ABSTRACT

The contemporary era is one of both accelerated economic globalization and rising inequality. There is an increasing awareness among both academic scholars and development professionals that globalization puts certain populations at risk. However, there has been inadequate theoretical analysis and a lack of up to date empirical studies that explain just how contemporary globalization affects inequality and the well being of individuals. This study explores the conditions under which TNC penetration and other globalization processes influence change in domestic income distribution. Its aim is to investigate whether theoretical models that have proven successful in explaining differences in income inequality cross-sectionally also allow for an understanding of the dynamics of income distribution during the 1980s and early 1990s, an era characterized by a dramatic acceleration of globalization. We present an analysis of change in national income distribution using linear regression models with a panel design. This study suggests that dependence on foreign investment as a development strategy, especially compared to domestic and human capital investment, may be misguided for nations concerned with equality. Net of other factors, foreign investment dependence benefits the elite segments of the income-earning population over the poorer eighty percent. Our analysis provides evidence of a shift in capital/labor relations brought about by globalization that has significantly contributed to the rise in income inequality seen throughout the world.

The Resilience of Dependency Effects in Explaining Income Inequality in the Global Economy: A Cross-National Analysis, 1975–1995

Linda Beer
Terry Boswell

INTRODUCTION

The contemporary era is one of both accelerated economic globalization and rising inequality. International markets for goods, services, and capital have become increasingly integrated and since the 1980s this trend has shown a sharply upward curve (Rodrick 1997; Brady and Wallace 2000). Economic inequality has increased during this time period as well, whether measured between individuals, between nations, or within nations (Berry et al. 1983; Ram 1992; Korezeniwicz and Moran 1997). Milanovic (1999) estimates that the world Gini index for the richest to the poorest income groups increased *one percent per year* between 1988 and 1993, (from .63 to .66), while the World Development Report finds that GDP per capita in the richest 20 countries has grown to 37 times that of the poorest 20 nations, a gap that has doubled in the past 40 years (2000/01).

There is an increasing awareness among both academic scholars and development professionals that globalization puts certain populations at risk (Rodrick 1997; Birdsall 1999; UNCTAD 2000). This contrasts with the "Washington Consensus" among global elites that emphasized trade and investment liberalization is the panacea for development problems in the 1980s and early 1990s. The key turning point was the impoverishment left behind by the East Asian cur-

Linda Beer
Department of Sociology
Emory University
1555 Pierce Dr.
Atlanta, GA 30322
lbeer@emory.edu

Terry Boswell
Department of Sociology
Emory University
1555 Pierce Dr.
Atlanta, GA 30322
tbos@emory.edu

http://www.emory.edu/SOC/ (case sensitive)

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rency crisis of 1997 and subsequent meltdowns from Russia to Brazil, which produced earnest calls, often by the same elites, to take heed of the ways in which globalization has had unequal effects among the world's population, both within and between nations. And since the agenda-setting success of the "Battle of Seattle," 'globalization' has become the unifier of diverse grass-root social movements in a string of large-scale protests when the WTO, IMF, or other global policy makers try to meet. Inequality is back on the global agenda, according to the World Bank's *World Development Report* (2000/01). However, there has been inadequate theoretical analysis and a lack of up to date empirical studies that explain just how contemporary globalization affects inequality and the well being of individuals (Paus and Robinson 1997).

To examine the effects of globalization on inequality, we start with world-system theory, which emphasizes the developmental consequences of global relations between unequally powerful nations, in particular, relations of dependency. Since the 1970s, much of this work has been concerned with the effects of accumulated investment from transnational corporations (TNCs) in the developing world, or periphery.[1] Specifically, studies of 'capital dependency' or TNC 'penetration' contend that disproportionate control over host economies by transnational corporations increases inequality by altering the development patterns of these nations. Although the vast majority of FDI is located within developed nations, the impact of FDI on a developing nation's economy is much more significant (WIR 2000). Therefore, world-system scholars focus on accumulated stocks of foreign investment as a share of the host nations GDP.

