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Globalization and International Student Mobility: A Network Analysis¹

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Much research in comparative and international education seeks to understand globalization through policy, investigating how policies and entire policy discourses move from country to country, from “the global to “the local,” from the “North” to the “South,” or the “South” to the “South” (Arnové, 1999; Chisholm, 2009; Steiner-Khamsi, 2004). While justified by magnitude and significance of global policy initiatives, this focus has precluded discussion of other key global trends and processes. In this paper, I seek to better understand the globalization of education by analyzing changes in international student mobility in higher education. Flows of international students have become immense – exceeding 3 million in 2009 (UNESCO Institute for Statistics, 2011), but more importantly these flows constitute and reflect larger global relationships of knowledge production, transfer and circulation.

I use network analysis techniques to examine how international student flows have changed over a ten-year time period (1999-2008). This perspective involves a trade-off between breadth and depth. On one hand, quantitative data on international students exclude many essential features of globalization (i.e. identity and culture). While data do not portray the “imaginative regimes that make globalization possible” (Carney, 2009:64), they are not far beneath the surface: the notion of individuals pursuing education abroad is predicated on increased levels of interconnectivity, self-determination and risk, all hallmarks of globalization and the culture of late modernity (Appadurai, 1996; Giddens, 1991). On the other hand, data offer extensive insight on one aspect of globalization and how it is changing. There is immense complexity to the international student network: millions of students make autonomous choices about their international study, picking from thousands of courses of study, motivated by any number of peer, family, economic and cultural influences, yet in this complexity there are clear trends. By concentrating less *on* nation-states and more on the connections *between* them, the use of a network perspective allows for a sophisticated understanding of these trends. Through a dialog with theory, the analysis also speaks to larger global processes and flows across points of fixity (Robertson, 2011a).

I begin by offering some context on international student mobility, including its rapid growth in recent years (more thorough treatments of the context are available elsewhere, e.g. Gürüz, 2008; IOM, 2008; UNESCO Institute for Statistics, 2009). I then discuss theoretical perspectives on globalization and their implications for international student mobility in section two. The third section of the paper describes the dataset and network analysis techniques utilized. I then present findings from the analysis in section four, and discuss their significance in section five.

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The Rise of International Student Mobility

Between 1950 and 2009 internationally mobile students increased from 107,000 to 3.4 million; approximately half of this growth was in the last decade (Barnett and Wu, 1995; UNESCO Institute for Statistics, 2011). Much literature situates international student mobility in the context of the “global knowledge economy” or “information society” in which an increasing share of economic and social life centers on the exchange of information or intellectual property rather than goods (Bell, 1974; Gürüz, 2008; IOM, 2008). In this perspective, the rise of international student mobility is associated with an increased demand for technical, specialized, post-secondary education that prompts students to go abroad in search of educational opportunities that are better than those available to them in their home country. However, the history of international student mobility is significantly longer and more complex, reaching back to medieval universities (Rivza and Teichler, 2007:459). Additionally, the reasons for its growth are complex and multifaceted. For instance, international student enrollment played an important role in United States’ foreign policy during the Cold War. Providing higher education to students from non-aligned countries asserted and maintained American supremacy as a producer of knowledge, created a generation of educated elites with favorable ties to the United States, and provided a skilled labor force that contributed to growth in strategically important areas (Altbach, 2004:9; Brown and Lauder, 2006).

More recently, the transformation of welfare states into “workfare post-national regimes” (Robertson, Bonal and Dale, 2002:477) has created a context that favors increased levels of student mobility. While the former viewed higher education as a public good and funded it accordingly (although often for relatively few), the latter recast higher education as a commodity that primarily benefits individuals, requiring that they pay an increasing share of the cost (Portnoi, Bagley and Rust, 2010). With a decline in state funding, enrollment of “full fee” international students became an important source of revenue of many universities (IOM, 2008; Shin, Welch and Bagnall, 1999). Commodification also made the sector amendable to global free trade (de)regulation, a transformation that was supported by the World Trade Organization’s (WTO) General Agreement on Trade in Services (GATS). This liberalization was accompanied by increasing levels of internationalization across the higher education sector, evident in the establishment of international branch campuses, offshore delivery models, twinning, franchising, “migration of academic talent”, and international research collaboration (Altbach, 2004:15; Welch, 2002).

Despite increased levels of competition and connectivity, international student flows are often characterized as having a strong “South” to “North” polarity (Altbach 2004:16; IOM, 2008). English speaking countries in the “North” are particularly prevalent as a destination of international student enrollment: five predominantly English-speaking countries (the USA, United Kingdom, Canada, Australia and New Zealand), enrolled 47% of all international students in 2003 (Böhm et al., 2004). However, some evidence suggests that this is changing: growth rates in incoming students to China, Japan and Southeast Asia has dramatically outpaced that of established destinations (Shields and Edwards, 2010; Welch, 2010).

Theorizing International Student Mobility

In this section, I discuss theoretical perspectives on the globalization and highlight their implications for international student mobility. As student flows are highly complex (involving millions of individuals moving throughout the world), their analysis gains clarity when put in dialog with an explicit theoretical framework that establishes key criteria for analysis. For the purposes of this study, I distinguish between three broad theoretical perspectives that make competing claims about globalization and its relationship with student flows: (1) competition and neoliberalism, (2) critical theories, and (3) new institutionalism and world culture. This classification is not exhaustive: there is some overlap between categories and considerable diversity of viewpoints within them. However, it offers clear and distinct criteria for analysis, which are discussed at the end of this section.

Competition and Neoliberalism

The globalization of higher education is often interpreted as a phenomenon of neoliberalism, which emphasizes increased global competition through the removal of protective policies and the implementation of global and regional *laissez-faire* trade regimes (e.g. the World Trade Organization and the North American Free Trade Agreement). This focus on competition dominates policy discourses at both the national and international levels (e.g. OECD, 2008; Salmi, 2009; UK Department for Business Innovation and Skills, 2009; World Bank, 2003), and much academic literature implicitly accepts the neoliberal categories of competition, rational choice and the knowledge economy.

Neoliberal perspectives associate globalization with the advent of a post-capitalist knowledge economy in which economic value derives primarily from the production of intellectual property (Bell, 1974; Drucker, 1993). The labor market of this knowledge economy is global in scope: with increased access to information technology throughout the world, labor can be sourced wherever it is cost-effective, creating further competition for employment and, in many cases, increased opportunities. This competition results in de-territorialization and a decline in the power of the nation-state (Ohmae, 1996); as a result the geographical advantage and benefits of residency in high-income countries disappear. While sharing an emphasis on competition and rational choice, the form of neoliberalism articulated in knowledge economy discourses differs from that in the field of international relations (e.g. Keohane and Nye, 1977) in this respect, as the latter views the nation-state as a strong, autonomous actor.

