IJCS
International Journal of Comparative Sociology

http://cos.sagepub.com
Los Angeles, London, New Delhi, Singapore and Washington DC
Vol 50(1): 5–38
DOI: 10.1177/0020715208098615

A New Trichotomous Measure of World-system Position Using the International Trade Network

Rob Clark
University of Oklahoma, USA

Jason Beckfield
Harvard University, USA

Abstract

Snyder and Kick's (1979) measure of world-system position continues to serve as the premier trichotomous network indicator of a state's location in the capitalist world economy. In this study, we identify several problems with this orthodox measure concerning its age, informal construction, and incorporation of inappropriate networks. We introduce a trichotomous network measure of world-system position that addresses these concerns, applying Borgatti and Everett's (1999) core/periphery model to a three-tiered partition using international trade data. Our trichotomous measure of the trade network identifies an expanded core, consisting of an old orthodox core joined by a set of upwardly mobile states. We estimate the effect of world-system position on economic growth and find that our trade measure significantly outperforms Snyder and Kick's orthodox measure. When controlling for human capital, the strong effects of our trade measure persist, while the weaker effects estimated by the orthodox measure largely disappear. Moreover, our models with human capital reveal that states economically converge *within* world-system zones, while continuing to diverge *between* zones.

Key words: development • globalization • networks • trade • world-system

INTRODUCTION

The presence of a three-tiered capitalist world economy with a distinct 'semi-periphery' has long been posited by world-system theorists. However, empirical studies using network procedures to measure discrete world-system positions have rarely created only *three* categories of states. In fact, as of yet, no one has adhered to world-system orthodoxy and formally classified individual states according to a trichotomous network partition. Thus, Snyder and Kick's (1979) informal collapse of 10 blocks into three has survived as the industry standard for representing a trichotomous network measure of world-system position.

Drawing from Borgatti and Everett's (1999) network core/periphery model, we develop a procedure for creating a trichotomous partition and apply this model to the international trade network during the 1980–90 period. We identify an expanded core, comprising Snyder and Kick's orthodox core joined by a set of upwardly mobile states from their orthodox semiperiphery and periphery. We then compare the performance of our trade measure to Snyder and Kick's orthodox measure in a set of analyses predicting economic growth during the 1980–2000 period. As the findings reveal, our measure performs well in identifying a fast-growing core, a middle-class semiperiphery, and an underdeveloping periphery. In contrast, the orthodox measure produces weaker effects and specifies a set of core states that do not grow significantly faster than semiperipheral states. Moreover, when controlling for a state's level of human capital, the effects of world-system position largely evaporate under the orthodox classification, but persist under our classification. Finally, although our sample of states economically diverged from one another during the 1980–2000 period, estimating human capital and world-system position produces conditional ß-convergence. That is, states *within* world-system zones economically converge when controlling for human capital. We interpret this latter finding as evidence of a world-system comprising discrete zones that shape the pattern of global economic inequality.

A Three-Tiered World-System

According to world-system orthodoxy, states are located in one of three zones (core, semiperiphery, or periphery), with state strength concentrated in the core, and peripheral economies representing the system's weakest group. Core/periphery relations are considered exploitive because peripheral states have historically been dependent upon the core for capital investment and/or processed goods. Consequently, stronger core states are able to enforce unequal exchange on the weaker periphery, resulting in surplus capital becoming concentrated in the core. Ultimately, zone assignments are determinative in sending countries on disparate trajectories, as a state's position in the capitalist world economy is an important determinant of economic, political, and social welfare outcomes that tend to disadvantage the non-core (Bollen, 1983; Bollen and Jackman, 1985; Kick, 1987; Kick and Davis, 2001; Nemeth and Smith, 1985; Nolan, 1983; Snyder and Kick, 1979; but see Jackman, 1980; Van Rossem, 1996).

While dependency scholars have long noticed the exploitive effects of core/periphery relations, Immanuel Wallerstein (2000: 90–1) has suggested that an intermediate 'semiperipheral' zone is essential for ensuring the political stability of a hierarchical world economy. Dividing the majority of weaker states into a lower and middle stratum prevents a destabilizing polarization and decreases the likelihood that subordinate classes from across the world will collectively organize (Chirot and Hall, 1982: 85–6). Thus, because the semiperiphery is both exploiter to the periphery and exploited by the core, core states are not faced with a unified opposition. Semiperipheral states may exhibit a balanced mix of both core and peripheral features, or exhibit characteristics that exist at intermediate levels (Chase-Dunn, 1998).

Several studies have lent empirical support to claims that a three-tiered structure in the world economy exists. Arguing against a dichotomous core/periphery image of the world-system, Steiber's (1979) network analysis of 15 economic regions shows that the semiperiphery does indeed form a unique, intermediate stratum in the world economy. Other studies have examined the distribution of national income to verify the existence of a three-tiered structure in the world economy. Arrighi and Drangel (1986) find a tri-modal distribution of GNP per capita between the years 1938 and 1983. More recently, Babones (2005) offers several methodological refinements and also finds a tri-modal distribution of GNP per capita for 103 countries between 1975 and 2002. Thus, partitioning the world-system into three discrete zones is not only consistent with theory, but it is also empirically grounded.

Moreover, a trichotomous partition may offer utility when predicting economic development. Nolan (1983) finds that Snyder and Kick's (1979) trichotomous classification successfully predicts economic growth during the 1960–70 period. Importantly, Nolan opts against using Snyder and Kick's 10-block classification because it is world-system status that theoretically predicts development, not the 'false precision' (Nolan, 1983: 415) found in the more refined block model. Collectively, the above findings suggest both the empirical reality of a semiperiphery in the world-system, as well as the utility of a three-tiered measure to predict developmental outcomes.

Today, the standard trichotomous network measure of world-system position remains Snyder and Kick's (1979) orthodox classification,[1] which has now become the industry standard (Alderson and Beckfield, 2004; Alderson and Nielsen, 1999; Beckfield, 2003; Bollen and Jackman, 1985; Crenshaw, 1992, 1995; Hoover, 1989; Lee et al., 2007; London, 1987; London and Williams, 1990; Muller, 1988, 1995; Nolan, 1983; Nolan and White, 1983; Rau and Roncek, 1987; Simpson, 1990; Smith and London, 1990; Wejnert, 2005).[2]

However, most network studies that actually generate world-system positions violate world-system orthodoxy by grouping countries into more than three categories (Kick, 1987; Mahutga, 2006; Nemeth and Smith, 1985; Smith and White, 1992; Snyder and Kick, 1979; Van Rossem, 1996), including, most notably, Snyder and Kick (1979) themselves. Thus, despite being one of the most fundamental elements in world-system orthodoxy (i.e. the presence of *three* world-system zones), Snyder and Kick (1979) ultimately use a 10-block model for their analyses. Similarly, Smith and White's (1992: 869) blockmodeling reveal three major strata that they divide into five smaller sub-blocks for their analyses: core, semiperiphery1, semiperiphery2, periphery1, and periphery2. Nemeth and

Smith (1985: 546) collapse their eight-block model into four groups: core, periphery, and two semiperipheries. Kick (1987: 135) and Kick and Davis (2001: 1567) report the existence of 11 blocks that are part of four larger sub-groups: core, semicore, semiperiphery, and periphery. Van Rossem (1996: 513) constructs a four-block model, consisting of core, semiperiphery, periphery1, and periphery2. And Mahutga (2006: 1875) constructs five sets of block models that contain between four and five zones: core, strong semiperiphery, weak semiperiphery, strong periphery, and weak periphery. Each study retains the *language* of a trichotomous world-system (i.e. using core, semiperiphery, and periphery labels), but researchers employ groupings of a finer grain for their analyses. In fact, as of yet, no one has adhered to world-system orthodoxy and formally created a three-tiered network partition of the world-system. Thus, we fill an important gap in the literature by specifying a theoretical model for trichotomously partitioning network data, applying this model to the international trade network, and assessing the ability of the model to predict economic growth.

Of course, it is important to note that several scholars conceptualize the core/periphery hierarchy as fundamentally continuous. For example, Chase-Dunn (1998) asserts that there are *no* discrete categories in the world-system.

> For myself the vocabulary of zones is simply shorthand. I don't see any advantage in spending a lot of time trying to define and empirically locate the boundaries between zones because I understand the core/periphery hierarchy as a complex continuum. Since there is upward and downward mobility in the system there must be cases of countries or areas which are in between zones, at least temporarily. For me it doesn't matter whether there are 'really' three zones, four zones or twenty zones. (Chase-Dunn, 1998: 214)

Several studies have produced continuous measures of position in the world economy, including Mahutga's (2006) and Van Rossem's (1996) network measures, Jorgenson's (2006) weighted exports index, and Kentor's (2000) attribute measure based on 10 indicators of economic power, military power, and global dependence. The advantage of a continuous measure is, of course, that there is no loss of information *within* world-system zones. We take seriously the possibility that continuous measures of world-system position are preferable. Thus, we replicate our main analyses using a continuous version of our trichotomous indicator and report the results below (anticipating the results, we find that our categorical measure actually outperforms the continuous version in predicting economic growth).

Snyder and Kick's Orthodox Measure of World-System Position: A Critique

Following Borgatti and Everett's (1999) core/periphery model for assigning actors to network blocks, we introduce a trichotomous measure of world-system position using data from the international trade network during the 1980–90 time period. We argue that our measure overcomes several problems associated with Snyder and Kick's orthodox measure, namely its age, informal construction, and use of inappropriate networks.

First, we are testing the performance of Snyder and Kick's orthodox world-system measure against a more recent alternative, as the trade data we use to create our trichotomous network measure covers the 1980–1990 time period. Although Snyder and Kick constructed their world-system measure with data from the mid-1960s, these country assignments are still in vogue today. This may be problematic, especially when considering the rapid development of East Asian economies (Firebaugh and Goesling, 2004, Table 1, p. 286) that have become more integrated in the world trade network in recent decades (Kim and Shin, 2002: 457). Consequently, some of these states may require an 'upgrade'. In particular, if the orthodox measure is still accurate, it would mean that South Korea has remained in the semiperiphery and that China continues to be a *peripheral* economy.

