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Globalization, the structure of the world economy and economic development ☆

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ABSTRACT

How does the structure of the world economy determine the gains from participation therein? In order to answer this question, we conduct a state of the art network analysis of international trade to map the structure of the international division of labor (IDL). We regress cross-national variation in economic growth on positional variation and mobility of countries within the IDL from 1965 to 2000. We find that the highest rates of economic growth occurred to countries in the middle of the IDL over the course of globalization. Second, we find that upper tier positions in the IDL are converging with each other, but diverging from the lower tier. This suggests that the mechanism underlying the rapid economic growth in intermediate positions was their uniquely high rates of upward mobility, in turn a function of their middling position. Taken together, these findings suggest that a country's long-term economic development is conditioned by its position in the IDL.

1. Introduction

One of sociology's most significant historical and contemporary contributions to the social sciences lies in the basic insight that social structure—the concrete relations between social actors—plays a causal role in shaping the life experiences of actors therein. In the sociological study of the wealth and poverty of nations, there has been no bigger structural intuition than that of world-system theory. Paraphrasing a major theme from this approach, a "country's world-system position, in a macro-structural sense, is considered the key determinant of the society's capacity for sustained economic growth and development" (Crowly et al., 1998, p. 32). The key relational insight is that the world-system is composed of a "single ongoing division of labor…based on differential appropriation of the surplus produced [such that] positions are hierarchically ordered, not just differentiated" (Evans, 1979b, pp. 15–16). For nearly two decades after its emergence in the mid-1970s, the world-systems perspective dominated the sociological study of economic development.

In spite of previous work that found support for the notion that world-system position is positively associated with economic growth (Nemeth and Smith, 1985; Snyder and Kick, 1979; Kick and Davis, 2001), their is a high degree of skepticism about the saliency of social structure as a determinant of development over the course of globalization. Wade (2004) paraphrases this skepticism as "…country mobility up the income/wealth hierarchy is [no longer] constrained by the structure"

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(567). An extremely popular and influential version of this perspective argues that globalization ‘‘flattens out’’ the world and leads to economic dynamism everywhere, and particularly in the poorest regions (Friedman, 2005). In short, globalization leads to rapid economic development in the periphery during the late 20th and early 21st centuries.

As a point of departure, we revisit classic hypotheses regarding the distribution of economic rewards across the structure of the international division of labor (IDL). Empirically, we conduct a network analysis that allows us to map the structure of the IDL on a large sample of countries across a fairly long temporal range, and examine the relationship between a country's position and mobility in that structure and their subsequent growth trajectory. The results indicate that structure matters in significant ways. In particular, intermediate positions in the IDL had significantly higher growth rates than other positions, which in turn is a function of their greater degree of structural mobility. Our findings highlight the contingent nature of economic development and challenge some contemporary views of economic ‘‘globalization’’ that posit the structure of the world-economy no longer conditions development processes, as well as those that see globalization as intensified exploitation of non-core countries. Ultimately, we argue that our results warrant a fresh look at the structural contingencies that lead to growth and stagnation across the structure of the world-economy.

2. Enhancing welfare or entrenching hierarchy? The international division of labor, economic growth and upward mobility

The story of winners and losers in the IDL remains an important and hotly debated topic in the social sciences. Within this dialogue, a key question is how does the structure of the world-economy impact economic development and the wealth/poverty of nations? The key point of contention revolves around two views of the role that the international division of labor plays in the development of individual countries. As Evans (1995) argues, ‘‘the international division of labor can be seen as the basis of enhanced welfare or as a hierarchy’’ (7).

The ‘‘enhanced welfare’’ view claims that any one particular role in the IDL is not necessarily better than another, but rather that ‘‘compatibility with [a country's] resource and factor endowments defines the activity most rewarding for each country’’ (Evans, 1995, p. 7; also see the classic treatments of Ricardo [1817] 2004, Smith [1776] 2003). The ‘‘enhanced welfare’’ position contrasts sharply with global political economy arguments that development outcomes vary by a country's position in the IDL (Chase-Dunn, 1998; Galtung, 1971). Indeed, the world-system perspective argues that the IDL conforms to hierarchically stratified zones with different types of production occurring across the various zones: ‘‘Core production is relatively capital intensive and employs skilled, high wage labor; peripheral production is labor intensive and employs cheap, often politically coerced labor’’ (Chase-Dunn, 1998, p. 77). In turn, they argue that core positions ‘‘generate a ‘multidimensional conspiracy' in favor of development,’’ while peripheral ones do not (Evans, 1995, p. 7).

With respect to empirical expectations regarding the association between position in the IDL and economic growth, the ‘‘enhanced welfare’’ view presents a simple null hypothesis: if the structure of the IDL is simply ‘‘differentiated’’ rather than hierarchically organized, we would expect that cross-national variation in structural location should not be a significant predictor of economic growth. On the other hand, the world-systems perspective offers two distinct hypotheses corresponding to different phases in the cycles of world-economic expansion and contraction. The first is a simple linear hypothesis—the core grows faster than the semiperiphery and the periphery, and the semiperiphery grows faster than the periphery, which is consistent with early ‘‘stagnationist’’ views of world-system dependency (Frank, 1969).

An alternative world-systems account is consistent with a non-linear hypothesis—the semiperiphery grows faster than both the core and the periphery during particular phases in long-term Kondratieff cycles of world-economic expansion and contraction (Wallerstein, 1976). During world-economic upswings—Kondratieff A phases—core countries reap the benefits of an expansionary economy and the association between position in the IDL and economic growth is linear. However, Wallerstein suggests that the world-economy entered a downturn—and Kondratieff B phase—ca. 1967, during which there was a ‘‘shift in relative profit advantage to the semi-peripheral nations’’ (Wallerstein, 1976, p. 464, 1998). Thus, select countries in the semiperiphery become the beneficiaries of the relocation of global industries to non-core countries. In other words, the B phase represents the greatest possibility for growth owing to the greater openness of the system to the flow of mature technologies out from the core. Therefore an alternative hypothesis emerging from this perspective is that the IDL benefits countries ‘‘in the middle’’ and that semi-peripheral growth will exceed that of both the core and the periphery.

2.1. Mobility in the IDL and economic growth

While there are good reasons to expect more rapid growth in the semiperiphery, the mechanisms behind this dynamism are less understood. In developing our argument, we draw on a large and growing literature on global commodity chains, which focuses on the way in which firms from the lower tier of the IDL link up with those at upper tiers of the IDL in order to ‘‘upgrade’’ their role in the chain at the firm level, and the IDL at the level of the national economy (Bair, 2005; Gereffi and Korzeniewicz, 1994; Gereffi et al., 2001; Gereffi and Memedovic, 2003; Memedovic, 2004).

A major issue within this literature is whether or not upward mobility generates positive development outcomes. Some are willing to acknowledge that the ‘‘growth miracles’’ in countries such as South Korea, Singapore, Taiwan and Hong Kong stem from real upward mobility via the internalization of a growing share of manufacturing flowing out from core countries (Chase-Dunn, 1998). Others tend to argue that what appears to be upward mobility—the growth in manufacturing activity among non-core countries—actually reflects the desire of core firms to shift less profitable manufacturing activities onto more vulnerable firms at lower tiers of the IDL (Arrighi et al., 2003). In other words, detractors from the upgrading hypothesis suggest that upward mobility in the IDL is not a viable development strategy because it creates greater competition in formerly core economic activities: "the very success of Third World countries in internalizing within their domains the industrial activities with which First World wealth had been associated activated a competition that sharply reduced the returns that previously had accrued to such activities" (Arrighi et al., 2003, p. 23).