This focus is in sharp contrast with most globalization studies. While globalization has multiple economic, political, and cultural facets, when studying inequality most have focused on the effects of international trade, neglecting the significance of foreign ownership (Rodrick 1997; Ferreira and Litchfield 1998; Lachler 1998; WDR 2000/01). Similarly, with some important exceptions (i.e. Tsai 1995; Dixon and Boswell 1996), most recent cross-national studies of income inequality have moved away from examining global forces like foreign direct investment (FDI) focusing instead, on economic and socio-cultural dualism (Williamson 1991; Nielsen and Alderson 1995) or technoecological heritage (Lenski and Nolan 1985; Crenshaw and Ameen 1994). This is surprising for two reasons. First, dependency arguments concerning the impact of FDI on

1. See, for instance, Chase-Dunn 1975; Bornschier 1981; Rubinson 1976; Bornschier and Ballmer-Cao 1979; Dolan and Tomlin 1980; Evans and Timberlake 1980; Sullivan 1983; Bornschier and Chase-Dunn 1985; Dixon and Boswell 1996; Beer 1999.

inequality have received relatively robust empirical support, warranting further examination.[2] Second, foreign direct investment has dramatically increased in importance over the past two decades, and is currently the primary source of resource flows to developing nations (Froot 1993; Tsai 1995). In 1988, FDI surpassed all other forms of lending as a source of foreign capital to developing nations (WDR 1991). In 1982, the total value of global inward FDI stock stood at almost 6 billion (US$), by 1990 that figure had reached 1.7 trillion (US$), and by 1999 it had reached 4.7 trillion (WIR 2000). The ratio of world FDI stock to world GDP increased from 5% in 1980 to 16% in 2000 (WIR 2000). Indeed, LDCs are encouraged to attract foreign investment as the primary route to economic growth and well being in the contemporary world-economy. Foreign investment is promoted by development agencies such as the World Bank and the International Monetary Fund as an efficient way to add to existing domestic pools of capital, technology and entrepreneurial talent (McMichael 1996; Rothgeb 1996; WIR 1991). Implicit in the logic of investment liberalization is the idea that the free flow of unregulated capital is the best means to national development (Ranney 1998). It has only been recently that traditional development agencies have begun to realize that FDI may disadvantage certain groups of individuals and that it is incumbent upon policymakers to safeguard vulnerable populations (UNCTAD 2000).

This study is an attempt to explore the conditions under which TNC penetration and other global factors influence change in domestic income distribution. Its aim is to investigate whether theoretical models that have proven successful in explaining differences in income inequality cross-sectionally also allow for an understanding of the dynamics of income distribution during the 1980s and early 1990s, an era characterized by a dramatic acceleration of globalization. Due to a prior lack of high quality time-series income inequality data, most cross-national studies of income distribution have employed regression models with a cross-sectional design. It is clear that the lack of time-series and longitudinal analyses covering many countries is a significant gap in the literature concerning cross-national income inequality. Moreover, examining changes in inequality over the short-term has both theoretical and empirical benefits, allowing for an analysis of the impact of contemporary globalization on inequality and for an evaluation of the sometimes-contradictory findings of prior research.

2. Some seem to conclude that the insignificance of core/periphery dummy variables invalidates any world-system approach, even though such indicators are the crudest possible measures (i.e. Muller 1988).

This paper presents an analysis of change in national income distribution using linear regression models with a panel design. The data set contains inequality data for 65 nations at two points in time, circa 1980 and 1995. Before presenting our empirical models, we provide a summary of the literature and a discussion of our data and methods.

THEORETICAL PERSPECTIVES ON CROSS-NATIONAL INCOME INEQUALITY

There are three main world-system arguments concerning the global sources of domestic income inequality, which follow something of a rough temporal pattern. The first focuses on inequalities arising from the concentration of land ownership that are a legacy of colonialism, and later through corporate agriculture, that generates severe income inequality (Furtado 1970; Muller and Seligson 1987; Boswell and Dixon 1990). Many cross-national studies have found a positive association between land inequality and inequitable distribution of income (Simpson 1993; Crenshaw 1993; Crenshaw and Ameen 1994). In the examination of the relationship between growth and inequality, some researchers have found that land redistribution prior to the onset of economic expansion is a crucial intervening variable (Bowman 1997; Deininger and Squire 1997).

The second emphasizes the export structure of developing nations. Trade between industrial and industrializing countries creates dependent patterns of unequal exchange, leading to high levels of income inequality within the developing world (Baran 1957; Frank 1967; Galtung 1971). Export-oriented production for the world market creates sector dualism in which the primarily foreign-owned export segment of the economy monopolizes internal capital and repatriates profits, stagnating the domestic sector. The empirical evidence indicates that large export sectors are positively related to income inequality (Stack 1980; Prechel 1985). The considerably more capital-intensive nature of export production results in higher returns to capitalists at one end and the underemployment of the indigenous labor force at the other. Moreover, wages are depressed by limited labor force mobility between sectors due to lack of skill transferability, low education levels, and various social and legal barriers (Amin 1976; Prechel 1985).

