartes, Worthy focuses on the dualistic style of thinking that has become known as Cartesian. He indicates that Descartes divided the world into mechanistic parts, eliminating focus on interconnections. Worthy suggests that the intellectual heritage of the ancient Greek philosophers and Enlightenment thinkers places less value on direct experience of the natural world and moves away from the idea that nature and humans are interconnected. Recent scholarship offers a counter position, but it is not engaged in this book (see Marx and Engels 1975, vol. 1; Clark, Foster, and York 2007).

In discussing ways to overcome our dissociated thought patterns, Worthy calls for an increase in thinking that focuses on interconnections and relationships—more akin to Eastern thought. He suggests that holism, as developed by numerous scientists and philosophers working in the realm of ecology, most specifically Jan Christian Smuts, offers a useful position. Smuts was a statesman who developed a holistic perspective rooted in “the idea of interconnection.” This conception was to serve as an alternative to mechanistic worldviews. Reflecting on this position, Worthy writes, “holism integrates wholes temporally in a flux of time, implicitly challenging Aristotle’s law of identity, which presupposes a sort of stasis” (p. 279-280). In this, Worthy uncritically accepts holism as an unproblematic approach towards dissolving dissociations in the modern world. He is not aware of the social, racial, and historical context that influenced Smuts’s philosophy. As a result, Worthy misses Smuts’s belief that there is a hierarchy of wholes that exists in the natural and social world. Smuts

engaged in a double transference where he looked to nature to find justification for social and racial inequalities in society. Smuts viewed the more advanced wholes as being less dependent on their immediate environment. In the South African context, this conception was used to excuse white domination of the African population (Foster and Clark 2008). This uncritical assessment of holism presents a serious shortcoming in Worthy's argument that the development of Western thought is a primary contributor to modern day dissociation.

Invisible Nature attempts to understand the contemporary divide between humans and the environment through examining its intellectual roots within the history of Western philosophy. While it fails to engage in a nuanced discussion of Western and Eastern thought—resulting in its problematic emphasis on a non-dialectical holism, particularly that of Jan Christian Smuts—it does provide intriguing insights into the nature of modern day dissociations. In *Invisible Nature*, Worthy illuminates the complex set of social relations, particularly those associated with the global economy that contribute to and perpetuate dissociations between humans and nature. Importantly, Worthy reveals that environmental problems are social problems.

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Amy Quark. 2013. *Global Rivalries: Standards Wars and the Transnational Cotton Trade*. Chicago: University of Chicago Press. 282 pages, ISBN 978-0226050676 Paper (\$24.50).

Global Rivalries is an important contribution not only to the growing literature on the role of standards in governing global trade, but also to institutional theory and international political economy more generally. The book is a pleasure to read: well-written and logically-organized, it weaves seamlessly different logics of capital accumulation and other macro-structural trends with the minutiae of negotiations and struggles over quality standards, benchmarking and arbitration in transnational cotton trade.

Combining broad-stroke pictures of the changing shape of the global economy and its geopolitical features with rich interview material and archival work, Amy Quark manages to bring to life conflicts and shifting alliances around cotton standards in three historical

periods: (1) an earlier period of internationalization (1870-1922) dominated by British cotton merchants and their association (the Liverpool Cotton Association, LCA) in the context of a British-led project of economic liberalism; (2) a period of gradual consolidation of U.S. interests through the assertion of 'standards power' by the U.S. Department of Agriculture (USDA) (1922-2004), in the context of a U.S.-led project of embedded liberalism and unequal market liberalization; and (3) the current period (2005-), following the establishment of the WTO and the phasing out of the Multi-Fibre Arrangement (MFA), which is characterized by the ascendancy of China and industry consolidation.

Quark's main argument is that institutional change can only be properly understood by embedding the analysis of changing strategies by key actors (businesses, their associations, and state agencies) in a more general understanding of broader political projects. By examining conflict, resistance and compromise that flare up around definitions of standards, inclusion and exclusion of key parameters, measurement devices, and the design of arbitration measures, Quark is able to explain trajectories of institutional change that are necessarily incremental and often create hybrid forms of governance.

For each historical period, Quark provides three useful orientation devices that make the book approachable even to non-specialists. *First*, she organizes the discussion of relevant changes in cotton standards along three distinct elements: definition of quality; benchmarking; and arbitration of dispute settlements. Although these elements often intersect, they have their own individual features that lead to sometime unique outcomes. *Second*, she highlights the changing fault lines of conflict between: state and business; different types of cotton industry operators (producers, ginner, merchants, spinners, textile manufacturers); operators of different size and economic might; operators based in different countries and regions; and national and transnational jurisdictions. *Third*, she analyzes strategic intent and outcomes along three themes: *redirection* strategies employed by emerging rivals that attempt to change standards controlled by dominant players; *preservation* strategies that dominant players roll out to either fight back or partially accommodate these attempts; and *protection* strategies activated by marginalized actors trying to improve their situation. The end result of this approach is a sophisticated, fine-grained analysis that ultimately leads to a solid and convincing argument.