A second point of contention involves whether or not upward mobility is viable, stemming from disagreements over "the degree of mobility within the system available to individual states" (Chase-Dunn, Christopher and Peter Grimes, 1995, p. 397). Some argue that "it is highly unlikely that countries with little to no advanced industry can move up because they lack the necessary levels of capital, infrastructure, workforces skills and technical expertise to do so" (Mahutga, 2006, p. 1865). Classic dependency theory, exemplified by Frank (1969), presents an extremely "stagnationist" version of this position. On the other hand, even within this tradition there is an interest in discovering how "dependency reversal" can lead to some form of more autonomous growth in relation to "external" global structures (Gereffi, 1983; Evans, 1979a,b). The idea of "dependent development" (see, especially Evans, 1979a) explicitly theorized the possibility of upward mobility in the world-system, particularly among the newly industrializing countries (Caporaso, 1981; Deyo, 1987).

Empirically, there are examples of upwardly mobile countries that experience real development (e.g. Amsden, 2001; Evans, 1979a; Gereffi and Wyman, 1990), those that seem to experience upward mobility without subsequent economic development (e.g. Schrank, 2004), and still other cases that experience neither mobility nor development (e.g. Frank, 1969). As a resolution to these points of contention, we suggest that some unique characteristics of countries in the middle of the IDL may give us some theoretical leverage in understanding these disagreements.

We start by acknowledging that upward mobility—or industrial upgrading—stems, at least to a large degree, from the outsourcing decisions of, and/or technological diffusion from, firms in core countries (Bair, 2005; Dicken, 2003; Gereffi, 1994; Gereffi and Memedovic, 2003; Gereffi and Korzeniewicz, 1994; Parente and Prescott, 2000), and therefore suggest that upward mobility over the course of economic globalization is in part a function of a site's attractiveness to and ability to absorb technology and knowledge from these actors. Thus, while many assume that countries have equal *access* to the world stock of "usable knowledge" and a minimum infrastructural basis to *implement* advanced production technologies (Parente and Prescott, 2000), we suggest that semi-peripheral countries are more attractive sites of industrial migration than both core and peripheral countries.

First, semi-peripheral countries contain either "a relatively equal mix of core and peripheral types of production," or "a predominance of activities which are at intermediate levels with regard to the current world-system distribution of capital intensive/labor intensive production" (Chase-Dunn, 1998, pp. 77, 212). As a consequence of these intermediate forces of production, labor costs are lower in semi-peripheral countries than in the core while their ability to implement advanced production processes is higher than in the periphery. Thus, semi-peripheral countries are more attractive than alternative core and peripheral countries as sites of industrial migration, and thus have higher "absorptive capacity." Second, many sempe-ripheral nations may be an attractive alternative to peripheral sites because firms that relocate to poorer countries must balance the expected gains from lower production costs against the amount of time required for the new location to produce comparable commodities to the home country, and more experience translates into a steeper learning curve (Thun, 2008; Wood, 1994). Indeed, absorptive capacity may very well be cumulative such that countries who gain experience and competence with one firm or industry often become more attractive to others and early experience leads to greater future access (Cohen et al., 2009). Thus, the question of mobility's impact on development may be resolved by arguing that mobility is a viable developmental path, but that semi-peripheral countries occupy structural positions that encourage upward mobility more than peripheral ones. Thus, our final hypothesis is that differential rates of upward mobility explain any variation in growth across positions in the IDL.

3. Network methods and data

3.1. Roles and positions in the IDL

We begin by identifying the structure of the IDL and the position of individual countries within it.

Our approach follows the classic literature on the identification of *roles* and *positions* in network analysis (Wasserman and Faust, 1999, pp. 347–393; 461–502; Dorien et al., 2005), implemented in a wide variety of empirical contexts (Anheier and Gerhards, 1991; Boorman and White, 1976; Mullins et al., 1977 White et al., 1976), and in studies of the structure of the world economy in particular (Alderson and Beckfield, 2004; Breiger, 1981; Mahutga, 2006; Nemeth and Smith, 1985; Smith and White, 1992; Snyder and Kick, 1979; Van Rossem, 1996).

At a conceptual level, the identification of roles and positions begins with the intuition that actors in similar structural positions should have relatively isomorphic patterns of relations to others. Thus, the goal is to identify similarly positioned actors by the extent to which they have interchangeable patterns of relationships. The method starts with a relation or set of relations and then (1) estimates the degree of similarity between each pair of actors with an equivalence criterion, (2) uses these estimates as the basis for assigning actors to relatively equivalent structural positions, and sometimes (3) determines the role played by each of the equivalent groups (or "blocks" in the block model literature) by analyzing the relations between them.

Over time, network based role and position analyses that quantify the world-economy evolved from strict to more general equivalence criteria (Lloyd et al., 2009). Earlier studies used structural equivalence as the criterion (e.g. Snyder and Kick, 1979). For a pair of actors to be structurally equivalent, they need identical patterns of relations with identical others. Yet, structural equivalence overlooks the situation in which two countries could have identical patterns of relationships to partners that are not identical, but nonetheless occupy identical *positions* in the network. A classic example is that of managers and subordinates across multiple departments in a firm. Given a relationship of "gives orders to," it is clear that managers in different departments would not be structurally equivalent because the subordinates to whom they give orders are in different departments, even though they occupy identical social roles as subordinates, or order takers.

A more general criterion is regular equivalence. Regular equivalence identifies actors who have similar patterns of ties to *equivalent* (rather than identical) others (Wasserman and Faust, 1999, p. 473). More formally, "two points in a network are regularly equivalent if and only if for each tie one has with another point, the self-equivalent point has an identical tie with an other-equivalent point" (White and Reitz, 1983, p. 12). Returning to the example of managers and subordinates in a firm, the managers would play equivalent roles by virtue of their identical patterns of giving orders to subordinates, who are themselves equivalent by virtue of their identical pattern of receiving orders from managers. Thus, it has been shown that regular equivalence is appropriate over stricter types of equivalencies because it is a more general measure of role similarity (see Batagelj et al., 1992; Faust, 1988; Wasserman and Faust, 1999; White and Reitz, 1983; White, 1984; Ziberna, 2008).

The first step in our analysis obtains the degree of regular equivalence between each country pair in our sample across five different trade relationships (see below) at each time point. We obtain the regular equivalence between each country pair via the REGE algorithm in UCInet (Borgatti et al., 2002; see Wasserman and Faust, 1999 and Ziberna, 2008 for extensive mathematical and conceptual discussion, and Alderson and Beckfield, 2004; Mahutga, 2006 and Smith and White, 1992 for implementations).[1] The REGE algorithm identifies the level of regular equivalence between each pair of countries. Given a focal dyad *ij*, REGE finds the best matching set of ties between *i*'s ties with its neighborhood and *j*'s ties with its neighborhood and weights the match by the equivalence of the two neighborhoods. This match is expressed as a ratio of the maximum possible equivalence, which would occur if every tie from *i* to its neighborhood could be perfectly matched by a tie from *j* to its neighborhood, and the two neighborhoods were perfectly equivalent. It is highly unlikely that any two nations would be exactly equivalent, so our multi-relational regular equivalence analysis produces a single equivalence matrix consisting of an equivalence measure for each pair of countries between maximally dissimilar (0) and regularly equivalent (1) in each period.

Having identified the level of regular equivalence between each pair of countries, our second step combines two complementary techniques—correspondence analysis and hierarchical clustering—to identify the structural positions in which countries are located. We use a "complete link" hierarchical clustering routine to identify groups of countries that are approximately regularly equivalent. The complete link clustering routine starts by assigning each country to its own cluster so that the similarities between each cluster equals the similarity between each country. The second step finds the most similar pair of countries and merges them into a single cluster, resulting in N-1 clusters. The third step recomputes the similarities between new cluster as equal to the maximum similarity between any individual member of a given cluster and any individual member of another cluster. Steps 2 and 3 are repeated until all countries are clustered into a single cluster of size N (Borgatti, 1994; Johnson, 1967; Wasserman and Faust, 1999). The hierarchical clustering routine produces many possible sets of equivalent groupings that span the continuum from trivial sets in which each actor occupies its own position to one in which all actors occupy the same position, so we use these results in conjunction with correspondence analysis that we discuss below to identify the country positions.[2]

At a conceptual level, correspondence analysis represents the matrix of regular equivalencies in a low-dimensional Euclidian space by assigning coordinates to actors that place them close to those with whom they are similar and far from those with whom they are dissimilar (Greenacre, 1984; Weller and Romney, 1990). Computationally, correspondence analysis decomposes the information contained in a data matrix into three matrices: an N-1 dimensional **U** matrix summarizing the information in the rows, an N-1 dimensional **V** matrix summarizing the information in the columns, and an N-1 diagonal **d** matrix of singular values that summarizes the amount of variance explained by each dimension of **U** and **V**, where larger singular values correspond to higher explained variance. Because our correspondence analysis is standard, we refer the interested reader to orthodox texts for the technical aspects of the analysis (Greenacre, 1984; Weller and Romney, 1990).