Prechel (1985) argues that the productive capacities and structure of the export and traditional economic sectors of developing nations are linked, not simply temporarily disarticulated. The growth of the first depends on the stagnation of the latter. Furthermore, creation of a high-wage high-profit oligopolistic capitalist sector not only creates a minority of high-income employees; it further increases inequality by encouraging urban migration and increased competition for unskilled jobs (Evans and Timberlake 1980). Competition in crowded urban areas reduces wages by decreasing the bargaining power of labor. These tendencies are exacerbated by the development strategies most developing nations pursue. Prechel discusses the implications of these strategies for increasing income inequality, arguing that export-oriented production is usually foreign-owned or financed. This leaves these economies vulnerable to fluctuations in the world market, which along with the factors already discussed, contributes to maintenance of high levels of income inequality. The subordinate position of peripheral governments vis-a-vis core capital and prominent transnational actors such as the IMF, decrease their ability to implement autonomous social and economic policies (McMichael 1996).

Other discussions of trade dependency focus on the character of a nation's participation in the global trading system. Commodity concentration refers to the degree to which a nation's export role is limited to the production of only a few commodities. In comparison, nations with a more diversified array of exports have more options in responding to fluctuations in the world economy, for example being able to better weather downturns in the global commodity market. Commodity concentration has been found to have negative effects on physical quality of life (Ragin and Bradshaw 1992).

While size of the export sector has been found to be associated with inequality, other dependency measures such as commodity concentration and debt service have not been found to be significantly related to income inequality (Weede and Tiefenbach 1981; Prechel 1985; Chan 1989). However, dependency scholars stress the dynamic nature of global capitalism, and how the changing character of capitalist exchange on a global scale is coupled with alterations in the nature of the relations of dependency among the participants. Many of these researchers argue that, for the past twenty to thirty years, cross-national capital transfers are more indicative of dependency than are trade-based measures (Prechel 1985; Chan 1989).

The third wave of the literature, which is our main emphasis, focuses on foreign investment as the primary means through which the modern capitalist world-system creates and maintains intra- and international socioeconomic inequities. Numerous empirical studies have confirmed a significant association between foreign corporate penetration and inequality (Evans and Timberlake 1980; Kohli et al. 1984; Bornschier and Chase-Dunn 1985; Chan 1989; London and Robinson 1989; Crenshaw and Ameen 1994; Dixon and Boswell 1996; Beer 1999; Alderson and Nielsen 1999). Others have found foreign penetration effects only in certain geographical regions (Rothgeb 1989; Tsai 1995). Even those studies that fail to confirm this relationship generally report their conclusions with reservation and do not dismiss foreign corporate penetration as a potentially important determinant of income inequality (Weede and Tiefenbach 1981; Crenshaw 1992).

Three main mechanisms are hypothesized to link capital dependency and social inequality (Crenshaw and Ameen 1994). First, foreign investment in developing countries generates large sectoral disparities. The sector dualism in this case is between the foreign and domestic sectors. The former includes a disproportionate share of the export sector in developing countries, but is not limited to it. Compared to the domestic sector, higher capital intensity and lower utilization of indigenous labor polarizes income distributions.

Second, transnational corporations operating in developing nations accrue a disproportionate share of local sources of credit and repatriate a portion of profits rather than reinvesting them in the local economy. Most importantly, compared to domestic capital, they do not facilitate near as many links to local businesses and may even displace small and medium business suppliers, professionals, and retailers who fuel the entrepreneurial and professional middle class. The lack of linkages between sectors is the prime difference between FDI in the periphery and in the core, where linkages are common and foreign investment has a large multiplier effect on local business.

Finally, the governments of these nations, motivated by the necessity of attracting and maintaining highly mobile foreign investment, implement policies and strategies that decrease the bargaining power of labor and inhibit vertical mobility by the lower classes, while enhancing the mobility and training of the managerial and TNC technical elite. These include tax concessions, guarantees of profit repatriation, and labor laws unfavorable to workers (London and Robinson 1989; O'Hearn 1989). Engineers or MBAs with degrees from the US or EU expect pay and living conditions similar to their core peers, but one major reason a TNC locates in the periphery is for low cost labor. While globalization is designed to ever increase the mobility of capitalists to seek higher returns across borders, workers face decidedly nationalist laws that criminalize their behavior.