As the labor force is globalized, so is the formation of human capital: guided by the “invisible hand” of market forces, individual rational actors will gravitate towards educational investments that most efficiently produce desired outcomes, including studying abroad. A recent report from the International Organization for Migration describes this highly rationalized calculation as follows:

The choice of a host establishment by foreign students and their families may be viewed as the outcome of an assessment of the monetary and non-monetary costs of studying abroad, and the monetary and non-monetary benefits that students (and their families) hope to reap from it (IOM, 2008:112).

As individuals' decisions regarding higher education hinge on a calculation of their own future economic prospects, the nation-state has little need to intervene, and therefore minimizes (or absolves) its involvement in higher education. Without the support of a nationally planned, funded and coordinated system of higher education, institutions (i.e. universities) become largely autonomous actors that compete with one another in the global higher education market, as seen in the increased emphasis on global university rankings (Marginson, 2010). As all students pay the full cost of their education, the distinction between home and international students erodes. Ultimately, the landscape of higher education becomes "borderless" (Middlehurst, 2001) as institutions compete globally for student enrollment.

Critical Theories

A wide range of critical theories (e.g. world systems analysis, neo-Marxism, and post-structuralism) claim that the primary drivers of globalization are power and hegemony. While the diverse theories within this category differ in many respects, they would all reject notions that global processes are essentially egalitarian and consensual. For example, world-systems analysis transposes the Marxist struggle between labor and capital from a national to a global level (Arnove, 2009; Clayton 2004). The nation-state is not usurped, but put into a state of paradox: on one hand, capital seeks to escape the regulatory confines of the nation-state in order to accrue value, while on the other hand it relies on the state as a point of fixity to realize these profits (Robertson, Bonal, and Dale, 2002). This paradoxical status gives rise to a set of self-contradictory policy discourses (or "policyscapes") in which "the state itself has been identified as the problem" and therefore seeks to rationalize its own dismantling (Carney, 2009:72).

Neo-Marxist analyses reject the notion of an egalitarian, post-capitalist knowledge economy with its premise of commodified knowledge as "intellectual property." Instead, Bob Jessop (2003:13 – 14) argues that knowledge is a "fictitious commodity" that is "artificially made scarce" through intellectual property regimes and market-driven education reforms in order to serve capitalist interests (Robertson, 2005). From this perspective, higher education is not human capital but rather a form of cultural capital with which "elite groups use education to perpetuate the dominance of their status-group culture" (Schofer and Meyer, 2005:900). As higher education enrollment expands globally, elites turn to "world class" universities and utilize other mechanisms (e.g. post-graduate degrees and internships with prestigious employers) as gatekeepers that protect and perpetuate their status.

In relation to international student mobility, critical theories identify how discourses on the knowledge economy have created "new normative understandings" of higher education as an individualized human capital investment (Carney and Bista, 2009:191). These understandings have rationalized a new globally structured agenda (Dale, 2000) for market-driven, deregulated higher education (epitomized in the WTO's GATS). It is implemented in local contexts, albeit with considerable friction (as exemplified in recent student protests in London, California, Chile and Quebec). Despite policymakers' claims of egalitarianism, those who ultimately benefit most from these new arrangements are "transnational and national elites that can gain access to the globally most prestigious universities" (Brown and Lauder, 2006:47).

New Institutionalism and World Culture

World culture theory differs from alternatives by analyzing globalization as a propagation of “global cultural and associational processes” (Meyer et al, 1997:144-145). Essentially, the theory posits that increased isomorphism and convergence in social and political domains can be explained through the spread of cultural values that are embodied in international organizations (e.g. the United Nations) and articulated in their declarations (e.g. the World Declaration on Education for All). Its proponents claim that these values, which include “individualism, voluntaristic authority, rational progress, and world citizenship,” (Boli and Thomas, 1997:171) are “stateless” (i.e. not originating from one particular country) and spread through a process that is “surprisingly consensual” (Meyer et al, 1997:145) rather than hegemonic. While representing one “distinctive current” (Rowan, 2006:203) within a wider body of new institutional research, the world culture approach of Meyer and his collaborators has been particularly prominent (and widely debated) in the field of comparative education (Anderson-Levitt, 2003; Dale, 2000; Wiseman and Baker, 2006).

World culture theory differs from its alternatives in several important respects. First, it views the nation-state as a strong rational actor that is essential to globalization, as sovereign (and implicitly equal) nation-states constitute the membership of international organizations and are responsible for “translating” their universal declarations into national policies. Second, world culture theory rejects functionalist rationalizations of social behavior, for example the orthodoxy that mass education “is necessary and beneficial for economic growth, citizen loyalty and democratic institutions” (Meyer et al, 1997:149). Instead, it locates the origins of such behaviors in world culture values, which are not rationalized themselves. Third, world culture theory acknowledges that international agendas are often incoherently implemented in local contexts, which it attributes to “loose coupling,” a separation of policy and practice that stems from the incompatibility of world culture in local contexts.

World culture theory also offers more explicit predictions for testing and falsification than its alternatives: giving rise to a genre of research that associates membership in international organizations with practices that reflect world culture values, for example the expansion of mass education (Boli, Ramirez and Meyer, 1985), human rights education (Ramirez, Suárez and Meyer, 2007), policies on technology in education (Ham and Cha, 2009), and environmental education (Bromley, Meyer and Ramirez, 2011). Evan Schofer and John Meyer (2005) apply the world culture perspective to the worldwide expansion higher education, looking at national factors explaining the global rise of higher education enrollment in the twentieth century. Consistent with world culture theory, they find that functional variables (e.g. industrialization and economic growth) hold less explanatory power than cultural and institutional factors, particularly membership in international organizations.

Applied to the context of international student mobility, world culture theory explains the phenomenal growth of recent years through the diffusion of universalistic notions of “world citizenship” (Boli and Thomas, 1997:171), individual knowledge and cosmopolitanism that motivate students to pursue international study. While the “mimetic and normative dynamics” (Ramirez, 2010: 45) of world culture have resulted in worldwide standardized higher educational institutional models that actually reduce or eliminate the need for international study from a functional perspective, numbers of

international students nevertheless continue to rise, as the decision to study overseas is driven primarily by cultural values rather than rational choice. Consistent with research on higher education expansion (Schofer and Meyer, 2005), world culture theorists would expect these cultural factors and their institutional basis to be more important determinants of international study than functional or economic considerations.