3.2. Commodity trade data

The data underlying our measure of role/position in the IDL are trade in commodity groups from UN COMTRADE, classified under the Standard International Trade Classification (SITC, Rev. 1) and collected at three time points: 1965, 1980 and

[1] The REGE program is iterative and updates the equivalence of each pair of countries at each iteration and we use the default specification of three iterations as suggested in the literature (Faust, 1988). Each trade matrix was transformed with the base 10 logarithm to reduce skew prior analysis with the REGE algorithm.

[2] In principle, an analyst could start out with some α criterion whereby actors i and j would be placed in the same group if $RE_{ij} > \alpha$. However, there is no *a priori* theory that favors one level of α over another, large real world data sets are rarely broken down into discrete homogenous groups at any single α and the authoritative guide states simply that the "trick is to find the most useful and interpretable partition of actors into equivalence classes" (Wasserman and Faust, 1999, p. 383).

2000 (United Nations, 1963). Rev. 1 of the SITC consists of 55 categories at the two-digit level. However, we collect data on 15 two-digit U.N. categories displayed in Table 1, for two reasons[3].

First, as discussed above, the measurement of roles and positions is based on the supposition that similarly positioned actors are defined by the similarity in their relationships to others in the network. In the case of country level positions in the structure of the IDL, this supposition must account for the organizational variation between industries, both known and unknown. For example, "core" nodes in labor intensive industries—or buyer-driven commodity chains—are currently identifiable by their tendency to import (or buy) from a geographically diffuse set of low-wage countries, rather than produce and export. On the other hand, "core" nodes in capital and technology intensive industries—or producer-driven commodity chains—are currently identifiable by their tendency to engage in scale intensive production and either domestic consumption or exports (Bair, 2005; Gereffi, 1994; Mahutga, 2011). In short, patterns of trade—imports and exports in this case—do not mean the same thing across different types of commodities because of differences in the way their production is organized, such that similarly positioned countries should have relatively equivalent patterns of trade relationships across different *types* of industries.

Second, while the organization of some types of industries is well known—the garment industry is a prime example—that of other industries is less understood. Thus, it is difficult to determine which industries are necessary to represent the full spectrum of organizational variation that exists. Our approach is to draw from five categories identified by Smith and Nemeth (1988). Using factor analysis, Smith and Nemeth (1988) found that the 55 two-digit UN commodity categories cluster into 5 more or less equivalent types of trade relationships based on the pattern of their exchange between countries. In other words, the 5 relational categories in Table 1 capture the full spectrum of UN categories from which to choose, such that we can account for the UN's 55 two-digit commodity categories with the 5 broad relationships in Table 1 at the same time that we retain all the meaningful organizational variation that exists between commodity categories. In order to simplify our analyses, we take the sum of the three matrices within each category in Table 1 to produce five matrices representing each of the five types of relationships uncovered by Smith and Nemeth (1988) in 1965, 1980 and 2000.[4]

The 94 countries in our sample are representative of all world-regions, and contain a large number of less developed countries. Collectively, the sample accounts for between 92 and 98 percent of world GDP over time, between 96 and 99 percent of world trade over time, and roughly 80 percent of world population over time (see Table 2 for a list of included countries).[5]

4. Hypothesis testing: data and methods

4.1. Data

4.1.1. Dependent variable

The dependent variable in the regressions that follow is the standard annualized growth rate of per capita gross domestic product (GDP) for each country.

4.1.2. Independent variables

4.1.2.1. International division of labor/world-system position. We use indicators of core, semiperiphery and periphery that are identified in the categorical representation of our network analysis. This maximizes the comparability of this research with previous work (e.g. Snyder and Kick, 1979; Kick and Davis, 2001; Van Rossem, 1996; Nemeth and Smith, 1985).

4.1.3. World-system mobility

World-System mobility is derived from the continuous representation of our network analysis, and is defined below and in Table A2. Conceptually, this variable captures the change in distance between a focal non-core country and the center of the core group over time.

4.1.4. GDP per capita

Controlling for initial levels of GDP per capita has become fairly standard practice in neo-classical models of economic growth (e.g. Barro and Sala-i-Martin, 1995).

4.1.5. Human capital

Secondary education enrollment rates are seen as key determinants of growth insofar as they proxy for the cross-national variation in the stock of human capital (Barro and Sala-i-Martin, 1995).

[3] Given an $N \times N$ matrix where cell ij represents the export from actor i to actor j, one can use either actor i's reported exports, or actor j's reported imports to measure j's import from i, or equivalently, i's export to j. While export and import data are very highly correlated, reported imports tend to be more accurate because of the care taken by state agencies to record imports accurately for the purpose of tariffs (Durand, 1953). Thus, we use reported imports, measured in current US dollars, to measure both imports and exports between each country.

[4] By sum we mean $A_{ij}^{R} = \sum_{r=1}^{R} ij_r$, where r indexes the matrices in relation R.

[5] Two countries (Czechoslovakia and Yugoslavia) in our data set disintegrated over the period studied, and we imputed their values by either summing (in the case of trade and GDP) or averaging (in the case of percentage based attributes) across the newly formed constituent republics.

Table 1
UN commodity categories classified in relational categories from Smith and Nemeth (1988).

1) High tech/heavy manufacturing (HTHM)
58) Plastic materials, regenerated cellulose and artificial Resins
69) Manufactures of metal
71) Machinery–nonelectrical
2) Sophisticated extractive (SOEX)
25) Pulp and waste paper
34) Gas, natural and manufactured
64) Paper, paperboard, and manufactures thereof
3) Simple extractive (SIEX)
04) Cereal and cereal preparations
22) Oil seeds, oil nuts and oil kernels
41) Animal oils and fats
4) Low-wage/light manufactures (LWLM)
83) Travel bags, handbags, and similar containers
84) Clothing
85) Footwear
5) Animal products and byproducts (APAB)
01) Meat and meat preparations
02) Dairy products and bird's eggs
29) Crude animal and vegetable materials

4.1.6. Trade openness

Trade openness plays a dual role in this analysis. On one hand, trade openness captures either the effect of government induced open trade policy (IMF, 1997), the potential for trade openness to induce technology and knowledge transfer (Krueger, 1998), or the classic view of the efficiency promoting effects of producing/trading with respect to a country's comparative advantage (Ricardo, 1817). On the other hand, because our structural positions derive from trade, including trade openness also controls for the potential conflation bias between it and a country's structural position.

4.1.7. Population growth

It is also important to assess whether or not any slow economic growth we observe in non-core countries is an artifact of rapidly growing population because a high ratio of population growth to labor force growth slows down per capita growth by expanding the non-working age portion of the denominator faster than the working age portion can produce (Sheehey, 1996).

4.1.8. Regional/institutional variation

In addition to the standard growth covariates discussed above, we also integrate dummy variables to account for institutional and other unmeasurables that vary by region. We create indicators for Africa (excluding North Africa), Central and Eastern Europe, Latin America (comprised of Mexico, Central America, the Caribbean and South America), Middle East (including North African countries), the "West" (Western Europe and Maddison's (2001) "Western Offshoots"), and Asia (including East, South and Southeast Asia). Table A1 shows which countries are in which regions. Our decision to group western countries into a single category rather than separate regional groupings (North America, Western Europe and Oceania) is based on substantive considerations. First, geographical regions may be less than useful to capture meaningful institutional variation. For example, there is much reason to believe that the US and Germany have much more in common, institutionally, than do Mexico and the US, or Germany and Hungary, owing to commonalities such as long-term membership in the Organization for Cooperation and Development (OECD). Second, geographically based regional designations vary widely from one source to another (e.g. Kim and Shin, 2002, pp. 458–460; Taylor, 1988).