Second, perhaps the best reason to call into question the use of Snyder and Kick's trichotomous measure is that Snyder and Kick did not use it. In fact, not only did Snyder and Kick opt for their 10-block measure when conducting their analyses, but their informal collapse of 10 blocks into three receives little discussion in the text.

> In general, though with some deviations, we interpret the pattern of bonds depicted in the image matrices as a core-semiperiphery-periphery structure in which (1) block C constitutes the core; (2) blocks E through B (in the order shown) are the periphery; and (3) block D, *and perhaps also* C′ and D′, are located in the semiperiphery of the world system. (Snyder and Kick, 1979: 1110, 1114; italics added)

Bollen (1983) also questions the accuracy of this informal trichotomy, reclassifying six states by downgrading Spain, Portugal, and South Africa from the core to the semiperiphery, and Taiwan, Iraq, and Saudi Arabia from the semiperiphery to the periphery. In doing so, he emphasizes that 'this analysis does not mean that only these six countries are misclassified. Given the difficulty of measuring world system positions, other countries are likely to be in the wrong category' (Bollen, 1983: 475, fn. 11).

Finally, we singularly focus on economic relations (i.e. trade) because they constitute the most important set of international ties from a world-system perspective (Chase-Dunn, 1998: 104). Many network studies rely exclusively on trade relations for determining a state's world-system position (Mahutga, 2006; Nemeth and Smith, 1985; Smith and White, 1992). In fact, Peacock et al. (1988: 842) explicitly indicate their preference for Nemeth and Smith's (1985) network measure over Snyder and Kick's due to the former's singular focus on economic relations.

Several network studies, like Snyder and Kick (1979), consider military and political networks alongside trade relations (Kick, 1987; Van Rossem, 1996). However, it is clear from Snyder and Kick's presentation of their data that their non-economic forms of interaction (i.e. interventions, diplomats, and treaties) do not perform as well. Among the different networks that they investigate, Snyder and Kick (1979: 1114) find that a 'three-tiered structure is most clearly reflected in the image matrix for trade'. Moreover, military interventions connect core states to the periphery, but such interactions show the core to be completely isolated from itself (see Snyder and Kick's, 1979: 1113–14, *zero* density in the core block for this measure). In addition, Delacroix and Ragin (1981: 1322) critique Snyder and Kick's network measure for incorporating political networks because it 'betray[s] the logic of economic primacy inherent in dependency theory' and 'political dependency measures have low correlations with investment- and trade-based measures'.

At the very least, we argue that a network measure derived solely from a state's economic relations is preferable for the purposes of predicting economic development. At the same time, we appreciate that non-economic networks may be important for determining a wide range of outcomes within the world-system. For example, political relations, such as IGO memberships, treaty ratifications, or diplomatic ties, may be important for shaping outcomes such as democratization. In this way, we can envision a variety of network inputs that may be appropriate for predicting different outcomes of theoretical interest to world-system scholars.

Ultimately, we suggest that all three of the aforementioned issues represent important distinctions between our measure and Snyder and Kick's. We are interested, however, in learning whether the age difference, in particular, is mostly responsible for the discrepancy in performance between the two measures. Therefore, in supplemental analyses, we replace our newer trade measure with an older trade measure covering the 1963–7 period (which coincides with the time period Snyder and Kick select for their trade data), but constructed from the same methodological procedures that we outline below. Consequently, when comparing the performance of this older trade measure to the orthodox measure, we are able to hold age constant and focus on methodological differences, as well as Snyder and Kick's use of non-economic networks.

A New Trichotomous Network Measure of World-system Position

We begin, as a point of departure, by noting that previous scholars proceed inductively when constructing their partitions (i.e. allowing their data to determine the number of discrete categories that emerge). In contrast, we proceed deductively, relying on theory. Thus, the differences among prior network studies are in some ways less important than how they each differ from the present approach. At the same time, we emphasize that what these past efforts share in common with the present study is the attempt to cluster groups of states whose pattern of ties are similar to one another. In short, we seek to identify a group of core states who largely share ties with one another, a group of peripheral states who are largely isolated from one another, and a group of semiperipheral states whose intra-block ties falls somewhere in between.

Early network studies used CONCOR (Kick, 1987; Nemeth and Smith, 1985; Snyder and Kick, 1979), a partitioning method based on structural equivalence, whereby actors are considered equivalent if they share identical ties to and from all other actors in the network (Wasserman and Faust, 1994: 356). Subsequent network studies relax this criterion by using partitioning methods based on role or regular equivalence (Mahutga, 2006; Smith and White, 1992; Van Rossem, 1996), whereby actors are considered equivalent if they occupy the same structural role, even if the identity of the actors with whom they share ties is not identical (Wasserman and Faust, 1994: 473).

What these previous studies all share in common, however, is that they make no attempt, a priori, to fit a trichotomous partition on the network data. This suggests, on the one hand, that imposing a trichotomous partition which adheres to world-system orthodoxy would be a novel contribution to the field. On the other hand, the fact that no prior network study has ultimately opted for a trichotomous partition suggests that a three-tiered system, as specified by Wallerstein, may not ‘fit the data’. Consequently, we not only present results from our trichotomous partitioning, but we also attempt to validate such a classification by comparing our observed partition to an ideal trichotomous partition, as we describe below.

Following prior network studies (Kick, 1987; Mahutga, 2006; Nemeth and Smith, 1985; Smith and White, 1992; Snyder and Kick, 1979; Van Rossem, 1996), we measure each state’s economic ties by their activity in the world trade network. Trade data come from the *Direction of Trade Statistics* (International Monetary Fund, 2004) to cover the years 1980–90.[3] We rely on import (rather than export) data because of its greater accuracy (Kim and Shin, 2002), and we dichotomize the raw data with a cut-off of $1 million (US), which is the lowest non-zero value that the IMF reports. We dichotomize the raw trade data in order to calculate inter-block densities, as we discuss below. Thus, all network cells representing imports from country *j* to country *i*, whose average value between 1980–90 is equal to or greater than $1 million (US), are coded as one, and zero otherwise.

We consider all trade flows, rather than selected commodities, for two reasons. Most importantly, we note that previous studies which disaggregate flows into commodity classes (Mahutga, 2006; Nemeth and Smith, 1985; Smith and White, 1992) suffer from smaller samples, ranging from 53 to 86 cases. Since our goal is to assign a world-system position for as many countries as possible, it is important to use trade data that are available for a larger group of states. Second, as we note below, the pattern of ties between our core, semiperipheral, and peripheral countries is quite similar to Mahutga’s (2006) commodity-specific network analysis, in that we find a series of trade dependencies between stronger and weaker zones of the world-system. Nevertheless, we encourage future studies to replicate our methodology with disaggregated trade data.

Theoretical Model

Implicit in core/periphery network relations is the presence of an integrated core (whereby core actors share ties with all other actors) and an isolated periphery (whereby peripheral actors share ties with the core, but not with one another). In formalizing a discrete core/periphery structure, an idealized version of this network features an intra-core region (consisting solely of core actors) that is a 1-block, whereby all core actors are connected to one another. Meanwhile, the intra-periphery region (consisting solely of peripheral actors) is a 0-block, whereby all peripheral actors are isolated from one another. Intra-block densities are derived by calculating the ratio of observed ties in the block to the number of theoretically possible intra-block ties (excluding self-ties). Borgatti and Everett (1999) recommend treating the two off-diagonal regions (core-periphery and periphery-core) as missing data, so that the model focuses solely on maximizing core density and minimizing peripheral density.

However, Wallerstein's vision of the world-system features an economically polarized core and periphery that is buffered by a 'middle-class' semiperiphery. In essence, the dependency that characterizes core/periphery relations is replicated with, and qualitatively similar to, semiperipheral relations vis-à-vis both the core and the periphery. Thus, regardless of the state actors being observed or the zones in which they reside, there is only one type of interaction in the world-system (a dependent interaction), and there exists only two roles (exploiter and exploited). What distinguishes the semiperiphery from the other two zones is that its states perform *both* roles in interaction, depending on the zone with which it is engaged (Wallerstein, 2000: 91). 'In part they act as a peripheral zone for core countries and in part they act as a core country for some peripheral areas' (Wallerstein, 1979: 97).

When including a semiperiphery, an additional intra-zone region (the intra-semiperiphery block) is created. Unfortunately, there seems to be nothing in world-system orthodoxy that informs one as to what the intra-semiperiphery region should look like. After all, world-system theorists and practitioners have spent most of their time discussing the semiperiphery's role in the off-diagonal regions (as exploiter of the periphery and exploited by the core). But how should the semiperiphery relate to *itself*?

We propose that the network's total density is the preferred specification for the intra-semiperiphery region. What makes the core-periphery relationship particularly exploitive is that the intra-core region is well integrated, while the periphery is isolated from itself, thereby making the latter dependent upon its ties with the former. Since there are no new roles introduced with the semiperiphery (i.e. all relationships are exploiter-exploited), in order for the core–semiperiphery relationship to be exploitive, the semiperiphery must be isolated from itself. Paradoxically, though, in the semiperiphery–periphery relationship, the semiperiphery must be relatively well integrated with itself in order to replicate exploitive relations with the periphery. Thus, the intra-semiperiphery region should consist of a group of actors that take on the density value of the entire network, falling in between an integrated 1-block and an isolated 0-block.

Conceptually, our trichotomous partition follows Borgatti and Everett's (1999) core/periphery model, in that we determine what type of partitioning will bring the intra-block values in the observed data closest to the ideal values of that block. In the case of the trichotomous model, the actors that should be placed in each class are determined by what combination of actors simultaneously maximize the density of intra-core ties, minimize the density of intra-periphery ties, and match the network's overall density with the intra-semiperiphery block, such that any changes made to the final partitioning would, on the whole, move the affected groups too far away from their respective idealized values.