Implications of Theoretical Perspectives

The theoretical perspectives discussed above identify key issues and criteria for the analysis of international student flows. They differ in their expectations of how student flows would change over time: neoliberalism and world culture theory would explain changes to student mobility through competitive and mimetic isomorphism, respectively (DiMaggio and Powell, 1983), and would therefore expect to see student flows become more even and diffuse over time. In contrast, critical perspectives would expect student flows to reflect unequal geopolitical relationships. Additionally, these theoretical conceptualizations identify relevant variables for analysis: for example, world culture theory posits a strong relationship between membership in international organizations and processes of globalization, whereas materialist theories (e.g. world-systems analysis) would expect to see student flows reflect underlying economic relationships. The aim of the analysis is *not* entirely to accept or reject any of the theoretical perspectives discussed above, and neither the data nor the analysis used here would be sufficient to do so. However, the typology identifies key issues and criteria for analysis. Specifically:

1. If neoliberalism claims that globalization increases competition, one can reasonably expect to see a greater dispersion of student flows, as this competition will lead to the establishment of new, “world class” universities. As the process is market-driven, it would not necessarily be associated with memberships in international organizations (although it could be), but to the extent that consumer-students buy their education from the countries they purchase other goods and services, international student flows would reflect the network of world trade.
2. If critical theories assert that hegemony and power are essential features of globalization, one would expect to see that nation-states in advantageous positions (i.e. a high degree of integration into student flows, with a favorable balance of incoming students), would leverage this status. The network of students would become increasingly polarized, and centralized. Materialist perspectives (e.g. world-systems analysis) would also expect that these flows would correlate with the networks of international trade.
3. If world culture theory claims that international student mobility (as a constituent process of globalization) is a result of cultural associational processes, then it would expect to see international student mobility expand with the “diffusion” of world culture. As the spread of world culture is consensual and voluntary, nation-states would not consent to relationships that are inherently unequal. One would therefore expect to see increasingly even flows of students, which would also be correlated with membership in international organizations.

That is not to say that the analysis constitutes a definitive or complete evaluation of these theories. As acknowledged above, these categories do not represent discrete theories but rather broad theoretical conceptualizations. This is especially true with respect to critical theories, as contrasting viewpoints within this category (for example Marxism and post-structuralism) differ in many of their fundamental tenets. In some cases, further research could shed further light on distinctions within categories: one relationship not examined in this paper is that between colonial rule and international student flows, which would offer insight into post-colonial theories. The same is true of the aforementioned distinction between neoliberalism in the field of international relations (Keohane and Nye, 1977) and that articulated in knowledge economy discourses, which is not explored here. While beyond the scope of this paper, further investigation of these issues would be a fruitful area for future research. However, for the purposes of analyzing international student flows, the boundaries of this theoretical typology are well-constrained. For example, few critical perspectives would predict increasing equality, and a variant of world culture theory that did not focus international organizations could not rightly be called (new) institutional.

Methods and Data

Comparative studies in education have often utilized data collected and compiled on the level of the nation-state, usually from databases produced by international organizations (e.g. the UNESCO Institute for Statistics). However, this approach has become problematic as it focuses *on* the nation-state while ignoring the vast inequalities and variations *within* them, as well as obscuring processes that operate on the regional and global levels. It is easy to identify the influence of “methodological nationalism” (Wimmer and Schiller, 2004) in research on international student mobility that analyzes countries in terms of inbound and outbound students. While this approach can identify some key trends (e.g. the rapid growth in student mobility in East Asian countries), it is ultimately limited as it attempts to analyze the process *on* states when, in fact, the process takes places *between* them.

The advent of a “network turn” in globalization research has created one escape from what Amartya Sen (1984:292) calls this “fiction of all nations throbbing as symbolic individuals.” Rather than considering countries as discrete actors with a set of attributes (e.g. gross domestic product, enrollment rates, number of incoming/outgoing students), network analysis focuses on connections between actors as the primary unit of analysis. This realization does not mean that network analysis has extricated itself entirely from the problematic of the nation-state: considering structural relations between countries still entails a relatively central view of the nation-state. However, a network perspective does shift the focus of the analysis – rather than “the container of social and political life” (Robertson, 2011b:2) – the nation-state is considered primarily in terms of its relational positioning, its embeddedness and connections to other actors.

The primary data used in this analysis are incoming international student counts by country of origin from 1999 to 2008. These data are collected as part of a collaboration between the UNESCO Institute for Statistics, the OECD and EUROSTAT (2011) and published by the UNESCO Institute for Statistics. Countries report the country of origin for all incoming students pursuing a degree or diploma at levels 5 and 6 (i.e. tertiary education) of the International Standard Classification of Education (ISCED). For example, data reported by Australia have the number of students coming

from each country in the world to Australia. The data can thus be conceptualized in the form of a series of directed links: the number of students moving from country A to country B in a given year. International students are identified by country of origin (based on ordinary residence and previous education); thus, the data are intended to represent only those students who have crossed an international border for their study. For example, a non-citizen, permanent resident of the United States (i.e. a Green Card holder) who studied in the US would not be counted as an international student.

Inevitably, data on international student flows contain errors and incompleteness. Data collection and reporting practices vary between countries, as do immigration policies and associated procedures for defining and identifying international students. Additionally, not all countries report international student data, resulting in missing data and an overall tendency to underestimate global numbers of international student. However, these limitations have minimal impact on the validity of the analysis; as UNESCO (Forthcoming) estimates that countries reporting international student data account for 95% of global tertiary enrolment, missing data are unlikely to significantly alter results. Furthermore, the theoretical conceptualization of the study is primarily concerned with changes in the network, not the properties of the network in absolute terms. For example, a neoliberal perspective would not claim that competition has created a world of even flows, only that they are becoming more even (Beckfield, 2010:1023). Hence, the analysis below focuses on changes and trends over the ten-year timeframe, and to the extent that measurement error is evenly distributed over time, it has minimal influence on findings.

Based on the theoretical typology presented above, the analysis compares changes in the international student network to two other key global networks: those of international governmental organizations (IGOs) and world trade. The former is used to evaluate world culture theory's claims that international organizations facilitate processes of globalization, while the latter investigates materialist conceptualizations of these changes (e.g. including world-systems analysis). Data on nation-states' membership in international governmental organizations (IGOs) are taken from the Correlates of War project (Pevehouse, Nordstrom and Warnke, 2004). These data represent the network of world polity based on the number of common membership in IGOs that two countries share. As nearly every country in the world is a member of the United Nations, most country pairs have at least one tie. The strongest link is between France and the Netherlands which share membership in 130 IGOs. Data on world trade are taken from the United Nations' Comtrade database, which records imports to each country broken down by country of origin, providing complete data on trade links between all countries in the world.

I also analyze student flows in relation to three networks are strategically important in global higher education: the Organization for Economic Co-Operation and Development (OECD), the European Higher Education Area (EHEA), and countries that have committed education services to liberalization under the World Trade Organization's (WTO) General Agreement on Trade in Services (GATS). The OECD has played a significant role in developing and coordinating educational policy in liberalized market economies, including in higher education and international student mobility (e.g. OECD, 2004). Additionally, the recently formed EHEA, a result of the ongoing Bologna Process, is

the first attempt to formally harmonize higher education on a regional scale and has the potential to significantly alter global patterns of student mobility (Dale and Robertson, 2012). Finally, as both an IGO and an advocate of free trade, the WTO presents a curious intersection of world culture theory and neoliberalism. The inclusion of education services (particularly higher education) in GATS has been contentious and divisive (Collins, 2007; Verger, 2009). I consider the 42 countries that have committed education services in GATS negotiations as an independent, interconnected network.