Correlations, descriptive statistics and data sources and further description appear in Tables A1 and A2 in the appendix.

4.2. Regression methods

In order to test the hypotheses identified above, we estimate regression models where economic growth is regressed on indicators for core and periphery, mobility and control variables. In order to enlarge the statistical power of our models, we pool the observations across two growth periods (1965–1980 and 1980–2000). Pooling these data allows us to account for omitted variables that vary across units but not over time (unit effects). The most conservative approach is the fixed effects model (FEM), which is equivalent to OLS estimates that include a series of dummy variables for N-1 units. Yet, research shows that "the results from fixed effects estimation are often found to be disappointing" when applied to growth models (Temple, 1999, p. 132).

Table 2
Country by IDL Equivalence Group and Region.

Country and rank in 1965	Group* 1965	1980	2000	Country and rank in 1965	Group* 1965	1980	2000
1 USA (W)	1	1	1	48 Chile (L)	4	3	3
2 France (W)	1	1	1	59 Panama (L)	4	3	4
3 Germany (W)	1	1	1	49 Costa Rica (L)	4	4	4
4 UK (W)	1	1	1	53 Peru (L)	4	4	4
5 Italy (W)	1	1	1	55 Honduras (L)	4	4	4
6 Japan (As)	1	1	1	58 Uruguay (L)	4	4	4
7 Netherlands (W)	1	1	1	60 Iran (ME)	4	4	4
9 Canada (W)	1	1	1	50 Nicaragua (L)	4	4	5
11 Belgium (W)	1	1	1	54 Malta (W)	4	4	5
8 Sweden (W)	1	1	2	61 Cote d'Ivoire (Af)	4	4	5
10 Switzerland (W)	1	2	2	62 Iceland (W)	4	4	5
21 Spain (W)	2	2	1	51 Venezuela (L)	4	5	4
12 Denmark (W)	2	2	2	63 Ecuador (L)	4	5	4
13 Austria (W)	2	2	2	52 Jamaica (L)	4	5	5
14 Czechoslovakia (CEE)	2	2	2	57 Senegal (Af)	4	5	5
15 Norway (W)	2	2	2	64 Senegal (Af)	4	5	5
16 Hong Kong (As)	2	2	2	65 Ethiopia (Af)	4	5	5
17 Finland (W)	2	2	2	66 Paraguay (L)	4	5	5
18 Australia (W)	2	2	2	56 Angola (Af)	4	6	6
19 Yugoslavia (CEE)	2	2	2	70 Cyprus (W)	5	4	4
20 India (As)	2	2	2	73 Sri Lanka (As)	5	4	5
22 Hungary (CEE)	2	2	2	78 Saudi Arabia (ME)	5	5	3
23 Portugal (W)	2	2	3	67 Kuwait (ME)	5	5	5
24 China (As)	3	2	2	68 Trinidad/Tobago (L)	5	5	5
25 Argentina (L)	3	2	2	71 Bahrain (ME)	5	5	5
26 Brazil (L)	3	2	2	72 Libya (ME)	5	5	5
29 Ireland (W)	3	2	2	74 Cameroon (Af)	5	5	5
32 Singapore (As)	3	2	2	75 Jordan (ME)	5	5	5
36 South Korea (As)	3	2	2	76 Barbados (LA)	5	5	5
28 New Zealand (W)	3	2	3	77 Bolivia (LA)	5	5	5
30 Malaysia (As)	3	3	2	69 Ghana (Af)	5	6	5
31 Mexico (L)	3	3	2	79 Zambia (Af)	5	6	6
37 Thailand (As)	3	3	2	91 Mauritius (Af)	6	5	5
27 Israel (ME)	3	3	3	80 Togo (Af)	6	5	6
34 Greece (W)	3	3	3	82 Benin (Af)	6	5	6
40 Philippines (As)	3	3	3	88 Qatar (ME)	6	6	5
41 Indonesia (As)	3	3	3	90 Brunei Darussalam (As)	6	6	5
33 Morocco (ME)	3	3	4	81 Congo, Dem Rep (Af)	6	6	6
42 Turkey (ME)	3	4	3	83 Malawi (Af)	6	6	6
35 Pakistan (ME)	3	4	4	84 Gabon (Af)	6	6	6
38 Egypt (ME)	3	4	4	85 Burkina Faso (Af)	6	6	6
39 Nigeria (Af)	3	4	5	86 Niger (Af)	6	6	6
44 Colombia (L)	4	3	4	87 Chad (Af)	6	6	6
45 Guatemala (L)	4	4	4	89 Mali (Af)	6	6	6
46 El Salvador (L)	4	4	4	92 Central African Republic (Af)	6	6	6
47 Tunisia (Af)	4	4	4	93 Gambia (Af)	6	6	6
43 Algeria (ME)	4	5	5	94 Samoa (As)	6	6	6

Notes: Countries arranged from highest to lowest in 1965.
* Group 1 = Core; Group 2 = Core-contenders; Group 3 = Upper-tier semiperiphery; Group 4 = Strong periphery; Group 5 = Weak Periphery; Group 6 = Weakest Periphery. For the regression analyses, Core = 1; Semiperiphery = 2 and 3; Periphery equals 4–6 and European Semiperiphery = 1 if a country is located both in either of 2 or 3 and Eastern or Western Europe. Af = Africa, As = Asia; CEE = Central and Eastern Europe; L = Latin America; ME = Middle East; W = West.

For example, while the FEM approach eliminates between country variation in the estimation of coefficients, most growth analysts are primarily interested in understanding how between country variation in some factor causes between country variation in growth. A byproduct of removing between case variation is that the consistency of the FEM approach is low in "short" panels, i.e. in panels where the ratio of cross-sectional observations to time-series observations is low (Halaby, 2004; Wooldridge, 2002) and they are unable to capture the effect of time invariant—or nearly invariant—covariates such as core, periphery and semiperiphery, which are perfectly, or near perfectly, collinear with the fixed effects. Thus, we follow Temple (1999) and include the regional level fixed effects described above, which are likely to capture much of the meaningful variation attributable to unit effects that tend to vary more between than within regions, while maintaining a greater degree of identifying variation on each side of the equation (Koop et al., 1995; Temple, 1999, p. 132).

Another type of omitted variable is one that varies over time but not over units (period effects). We include a period specific fixed effect for the first period (1965–1980) in order to control for this source of bias. Finally, pooled data of the type analyzed here are also often plagued with both heteroskedasticity and spatial contemporaneous autocorrelation. Thus, standard errors are obtained using panel corrected standard errors (Rogers, 1993). We also conduct robustness checks by estimating additional estimates of our final models using OLS estimates with lagged values of the structure covariates and a two-stage generalized methods of moments (GMM) equation that uses all available lagged values of mobility and structural position and the exogenous variables that appear in the model as instruments. In these models, standard errors are obtained with a heteroskedasticity consistent covariance matrix. Because these data may violate some standard assumptions of regression analysis such as independent observations and random sampling, we also estimated all models using bootstrap standard errors (Snijders and Borgatti, 1999), which were substantively identical. All regressions were carried out with Stata 11.0.

5. Results

5.1. The Structure of the IDL

Figs. 1–3 graph the first and second dimensions of our correspondence of regular equivalence on the *X* and *Y*-axis, respectively, with a six-group partition of our hierarchical clustering routine superimposed on top for each period.[6] In Figs. 1–3, adjacent actors are highly equivalent by our equivalence criterion, while distant actors are dissimilar, and the ellipses represent two-dimensional 95 percent confidence intervals centered on the mean *X* and *Y* coordinates of each hierarchical clustering group. Thus, the correspondence analysis gives a sense of the country-to-country equivalencies while the non over-lapping hierarchical clustering results identify groups of countries that are more or less equivalent.