Application of Theoretical Model

Applying this theoretical model to our data, we created a trichotomous partition for the international trade network for the 1980–90 period. First, we determined each state's level of coreness using the continuous coreness procedure available in UCINET 6 (Borgatti et al., 2002). The procedure fits a continuous core/periphery model on network data and identifies how 'core-like' each actor is. Scores range from 0 to 1, with larger values indicating greater coreness and smaller values indicating greater peripherality. In short, this represents a continuous version of a procedure that identifies core and peripheral actors with relational data. We then permuted the rows and columns of the network based on the continuous coreness scores of all actors, with the most core-like actor occupying the top row and left-most column, and the least core-like actor occupying the bottom row and right-most column. Thus, the ordering of actors is fixed, with only the cut-lines representing the block boundaries to be determined. We then calculated intra-block densities for the core, semiperiphery, and periphery that resulted from different partitioning versions until the three blocks, collectively, most closely approached their respective ideal block densities.

Table 1 shows the resulting block densities for 144 states in the 1980–90 trade network. We maximized the density of the intra-core block (.979) with 45 states, minimized the density of the intra-periphery block (.049) with 78 states, and formed an intra-semiperiphery block (.379) with 21 states that approaches the total density of the entire network (.380). We do not show block densities for the off-diagonals in Table 1 so that we may emphasize that the intra-zone densities are solely responsible for creating our trichotomous partition. However, we can note here that the core-semiperiphery off-diagonals have block densities of .851 (core sends) and .837 (core receives), the core-periphery off-diagonals have block densities of .522 (core sends) and .427 (core receives), and the semiperiphery–periphery off-diagonals have block densities of .168 (semiperiphery sends)

Table 1 Trichotomous block densities for the international trade network (1980–90) (total network density = .380, N = 144)

	Core	Semiperiphery	Periphery
Core	.979 (45 states)	.	.
Semiperiphery	.	.379 (21 states)	.
Periphery	.	.	.049 (78 states)

Note: Following Borgatti and Everett (1999), we treat the off-diagonals as missing.

and .136 (semiperiphery receives). We interpret these off-diagonals as consistent with prior network studies (e.g. Mahutga, 2006) that show peripheral and semiperipheral economies as being trade dependent upon the core, while the periphery is also trade dependent upon the semiperiphery.

How closely does this partition correspond to an ideal trichotomous network? Following Borgatti and Everett (1999), we derive the following algorithm, where r is the Pearson correlation coefficient, a_{ij} indicates the presence or absence of a tie in the observed data, and δ_{ij} indicates the presence or absence of a tie in the ideal network. Thus, the equation represents the level of association between the observed (a_{ij}) and ideal matrix (δ_{ij}).

$$r = \sum_{i,j} a_{ij}\,\delta_{ij} \tag{1}$$

$$\delta_{ij} = \begin{cases} 1 & \textit{if} \quad c_j = \textit{CORE} \text{ and } c_i = \textit{CORE} \\ \text{Total Network Density} & \textit{if} \quad c_j = \textit{SEMIPERIPHERY} \text{ and } c_i = \textit{SEMIPERIPHERY} \\ 0 & \textit{if} \quad c_j = \textit{PERIPHERY} \text{ and } c_i = \textit{PERIPHERY} \\ . & \textit{if} \quad \textit{otherwise} \end{cases}$$

We created an ideal 144 × 144 network comprised of a 45-actor intra-core block with a density of 1, a 78-actor intra-periphery block with a density of 0, and a 21-actor intra-semiperiphery block with a density of .380 (we randomly filled 38% of all cells in this block). We ignore self-ties and off-diagonals, thereby producing a network with 8406 non-missing cells. Using QAP correlation in UCINET, we investigated the level of correspondence between the ideal and observed networks and found that the two networks are very highly correlated ($r = .839, p < .001$).[4] Other correspondence measures, including the simple matching coefficient ($s = .935, p < .001$), which indicates the proportion of cells in the two networks with the same value, as well as the Hamming distance ($d = 543$, $p < .001$), which indicates the number of cell substitutions required to make the two networks identical, suggest the same results. In sum, the observed trade network does not deviate far from what we would theoretically expect to see.

Table 2 lists eight alternative partitions, as well as the one we ultimately select, Partition V (in bold). Among the alternatives, our ability to increase intra-core density and/or decrease intra-periphery density beyond what we ultimately select with Partition V is fairly limited. The range of possible block

Table 2 Alternative partitions (*N* = 144)

	Block sizes	Block density (core)	Block density (semiperiphery)	Block density (periphery)	Implication
I	COR: 44 SP: 21 PER: 79	.982	.400	.050	Bulgaria to Semiperiphery; Libya to Periphery
II	COR: 44 SP: 22 PER: 78	.982	.394	.049	Bulgaria to Semiperiphery
III	COR: 44 SP: 23 PER: 77	.982	.387	.048	Bulgaria to Semiperiphery; Tanzania to Semiperiphery
IV	COR: 45 SP: 20 PER: 79	.979	.387	.050	Libya to Periphery
V	**COR: 45** **SP: 21** **PER: 78**	**.979**	**.379**	**.049**	
VI	COR: 45 SP: 22 PER: 77	.979	.370	.048	Tanzania to Semiperiphery
VII	COR: 46 SP: 19 PER: 79	.971	.365	.050	Israel to Core; Libya to Periphery
VIII	COR: 46 SP: 20 PER: 78	.971	.361	.049	Israel to Core
IX	COR: 46 SP: 21 PER: 77	.971	.352	.048	Israel to Core; Tanzania to Semiperiphery
Ideal		1.000	.380	.000	

Note: We selected Partition V (in bold) for the present study.

densities within the core (.971–.982) and periphery (.048–.050) is fairly small. Conversely, the range of possible block densities within the semiperiphery (.352–.400) is much larger. For example, Partitions I–III move Bulgaria from the core to the semiperiphery and increase intra-core density from .979 to .982. However, all three partitions simultaneously increase intra-semiperiphery density well above the network's total density of .380 (from .379 to .387, .394, or .400). Alternatively, Partitions III, VI, and IX all move Tanzania from the periphery to the semiperiphery, which slightly decreases intra-periphery density from .049 to .048. Again, though, all three partitions simultaneously move intra-semiperiphery density well away from the network's total density of .380 (from .379 to .387, .370, or .352). Finally, partitions IV, VII, and VIII move Libya from the semiperiphery to the periphery and/or move Israel from the semiperiphery to the core. All three partitions either decrease core density, increase peripheral density, or move semiperipheral density further away from the network's total density, none of which are desirable. Thus, given these neighboring alternatives, our selected partition (Partition V) best maximizes the core, minimizes the periphery, and sets the semiperiphery closest to the network's total density.

Table 3a shows a cross-tabulation of Snyder and Kick's orthodox measure and our trade measure for 116 countries that carry both forms of classification. The arrows indicate the direction of mobility from a state's orthodox classification to its trade classification. As the table reveals, 34 states experienced some form of upward mobility, while only five states experienced downward mobility. This is consistent with other accounts of convergence (Kim and Shin, 2002) and upward mobility (Smith and White, 1992) in the international trade network in recent decades. Nineteen states in the orthodox core remain in the trade core during the 1980–90 period. However, the trade network's core is significantly expanded, featuring the orthodox core along with 24 upwardly mobile economies from the orthodox non-core. Fifteen are from the orthodox semiperiphery, and nine are from the orthodox periphery. These 43 states (i.e. the orthodox core and the 'new core'), plus two states that lack an orthodox classification (Egypt and Singapore), comprise a densely connected core region (about one-third of the entire trade network) where almost all actors trade with one another.

Conversely, the largest cell in Table 3a is located in the bottom right, a group of 49 stagnant economies that have remained in the periphery. Combined with the five states that experienced downward mobility, along with 24 states in the trade periphery that lack an orthodox classification, the 78 states in the trade periphery represent more than *half* of the world trade network that, economically, are almost completely isolated from one another. We interpret this as evidence that even in an era of globalization, relations in the world economy remain strongly structured by distinct zones of integration and isolation.

Table 3b reproduces the previous cross-tabulation, but identifies which states belong to which cell. Immediately, we notice that the 'new core' includes many Asian economies (China, India, Indonesia, Malaysia, Pakistan, Singapore, South Korea, and Thailand). The trade core is also 'de-politicized', as it includes much

Table 3a Cross-tabulation of orthodox position and trade position (N = 116)

	Orthodox position		
Trade position	**Core**	**Semiperiphery**	**Periphery**
Core	19	**15**↑	**9**↑
Semiperiphery	**0**↓	9	**10**↑
Periphery	**1**↓	**4**↓	49

Note: Arrows indicate direction of mobility from a state's orthodox classification to its trade classification.