Theoretically, Quark targets institutionalist approaches to governance, crediting them with unfolding uncertainty and hybridity in institutional transformation, but also critiquing their lack of explanation of *why* institutions change (see Chapter 1). To provide an answer to this question, she proposes to analyze conflict, changing alliances, and compromises that emerge "out of the concrete class relations and material and ideological circumstances characterizing the actually-existing capitalist system" (p.7). While the specific focus on institutionalism ensures a tighter theoretical framework, it also misses opportunities of debate with other relevant analytical approaches. Strangely for a book dealing with quality standards, Quark's coverage of the rich literature on this topic (spanning international political economy, economic sociology and economic geography) is tentative and superficial. The same can be said about global commodity chain (GCC) analysis, the Regulation School and world-systems analysis, which she mentions only in passing. This problem spills into methodology as well: Quark claims to use GCC analysis (p. 31) without explaining in much detail what it entails. More information about the breakdown of interviews by type of actor and location, and about the challenges and limitations of her research approach, would have also been helpful. On the other hand, she provides a convincing claim of why we should care about standards, and about cotton, in order to understand where the global economy is going and "what kind of integration is desired and on whose terms in a period of hegemonic struggle" (p. 5).

Chapter 2 is the best empirical chapter of the book. It deploys the analytical framework provided in Chapter 1 to explain struggles over cotton quality standards from the 1870s to 1920s. Quark chronicles the rise and formalization of private standards within a British-led project of economic liberalism. She shows how merchants in Liverpool came to claim authority to define cotton quality, benchmarking and dispute settlement. At the same time, she highlights how the liberal project also generated new patterns of social conflict that came to destabilize the Liverpool standards, leading to redirection strategies by increasingly powerful U.S. merchants and protection strategies by impoverished U.S. cotton producers. These strategies became embedded in a technocratic state-building project centered around the USDA. As Quark underlines in the following chapters as well, one of the main features of these conflicts is that emerging rivals face the problem of overcoming institutional dependence – they need to rely, at least for a period, on the very same institutions they are seeking to replace. Therefore, it was only after World War I that the USDA was able to start imposing its standards, and only after having engaged in a “process of *bricolage*, grafting the elements of most concern to Liverpool merchants” (p. 74). This shifted “quality governance from private, transnational standards centered in Britain ... to public, transnational standards centered in the United States that would ultimately prefigure the goals of embedded liberalism” (p. 77).

Chapters 3 and 4 analyze the various elements that reconfigured cotton quality standards in the post-World War II period up through 2005. Chapter 3 examines the “project of uneven liberalization” that the U.S. was able to deploy to serve the interests of the U.S. cotton industry. This project was implemented through the negotiation of the Multi-Fibre Arrangement (MFA) in 1974; the promotion (via the World Bank and the IMF) of structural adjustment programs in other cotton-producing countries (especially in Africa); and the establishment of a comprehensive system of subsidies at home. Most importantly, Quark shows that the introduction by USDA of a new, mechanized measurement system for cotton quality marked a significant shift from the existing manual classification system. USDA portrayed this new system as “more scientific,” reliable, and faster. In reality, it included some measurements that were of advantage to U.S. cotton producers, while omitting others that would have been of advantage to hand-picked cotton producers, especially in Africa. Chapter 4 focuses on the impact that the establishment of the WTO (and the phasing out of the MFA) and China’s accession had on reconfiguring conflict and strategic action. It shows how China started challenging USDA’s quality classification system and how USDA responded by challenging the “scientificity” of alternative approaches.

Chapters 5 and 6 focus on cotton quality struggles in the 2000s. Chapter 5 is strangely short and could have been usefully merged into Chapter 6, which contains too much empirical detail even for the specialist reader. Quark examines how the Chinese state first sought to import the technology and related institutional arrangements that USDA had developed, and then challenged USDA on its own turf. Eventually, however, USDA and transnational merchants addressed some of the key concerns posed by the Chinese state in an attempt to keep control of the cotton classification system and standards, leading to a new hybrid institution—“standards with Chinese characteristics.”