The ubiquitous finding in previous role and position analyses of trade networks is that they are best characterized as core/periphery structures, in which central actors form a cohesive subgroup at the center of a network while peripheral actors are both less integrated over all and concentrate their ties with core countries (Snyder and Kick, 1979; Nemeth and Smith, 1985; Smith and White, 1992; Van Rossem, 1996; Mahutga, 2006; Lloyd et al., 2009). We anticipate and find the same type of structure here. For example, the first dimension (*X* axis) of our correspondence analysis explains 90.5, 93.5 and 96 percent of the country-to-country variation in regular equivalence in 1965, 1980 and 2000, which is consistent with previous research showing that a core/periphery structure will manifest high variation explained by the first dimension of correspondence analysis and similar scaling techniques (Borgatti and Everett, 1999; Boyd et al., 2010; Mahutga, 2006; Smith and White, 1992).

Second, the ordering of countries from right to left in Figure 1 provides an intuitive sense that the first dimension of our correspondence analysis is a continuous measure of ‘‘coreness'' in the world-system. As Table 2 documents, the group of countries to the far right (labeled group 1) includes the strongest countries in the world led by the United States. The next group to the left (group 2) is made up of some developed European countries, on one hand, and many of the more dynamic economies of the developing world, including China (by 1980), Hong Kong, India, along with Brazil, South Korea and Singapore (by 1980), on the other. The third group to the left (group 3) includes most of the rest of the more dynamic economies in the developing world, including Indonesia, Ireland, Malaysia, Thailand, Singapore, and Turkey (Amsden, 2001; Gereffi and Wyman, 1990). At the other extreme, countries located on the left hand side of Figure 1 (groups 4–6) include poor countries commonly associated with the periphery, such as Central African Republic, Malawi, Samoa, Bahrain, Jordan, Bolivia and Trinidad and Tobago. The wealthiest countries in this region of the graph turn out to be major oil producing countries, such as Saudi Arabia, Kuwait and Libya. Thus, the spatial placement of countries along the X axis of Figure 1 thus suggests that countries are increasingly ‘‘core like'' as they move from left to right.

Provisionally, then, we labeled these groups accordingly: the group we labeled core in Figures 1–3 is the most extreme group on the right hand side. There are two groups between the core and the origin that we've labeled (2) core-contenders and (3) upper-tier semiperiphery. Our fourth group—the strong periphery—is at or below the origin, and the two lowest groups—(5) weak periphery and (6) weakest periphery—correspond to an increasing distance from the core. Buttressing our classification of country positions, Table 3 describes the average relational patterns, productivity and export specialization for each group of countries. The first two columns of Table 3 report the average out-degree (number of export partners) and in-degree (number of import partners) for each group. These averages are entirely consistent with the notion of a core/periphery structure: core actors have the highest out-degree and in-degree of any group across all three-time periods because they interact with members of all other groups, while the number of import and export partners decreases as positions become more peripheral. The second two columns report the average export market and import dependency on the focal group by those below it, and show that countries in positions outside of the core tend to be dependent upon the core for both export markets and imports.

The fifth, sixth and seventh columns of Table 3 describe the productivity and pattern of export specialization for each group. As column five shows, the core group has the highest GDP per capita, followed by the core-contenders and upper-tier semiperiphery. While the relationship is more or less monotonic, the average GDP per capita is higher for the weak and weakest

[6] The hierarchical clustering solution provides a decreasing number of larger groups as the level of regular equivalence moves from high to low values. We selected a six-group partition in each year because those with a larger number of groups were simply splitting off a small number of countries from the larger group of six at each increase in regular equivalence. For example, in 1965, a seven group partition would include the six we report plus a seventh singleton consisting of China; in 1980, a seven group partition would include the six we report plus a singleton seventh group consisting of Chad; in 2000 a seven group partition would include the six we report plus a two-country seventh group consisting of Malawi and Samoa.

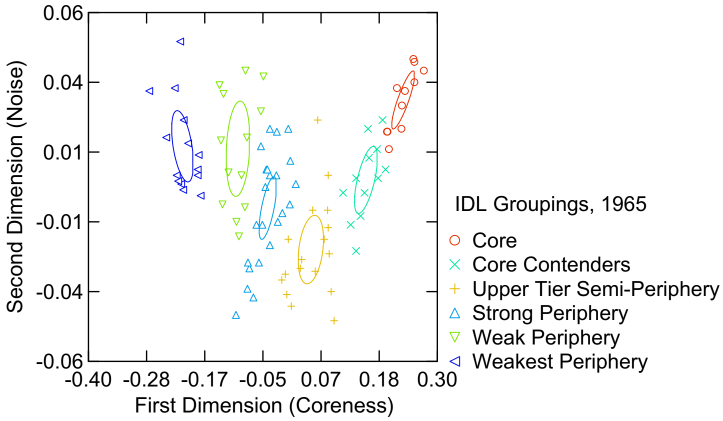

Fig. 1. Superimposition of hierarchical clustering and correspondence analysis of regular equivalencies, 1965.

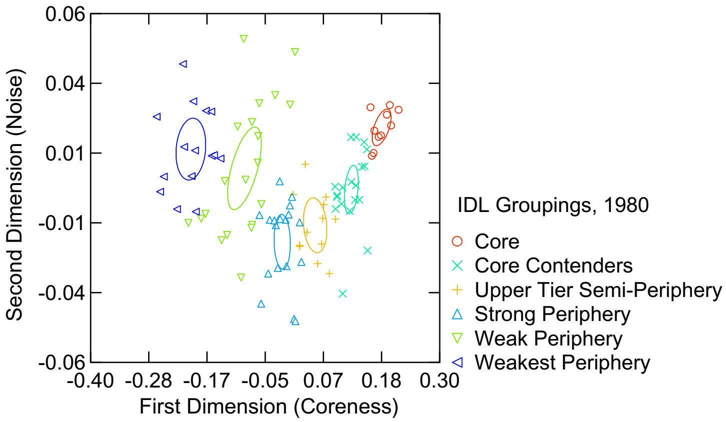

Fig. 2. Superimposition of hierarchical clustering and correspondence analysis of regular equivalencies, 1980.

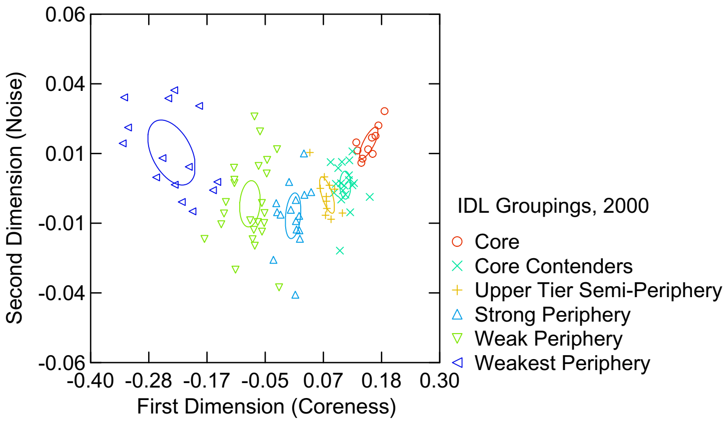

Fig. 3. Superimposition of hierarchical clustering and correspondence analysis of regular equivalencies, 2000.

periphery than one might expect because they contain the major oil producers (see Table 2) and therefore have higher per capita output than might be predicted by their position alone. Column six reports the trade relation from Table 1 in which the highest percentage of the focal group's exports resides. The core group primarily exports the high technology and heavy manufacturing (HTHM) category in all periods. In 1965, the major category for all other groups consists of primary goods—simple extractive goods (SIEX) for the upper-tier semiperiphery and weak and weakest periphery and animal products (ANIM) for the core

Table 3
Descriptive statistics of the international division of labor, 1965–2000.