More recent work along this line emphasizes the decreased autonomy of peripheral national governments to the workings of the global economy and emerging transnational actors. Scholars argue that nations that are highly dependent on foreign capital and encumbered by enormous debt are subordinated to TNCs and multilateral development agencies such as the IMF and the World Bank (McMichael 1996). These global actors influence economic and social policies both directly (by tying loan restructuring to the implementation of structural adjustment policies) and indirectly (by creating a competitive environment among developing nations for foreign investment that depresses wages and encourages lowered labor and environmental standards). DeMartino (1998) asserts that the increased mobility of capital weakens the ability of developing nations to tax capital and provide social insurance for workers. Liberalized

investment rules undermine national policies that encourage employment and wage enhancement such as targeted job training, priority hiring and local purchasing requirements (Ranney 1998).

Alternative Theories of Cross-National Income Inequality

The "classic" modernization argument is based on the work of Simon Kuznets (1955, 1963, 1976) who found a curvilinear association between income inequality and economic growth, and was among the first to develop a theoretical argument to explain this finding. Modernization theorists argue that wealth concentrates in the hands of a few entrepreneurs in the early stages of industrialization, as this is the most efficient use of scarce capital. Increasing the rate of capital investment, both foreign and domestic, depends on the development of modern economic segments of the economy. Inequality eventually decreases, however, as modern values and technology diffuses through out the economy.

Recent research seeks to explain inequality by reference to dualism between modern (industrial) and traditional (agricultural) sectors, which harkens back to modernization theory (Paukert 1973; Cheney and Syrquin 1975; Ahluwalia 1976; Kuznets 1976). It is not development per se, but dualism and diffusion processes that are the keys to explaining income inequality (Nielsen and Alderson 1995).[3] Dualism is also found in dependency arguments (Prechel 1985), differing in the type of sectors and in the predictions of readily increasing sector integration by diffusion alone due to structural constraints that prevent the lessening of inequality. Nielsen (1994) argues that two transitional processes explain part of the effect of development on income distribution: sector dualism and generalized sociocultural dualism. Sector dualism is primarily economic and is associated with labor force shifts from the low productivity low-wage traditional sector to the high productivity high-wage modern sector. He argues that the movement of labor from one sector to another increases income inequality as an automatic numerical consequence, regardless of the level of income inequality within the various sectors. This notion of sector dualism is drawn from the work of Kuznets (1955) and Lecaillon et al. (1984) and is both the process by which sectoral labor force shifts produce income inequality and the amount of inequality due to differences in income between traditional and modern economic sectors of develop-

3. Nielsen and Alderson (1999) are hard to classify. Their rhetoric is quite critical of world-system theory, while their actual empirical findings confirm penetration effects previously found in similar models.

ing nations. That is, it is a function of both the differences in average incomes between sectors as well as the relative size of the sectors. Urbanization and internal migration are related to these processes, and indicators such as percent of labor force in agriculture have been found to be associated with income inequality at lower levels of development (Crenshaw 1992, 1993; Simpson 1993; Nielsen and Alderson 1997). Direct measures of sector dualism, the Gini coefficients for the difference between agricultural shares of the labor force and its share of the total income of society, have also been found to be positively associated with inequality (Nielsen 1994; Nielsen and Alderson 1995).

Generalized sociocultural dualism is associated with the demographic transition, which is the increased growth rate of newly developing populations (due to reductions in the death rate through the diffusion of medical technology) that is not yet offset by a reduction in the birth rate. As a consequence, societies experiencing the transition have a high natural rate of population growth that increases income inequality through its impact on labor surplus, decreasing the relative bargaining power of low-skilled workers. Nielsen (1994) argues that any variable associated with development that generates heterogeneity due to partial or selective diffusion will contribute to inequality. Generalized sociocultural dualism entails all of the dimensions of industrialism that spread unevenly and therefore affect the distribution of income, including the diffusion of education and political democracy, which have been traditionally explained by other scholars from a different perspective.

Another often-debated topic among development scholars is access to education. Some theorists argue that education allows for the attainment of credentials and skills necessary for employment in the modern industrial sectors of the economy (Simpson 1990; Crenshaw 1992). This argument is derived from the modernization perspective in that the relationship is dependent on national economic growth and increasing internal sectoral complexity. Educational institutions in the early stages of economic growth are assumed to be concentrated in urban areas and primarily accessed by elites. As industrialization continues, however, mandatory and open educational policies are instituted nationally, allowing for educational attainment and hence increased employment opportunities for the rest of the population. This occurs through a process of diffusion of institutional forms and practices from urban to rural areas and is also a result of the growth of effective popular demand generated by improving economic conditions.