Several other variables are included in the analysis due to their prominence in related literature or substantive interest. Differences in gross domestic product (GDP) are used to determine the extent to which student flows follow a “South” to “North” polarity (IOM, 2008), and differences in scientific and technical publications are used to analyze whether students tend to study in “knowledge producing” countries (Gürüz, 2008; IOM, 2008). Both of these variables are taken from the World Bank’s World Development Indicators, and the difference between country pairs is used to relate country-level data to network links. I also take geographic factors into account in two ways: first by using the distance between countries (between the capital cities of country pairs, measured in thousands of kilometers), and second by using UN regional classifications (United Nations Statistics Division, 2011) to create a network of regions, in which each country is connected to all others in its geographic region, but none outside its region (cf Beckfield, 2010). The former measures the extent to which geographic distance influences mobility patterns, while the latter is used to analyze changes to intra- and inter-regional mobility (UNESCO, 2009). Inevitably, the covariates used in the analysis are limited and do not reflect the full range of factors that influence international student mobility (e.g. language, policy, financial considerations, the reputation of individual institutions, etc.). Variables have been selected based on their relevance to theory and the analysis does not purport to explain the totality of international student flows.

The complete dataset contains 154,119 directed links for 206 countries over a ten-year period. With the exception of geographic data, all variables used in the analysis are time-varying, including not only international student flows, but also membership in international organizations and participation in international higher education initiatives. This means that changes in student flows are analyzed in relation to dynamic, changing global networks, rather than against a static snapshot of a rigid global order.

Analysis

The analysis is comprised of three parts. In the first part I describe changes to the network structure (i.e. the total set of relationships between actors) by examining trends in three common network indicators: density, centralization, and clustering. The second part compares the network of the international student mobility network to other key global networks using rank correlation coefficients, and the third section isolates and tests the significance of these relationships using a random effects regression model.

Network Indicators

Network density refers to the proportion of realized ties in a network relative to the total number of possible ties. If the international student network were maximally dense, student flows of equal

numbers would exist between all countries. Both neoliberal and world culture perspectives on globalization expect that density would increase: either through competitive forces or the institutional diffusion of world culture, new international student links would be formed. However, results (Figure 1) show an overall decrease in density of student flows, albeit with considerable variation between years.² This indicates that the distribution of students in network has become concentrated into a smaller number of links between countries, rather than spreading into a more diffuse, even distribution.

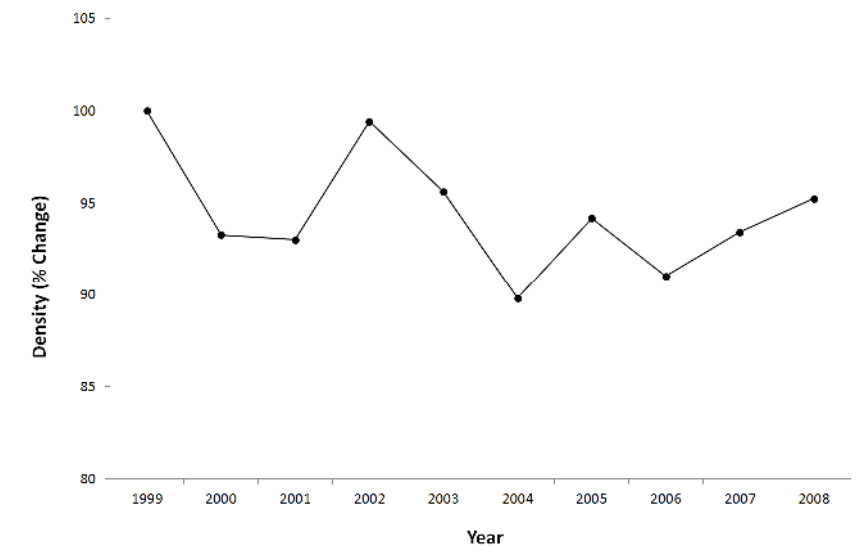


FIGURE 1: Proportional changes to the density of the international student network between 1999 and 2008.

Theoretical perspectives on globalization also differ on expected change in network centralization, which measures the extent to which the network is “star shaped.” For example, in a completely centralized network all actors would be connected to one central “hub,” but not to any others. For the purposes of this analysis, three commonly-used measures of network centralization were computed: degree, betweenness, and closeness centralization (Alderson and Beckfield, 2004; Freeman, 1978). Degree centralization is the simplest of these methods, and is based on the number of links to each actor in the network. Betweenness centralization is slightly more complex: the betweenness of an actor is based on the extent to which it lies on the path between other actors. Closeness centralization is the most complex method used, measuring the extent to which an actor lies on the shortest path between other actors in the network. While these are calculated in different ways, all denote the extent to which key actors occupy central positions within the network.

Centralization values were computed on normalized student data for each year using methods for weighted networks described by Opsahl, Agneessens and Skvoretz (2010). Figure 2 shows that all measures of centralization increased between 1999 and 2008. Of the three measures, degree centralization offers the most straightforward interpretation: indicating that key actors increasingly act as “hubs” with numerous, strong ties. Increases in betweenness centralization show that these central

² To allow comparison between network indicators that are calculated and scaled differently, graphs show changes as a percentage of 1999 value. Raw values in tabular format are provided in the online appendix.

actors are situated on the paths between many other countries and thus mediate exchanges between them. Closeness centralization is somewhat less intuitive: In this context “closeness” does not refer to geographic distance, but rather the strength of ties between actors (with larger flows of students associated with greater “closeness”). This means that other actors’ strongest connections to one another (i.e. the “shortest paths”) are through these central “hubs.” Because all three measures increase, disaggregating their respective conceptual meanings is difficult; rather the three measures should be interpreted as corroborating and verifying a trend towards a more centralized network.

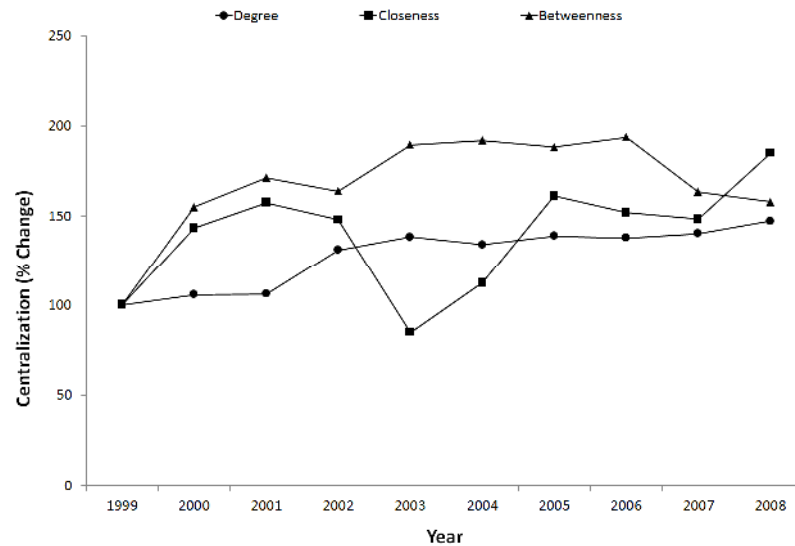


FIGURE 2: Proportional changes in degree, closeness and betweenness centralization in the international student network between 1999 and 2008.