	Network characteristics		Dependence of lower groups on row group		Productivity and export specialization		
	Out-degree[a]	In-degree[a]	Export market[b]	Import[c]	GDPpc	Category[d]	PRODY[e]
1965							
Core	92	76	56.9	48.3	11461	(1) HTHM	8768
Core contenders	82	51	10.2	43.9	6556	(5) APAB	5031
Upper-tier semiperiphery	53	45	9	2.4	3822	(3) SIEX	4918
Strong periphery	30	40	5.1	1	3519	(5) APAB	5031
Weak periphery	23	39	1.7	1.6	4615	(3) SIEX	4918
Weakest periphery	12	29	N/A	N/A	4799	(3) SIEX	4918
1980							
Core	92	86	82.4	86.3	16756	(1) HTHM	12461
Core-contenders	86	60	6.9	9	10926	(1) HTHM	12461
Upper-tier semiperiphery	66	55	1.3	3.3	5903	(4) LWLM	7075
Strong periphery	45	46	1.2	1.1	4555	(4) LWLM	7075
Weak periphery	30	50	0.2	0.5	5047	(2) SOEX	6348
Weakest periphery	18	38	N/A	N/A	5656	(2) SOEX	6348
2000							
Core	92	91	75.9	75.2	24643	(1) HTHM	15995
Core contenders	90	81	10.4	14.4	17134	(1) HTHM	15995
Upper-tier semiperiphery	83	77	7.2	5.7	10221	(1) HTHM	15995
Strong periphery	70	65	1.4	2.6	5472	(4) LWLM	8857
Weak periphery	54	60	8.4	2.7	6580	(2) SOEX	7847
Weakest periphery	36	49	N/A	N/A	1697	(2) SOEX	7847

Notes: All statistics are group-wise averages.
[a] Out-degree and in-degree are calculated on the sum of the 15 categories where $ij = 1$ if there was any export or import between i and j on any relation.
[b] Export market is the average percent of lower group exports accounted for by focal group's imports.
[c] Import is average percent of lower group imports accounted for by focal group's exports.
[d] Letters are abbreviations of 5 relations in Table 1.
[e] PRODY is the weighted average of the GDPpc (1996 international dollars) of countries exporting the focal group's primary export product category (Hausmann et al., 2007).

contenders and strong periphery. However, by 1980 the core contenders made a shift into HTHM, the upper-tier semiperiphery and strong periphery made a shift into low-wage light manufacturing (LWLM) and the remaining two peripheral groups continued to export primary goods. By 2000, the core, core-contenders and upper-tier semiperiphery all exported primarily HTHM while the periphery exported either LWLM or primary goods. Column 7 reports the category's associated productivity level (PRODY) in each year, which is "a weighted average of the per capita GDPs of countries exporting a given product" that we calculated with the average trade and GDPpc of each group (Hausmann et al., 2007: 9). The PRODY values for each group's primary export category decrease as positions become more peripheral, suggesting that positions toward the top of the hierarchy also tend to export the more productive commodity bundles. In short, these results suggest that our role-position analysis identifies the extent to which countries occupy more or less core-like positions in the IDL.

5.2. The Structure of the IDL and Economic Growth

[Table 4: Average yearly GDP per capita growth by group, about here]

Table 4 reports the average economic growth rate for each of our six groups from 1965 to 1980, and 1980 to 2000. Table 4 suggests two conjectures. First, in neither period was the greatest economic growth in the core. Rather, the most rapidly growing countries are found in our core-contending and upper-tier semi-peripheral groups. In fact, the already high growth observed in our core-contending group is actually attenuated by the inclusion of the already wealthy/developed European countries in the second period, in which the average growth for the non-European core contenders was 5.23 percent per year. Second, our three peripheral groups grow the slowest in both periods, two had less than 1 percent annual growth in the second period, and one had *negative* growth in the second period.

Table 5 reports the unstandardized regression coefficients for a baseline regression of economic growth on the core, periphery and temporal fixed effects in order to assess the significance of these relative growth rates.[7] As model 1 shows, the semiperiphery grows significantly faster than does the periphery, but the growth deficit between the core and semiperiphery is just under significance at the conventional 0.05 level ($p < 0.06$). As discussed above, the semi-peripheral group's growth is somewhat slowed by the inclusion of the western European semiperiphery. Thus, model 2 controls for this group of countries, which increases

[7] We combine the subgroups within the semiperiphery and periphery into single indicators for two reasons. First, the small number of countries in some of the groups increases the standard error for the difference between their growth and a comparison group asymptotically, which raises the probability of a type II error. Second, preliminary analyses reveal that there were not significant growth differences between any of the semi-peripheral or peripheral groups, but rather that the differences were between the major categories.

Table 4
Average yearly GDP per capita growth by group.

Major group	Minor group	Growth 1965–1980	1980–2000
Core	Core	3.715	2.605
Semiperiphery	Core-contenders	4.250	3.545
	Upper-tier semiperiphery	5.298	2.745
Periphery	Strong periphery	2.448	1.379
	Weak periphery	3.025	−0.091
	Weakest periphery	1.732	0.074

Table 5
Unstandardized coefficients from regression of economic growth on select independent variables.

	1	2	3
Structure[a]			
Core	−0.902	−1.280*	−2.739***
	(0.581)	(0.707)	(0.844)
Periphery	−2.628***	−3.007***	−1.428*
	(0.581)	(0.704)	(0.691)
European semiperiphery	–	−1.383*	−2.802***
		(0.761)	(0.824)
Institutional/regional fixed effects[b]			
West	–	–	−0.790
			(0.862)
Africa	–	–	−2.952**
			(1.102)
Middle East	–	–	−2.498**
			(0.991)
Central and Eastern Europe	–	–	−4.474***
			(0.987)
Latin America	–	–	−2.875***
			(0.871)
Neo-classical growth model			
Initial GDP per capita	–	–	−0.382
			(1.060)
Human capital	–	–	.003
			(0.018)
Trade openness	–	–	−0.013**
			(0.005)
Population growth	–	–	−0.738**
			(0.306)
Temporal fixed effects			
1965–1980	1.738***	1.693***	1.564***
	(0.381)	(0.384)	(0.393)
Constant	3.178***	3.579***	8.488**
	(0.519)	(0.656)	(3.272)
R^2	0.212	0.224	0.415
N	188	188	188

Notes: Numbers in parentheses are panel corrected standard errors.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$ (one-tailed test).
[a] Semiperiphery is the excluded category.
[b] Asia is the excluded category.

the growth difference between the semiperiphery and both the core and periphery, which are both in the expected direction and significant at conventional levels. Model 3 includes all of the control variables. Compared to Asia, all but the West show slower growth, and both trade openness and population growth have a significantly negative association with economic growth. More importantly, model 3 shows that the significant difference between the growth rates of the semiperiphery and both the core and periphery holds net of the additional controls. Models 1–3 support the non-linear hypothesis discussed above.

5.3. Structural Convergence/Divergence in the International Division of Labor

The final stage of this analysis assesses the competing claims about the effect of IDL mobility on growth, and whether or not differential patterns of mobility explain the growth divergence between the semiperiphery and periphery observed above. In order to quantify the mobility of a country to/from the core group, we start by measuring the distance between

Table 6
Structural convergence/divergence.

Major group	Minor group	Mobility	
		1965–1980	1980–2000
Semiperiphery	Core-contenders	0.059	0.027
	Upper-tier semiperiphery	0.126	0.178
Periphery	Strong periphery	−**0.056**	−**0.021**
	Weak periphery	−**0.034**	−**0.005**
	Weakest periphery	−**0.083**	−**0.095**

Notes: Mobility measured with the average of equation 3 for each group minus the period specific mean, excluding outliers.

it and the center of the core group with $d_{it} = \bar{x}_{ct} - x_{it}$, where $\bar{x}_{ct}$ is the average first dimensional coordinate for all core countries at time *t*, and x_{it} is the first dimensional coordinate for country *i* at time *t*.[8] We use this distance measure to gauge the mobility of each non-core country over time with the following equation:

$$u_{ik} = \frac{(d_{it} - d_{i(t+1)})}{d_{it}}, \tag{1}$$

were *k* indexes the period between t and t + 1. Thus, mobility is the distance traveled toward/away from the center of the core group as a proportion of the maximum distance a country would travel if it reached the core.