Table 3b Cross-tabulation of orthodox position and trade position ($N = 116$)

	Orthodox position		
Trade position	**Core**	**Semiperiphery**	**Periphery**
Core	Australia, Austria, Belgium, Canada, Denmark, France, Germany (FR), Greece, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, USA, Yugoslavia	Argentina, Bulgaria, Finland, Germany (DR), Hungary, India, Iran, Ireland, Malaysia, Pakistan, Romania, Saudi Arabia, South Korea, Turkey, USSR	Brazil, China, Czechoslovakia, Indonesia, Mexico, Morocco, New Zealand, Poland, Thailand
Semiperiphery		Cyprus, Iraq, Israel, Kenya, Peru, Philippines, Sri Lanka, Uruguay, Venezuela	Algeria, Chile, Colombia, Ivory Coast, Kuwait, Libya, Nigeria, Panama, Tunisia, UAE
Periphery	South Africa	Cuba, Jordan, Lebanon, Myanmar	Afghanistan, Albania, Benin, Bolivia, Burkina Faso, Burundi, Cambodia, Cameroon, CAR, Chad, Congo (DR), Congo (R), Costa Rica, Dominican Rep., Ecuador, El Salvador, Ethiopia, Gabon, Ghana, Guatemala, Guinea, Haiti, Honduras, Iceland, Jamaica, Laos, Liberia, Madagascar, Mali, Malta, Mauritania, Mongolia, Nepal, Nicaragua, Niger, North Korea, Paraguay, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Syria, Togo, Trinidad-Tobago, Uganda, Vietnam, North Yemen, South Yemen

Note: Trade data are not available for Luxembourg (orthodox core) and Taiwan (orthodox semiperiphery). Orthodox designations are not available for 28 states: two in the trade core (Egypt and Singapore), two in the trade semiperiphery (Bangladesh and Zimbabwe), and 24 in the trade periphery (Angola, Bahamas, Bahrain, Barbados, Brunei, Cape Verde, Comoros, Djibouti, Equatorial Guinea, Fiji, Gambia, Guinea-Bissau, Guyana, Malawi, Maldives, Mauritius, Mozambique, Oman, Papua New Guinea, Qatar, Solomon Islands, Suriname, Tanzania, and Zambia).

of Eastern Europe (Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and the Soviet Union), as well as several countries from the Middle East (Egypt, Iran, Morocco, Saudi Arabia, and Turkey). Other members of the expanded core include Western nations (Finland, Ireland, and New Zealand) and large economies from Latin America (Argentina, Brazil, and Mexico). Finally, on the bottom left, we notice the extreme downward mobility of South Africa, the one country located in the orthodox core and trade periphery. Of course, this is one of three countries that Bollen (1983) downgrades from the core to semiperiphery, which suggests that South Africa's downward mobility has not been as severe as what Table 3b implies.

We appreciate that some readers may object that some of our core countries (e.g. Bulgaria and Iran) do not *really* belong in the core. We maintain that just as all states exhibit a relative mix of core and peripheral activities within their borders, all states feature role sets that contain a relative mix of core and peripheral positions. While some states may be classified as core in the world economy, they may be relatively peripheral in the world polity. Other states may be highly integrated in world trade, but may lack military power. And, again, because we are predicting economic growth in this study based on a deductive model of world economic relations, we are most interested in a state's position in the world economy. Moreover, we emphasize the distinction between core, semiperipheral, and peripheral positions as conceptualized by world-system theory, and core, semiperipheral, and peripheral positions as identified by formal network analysis. As Borgatti and Everett note, the mapping from conceptualization of position to network realization of position is an open empirical question.

In addition, we note that the world-system exhibits considerable mobility across zones, perhaps more than what is traditionally thought. We argue that the presence of mobility is an important feature that sustains the capitalist world economy, as capital constantly relocates to more productive venues. Rather than viewing world-system theory as exclusively the history of exploitive relations between North and South, we also see it as a theory of exploitive relations between core and periphery. Thus, while zonal boundaries may change across time as states experience upward and downward mobility, it is the core/periphery hierarchy that remains fundamental and intact. The real test of the utility of any given classification is its predictive ability, which is fundamentally an empirical question that we address below. Thus, we emphasize that we are less interested in preserving the identity of a core that is exclusively or predominantly Western/European, and more interested in preserving the conceptualization of a core that is fast-growing relative to an underdeveloping periphery.

METHODS

Analyses

The dependent variable, economic growth, is calculated as a change score between T_1 (a state's average score during the 1980–5 period) and T_2 (a state's average score during the 1995–2000 period). We log the dependent variable at T_1 and T_2 before calculating the change score because the measure is highly skewed (see Jackman, 1980). We also include the dependent variable at T_1 (1980–5) as a right-hand side predictor in order to control for the effect of initial values on subsequent growth. We note that a negative coefficient for the lagged dependent variable would be interpreted as evidence of unconditional ß-convergence in a model without other predictors. In a model *with* other predictors, a negative coefficient would be interpreted as evidence for 'conditional' ß-convergence.[5]

The main analyses are presented in Table 4. We first regress the change score on the lagged dependent variable to create a baseline, and assess the evidence for unconditional ß-convergence. Subsequently, we introduce the two independent variables, comparing the effects of world-system position on economic growth when using Snyder and Kick's (1979) orthodox measure versus our trade measure. Initially, we use nominal versions of both measures in order to contrast economic growth between (1) core and periphery, (2) semiperiphery and periphery, and (3) core and semiperiphery. Theoretically, the orthodox and trade measures should exert *positive* effects on economic growth when peripheral states are the excluded reference category. Conversely, the two measures should exert *negative* effects on growth when core states are the omitted group. Finally, we estimate ordinal versions of both measures (core = 3; semiperiphery = 2; periphery = 1) which should theoretically exert positive effects on economic growth.

We replicate these models in Table 5 when holding constant a state's initial level of secondary education (1980–5) in order to assess whether the effects of the orthodox and trade measures persist when controlling for human capital. In Table 6, we replicate the main analyses by replacing our newer trade measure with an older trade measure from the 1963–7 period in order to determine how large of a factor age is in explaining the discrepancy between our trade measure and Snyder and Kick's orthodox measure. And in Table 7, we replicate the main analyses by comparing our trichotomous trade measure to dichotomous and continuous versions of our trade measure in order to examine how much information is lost by collapsing states into discrete categories. Overall, the four sets of analyses presented in Tables 4–7 produce samples of 96, 92, 86, and 117 states, respectively (Appendix A identifies which states are included in each sample).

We are sensitive to the possibility of collinearity in the models due to correlated predictors (see Appendix B). Therefore, we report mean and maximum variance inflation factor (VIF) scores for all models. The maximum VIF score across every model is always well below 10 (the maximum VIF score across all models is 3.37 in model 3 of Table 5), suggesting that collinearity is never severe (Chatterjee et al., 2000: 240). On the other hand, the mean VIF falls between 2 and 3 in 13 of the 27 models across Tables 4–7, which does suggest the presence of mild collinearity. However, we direct the reader's attention to the first column of the correlation matrices for Tables 4–7 in Appendix B. The first column for Tables 4 and 5 show that the ordinal version of our trade measure is more positively correlated with economic growth ($r = .50$ in Table 4; $r = .48$ in Table 5) than the ordinal version of the orthodox measure ($r = .28$ in Table 4; $r = .29$ in Table 5), which is consistent with the results we report below. The first column for Table 6 shows that our older trade measure achieves a slightly higher positive correlation with economic growth ($r = .37$) than the orthodox measure ($r = .35$), which is also consistent with the results we report below. And the first column for Table 7 shows that the trichotomous version of our measure is more highly correlated with economic growth ($r = .39$) than either the dichotomous ($r = .32$) or continuous ($r = .36$) versions, which is again highly consistent with what we report below. Thus, collinearity does not impact the main conclusions drawn from this study.

We also investigated the presence of influential cases using the Hadi procedure available in Stata 10.0 (Stata Corporation, 2007). The procedure identifies multiple outliers in multivariate data (we use the $p < .05$ significance level as our outlier cutoff). We found that China was a consistent outlier in the models presented in Tables 4 and 7, while Equatorial Guinea was a consistent outlier in the Table 7 models. However, when we replicate the Table 4 models without China and the Table 7 models without China and Equatorial Guinea, our trade measure continues to dramatically outperform the orthodox measure, and our trichotomous version continues to outperform the dichotomous and continuous versions.

We use the Bayesian Information Criterion Prime (BIC′) to adjudicate among models. BIC′ suggests that the more parsimonious model is preferable unless fit is significantly enhanced. Smaller BIC′ values indicate better fit. Raftery (1995; see Table 6, p. 139) proposes that a BIC′ decrease of 2–6 across two models suggests ‘positive’ evidence of model improvement, while a BIC′ decrease of 6–10 across two models suggests ‘strong’ evidence, and a BIC′ decrease of more than 10 suggests ‘very strong’ evidence.

Data

Data for our dependent variable (GDP per capita) and control variable (secondary education) come from the *World Development Indicators* (International Bank for Reconstruction and Development, 2004).

Dependent Variable

GDP per capita (PPP): We demonstrate the utility of our new trichotomous measure with an analysis of economic growth, which is a standard welfare outcome in network studies of the world-system (Jackman, 1980; Kick and Davis, 2001; Nemeth and Smith, 1985; Nolan, 1983; Snyder and Kick, 1979; Van Rossem, 1996). We measure economic growth as GDP per capita based on purchasing power parity, which is the gross domestic product converted to international purchasing power parity rates. Data are in 1995 international dollars. An international dollar has the same purchasing power over GDP as the US dollar has in the United States. We also considered GDP PC growth based on foreign exchange rates (FX) rather than purchasing power parity (PPP). The two versions are almost perfectly correlated ($r = .987$ in Table 4; $r = .987$ in Table 5; $r = .985$ in Table 6; $r = .975$ in Table 7) and produce comparable results in analyses. However, we note that measuring economic growth with the GDP PC (FX) indicator (a) *reduces* the strength of association between the orthodox measure and economic growth (core status drops out of significance in the model 2 replication in Table 4), while (b) *not substantively affecting* the strength of association between our trade measure and economic growth.

Independent Variable

Orthodox Measure of World-System Position: We test the performance of our trade measure against the orthodox measure of world-system position, which refers to the standard trichotomous network indicator used in world-system research, and is constructed from Snyder and Kick's (1979) original classification. In separate analyses, we use an 'updated' version of Snyder and Kick's (1979) measure, based on revisions from Bollen (1983) and additions from Bollen and Appold (1993), and find that our trade measure similarly outperforms this alternative version.