Some aspects of network centralization can be captured in a visual analysis of the network topography. Figure 3 represents undirected total student flows in 1999 and 2008, respectively. Student flows between two countries are represented by a line between the capital cities of those countries, with darker lines representing higher numbers of students. While flows are very complex, the centralized character of the network is visible in the relatively small number of “hubs” with multiple dark lines.

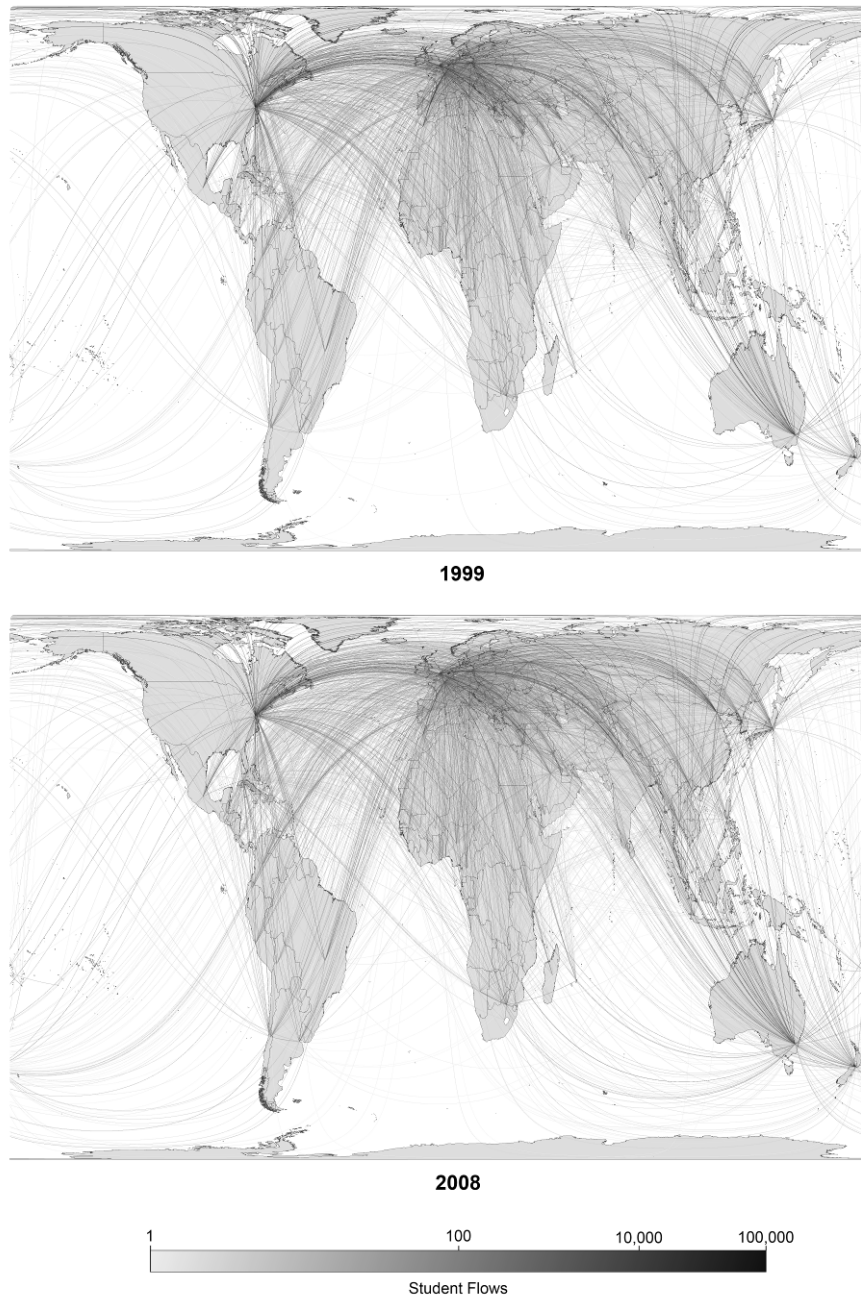


FIGURE 3: International student flows in 1999 (top) and 2008 (bottom). Lines are drawn between capital cities of countries, and represent the total (undirected) number of students moving between countries, scaled logarithmically (see legend). The map highlights the complexity of student flows, but also illustrates some general patterns: European countries are densely interconnected while Sub-Saharan Africa shows little interconnectivity. Groups of dark lines link several Asian countries (India, China, South Korea and Japan) to the West. More maps are available in the online appendix. An animation of student flows between 1999 and 2008 can be viewed at <https://vimeo.com/28617135>.

Clustering measures the extent which actors form locally-connected groups (or cliques). High clustering coefficients are associated with “small world” networks, those in which most actors share numerous connections, if not directly then through intermediary links (Watts and Stogartz, 1998).

Conversely, when clustering is lower, local connections between actors are relatively scarce: what Mark Granovetter (1983:202) calls “weak ties” are absent, creating a network that is “fragmented and incoherent.” While proportional changes are relatively small in absolute terms (Figure 4), they indicate a trend toward a less clustered network.

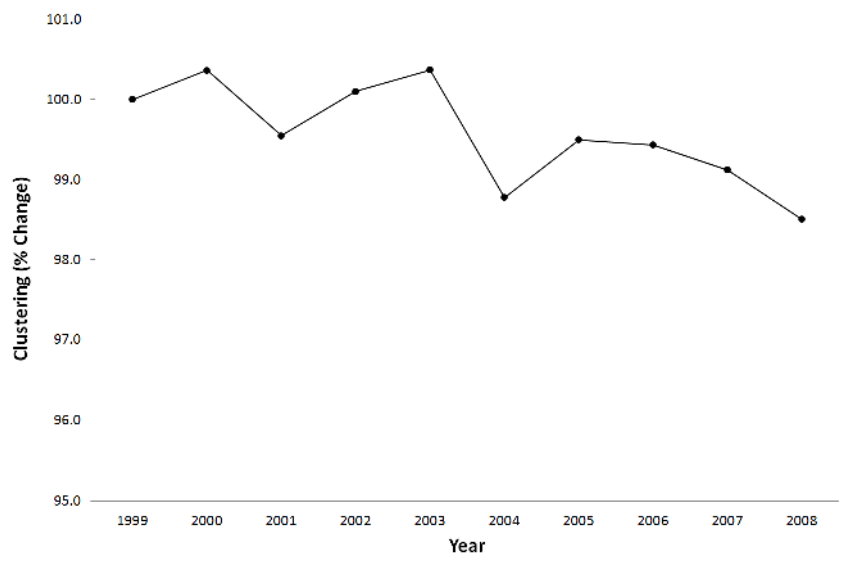


FIGURE 4: Proportional changes in clustering in the international student network between 1999 and 2008.