As Table 6 shows, the vast majority of upward mobility accrues to the semi-peripheral positions, which are significantly more mobile than peripheral countries on average.[9] Excluding the developed Eastern and Western European countries from our core-contending group significantly increases the average mobility score.[10] When combined with the changing export specializations reported in Table 3, these patterns of mobility support Arrighi et al's (2003) contention that upward mobility creates greater competition among "core" activities because the number of countries specializing in HTHM increased from 11 (1965) to 40 (2000) as these two semi-peripheral groups upgraded their export specialization. However, the apparent close association between group-wise mobility and growth also suggests that moving up from primary product specialization in 1965 through light manufacturing in 1980 and onto high tech/heavy manufacturing (core contenders by 1980 and whole semiperiphery by 2000) may be a key mechanism explaining the rapid growth of the semiperiphery. Indeed, the lowest performing countries either continue to be locked into extractive product export (the weak and weakest periphery) or low wage/light manufacturing (the strong periphery) throughout the period. Thus, these patterns provide an opportunity to test two of the hypotheses discussed above—the null hypothesis that upward mobility is ineffective for development because it creates greater competition, and the alternative hypothesis that upward mobility is conducive to growth but concentrated among countries at intermediate structural positions.

In order to test this hypothesis, Table 7 reports results of regressions of economic growth on mobility, the periphery and the control model from above. Model 4 reproduces the full model in Table 5 (model 3) for the non-core countries in our sample in order to rule out potential sampling effects induced by the exclusion of core countries, which produces substantively identical results. If the divergent growth between the semiperiphery and the periphery is a function of the greater upward mobility of the former, we would expect the negative effect of the periphery to drop out after controlling for mobility. As model 5 shows, this is exactly the case as mobility retains its positive significance while the negative effect of the periphery becomes insignificant.

While model 6 suggests that the semiperiphery's greater propensity for upward mobility explains its higher growth than the periphery, it is possible that the direction of causation also works in the opposite direction from growth to mobility if investing/offshoring transnational firms are selecting high growth countries, a classic case of the simultaneity form of endogeneity bias. As a result, we provide robustness checks across two additional estimators. The first approach (lagged OLS, models 6 and 7) uses the lagged values of mobility and the periphery as an instrument for their contemporaneous values with the intuition that past investment/offshoring decisions cannot be made on the basis of future growth. These estimates are entirely consistent with those in Table 7. The second approach implements generalized method of moments instrumental variables regression (GMMIV). The GMMIV models (models 8 and 9) are implemented in two stages. In the first stage, mobility and the periphery dummy variable are regressed on lagged values of mobility, the periphery and contemporaneous values of the other modeled exogenous variables in the first stage. In the second stage, the predicted values of mobility and the periphery obtained from the two first stage regressions are used as instruments for mobility and the periphery. Like the other two approaches, these results are substantively identical to those presented in Table 7 above.

[8] This corresponds to an alternative operationalization alluded to by Borgatti and Everett (1999) "In a Euclidean representation, ["peripheralness"] would correspond to distance from the centroid of a single point cloud" (Borgatti and Everett, 1999, p. 387, also see Boyd et al., 2006; Boyd et al., 2010).

[9] $E(u|k)$ has been subtracted from the group-wise mobility figures in Table 6. While this is constant across cases within periods and therefore has no bearing on the regression coefficients that follow, it identifies upwardly mobile individual countries net of the "density effect" (see Butts (2006) and Mahutga (2006) for a full discussion) for presentation purposes. In order to make sure that outliers did not unduly influence our summary measure for each group, we utilized the applications available in SYSTAT to identify outliers and influential cases. We found several outliers: in the 1965–1980 period, we found one positive outlier (Spain) from group 2, and two negative outliers: Angola from group 4, and Zambia from group 5. In the 1980–2000 period, we found 2 positive outliers: Indonesia from group 3, and Turkey from group 4, and one negative outlier (Malawi) from group 6. The substantive interpretations were generally the same with or without the outliers included.

[10] The average upward mobility for our non-European core contenders in the 1965–2000 period is 0.418, while that observed in 1980–2000 is 0.272. On the other hand, the developed, European core-contenders display downward mobility in both periods, which is consistent with a picture of the two groups switching places in the overall distribution of "coreness."

Table 7
Unstandardized coefficients from regression of economic growth on mobility and select independent variables, 1965–2000.

	OLS		Lagged OLS		GMMIV	
	4	5	6	7	8	9
Structure[a]						
Mobility	–	3.293**	–	4.193***	–	8.177***
		(1.160)		(1.241)		(2.570)
Periphery	−1.426*	−0.874	−1.833*	−0.984	−2.723*	−0.294
	(0.694)	(0.617)	(0.860)	(0.768)	(1.216)	(1.368)
European semiperiphery	−2.840***	−1.886*	−4.432***	−3.243**	−3.244*	−1.725
	(0.832)	(0.867)	(1.119)	(1.092)	(1.293)	(1.856)
Institutional/regional fixed effects[b]						
West	−0.862	−0.930	−0.377	−0.397	−1.705	−2.357*
	(0.869)	(0.819)	(1.145)	(1.057)	(1.523)	(1.107)
Africa	−2.903**	−2.160*	−2.059	−1.588	−1.454	−0.415
	(1.103)	(1.067)	(1.369)	(1.282)	(1.382)	(1.004)
Middle East	−2.428**	−1.975*	−1.917	−1.375	−1.399	−1.833
	(0.994)	(0.972)	(1.479)	(1.480)	(1.512)	(1.183)
Central and Eastern Europe	−4.543***	−3.439***	−7.772***	−6.018***	−6.018***	−3.751*
	(0.989)	(1.037)	(1.822)	(1.723)	(1.718)	(2.083)
Latin America	−2.906***	−2.750***	−3.684***	−3.555***	−3.487***	−3.555***
	(0.874)	(0.839)	(0.976)	(0.947)	(1.003)	(0.771)
Neo-classical growth model						
Initial GDP per capita	−0.197	−0.078	0.360	0.327	0.376	0.687
	(1.085)	(1.026)	(1.449)	(1.361)	(1.336)	(1.145)
Human capital	0.000	0.003	−0.014	−0.016	−0.009	0.002
	(0.019)	(0.018)	(0.024)	(0.024)	(0.022)	(0.023)
Trade openness	−0.013**	−0.011**	−0.017**	−0.014**	−0.016**	−0.013*
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)
Population growth	−0.809**	−0.854**	−1.495***	−1.478***	−1.501***	−1.501***
	(0.311)	(0.290)	(0.446)	(0.411)	(0.395)	(0.302)
Temporal fixed effects						
1965–1980	1.611***	1.781***	–	–	–	–
	(0.421)	(0.428)				
Constant	8.058**	6.687*	8.646	7.696	8.769*	4.746
	(3.321)	(3.118)	(4.770)	(4.071)	(4.395)	(3.726)
Difference in Sargan C	–	–	–	–	2.688	4.816†
R^2	0.420	0.455	0.522	0.579	0.518	0.519
N	167[c]	167[c]	83[c]	83[c]	83[c]	83[c]

Notes: Numbers in parentheses are panel corrected standard errors.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$ (one-tailed test).
† $p < 0.10$ (χ^2 distribution).
[a] Semiperiphery is the excluded category.
[b] Asia is the excluded category.
[c] Core countries are excluded.