Control Variable

Secondary Education: We notice that Snyder and Kick (1979) control for secondary school enrollment in their analyses. Moreover, past studies have emphasized the role of human capital in triggering economic growth and producing conditional ß-convergence in the world economy (Barro, 1991, 2001). Thus, we replicate our main analyses by similarly controlling for secondary education, which refers to the proportion of people in the age group that officially corresponds to the secondary level who are currently enrolled.[6]

RESULTS

Table 4 shows results from the OLS regression of GDP PC (PPP) on the orthodox and trade measures of world-system position across 96 states. For these, and all subsequent analyses, each cell reports the unstandardized coefficient, with the robust standard error in parentheses and standardized coefficient in bold.[7] Model 1 represents the base model, with the change score in GDP PC regressed on its lagged value. The initial value of GDP PC is *positive* and marginally significant, indicating mild *divergence* among the 96 states in this sample. Models 2–4 introduce Snyder and Kick's orthodox measure of world-system position. In model 2, core and semiperipheral states both grow significantly faster than the periphery. However, model 3 shows that core states did not experience significantly greater economic growth than the semiperiphery. Overall, the orthodox measure holds up fairly well with respect to distinguishing the periphery from the remainder of the world-system. However, models 2 and 3 add little additional explanatory power ($R^2 = .092$) to the base model ($R^2 = .034$). Moreover, BIC′ prefers the base model (1.285) to models 2 and 3 (4.450). In model 4, the ordinal version of Snyder and Kick's orthodox measure is a positive and significant predictor of economic growth. Moreover, BIC′ prefers this model (1.049) to the base. However, the model only explains about 8 percent of the variation in economic growth ($R^2 = .081$).

Models 5–7 introduce our trade measure of world-system position. Model 5 shows that core and semiperipheral states have experienced significantly greater economic growth than the periphery, with core status reaching the highest level of significance ($p < .001$). In fact, the positive effect of core status (versus the periphery) in our classification is well more than twice as large (B = .650) as the effect of core status in Snyder and Kick's orthodox classification (B = .256) in model 2. Conversely, our semiperipheral indicator does not perform quite as well ($p < .05$; B = .225) as Snyder and Kick's ($p < .05$; B = .243) in model 2. However, in model 6, we see that, in contrast to Snyder and Kick's classification, semiperipheral states in our network grow significantly slower than the core. Moreover, the negative effect of semiperipheral status (versus the core) in our classification is more than 12 times greater (B = –.285) than the negative effect of semiperipheral status in Snyder and Kick's classification (B = –.023) in model 3. We attribute the inflated performance of Snyder and Kick's semiperiphery due to the rapid economic growth of several upwardly mobile states in this zone (e.g. India, Ireland, Pakistan, South Korea, and Turkey) that we classify as belonging to the core. Overall, models 5 and 6 explain over a quarter of the variation in economic growth among the sample states ($R^2 = .267$). Furthermore, BIC′ provides *very strong* evidence of model improvement in models 4 and 5 (–16.138) relative to the base. In model 7, the ordinal version of our trade measure reaches the highest level of significance as a positive predictor of economic growth. Moreover, the positive effect (B = .605) is more than twice as large as Snyder and Kick's ordinal measure (B = .295) in model 4. Similar to our nominal indicators, our ordinal version explains over a quarter of the variation in economic growth ($R^2 = .266$) and BIC′ similarly provides *very strong* evidence of model improvement in model 7 (-20.585) relative to the base.

Finally, model 8 estimates the ordinal versions of the orthodox and trade measures simultaneously. While the orthodox measure is negatively signed and drops out of significance, our trade measure continues to exert a positive effect on economic growth at the highest level of significance. Because this model is testing one world-system measure while holding the other constant, model 8 essentially focuses on the economic performance of upwardly/downwardly mobile states whose orthodox and trade classifications are discrepant, thereby ignoring those states that remained in their respective world-system zones (i.e. the orthodox core and the stagnant periphery). As model 8 indicates, our trade classifications for these mobile economies more accurately predict economic growth than their orthodox classifications. Moreover, the orthodox measure adds no additional explanatory power ($R^2 = .267$) to the previous models containing our trade measure.

Table 4 presents the main results of our analyses. Overall, the findings reveal that our trade measure of world-system position significantly outperforms Snyder and Kick's orthodox measure as a predictor of economic growth during the 1980–2000 period. Nevertheless, the orthodox measure does hold up fairly

Table 4 OLS regression of GDP PC (PPP) on orthodox and trade position (*N* = 96)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
GDP PC (PPP) (1980–5)	.053† (.031) **.183**	−.000 (.044) **−.000**	−.000 (.044) **−.000**	−.005 (.043) **−.016**	−.053 (.041) **−.181**	−.053 (.041) **−.181**	−.053 (.042) **−.182**	−.049 (.047) **−.169**
Orthodox position								
Core		.206* (.097) **.256**						
Semiperiphery		.187* (.086) **.243**	−.018 (.098) **−.023**					
Periphery			−.206* (.097) **−.317**					
Ordinal (COR = 3; PER = 1)				.118* (.049) **.295**				−.013 (.056) **−.033**
Trade position								
Core					.427*** (.100) **.650**			
Semiperiphery					.188* (.089) **.225**	−.239* (.097) **−.285**		
Periphery						−.427*** (.100) **−.663**		
Ordinal (COR = 3; PER = 1)							.214*** (.050) **.605**	.219*** (.057) **.620**
High VIF (Mean VIF)	1.00 (1.00)	1.99 (1.69)	3.05 (2.31)	1.85 (1.85)	1.82 (1.56)	1.89 (1.58)	1.57 (1.57)	2.42 (2.15)
R^2	.034	.092	.092	.081	.267	.267	.266	.267
BIC′	1.285	4.450	4.450	1.049	−16.138	−16.138	−20.585	−16.078

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).
Note: Each cell reports the unstandardized coefficient, with the robust standard error in parentheses and the standardized coefficient in bold.

well given its age of construction. However, when controlling for a state's level of human capital, do the effects of world-system position (under either form of classification) persist? Table 5 is devoted to answering this question, replicating the above analyses when controlling for secondary education.

Table 5 shows results from the OLS regression of economic growth on secondary education, Snyder and Kick's orthodox measure, and our trade measure across 92 states. Model 1 regresses the change score in GDP PC on its lagged value, while holding secondary education constant. As expected, secondary school enrollment exerts a significant, positive effect on economic growth at a high level of significance ($p < .01$), and maintains this level of association across all eight models in this table. Moreover, human capital is able to explain about 18 percent of the variation in economic growth ($R^2 = .184$) in model 1.

Models 2–4 add Snyder and Kick's measure of world-system position. In contrast to the previous analyses, the orthodox measure is a non-significant predictor of economic growth. When holding human capital constant, core and semiperipheral states do not grow significantly faster than the periphery, nor is the core able to distinguish itself from the semiperiphery. Thus, secondary education appears to explain away the effects of world-system position. Moreover, models 2 and 3 contribute little additional explanatory power ($R^2 = .208$) relative to the baseline, and BIC′ clearly prefers model 1 (–9.703) to models 2 and 3 (–3.404). In model 4, the ordinal version of Snyder and Kick's measure is able to reach marginal significance ($p < .10$) as a positive predictor of growth. However, the measure still does not contribute much additional explanatory power ($R^2 = .202$), and BIC′ indicates that its inclusion to the model does not enhance fitness (–7.222). Nevertheless, for the first time, we see that the initial value of GDP PC is marginally significant ($p < .10$) in models 2–4 as a negative predictor of subsequent growth, indicating that controlling for both human capital and world-system position produces conditional ß-convergence among our sample of states. We interpret this as evidence that the structure of the world-system matters for the pattern of global economic stratification.

Models 5–7 test the effect of our trade measure when holding secondary education constant. In contrast to the orthodox measure, the significant effects of our trade measure persist in these models. Model 5 shows that core and semiperipheral states continue to experience significantly greater economic growth than the periphery, with core status still reaching the highest level of significance. In fact, the positive effect of core status (versus the periphery) in our classification is now well more than three times larger (B = .579) than the effect of core status in the orthodox classification (B = .156). Moreover, the positive effect of semiperipheral status (versus the periphery) in trade exerts a noticeably larger effect (B = .215) than it does under the orthodox measure (B = .166). Model 6 indicates that semiperipheral states grow significantly slower than core states, with a negative effect (B = –.246) well over 100 times larger than that estimated by the orthodox measure in model 3 (B = –.002). Interestingly, the positive effect of core status in model 5 (B = .579) and the negative effect of peripheral status in model 6 (B = –.587) are both slightly larger than the positive effect of secondary education (B = .564). Thus, the effect of being in the core (versus the periphery) on economic growth is slightly more powerful than the effect of human capital. Overall, models 5 and 6 explain almost twice the explained variation in economic growth ($R^2 = .359$) as the base model. Furthermore, BIC′ provides *very strong* evidence of model improvement in models 5 and 6 (–22.884) relative to the base. In model 7, our ordinal version continues to reach the highest level of significance and exerts a positive effect (B = .536) almost three times larger than Snyder and Kick's ordinal version (B = .187). Our ordinal measure explains the same amount of variation in growth (R^2 = .359) as our nominal measures, but fitness is significantly enhanced (–27.370). Overall, in contrast to the non-significance of the orthodox measure in models 2–4, models 5–7 reveal that our trade classification adds significant explanatory power above and beyond the effects of human capital. Moreover, the initial value of GDP PC exerts a highly significant ($p < .01$) negative effect on subsequent growth in models 5–7, revealing that our measure of world-system position produces much stronger conditional ß-convergence than Snyder and Kick's.

Finally, model 8 estimates the ordinal versions of the orthodox and trade measures simultaneously when controlling for secondary education. Similar to the main analyses presented in Table 4, the orthodox measure is negatively signed and drops out of significance, while our trade measure continues to exert a positive effect on economic growth at the highest level of significance. Moreover, the magnitude of our measure's effect (B = .609) is slightly larger than that of human capital (B = .605). The inclusion of the orthodox measure adds some additional explanatory power (R^2 = .368) relative to the previous three models, and it slightly improves model fitness (BIC′ = –24.160) relative to models 5 and 6. However, we remind readers that it does so as a *negative* predictor.