In an egalitarian world, one would expect to see high levels of inter-connectivity as the historical advantage of the global “core” would disappear over time. However, the opposite is occurring: more countries are connected to each other only by strong links. This phenomenon is illustrated in the outbound mobility trends from Sub-Saharan Africa (Figure 5). Connectivity between countries is concentrated in a small number of “hubs” – international students from Ghana and Nigeria are far more likely to meet in the United Kingdom, United States, or Australia than they are anywhere in Africa.

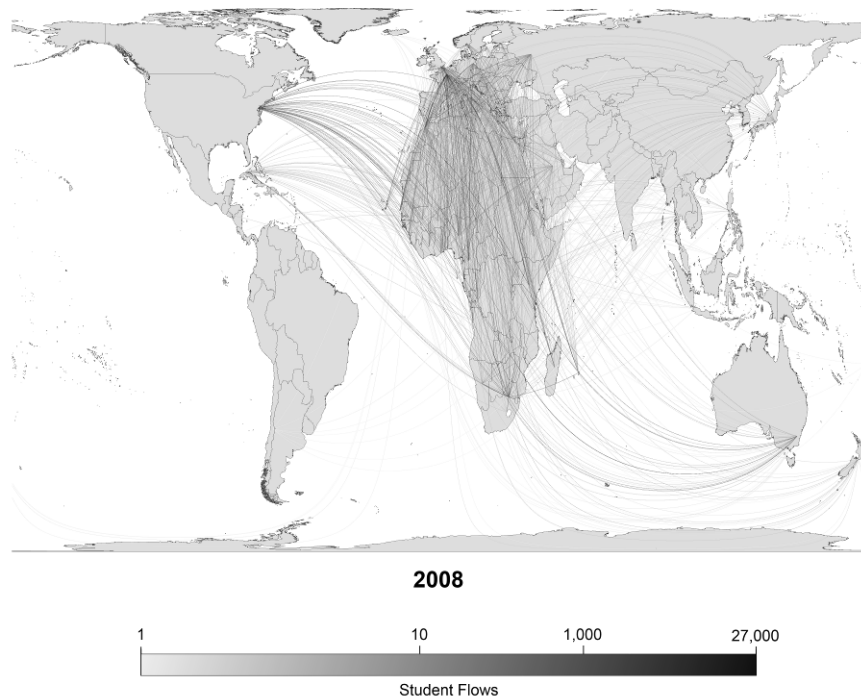


FIGURE 5: Flows of students from Sub-Saharan Africa in 2008 illustrate the concept of low clustering.

Correlations

Of equal importance to changes in network structure is the extent to which international student mobility relates to the relevant global networks and variables identified above, including IGO membership, world trade, key international organizations (i.e. the OECD, EHEA and WTO's GATS), geographic and regional location, and differences in GDP and authorship of scientific articles. However, correlating these data with international student numbers presents something of a methodological challenge, as some variables measure a directional flow between two countries (e.g. international students, international trade) while others are undirected (e.g. IGO memberships, geographic distance). To address this, I run two sets of correlations (Table 1), one using a symmetrical version of the international student data in which directional links are summed to give a total value of students moving between two countries (regardless of the direction), the other using the directed student flows between two countries.

Correlations were computed on country pairs for each year. As the distribution of student flows is highly unequal, and many correlated variables are categorical (e.g. OECD membership), I use a Kendall rank correlation coefficient, which is robust to non-normal distributions and non-parametric data (Kendall, 1975).

TABLE 1

CORRELATION COEFFICIENTS FOR SELECTED GLOBAL NETWORKS

	1999	2002	2005	2008
<u>Undirected Networks</u>				
IGO memberships	0.41	0.42	0.43	0.43
OECD	0.27	0.26	0.26	0.26
EHEA	0.22	0.23	0.25	0.25
GATS	0.03	0.04	0.05	0.06
Geographic Region	0.13	0.17	0.19	0.20
Distance	-0.20	-0.21	-0.22	-0.23
<u>Directed Networks</u>				
World Trade	0.43	0.40	0.40	0.41
Articles (Difference)	0.29	0.25	0.22	0.20
GDP (Difference)	0.26	0.23	0.19	0.19

Kendall's τ for selected undirected and directed network variables, 1999 to 2008 in three year intervals. Author's analysis of data from UNESCO (2012). Higher correlation values represent stronger similarities between networks. Results for all years available in the Online Appendix.

The high correlation of IGO memberships and student flows lends support to world culture theory, which claims that increased memberships in international organizations is associated with processes of globalization. The number of common memberships two countries share is strongly associated with the number of international students moving between them, and changes in the correlation over time indicate that this association is becoming stronger. The OECD and the EHEA also have relatively strong correlation values. The former is decreasing slightly while the latter is increasing, reflecting its relatively recent establishment and initial growth in membership. In stark contrast, there is virtually no relationship between student mobility flows and countries that have committed education services under WTO GATS negotiations; adding weight to Verger's (2008) claim that many countries commit educational services under GATS for external political reasons (e.g. as a concession to gain WTO membership) rather than educational considerations.

Geographic factors are also increasingly associated with student flows: As one would expect distance is negatively correlated with student numbers (most students would prefer to stay closer to home), and the correlation between these variables is growing stronger. This trend is confirmed in an increase in inter-regional students: while more students choose to go abroad for higher education, the share of those students that stay within their home geographical region is also growing.

Correlations between trade links and the directed student mobility network are also high, matched only by the values for IGO Links in the undirected network. This result could be interpreted as evidence that student mobility networks reflect the competitive pressures that guide international trade: consumer-students tend to buy higher education from the same countries that they purchase other goods and services. However, such claims would be easily countered by network analyses of the

world trade network itself, which exhibit a strong core/periphery structure (Fagiolo, Reyes and Schiavo, 2010). Explanations of student mobility as flowing from “South” to “North” (i.e. GDP) and one aspect of a knowledge economy (i.e. scientific articles) are relatively strong, but also declining.

Regression Analysis

Correlation values indicate that both institutional and economic factors (i.e. IGO memberships and world trade networks) are strongly related to the international student network. The importance of these variables lends support to world culture theory and world systems analysis, respectively. In order to consider the influence of each variable independently, I finish the analysis by testing the independence and significance of the relationship between the international student network and the networks of IGO membership, world trade, and geographic regions. To include both IGO membership (an undirected variable) and world trade (a directed variable) in the same model, undirected student counts and trade values are used in the analysis.