The robust effects of models 6 through 9 provide exceptionally strong evidence of the explanatory value of structural position and change, given their high level of saturation with a case to regressor ratio of less than seven. Moreover, they also increase the magnitude of mobility's effect on growth. The standardized coefficient for mobility in model 5 in Table 7 is 0.211, which increases to 0.300 for lagged mobility (model 7) and 0.591 for the GMMIV estimates (model 9). The difference in Sargan C statistic tests the null hypothesis that the instrumented variables are exogenous, and provides only modest evidence against the hypothesis. Thus, not only do the standardized coefficients suggest that the effect of mobility is substantively significant, in combination with the endogeneity tests they also suggest that, if present, simultaneity tends to create attenuation bias and thus work against significant coefficients in Table 7. Moreover, the standardized coefficients suggest that mobility is a *substantively* significant explanatory variable in these models. Of the neo-classical control variables included, only population growth produced a larger standardized coefficient than mobility, and even this relationship only holds for models 5 (−0.321) and 7 (−0.567) but not 9 (−0.575).

6. Conclusion

Debates about the impact of the structure of the world-economy on economic development are central to a sociological understanding of the wealth and poverty of nations. We summarize these debates as consisting of a fairly pessimistic view predicting a positive and monotonic relationship between structure and growth, and a more optimistic but temporally bounded view predicting a non-linear association between structure and growth. We juxtapose these structural hypotheses with the classic economic thinking of an "enhanced welfare" view of the IDL in which what matters is a country's ability to adjust its productive activity according to its comparative advantage (Ricardo, [1817] 2004) or resource and factor endowments (Smith, [1776] 2003; Wood, 1994). Moreover, we identified two contending arguments about mobility in the IDL, one claiming that it is unlikely or unrelated to development and the other claiming that it is positively related to development but more likely among countries in the middle of the IDL.

Our results tell us several things about the veracity of these claims. First, our findings are inconsistent both with the "enhanced welfare" view of the IDL and the more pessimistic view that rapid growth is geographically concentrated in the core. Rather, the most rapid economic growth accrues to countries at intermediate positions, at least in the last three and a half decades of the twentieth century. The semiperiphery is converging toward the core's level of income but diverging from that of the periphery, which seems to be stuck in stagnant positions. Second, our mobility analyses suggest that the semiperiphery is also converging toward the core in terms of the structure of its productive forces, but diverging from the periphery where the latter continued to export either primary or low-wage light manufacturing goods through 2000. Moreover, the observed growth divergence between the periphery and semiperiphery appears to be a function of the greater propensity for upward mobility enjoyed by countries in the middle of the IDL *vis-à-vis* their peripheral counterparts. These findings suggest that upward mobility is a viable path toward development, but countries in the middle of the IDL also share significant advantages over their peripheral counterparts with respect to upward mobility.

At the same time, casual observation implies that an active state played a predominant role in the success stories of our sample. The top five upwardly mobile countries—(1) China, (2) Spain, (3) Thailand, (4) South Korea and (5) Indonesia—are exemplars of state led development. Moreover, these cases also illustrate the efficacy of state involvement when it is oriented toward improving the economy's overall position in the international division of labor (Abbot, 2003; Evans, 1979a, 1995; Gereffi, 2009), a dynamic that is receiving increasing attention across the social sciences (Chang, 2007; Kozul-Wright and Rayment, 2007; Reinert, 2007). Our results, when coupled with these analyses, suggest a policy script that subsidizes "initial entrants in new activities" that are concentrated in higher positions of the IDL (Hausmann et al., 2007: 23). However, these states were all positioned within one of the two semi-peripheral groupings early on. Thus, while we argue that the structural of the world-economy systematically favors some and not others, it is also likely that the structure simply sets broad constraints within which there is a significant degree of agency for social actors to improve upon the country's position, so long as these actors are attuned to the strengths and weaknesses such a position entails.

More importantly, however, this paper speaks to the value of research oriented to identifying the role played by world-economic structure in the centuries long cross-national variation in income levels. Indeed, there is a growing awareness in the social sciences that factors associated with a country's position in the IDL do matter for economic growth, including the "quality of its export basket" (Hausumann et al., 2007) or its location in the "product space" (Hidalgo et al., 2007). We contribute to this growing awareness by showing that upward mobility in the IDL is a real (if incomplete) path to growth, suggesting that its determinants should become a subject of future research. Indeed, studies of the determinants to industrial upgrading at the level of the nation-state promise to create dialogue across the disciplinary divides that currently exist in the study of political economy.

Appendix

Table A1
Correlation Coefficients for Variables Included in Analyses.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Economic growth																
2 Core	0.077															
3 Semiperiphery	0.337	−0.249														
4 Periphery	−0.368	−0.399	−0.789													
5 European semiperiphery	0.040	−0.112	0.450	−0.355												
6 Mobility	0.383	–	0.255	−0.255	−0.197											
7 GDP per capita	0.039	0.426	0.140	−0.403	0.318	0.011										
8 Secondary education enrollment	0.128	0.425	0.257	−0.513	0.366	0.021	0.751									
9 Trade openness	−0.209	0.004	0.001	−0.003	−0.134	−0.041	0.027	0.037								
10 Population growth	−0.304	−0.392	−0.298	0.531	−0.363	−0.009	−0.343	−0.586	−0.011							
11 West	0.147	0.651	0.130	−0.536	0.402	−0.021	0.577	0.603	0.028	−0.561						
12 Asia	0.474	−0.035	0.342	−0.302	−0.121	0.430	−0.099	0.037	−0.096	0.012	−0.132					
13 Africa	−0.261	−0.184	−0.337	0.436	−0.164	−0.290	−0.553	−0.507	0.154	0.306	−0.283	−0.199				
14 Middle East	−0.187	−0.148	−0.135	0.222	−0.132	−0.046	−0.016	−0.122	0.005	0.457	−0.157	−0.160	−0.218			
15 Central and Eastern Europe	−0.041	−0.064	0.259	−0.204	0.154	−0.201	0.048	0.156	−0.067	−0.232	−0.099	−0.070	−0.094	−0.076		
16 Latin America	−0.110	−0.184	−0.116	0.227	−0.164	0.133	0.037	−0.123	−0.092	0.034	−0.283	−0.199	−0.270	−0.218	−0.094	
17 1965–1980	0.269	0.017	0.000	−0.011	−0.056	0.001	−0.182	−0.390	−0.338	0.132	–	–	–	–	–	–
Mean	2.479	0.112	0.330	0.559	0.090	0.000	3.611	41.870	61.233	1.964	–	–	–	–	–	–
SD	3.274	0.316	0.471	0.498	0.288	0.237	0.428	28.572	38.567	1.255	–	–	–	–	–	–

Table A2
Variable Measurement and Source.

Variable	Measurement	Source
Position in the IDL	Role and position analysis of five matrices at each period. Each of the five $N \times N$ matrices were obtained by cell wise summation of the three UN classified commodity groups within the five broad relational categories of Smith and Nemeth (1988) in Table 1	UN COMTRADE
Mobility in the IDL	Change in distance from core group as a percent of initial distance, minus the global average for each period	Correspondence analysis of regular equivalence matrix obtained from UN COMTRADE data
Economic Growth	Gross domestic product per capita adjusted to achieve purchasing power parity (PPP). Growth measured as a percent change: $(GDPpc_{t1}–GDPpc_{to})/GDPpc_{to}Year_{t1}–Year_{t0}$	The majority of these data (83%) come from the Penn World Tables (Heston et al., 2002), and the remaining 17% of missing cases were obtained from Milanovich (2005) and the Total economy database. Growth rates are highly correlated across GDP per capita sources. Nonetheless, auxiliary analyses including dummy variable for source rule out bias owing to data source
Initial GDP per capita	Gross domestic product per capita adjusted to achieve purchasing power parity (PPP), logged for skew with the base 10 logarithm.	See economic growth
Human capital	Students enrolled in secondary education/school aged population	World Bank (2006), UN Statistical Yearbook (Various Years)
Trade openness	(Imports + exports)/GDP	IMF (2006)/World Bank (2006)
Population growth	$Population_{t2}–population_{t1}$	World Bank (2006)
Institutional/ regional variation	Dummy variables for West, Asia, Africa, Central and Eastern Europe, Latin America, and the Middle East	Regional placements appear in Table A1

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