The results from Tables 4 and 5 demonstrate that our trade measure of world-system position significantly outperforms Snyder and Kick's orthodox measure. To what extent can we attribute the discrepancy in the performance of these two measures to their age difference? In order to answer this question, we replicated our methodology and constructed an alternative world-system measure using older trade data covering the 1963–7 period, which represents the exact period of time Snyder and Kick selected for their trade data. We then tested this measure against Snyder and Kick's using a common sample of 86 countries. Thus, we are able to hold age constant in these analyses, focusing solely on methodological differences and our exclusion of non-economic networks. Our older trade measure is more highly correlated with the orthodox measure (r = .815, N = 97) than is our newer trade measure with the orthodox measure (r = .661, N = 116), which presumably reflects the age difference between our two trade measures. That is, the strong correlation of .815 between the two measures that employ data from the 1960s suggests that a substantial part of the difference between our new measure and Snyder and Kick's owes to age. However, our older trade measure is also more highly correlated with our newer trade measure (r = .780, N = 114) than is the orthodox measure with our newer trade measure (r = .661, N = 116), which presumably reflects the important methodological differences

Table 5 Replicating analyses with secondary education ($N = 92$)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
GDP PC (PPP) (1980–5)	−.104 (.067) **−.353**	−.121† (.064) **−.413**	−.121† (.064) **−.413**	−.125† (.063) **−.427**	−.177** (.061) **−.605**	−.177** (.061) **−.605**	−.178** (.061) **−.607**	−.170** (.061) **−.580**
Secondary education (1980–5)	.007** (.002) **.660**	.006** (.002) **.593**	.006** (.002) **.593**	.006** (.002) **.596**	.006** (.002) **.564**	.006** (.002) **.564**	.006** (.002) **.565**	.006** (.002) **.605**
Orthodox position								
Core		.129 (.087) **.156**						
Semiperiphery		.127 (.079) **.166**	−.002 (.083) **−.002**					
Periphery			−.129 (.087) **−.198**					
Ordinal (COR = 3; PER = 1)				.077† (.045) **.187**				−.064 (.057) **−.156**
Trade position								
Core					.382*** (.098) **.579**			
Semiperiphery					.178* (.085) **.215**	−.204* (.082) **−.246**		
Periphery						−.382*** (.098) **−.587**		
Ordinal (COR = 3; PER = 1)							.191*** (.049) **.536**	.217*** (.057) **.609**
High VIF (Mean VIF)	2.86 (2.86)	3.20 (2.41)	3.37 (2.95)	3.17 (2.74)	3.25 (2.35)	3.25 (2.36)	3.23 (2.59)	3.31 (2.83)
R^2	.184	.208	.208	.202	.359	.359	.359	.368
BIC′	−9.703	−3.404	−3.404	−7.222	−22.884	−22.884	−27.370	−24.160

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).
Note: Each cell reports the unstandardized coefficient, with the robust standard error in parentheses and the standardized coefficient in bold.

detailed above. That is, there is more to the difference between the two measures than simply the age of the data.

We also take the next step of entering our measure based on the older data in the regression models. Table 6 shows the results. Our older trade

Table 6 Replicating analyses with older trade position (1963–7, *N* = 86)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
GDP PC (PPP) (1980–5)	.051 (.037) **.183**	.051 (.037) **.183**	.042 (.036) **.152**	.058 (.041) **.207**	.058 (.041) **.207**	.044 (.035) **.159**
Orthodox position						
Core	.139 (.084) **.189**					
Semiperiphery	.181* (.088) **.251**	.042 (.100) **.059**				
Periphery		–.139 (.084) **–.229**				
Ordinal (COR = 3; PER = 1)			.091* (.043) **.246**			
Older trade position (1963–7)						
Core				.165† (.097) **.241**		
Semiperiphery				.161* (.078) **.258**	–.004 (.101) **–.007**	
Periphery					–.165† (.097) **–.268**	
Ordinal (COR = 3; PER = 1)						.100* (.045) **.264**
High VIF (Mean VIF)	2.25 (1.86)	3.33 (2.50)	2.05 (2.05)	2.25 (1.80)	2.80 (2.32)	1.69 (1.69)
R^2	.159	.159	.137	.163	.163	.148
BIC′	–1.522	–1.522	–3.745	–1.890	–1.890	–4.907

† $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed tests).
Note: Each cell reports the unstandardized coefficient, with the robust standard error in parentheses and the standardized coefficient in bold.

measure outperforms the orthodox measure when comparing significance levels, standardized coefficients, explained variation, and model fitness. The difference between the performance of these two measures is most apparent when estimating the effect of core status versus the periphery, as our older trade measure exhibits a notably larger standardized coefficient and reaches a higher level of association. Overall, though, the differences are far smaller than that achieved in Tables 4 and 5. Thus, age is clearly a major factor explaining the discrepant performance between our newer trade measure and Snyder and Kick's orthodox measure. Nevertheless, we interpret these findings as an indication that age alone does not explain the difference in performance between the two world-system measures. Thus, while world-system classifications should be routinely updated, we feel that our method represents an improvement over previous strategies and that our decision to focus on economic relations has produced a measure of world-system position with greater predictive power.

Finally, we revisit the more fundamental question of a tripartite world-system by comparing our trichotomous measure to dichotomous and continuous measures of our trade network (both procedures producing these latter measures are available in UCINET 6.0). We present these results in Table 7. Because Snyder and Kick's orthodox measure is not included in these analyses, we are able to use a larger sample of 117 countries. Theoretically, discarding all variation within world-system zones eliminates an enormous amount of information. Thus, we would expect the continuous measure to significantly outperform our trichotomous measure, and for both measures to outperform the dichotomous measure. However, as models 1–3 in Table 7 reveal, only the latter is the case. Although the continuous measure exerts a stronger effect (B = .474) than the trichotomous (B =.458) and dichotomous (B = .334) versions, the trichotomous measure exhibits a stronger association ($p < .001$) than the other two versions ($p < .01$). The trichotomous measure also explains a greater proportion of the variation in economic growth ($R^2 = .163$) than the continuous ($R^2 = .146$) and dichotomous ($R^2 = .103$) versions. Moreover, BIC′ prefers the trichotomous measure (–11.299) to the continuous (–8.901) and dichotomous (–3.234) versions.

Taking matters one step further, models 4 and 5 disaggregate the relative contributions of between-zone and within-zone variation in trade coreness to economic growth. We do this by residualizing our continuous measure from our trichotomous measure, thereby creating a measure focused exclusively on capturing within-zone variation in coreness. In model 4, the residual is negatively signed and non-significant and helps explain almost none of the variation in economic growth ($R^2 = .023$). In model 5, we estimate the trichotomous measure and the residual simultaneously. The trichotomous measure (reflecting variation in coreness *between* zones) remains significant at the highest level, while the residual (reflecting variation in coreness *within* zones) remains non-significant. Moreover, we see that the inclusion of the residual adds little explanatory power ($R^2 = .165$) relative to model 2. These findings suggest that we can attribute the vast majority of the explained variance in economic growth to *between*-zone variation in coreness. Ultimately, these final analyses lead us to appreciate (a) how much is gained by adding a semiperipheral zone to a dichotomous partition, as well as (b) how little is lost by ignoring the intra-zone variation implied by continuous measures.

Table 7 Replicating analyses with dichotomous and continuous measures (*N* = 117)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
GDP PC (PPP) (1980–5)	–.008 (.033) **–.028**	–.036 (.034) **–.117**	–.053 (.040) **–.174**	.049 (.031) **.161**	–.045 (.042) **–.147**
Trade position					
Dichotomous (COR = 1; PER = 0)	.223** (.072) **.334**				
Trichotomous (COR = 3; PER = 1)		.170*** (.042) **.458**			.176*** (.048) **.474**
Continuous			3.908** (1.233) **.474**		
Continuous (residualized from trichotomous)				–1.184 (2.249) **–.058**	1.112 (2.527) **.054**
High VIF (Mean VIF)	1.34 (1.34)	1.46 (1.46)	1.78 (1.78)	1.15 (1.15)	1.82 (1.54)
R^2	.103	.163	.146	.023	.165
BIC′	–3.234	–11.299	–8.901	6.856	–6.871

† *p* < .1; * *p* < .05; ** *p* < .01; *** *p* < .001 (two-tailed tests).
Note: Each cell reports the unstandardized coefficient, with the robust standard error in parentheses and the standardized coefficient in bold.

DISCUSSION

The results from these analyses are straightforward. The orthodox world-system measure appears outdated as a predictor of economic growth relative to our newer trichotomous measure based on the trade network. The biggest difference between the two measures is that our trade measure features an expanded core that includes a diverse set of upwardly mobile states joining the old orthodox core. When using our classification, the difference in economic growth between the core and periphery is *more than twice as large* as the estimated difference when using Snyder and Kick's orthodox classification. Thus, an orthodox conception of core/periphery relations severely underestimates the extent to which core and peripheral economies are actually diverging from one another. Moreover, when controlling for a state's level of human capital, the effects of the orthodox measure largely disappear, while our measure remains relatively unaffected (our measure is also unaffected by the inclusion of a range of additional controls, including trade openness, a standard measure of globalization).

The most noticeable problem with Snyder and Kick's orthodox measure is that its core does not significantly outgrow its semiperiphery. Several countries from the orthodox semiperiphery have experienced substantial upward mobility.

Thus, their core underperforms, while their semiperiphery hyper-performs. In contrast, our trichotomous measure is not only accurate in distinguishing a developing core from an underdeveloping non-core, but it also identifies a 'middle-class' semiperiphery that has grown significantly more slowly than the core, but significantly more quickly than the periphery.

During the 1980–2000 period, the states included in our sample have economically diverged from one another (see model 1, Table 4). A central finding from our analyses reveals that much of this divergence is structured by world-system boundaries in the international trade network. However, the analyses also reveal that estimating the effects of world-system position and secondary education simultaneously produces conditional ß-convergence in economic growth. While previous studies have focused on the role of human capital in promoting economic convergence (Barro, 1991, 2001), we find that human capital by itself is not sufficient. Rather, it is only countries with comparable levels of education *and that occupy the same world-system position* that economically converge with one another. In this way, the core/periphery hierarchy continues to represent an important stratifier of the world economy.