I create two regression models to analyze these relationships. The first models the student flows between countries across all years, with an independent variable for the year to capture growth over time. The dependent variable is the number of students moving between countries; additional independent variables include common IGO memberships, trade, geographic region and distance between countries. Because the distribution of international students and trade is highly unequal, I use the natural logarithmic of these variables in both models (Atkinson and Riani, 2000).

The second model computes *growth* in student flows between two countries as a function of the same set of variables. Growth in students was calculated as the difference between averages for the 1999-2001 and 2006-2008 periods. I include a baseline count of international students, as initial student flows between countries could affect growth. Additionally, for time-varying predictors (i.e. trade and common IGO memberships), I include a change variable, which models the extent to which changes in the variables between 1999 and 2008 correspond to changes in student flows over the same time. For both models, random effects were used to account for repeated measures, and parameters were calculated using maximum likelihood estimation (Pinheiro and Bates, 2000). Regression diagnostics did not reveal anomalies (e.g. excessive multicollinearity) that would affect the interpretation of these results.³

³ Regression diagnostics, including variance inflation factors (VIFs) and scatterplots are available in the Online Appendix.

TABLE 2

MIXED-EFFECTS MODELS FOR ALL YEARS AND GROWTH

	<u>All Years</u>	<u>Growth</u>	
		Baseline	Change
IGO Links	0.056 (0.321) **	0.008 (0.095)**	0.016 (0.037)**
Trade	0.051 (0.081)**	0.095 (0.304)**	0.041 (0.058)**
Intra-Region	0.038 (0.008)	0.297 (0.128)**	--
Distance	-0.065 (-0.122)**	0.012 (0.047)**	--
Year	0.026 (0.033)**	--	--
Students (Baseline)	--	-0.145 (-0.302)**	--
N	45,312	4,258	

NOTE. –Standardized coefficients are included in parentheses, and can be used to compare the outcome variance explained by predictors within each model. The intercept variable for each model is not included. Author’s analysis of data from UNESCO (2012).

* Significant at $p < 0.05$ ** Significant at $p < 0.01$

Standardized regression coefficients (Table 2 – in parentheses) allow comparison of the extent to which independent variables explain variation in the dependent variable. The all years model confirms the importance of IGO memberships, which explain more variation in student flows than economic or geographic factors. In explaining *growth* in student flows, regional dynamics appear far more important than either IGO memberships or trade: a great deal of the growth that occurred in the period of analysis was between countries in the same region. However, both IGO memberships and international trade were also associated with growth in international student flows, although the latter has more explanatory power.

While effect sizes (i.e. non-standardized regression coefficients) are numerically small, it is important to interpret them in the context of the changes in the dependent variable. Because the outcome variable is logarithmically transformed, regression coefficients must be exponentiated to determine how an increase in an independent variable would be reflected in international student flows between two countries. For example, in the model for all years, a one-unit increase in common IGO memberships (i.e. one additional shared membership) corresponds to a 5.3% increase ($e^{0.056} = 1.058 = 5.8\%$ increase) in international student flows, if all other variables are held constant (Atkinson and Riani, 2000). Similar procedures can be used for other predictors, with the exception of international trade, which itself is logarithmically transformed. In this case, the regression coefficient can only be used to determine how a proportional change in the independent variable would be reflected in the dependent variable. For instance, a 25% increase in trade between two countries would correspond just a 1.1% increase ($1.25^{0.051} = 1.011 = 1.1\%$ increase) in international flows (UCLA Statistical Consulting, 2012). These techniques provide a framework with which to interpret regression results in practical terms and illustrate the respective influences of institutional and economic variables.

It is important to treat the regression results in context: they do *not* establish universal relationships between variables, denote cause and effect relationships, nor predict future patterns of student mobility. Nevertheless, overall results provide support for world culture theory, as they demonstrate a strong association between IGO memberships and increased levels of globalization (i.e. international student flows). In response, world-systems theorists would contend that IGO memberships themselves are reflective of underlying economic relationships. Just as Thomas Clayton (2004:283) quotes Immanuel Wallerstein's concept of a "political superstructure," it is possible to view IGO membership as little more than an "institutional" superstructure. However, this argument has to contend with results showing that, in respect to student mobility, the explanatory power of IGO membership is stronger than that of world trade.

Discussion

Network analysis reveals that changes to the international student flows are multi-faceted and complex. However, there are clear trends in this complexity: even with the growth of new destinations for study, the network of international students has become more centralized, less densely connected, and less like a "small world." It shares strong structural similarities with the networks of world trade and the world polity, increasingly with the latter.

Increasingly polarized student flows may seem at odds with clear evidence of emerging destinations for international students in Asia and the Middle East, which are experiencing growth rates well above those of established English-speaking destination countries (Shields and Edwards, 2010; Welch 2010). To some extent, this apparent contradiction may stem from a tendency to concentrate on individual nation-states rather than on the network of relationships between them. In fact, an increasingly polarized network is perfectly consistent with the rise of new destinations of study, as this would result in a concentration of a greater proportion of students into a relatively small number of links and a rise in central "hubs" in the network. Despite new destinations attracting increasing numbers of international students, the overall network became less even and diffuse between 1999 and 2008.

Additionally, in analyzing international student flows, it is also important to distinguish between *relative* changes to network structure and *absolute* increases in international student flows. As mentioned above, international student mobility has increased very rapidly in recent years, meaning that network links (and destination countries) that have experienced an overall increase in student numbers nevertheless may have decreased in prominence relative to the rest of the network. Thus, the characterization of an increasingly polarized and unequal network may appear inconsistent with the growth in international students experienced throughout much of the world, although the two are very much connected.

While there is strategic interest in forecasting future student mobility numbers (Böhm et al, 2004), the analysis that I have presented is of little use for this purpose. If there is any indication of future patterns of international student mobility, it is that the network of international student mobility will increasingly become a "world of regions" (Katzenstein, 2005) in which *intra*- and *inter*-regional dynamics will shape global flows of students (Olds, 2011). Both correlation and regression results

show an increase in intra-regional student mobility, and indicate a strong connection between regional ties and growth in student flows. However, regionalization is of equal importance with respect to *inter*-regional mobility and wider regional politics. For example, Susan Robertson (2008) shows how higher education figured prominently in determining European competitiveness strategy in Asia, both in creating a market for Asian students in Europe but also in fostering research collaboration and economic links. The regional focus is not distinct from other theoretical perspectives on globalization, but rather it is an intersection of them. Organized regional initiatives are highly contingent on institutional structures, and are often implicated in the spread of neoliberal policies (Dale and Robertson, 2002). The relationship between regional IGOs (e.g. the European Union and ASEAN), and international student flows, which I have not considered here, is an excellent area for further research.