In the concluding chapter, Quark provides helpful updates on how the financial crisis has led to increased price volatility and to further consolidation in the cotton industry, which “sharpened cotton players’ focus on ... [homogenizing] quality standards and associated rules for dispute settlement” (p. 223). She also points out that tensions over US cotton subsidies continue to simmer, weakening the legitimacy of the U.S. as leader in the sector. Quark concludes that “institutional change in the global capitalist system is inevitably incremental in nature due to institutional dependence” (p. 232). This dependence can create constraints but also opportunities for emerging rivals – they can effectively redirect existing

institutions, instead of starting new ones from scratch. Overall, Quark shows that “private authority is enmeshed in ... geopolitical tensions” (p. 242), suggesting that transnational firms, rather than becoming ‘placeless,’ are anchored in state-firm alliances that shift and take new forms. In leading the reader through the transitions from a British-led to a U.S.-led hegemonic coalition on cotton standards, and from the latter to a new coalition in which China and transnational firms figure prominently, Quark allows us to “conceptualize specific instances of institutional change as constituted by and constitutive of broader transformations in the organization of the global capitalist system” (Ibid.). This is a book worth reading.

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Salim Lamrani. 2013. *The Economic War Against Cuba*. New York: Monthly Review Press. 142 pages, ISBN 978-1583673409 Paper (\$12.95)

For more than fifty years the United States has maintained a comprehensive economic embargo on Cuba that makes most financial and commercial transactions with that country illegal for U.S. citizens and severely restricts U.S.-based travel to the island. In *The Economic War Against Cuba*, Salim Lamrani offers a concise yet informative study of these economic sanctions. He sheds light on the historical evolution and the goals of sanctions, their far-reaching effects, how they contravene international law, and the main reasons why they are still in place today. An anachronistic holdover from the Cold War, the U.S. embargo against Cuba (or “blockade” as Havana’s authorities and Lamrani call it) remains a key tool of American foreign policy nearly a quarter-century after the collapse of the former Soviet Union. During this period, the United States normalized its relations with communist countries like China and Vietnam but, as Lamrani fairly claims, “Washington has never hidden its determination to subvert, by whatever means necessary, the established order in Cuba” (pp.14-15). Arguably the most insightful part of his book, Lamrani documents the serious harm U.S. embargo restrictions have caused the Cuban people by considerably limiting Cuba’s ability to import medicines, medical equipment, and technologies essential for preventing and treating a wide array of illnesses. In his words, “economic sanctions are, at their core, a war against public health” (p.49).

Lamrani begins his study with a brief examination of the events that led the United States to impose an embargo on Cuba. Most economic and political ties between the two countries were severed after Fidel Castro’s victory over Fulgencio Batista in early 1959. To be sure, it was neither Castro’s record on human rights nor the lack of democracy in Cuba that worried Washington in the immediate aftermath of the revolution. At that time the Cuban economy was almost entirely dependent on the U.S. market. Indeed, 65% of Cuba’s exports went to the United States and 73% of its imports came from that country. Furthermore, the island’s economy benefited little from U.S. investments since the latter were carried out under conditions disproportionately favorable to foreign companies (p.19). There is no doubt that Fidel Castro’s economic reforms were highly detrimental to American business interests in Cuba and reflected a strong rejection of decades of U.S. imperialist schemes and paternalism. Between May 1959 and October 1960, the Cuban government expropriated seventy thousand acres of property owned by U.S. sugar firms. It also nationalized the assets of numerous overseas companies, especially U.S. enterprises, in key sectors such as telecommunications, mining, oil, banking, and electricity. Albeit with greater interests at

stake than other nations (among them Spain, France, the United Kingdom, and Switzerland), the United States was the only country to refuse the settlement terms that Castro offered, even though the legality of the nationalizations was recognized by the U.S. Supreme Court in the case of *Banco Nacional de Cuba v. Sabbatino* in March 1964 (p. 26). Most telling in Lamrani's account is the fact that the Eisenhower administration made a formal decision to topple the Cuban government in mid-March 1960, one month before the resumption of ties between Havana and Moscow (p. 23) and before Fidel Castro declared himself a 'Marxist-Leninist' and intensified efforts to export Cuba's revolution throughout the Western Hemisphere.