Put another way, our analyses show that countries between zones diverge, while countries within zones conditionally converge. We view this as strong evidence in favor of a categorical conceptualization of world-system positions, over a continuous conceptualization. If variation in coreness *within* world-system zones was an important predictor of growth, then semiperipheral countries near the core would be diverging from semiperipheral countries near the periphery. And yet, our residual measure (reflecting within-zone variation in coreness) is not a significant predictor of growth, nor does it contribute any real explanatory power above and beyond our trichotomous measure (reflecting between-zone variation in coreness) (see Table 7). Thus, we argue that the parsimony of partitioning the world-system into discrete categories is preferable to operationalizing the world-system as a complex continuum. However, we appreciate that predicting economic growth is only one barometer for assessing network structure. Future work could examine whether conditional convergence within world-system zones necessarily implies that the structure of our network is fundamentally more discrete than continuous.

Overall, the general proposition that world-system position affects economic growth is supported by the data. The findings from this study suggest that the 1980s world economy was more integrated than in previous decades, as approximately one-third of the world-system was comprised of a densely interconnected core. However, more than *half* of all world-system actors, a set of underdeveloping economies in the periphery, were almost completely isolated from one another. Thus, similar to prior eras, the world economy during this period comprised state actors that experienced very different levels of international trade integration. The more integrated, core-like members of the world economy experienced significantly greater economic growth during the final decades of the

20th century than the less integrated, peripheral actors. Thus, hierarchical integration in the world economy creates the disparate developmental effects that world-system network scholars suggest that it does, and these effects persist net of human capital. Ultimately, by creating a trichotomous partition of the international trade network, we have endeavored to match method to theory, and our empirical tests provide broad support for core world-system propositions.

The findings presented here join recent studies that find upward mobility (Smith and White, 1992) and convergence (Kim and Shin, 2002) in the world trade network. In particular, Kim and Shin (2002) find that the world trade network has become more densely interconnected during the 1959–96 period, and suggest that a group of upwardly mobile economies have emerged from the 'middle strata'. At the same time, Mahutga (2006) notes that they do not attempt to correlate a state's expanded ties with any developmental growth, nor do they investigate whether the network nevertheless obeys a core/periphery hierarchy that simply features greater density. In this study, we address both questions. Not only does our new, expanded core experience significantly greater economic growth than the orthodox core, but we also find that the network, as a whole, still exhibits a classic core/periphery hierarchy.

In sum, this study makes several methodological and empirical contributions to sociological research on the world economic system. First, we introduce a formal method for assigning states to world-system zones according to a trichotomous partition strategy that scholars may wish to replicate in the future. Second, our zone assignments suggest evidence of upward mobility in the world economy to a degree that has been under-appreciated by some world-system scholars. And third, our findings suggest that our trichotomous partitioning of the trade network enjoys substantial utility for predicting economic growth and the pattern of conditional convergence within world-system zones during the 1980–2000 period.

ACKNOWLEDGEMENTS

We thank Art Alderson, Tim Bartley, David Brady, Clem Brooks, Suzanna Crage, Jeremy Freese, Tom Gieryn, Amy Kroska, Erin Maher, and Stanley Wasserman for their generous assistance.

NOTES

1 Oftentimes with revisions from Bollen (1983) and/or additions from Bollen and Appold (1993).

2 But see Boswell and Dixon (1990), who trichotomize Kick's (1987) world-system measure, Peacock et al. (1988), who trichotomize Nemeth and Smith's (1985) measure, as well as Guillen and Suarez (2005), who trichotomize Van Rossem's (1996) measure.

3 The IMF collapses trade data for Botswana, Lesotho, Namibia, South Africa, and Swaziland into an entity called SACCA (South African Common Customs Area).

We use these data to represent South Africa. Also, the IMF collapses Belgium and Luxembourg together. We use these data to represent Belgium. Removing South Africa and Belgium from the analyses does not substantively affect the results.

4 The observed network is also highly correlated with a categorical core/periphery model ($r = .754$) and a continuous core/periphery model ($r = .764$).

5 Research on economic development distinguishes ß-convergence (i.e. a negative relationship between a state's initial level of wealth and its subsequent economic growth) from δ-convergence (i.e. the reduction of dispersion in the overall distribution of GDP per capita among national economies).

6 In separate analyses, we add controls for trade openness (trade/GDP), foreign investment (inflows/GDP), and region (sub-Saharan Africa dummy) and find that our trade measure continues to dramatically outperform the orthodox measure. Interestingly, trade openness (a standard measure of globalization) is marginally significant ($p = .062$) as a *negative* predictor in a baseline model, before dropping out of significance once we include world-system position. We interpret these results as evidence against the argument that globalization is unequivocally good for growth. Our results show that it is occupying a core position in trade networks, and not the volume of trade, that produces growth (see also Clark, 2008).

7 In preliminary analyses, we detected heteroskedasticity in several of the models. Thus, we report all results using robust standard errors. However, we note that using OLS standard errors produces slightly weaker results for the orthodox measure, and slightly stronger results for our new measure.

Appendix A List of states included in the analyses (Tables 4–7)

State	4	5	6	7	State	4	5	6	7	State	4	5	6	7
Albania	X	X		X	Gabon	X		X	X	Niger	X	X	X	X
Algeria	X	X	X	X	Gambia				X	Nigeria	X	X	X	X
Angola				X	Germany (FR)	X		X	X	Norway	X	X	X	X
Argentina	X	X	X	X	Ghana	X	X	X	X	Oman				X
Australia	X	X	X	X	Greece	X	X	X	X	Pakistan	X	X	X	X
Austria	X	X	X	X	Guatemala	X	X	X	X	Panama	X	X	X	X
Bahamas				X	Guinea-Bissau				X	Papua New Guinea				X
Bahrain				X	Guyana				X	Paraguay	X	X	X	X
Bangladesh				X	Haiti	X	X	X	X	Peru	X	X	X	X
Barbados				X	Honduras	X	X	X	X	Philippines	X	X	X	X
Belgium	X	X	X	X	Hungary	X	X		X	Portugal	X	X	X	X
Benin	X	X	X	X	Iceland	X	X	X	X	Rwanda	X	X	X	X
Bolivia	X	X	X	X	India	X	X	X	X	Saudi Arabia	X	X	X	X
Brazil	X	X	X	X	Indonesia	X	X	X	X	Senegal	X	X	X	X
Bulgaria	X	X		X	Iran	X	X	X	X	Sierra Leone	X	X	X	X
Burkina Faso	X	X	X	X	Ireland	X	X	X	X	Singapore				X

State	4	5	6	7	State	4	5	6	7	State	4	5	6	7
Burundi	X	X		X	Israel	X	X	X	X	Solomon Islands				X
Cameroon	X	X	X	X	Italy	X	X	X	X	South Africa	X			X
Canada	X	X	X	X	Jamaica	X	X	X	X	Spain	X	X	X	X
Central African Rep.	X	X	X	X	Japan	X	X	X	X	Sri Lanka	X	X	X	X
Chad	X	X	X	X	Jordan	X	X	X	X	Sudan	X	X	X	X
Chile	X	X	X	X	Kenya	X	X	X	X	Sweden	X	X	X	X
China	X	X		X	Korea (R)	X	X	X	X	Switzerland	X	X	X	X
Colombia	X	X	X	X	Kuwait	X	X		X	Syria	X	X	X	X
Comoros				X	Laos	X	X	X	X	Thailand	X	X	X	X
Congo (DR)	X	X	X	X	Madagascar	X		X	X	Togo	X	X	X	X
Congo (R)	X	X	X	X	Malawi				X	Trinidad and Tobago	X	X	X	X
Costa Rica	X	X	X	X	Malaysia	X	X	X	X	Tunisia	X	X	X	X
Cote d'Ivoire	X	X	X	X	Mali	X	X	X	X	Turkey	X	X	X	X
Cyprus	X	X	X	X	Malta	X	X	X	X	Uganda	X	X	X	X
Denmark	X	X	X	X	Mauritania	X	X	X	X	United Arab Emirates	X	X		X
Dominican Republic	X	X	X	X	Mauritius				X	United Kingdom	X	X	X	X
Ecuador	X	X	X	X	Mexico	X	X	X	X	United States	X	X	X	X
Egypt				X	Mongolia	X	X		X	Uruguay	X	X	X	X
El Salvador	X	X	X	X	Morocco	X	X	X	X	Venezuela	X	X	X	X
Equatorial Guinea				X	Mozambique				X	Zambia				X
Ethiopia	X	X	X	X	Nepal	X	X		X	Zimbabwe				X
Fiji				X	Netherlands	X	X	X	X					
Finland	X	X	X	X	New Zealand	X	X	X	X					
France	X	X	X	X	Nicaragua	X	X	X	X					

Note: an 'X' indicates that the state is included in the sample.

Appendix B Descriptive statistics and correlation matrices (Tables 4–7)

	Table 4 (*N* = 96)				**Correlation matrix**			
	Mean	**SD**	**Min**	**Max**	**(1)**	**(2)**	**(3)**	**(4)**
(1) Economic growth	.14	.32	–.67	1.26	–			
(2) GDP PC (PPP)	8.30	1.10	6.43	10.41	.18	–		
(3) Orthodox (Ordinal)	1.61	.80	1	3	.28	.68	–	
(4) Trade (Ordinal)	1.95	.91	1	3	.50	.60	.70	–

	Table 5 (*N* = 92)				**Correlation matrix**				
	Mean	**SD**	**Min**	**Max**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
(1) Economic growth	.15	.32	–.67	1.26	–				
(2) GDP PC (PPP)	8.28	1.10	6.43	10.41	.18	–			
(3) Sec. education	51.17	30.56	3.20	105.11	.38	.81	–		
(4) Orthodox (Ordinal)	1.60	.79	1	3	.29	.67	.66	–	
(5) Trade (Ordinal)	1.97	.91	1	3	.48	.62	.56	.72	–

	Table 6 (*N* = 86)				**Correlation matrix**			
	Mean	**SD**	**Min**	**Max**	**(1)**	**(2)**	**(3)**	**(4)**
(1) Economic growth	.15	.30	–.67	.93	–			
(2) GDP PC (PPP)	8.31	1.08	6.43	10.05	.33	–		
(3) Orthodox (Ordinal)	1.64	.81	1	3	.35	.72	–	
(4) Old trade (Ordinal)	1.87	.79	1	3	.37	.64	.82	–

	Table 7 (*N* = 117)				**Correlation matrix**					
	Mean	**SD**	**Min**	**Max**	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(1) Economic growth	.16	.33	–.67	1.58	–					
(2) GDP PC (PPP)	8.21	1.10	6.24	10.41	.14	–				
(3) Dichotomous	.46	.50	0	1	.32	.50	–			
(4) Trichotomous	1.83	.90	1	3	.39	.56	.92	–		
(5) Continuous	.08	.04	.01	.15	.36	.66	.85	.91	–	
(6) Residual	.00	.02	–.04	.03	.00	.37	.03	.00	.40	–

REFERENCES

Alderson, A. and Beckfield, J. (2004) 'Power and Position in the World City System', *American Journal of Sociology* 109: 811–51.