The results also provide a set of evidence with which to evaluate the claims of these theoretical conceptualizations. That is not to say that the analysis presented here should be considered a full and definitive test of these theories: international student mobility is only one global educational process among many; the data cover only ten years and inevitably contain errors. Furthermore, the theoretical categories are diverse and overlap one another to some extent: the criteria used in the analysis do not fully distinguish between these areas of overlap nor differentiate between variations of the same theoretical viewpoint (particularly those in the broad category of “critical theories”). Finally, the covariates used in the analysis are not exhaustive, and a range of other factors (e.g. language, economic considerations, and the reputation of individual institutions) likely influence student mobility patterns.

Interpreting findings with respect to theory is challenging, as *there is evidence to support all viewpoints*. Those who view international student mobility through the neoliberal categories of increased competition and the global knowledge economy could rightly point out that competition for international student enrollment and the emergence of new destinations remains a key feature of global higher education. Neither the increasing polarization of student flows nor its strong basis in international institutions could contradict this. Critical perspectives are supported by the increasing centralization of the network, which reflects a polarized, hegemonic world order. Finally, world culture theory is supported by the strong relationship between membership in international institutions and international student mobility.

However, *this does not mean that all viewpoints are equally valid*. Evidence in support of a theoretical perspective should not be interpreted as confirmation that it provides an adequate account of empirical phenomenon. This caveat is particularly true when analyzing complex data such as international student flows, which due to their complexity will always contain some evidence that supports a particular viewpoint. Rather, evaluating theory becomes a process of establishing and assessing the omissions and incompleteness of competing theoretical conceptualizations.

None of the theoretical accounts used in this analysis are complete; in fact, all contain important omissions. For example, the neoliberal focus on egalitarian competition and a “post-capitalist” global knowledge economy (Drucker, 1993) does not account for international student flows that are increasingly polarized and uneven. Strong versions of neoliberalism, such as American journalist

Thomas Friedman's (2006:194) claim that global competition is creating a "flat world" in which "natural ability trumps geography," find little support in the analysis presented here. While few scholars in the field of comparative education would defend neoliberalism as a coherent theoretical perspective, much research implicitly accepts its categories of competition, rational choice and the knowledge economy as characterizing global higher education. Additionally, egalitarian capitalist discourses such as those of the global knowledge economy are increasingly prevalent in civil society and international organizations: concepts such as social enterprise, social investment, and "market based solutions" in education, healthcare and the environment all claim to harness capitalist forces to produce equitable, socially beneficial outcomes. Results from this analysis challenge accounts of globalization that emphasize competition without acknowledging the inherent power relationships therein.

Similarly, critical theories account for the polarization of international student flows as reflecting global economic interests and relationships of power and hegemony, but they provide an incomplete account of the nexus between these relationships and international institutions. Theories rooted in materialist conceptualizations of globalization (i.e. world systems analysis) have to contend with evidence from this analysis that institutional relationships (i.e. the IGO network) have greater explanatory power than underlying relationships of the world economic system (i.e. the world trade network). A more convincing political economy of globalization would create a dialectic between institutional and economic factors in much the same way that Gramsci's (1946/1975) concept of "cultural hegemony" – or Adorno and Horkheimer's (1947/1997) "culture industry" – addressed the failings of Marx's economic determinism. Other variations of critical theory (e.g. post-colonialism) support in increasing polarization of international student flows, but are beyond the scope of the analysis presented here.

Finally, world culture theory accounts for the importance of international institutions and their associations with practices that reflect world culture values, but does not explain how a process that is driven by consensus and voluntarism clearly places some actors in increasingly privileged positions. The network perspective yields a great deal of insight in this respect, as it facilitates the identification and analysis of multiple, simultaneous relationships, showing that the normative enactment of world culture through institutional memberships is accompanied by increasing inequality in the relationships that constitute the network. In contrast, analyses conducted on the level of the nation-state (for example, by longitudinal analysis of national data) would identify the former but not the latter.

In one sense, all three theoretical viewpoints are highly valuable, as they establish key questions and criteria that guide the analysis. However, in another sense these perspectives contain contrasting world views that are deeply contentious and in many cases diametrically opposed. In particular, theoretical alternatives differ in their respective interpretations of international institutions and relationships of power. Advocates of world culture theory could rightly point out that results confirm the strong relationship between international institutions and processes of globalization, and that this has more explanatory power of observed phenomena than other factors (for example, trade networks or authorship of journal articles). However, in describing the spread of world culture as "surprisingly consensual" (Meyer et al, 1997:145), world culture theory essentially removes any element of power

and influence from this relationship. To critical theorists, the world culture approach fundamentally mischaracterizes a relationship that is driven by conflict, coercion and hegemony, a claim that is supported by increasingly polarized student flows. From critical theorists' perspective, theoretical accounts of globalization that replace power and hierarchy with voluntarism are not only incomplete, but also ideological, concealing hegemony under the guise of consensus. Although there is an imperative for theory to be parsimonious, to maximize its explanation of outcomes and minimize its stipulations, conditions, and assumptions, theories that omit relationships of power and hegemony risk legitimating and reinforcing these relationships.

The immense complexity of global student flows (see Figure 3) makes the identification of clear, unambiguous, trends in difficult if not impossible. Instead, the most viable approach to analysis is to use relevant theories to establish expectations and criteria that guide the analysis. In turn, the analysis informs and challenges these theories by highlighting contradictions between expectations and empirical evidence or revealing areas of incompleteness in their explanations of global educational processes. Rather than *confirming* theories, the analysis is most useful in identifying ways in which they are *untrue*: Neoliberal expectations of an emerging "flat world" of international student flows facilitated by increased competition are contradicted by evidence of increasing centralization of the international student network. Critical theories explain this unevenness through hegemony in the global political economy, but do not provide a complete account of the strong relationship between international organizations and global educational processes. Finally, world culture theory identifies the importance of international organizations, but is unable to explain a process that systematically privileges some actors as one of consensus and voluntarism.

While confirming the importance of international institutions in processes of globalization identified in other research (Boli and Thomas, 1997; Ham and Cha, 2009; Schofer and Meyer, 2005), this study highlights the need for theoretical accounts of the nexus between international institutions, relationships of power, and "world culture." This theorization could be approached from the perspective of global political economy, analyzing the multi-faceted interaction between institutions, their modes of cultural legitimation, and power embodied in material and economic forms as well as in epistemic and discursive regimes. Alternatively, other "new institutionalisms" (Hall and Taylor, 1996) differ from the world culture approach of John Meyer and his collaborators (the prevailing application of new institutionalism in the field of comparative education) by articulating dynamics of power, competition and conflict both within and between international institutions (DiMaggio and Powell, 1983; Carney, Rappleeye and Silova, 2012). However, the empirical evidence presented in this paper brings into question institutional theories that do not account for power, inequality, economic interests and hegemony inherent in global processes. Reconciling institutional and cultural aspects of globalization with the complex power dynamics in which they are situated is essential to better understanding the global relationships and processes that characterize contemporary education.

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