Lamrani's historical review of U.S. policy toward Cuba over the past five decades reveals not only that Washington has maintained the structure of economic siege against its communist neighbor largely unaltered, but also that U.S. sanctions clearly flout international law. The analysis of the embargo from a legal perspective in Lamrani's book is truly remarkable. Following the cancellation by the Eisenhower administration of Cuba's portion of the annual U.S. sugar import quota in July 1960, economic sanctions were significantly expanded. John F. Kennedy imposed a total embargo on U.S. trade with Cuba in February 1962 that included a ban on drugs and food products in violation of international humanitarian law. Most importantly, sanctions took an extraterritorial turn also in conflict with international legal norms and the national laws of the affected countries (p. 63). Among various measures, the United States vowed to deny financial aid to every nation providing assistance to Cuba, successfully pressured all members of the Organization of American States (with the sole exception of Mexico) to break diplomatic and trade relations with Havana, and in 1966, during the presidency of Lyndon B. Johnson, outlawed food shipments to any country that sold strategic or non-strategic goods to Cuba. Timid U.S. efforts toward a rapprochement with the Castro government in the second half of the 1970s during the Carter administration were replaced by a more bellicose policy with the rise of Ronald Reagan to the presidency in 1981. Committed to revive the goal of rolling back communism, Reagan reestablished the Cuba travel ban despite the fact that U.S. courts had upheld the constitutional right to travel, included Cuba on the list of terrorist nations, and ruled that foreign companies could export products to the island only if they contained less than 10% of U.S. components.

The U.S. rationale for its embargo on Cuba has changed markedly over time. Initially justified as retaliation for nationalization, the embargo quickly became a punitive measure for Cuba's international behavior. Well into the 1970s, the United States conditioned the reestablishment of normal relations with Cuba on the end of Fidel Castro's efforts to spread the revolution in Latin America and the termination of his alliance with the Soviet Union. Then, in the second half of the 1970s and throughout the 1980s, the removal of Cuban troops from Africa constituted the main U.S. demand. It was only after the demise of the Soviet Union, as Lamrani notes, that the issue of human rights took center stage (p. 31). Allegedly to hasten democratic changes in Cuba and certainly galvanized by the dire situation of the Cuban economy, Washington further strengthened its sanctions against Havana in the post-Cold War era. The Torricelli Act of 1992 forbade foreign subsidiaries of U.S. firms to trade with Cuba and prohibited any vessel from entering a U.S. port for a period of 180 days if that vessel had hauled freight to or from a Cuban port. Flouting both U.S. and international law, the extraterritorial Helms-Burton Act of 1996 (which codified all existing embargo restrictions) allows U.S. citizens whose property was expropriated without compensation by the Cuban government, including those who were not citizens when the expropriation occurred, to sue in U.S. courts foreign firms or individuals that 'traffic' in that property. During his second term in office, Bill Clinton used his limited licensing power to ease some embargo rules; in 2000, he also signed historic legislation that allowed U.S. companies to sell

medicines and food products to Cuba. Since then, U.S. sanctions were tightened by George W. Bush and relaxed again by Barack Obama, who, in 2009, lifted all restrictions on Cuban Americans in terms of remittances and travel to the island. Lamrani concludes his study by pointing out that the international community widely opposes the U.S. embargo on Cuba and that even the American public is largely in favor of lifting these failed unilateral sanctions and normalizing relations with Cuba (p. 71).

Two minor problems in Lamrani's book should be emphasized. First, notably absent is a discussion of the role of domestic politics in U.S. foreign policy toward Cuba. Between 1992 and 2004, all major U.S. moves to intensify or relax economic sanctions against Havana occurred in presidential election years, when partisan bidding for Cuban-American votes (and money) in the politically pivotal state of Florida takes center stage. Even Barack Obama, who had called three years earlier for the end of the embargo, said on the campaign trail in 2007 that he supported the preservation of such tool as an important inducement for change. While Lamrani is technically correct in writing that "the most severe recrudescences of these economic sanctions – except for the Bush administration – were generally the responsibility of Democratic administrations" (p. 45), the reality is that domestic politics influenced the U.S. approach toward Cuba in the post-Cold War era regardless of who was in White House. Second, Lamrani fails to recognize that despite a growing a consensus against the embargo within the American society there is currently no major domestic constituency (including the business community) in the United States willing to push hard for the resumption of normal relations with Cuba. It must be noted that Obama's decision to remove limitations on Cuban American travel and money transfers to Cuba, albeit well-intentioned, greatly reduced the potential role of the increasingly diverse Cuban American community as an agent of change in U.S.-Cuba relations. Recent Cuban migrants to the United States are more inclined to favor engagement with Cuba than older exiles. But the former can now more easily sustain strong family linkages with relatives on the island while the latter can still rally behind the embargo.

Notwithstanding these problems, Lamrani's book is an invaluable addition to the literature on the Cuban embargo. It is a superbly written and cogently argued study that enhances our understanding of U.S. economic sanctions with respect to Cuba, exposes the ill-conceived nature of Washington's plans and the questionable legal aspects of its measures, and provides substantial evidence of the dramatic impact that sanctions have had on the well-being of the Cuban people.

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