Alderson, A. and Nielsen, F. (1999) 'Income Inequality, Development, and Dependence: A Reconsideration', *American Sociological Review* 64: 606–31.

Arrighi, G. and Drangel, J. (1986) 'The Stratification of the World-Economy: An Exploration of the Semiperipheral Zone', *Review* 10: 9–74.

Babones, S. (2005) 'The Country-Level Income Structure of the World-Economy', *Journal of World-Systems Research* 11: 29–55.

Barro, R. (1991) 'Economic Growth in a Cross Section of Countries', *Quarterly Journal of Economics* 106: 407–43.

Barro, R. (2001) 'Human Capital and Growth', *American Economic Review* 91: 12–17.

Beckfield, J. (2003) 'Inequality in the World Polity: The Structure of International Organization', *American Sociological Review* 68: 401–24.

Bollen, K. (1983) 'World System Position, Dependency, and Democracy: The Cross-National Evidence', *American Sociological Review* 48: 468–79.

Bollen, K. and Appold, S. (1993) 'National Industrial Structure and the Global System', *American Sociological Review* 58: 283–301.

Bollen, K. and Jackman, R. (1985) 'Political Democracy and the Size Distribution of Income', *American Sociological Review* 50: 438–57.

Borgatti, S. and Everett, M. (1999) 'Models of Core/Periphery Structures', *Social Networks* 21: 375–95.

Borgatti, S., Everett, M. and Freeman, L. (2002) *Ucinet for Windows: Software for Social Network Analysis*. Harvard, MA: Analytic Technologies.

Boswell, T. and Dixon, W. (1990) 'Dependency and Rebellion: A Cross-National Analysis', *American Sociological Review* 55: 540–59.

Chase-Dunn, C. (1998) *Global Formation: Structures of the World-Economy*, updated edn. Lanham, MD: Rowman and Littlefield.

Chatterjee, S., Hadi, A. and Price, B. (2000) *Regression Analysis by Example*, 3rd edn. New York: Wiley.

Chirot, D. and Hall, T. (1982) 'World-System Theory', *Annual Review of Sociology* 8: 81–106.

Clark, R. (2008) 'Dependency, Network Integration, and Development', *Sociological Perspectives* 51: 629–48.

Crenshaw, E. (1992) 'Cross-National Determinants of Income Inequality: A Replication and Extension Using Ecological-Evolutionary Theory', *Social Forces* 71: 339–63.

Crenshaw, E. (1995) 'Democracy and Demographic Inheritance: The Influence of Modernity and Proto-Modernity on Political and Civil Rights, 1965 to 1980', *American Sociological Review* 60: 702–18.

Delacroix, J. and Ragin, C. (1981) 'Structural Blockage: A Cross-National Study of Economic Dependency, State Efficacy, and Underdevelopment', *American Journal of Sociology* 86: 1311–47.

Firebaugh, G. and Goesling, B. (2004) 'Accounting for the Recent Decline in Global Income Inequality', *American Journal of Sociology* 110: 283–312.

Guillen, M. and Suarez, S. (2005) 'Explaining the Global Digital Divide: Economic, Political, and Sociological Drivers of Cross-National Internet Use', *Social Forces* 84: 681–708.

Hoover, G. (1989) 'Intranational Inequality: A Cross-National Dataset', *Social Forces* 67: 1008–26.

International Bank for Reconstruction and Development (2004) *World Development Indicators CD-ROM: 2004*. Washington, DC: International Bank for Reconstruction and Development.

International Monetary Fund (2004) *Direction of Trade Statistics: March 2004 (CD-ROM)*. Washington, DC: International Monetary Fund.

Jackman, R. (1980) 'A Note on the Measurement of Growth Rates in Cross-National Research', *American Journal of Sociology* 86: 604–17.

Jorgenson, A. (2006) 'Unequal Ecological Exchange and Environmental Degradation: A Theoretical Proposition and Cross-National Study of Deforestation, 1990–2000', *Rural Sociology* 71: 685–712.

Kentor, J. (2000) *Capital and Coercion: The Economic and Military Processes that Have Shaped the World Economy 1800–1990*. New York: Garland.

Kick, E. (1987) 'World-System Structure, National Development, and the Prospects for a Socialist World Order', in T. Boswell and A. Bergesen (eds) *America's Changing Role in the World-System*, pp. 127–55. New York: Praeger.

Kick, E. and Davis, B. (2001) 'World-System Structure and Change: An Analysis of Global Networks and Economic Growth across Two Time Periods', *American Behavioral Scientist* 44: 1561–78.

Kim, S. and Shin, E.-H. (2002) 'A Longitudinal Analysis of Globalization and Regionalization in International Trade: A Social Network Approach', *Social Forces* 81: 445–71.

Lee, C.-S., Nielsen, F. and Alderson, A. (2007) 'Income Inequality, Global Economy and the State', *Social Forces* 86: 77–111.

London, B. (1987) 'Structural Determinants of Third World Urban Change: An Ecological and Political Economic Analysis', *American Sociological Review* 52: 28–43.

London, B. and Williams, B. (1990) 'National Politics, International Dependency, and Basic Needs Provision: A Cross-National Analysis', *Social Forces* 69: 565–84.

Mahutga, M. (2006) 'The Persistence of Structural Inequality? A Network Analysis of International Trade, 1965–2000', *Social Forces* 84: 1863–89.

Muller, E. (1988) 'Democracy, Economic Development, and Income Inequality', *American Sociological Review* 53: 50–68.

Muller, E. (1995) 'Economic Determinants of Democracy', *American Sociological Review* 60: 966–82.

Nemeth, R. and Smith, D. (1985) 'International Trade and World-System Structure: A Multiple Network Analysis', *Review* 8: 517–60.

Nolan, P. (1983) 'Status in the World System, Income Inequality, and Economic Growth', *American Journal of Sociology* 89: 410–19.

Nolan, P. and White, R. (1983) 'Demographic Differentials in the World System: A Research Note', *Social Forces* 62: 1–8.

Peacock, W., Hoover, G. and Killian, C. (1988) 'Divergence and Convergence in International Development: A Decomposition Analysis of Inequality in the World System', *American Sociological Review* 53: 838–52.

Raftery, A. (1995) 'Bayesian Model Selection in Social Research', *Sociological Methodology* 25: 111–63.

Rau, W. and Roncek, D. (1987) 'Industrialization and World Inequality: The Transformation of the Division of Labor in 59 Nations, 1960–1981', *American Sociological Review* 52: 359–69.

Simpson, M. (1990) 'Political Rights and Income Inequality: A Cross-National Test', *American Sociological Review* 55: 682–93.

Smith, D. and London, B. (1990) 'Convergence in World Urbanization? A Quantitative Assessment', *Urban Affairs Quarterly* 25: 574–90.

Smith, D. and White, D. (1992) 'Structure and Dynamics of the Global Economy: Network Analysis of International Trade 1965–1980', *Social Forces* 70: 857–93.

Snyder, D. and Kick, E. (1979) 'Structural Position in the World System and Economic Growth, 1955–1970: A Multiple-Network Analysis of Transnational Interactions', *American Journal of Sociology* 84: 1096–126.

Stata Corporation (2007) *Stata 10.0*. College Station, TX: Stata Press.

Steiber, S. (1979) 'The World System and World Trade: An Empirical Exploration of Conceptual Conflicts', *Sociological Quarterly* 20: 23–36.

Van Rossem, R. (1996) 'The World System Paradigm as General Theory of Development: A Cross-National Test', *American Sociological Review* 61: 508–27.

Wallerstein, I. (1979) *The Capitalist World-Economy: Essays by Immanuel Wallerstein*. Cambridge: Cambridge University Press.

Wallerstein, I. (2000) *The Essential Wallerstein*. New York: The New Press.

Wasserman, S. and Faust, K. (1994) *Social Network Analysis: Methods and Applications*. Cambridge: Cambridge University Press.

Wejnert, B. (2005) 'Diffusion, Development, and Democracy, 1800–1999', *American Sociological Review* 70: 53–81.

Rob Clark is Assistant Professor of Sociology at the University of Oklahoma. His research interests include international development, globalization, stratification, and organizations. He is currently investigating the impact of world-system mobility on development, and his recent work appears in *Sociological Perspectives* ('Dependency, Network Integration, and Development', 2008). Address: Department of Sociology, University of Oklahoma, Kaufman Hall 331, 780 Van Vleet Oval, Norman, OK 73019, USA. [email: robclark@ou.edu]

Jason Beckfield is Assistant Professor of Sociology at Harvard University. He is interested in the structure and evolution of international political-economic formations, and in the implications of these for patterns of social inequality. His work has recently appeared in the *American Sociological Review* ('European Integration and Income Inequality' in 2006) and *Social Problems* ('The Dual World Polity' in 2008), and his collaborative research on economic and gender inequality has appeared in the *International Journal of Comparative Sociology* ('Exactly How Has Income Inequality Changed?' in 2005, and 'Development and Democracy Matter for Women' in 2008).