Some researchers have confirmed this inverted-U relationship between educational enrollments and income inequality (Simpson 1990; Crenshaw 1992). Others have found negative effects on income inequality (Weede 1993; Nielsen 1994). Still others agree that the spread of education is curvilinear related to

income inequality, but assert that the relationship is U-shaped (Crenshaw and Ameen 1994). These scholars argue that along with the spread of educational credentials associated with development come increased competition for those positions requiring credentials, therefore reducing wage differentials between the educated and uneducated and decreasing income inequality (Nielsen and Alderson 1997). At a certain point of institutionalization, however, a new set of post-industrial social inequalities is established and the relationship becomes increasingly positive (Crenshaw and Ameen 1994).[4]

We will consider a variety of other specific arguments below when explaining the independent variables. But for now, let us turn to the variables and methods.

DATA AND METHODS

The Measurement of Income Inequality

Many researchers have recognized problems with the data quality and comparability of cross-national measures of income inequality (e.g. Ahluwalia 1993[1974]; Muller 1993[1984]; Hoover 1989). Fortunately, data collection procedures have improved substantially in recent years and much work has been done in assessing their comparability. Our primary source for the inequality data is a World Bank data set constructed by Deininger and Squire (hereafter referred to as "DS") (1996). In order to increase our sample size as much as possible we supplement the DS data with two other high quality sources: the ILO's "Statistics on Poverty and Income Distribution" (ILO) (1996) and the World Development Indicators 1999 (WDI) (1999). All three data sets were compiled from various sources, but with careful attention to issues of quality and comparability.

The DS data set has proven extremely useful in preliminary analyses (Deininger and Squire 1996, 1997). As many of the theoretical explanations of inequality contain a temporal element, lack of high quality time-series data has hampered empirical testing of these hypotheses. Indeed, Deininger and Squire argue that the use of inferior data calls into question the results of many studies, especially those examining changes in inequality over time (1996: 570, 573). They

4. Even when empirical findings do not differ, often-divergent theoretical explanations are offered. For example, Crenshaw (1992, 1993, 1994) and Simpson (1990, 1993) engage in a debate as to whether the effects of such factors as the diffusion of education and the spread of political democracy are primarily political or economic phenomena. This is in large part a theoretical, rather the empirical, debate.

impose stringent quality standards in the construction of their high-quality data set. Each observation must meet three requirements: 1) household or individual as the unit of observation, 2) comprehensive coverage of the population, and 3) comprehensive coverage of income or expenditure. The researchers argue that their data set improves upon those used previously in three ways: it contains a larger number of high caliber observations, includes a greater number of nations and provides a more reliable basis for time-series analysis.

In terms of the issues discussed by Deininger and Squire that may affect comparison of measures of inequality, we take the following steps. Where possible we attempt to use observations where the income recipient unit is the household rather than the individual, as household-based measures yield lower estimates of inequality. Similarly, we selected measures where income is reported net of taxes where possible, as these tend to generate more equally distributed estimates of fractile income shares. As previously mentioned, we supplement the DS data with ILO and WDI data sets. The data contained in each frequently overlaps and is quite similar. In terms of preference, we selected measures based on the income earning population first, then on the economically active population, and then on tax records. Based on the findings of previous studies, however, we do not expect any systematic bias based on differences in measurement in these areas (Deininger and Squire 1996; Alderson and Nielsen 1999).[5]

Using this methodology we constructed a panel data set for the years 1980-1995. The population consists of all nations with a population of over one million for which data was available. The result is a data set of 65 nations for which we have inequality data at two points in time. The measurement year of the earlier estimate ranges from 1968 to 1986 (mean of 1979), and the range for the later estimate is from 1988 to 1995 (mean of 1991). The 65 cases average a 11.5 year lag between inequality measures, ranging from 3 years to 21 years.[6]

[5.] The majority of indicators in our data set are based on income, but in the interest of expanding coverage we include 19 expenditure measures as well. To address the potential error involved, we follow the steps suggested by Deininger and Squire (1996). For the quintile data, we calculated the mean difference in income- and expenditure-based quintile shares and adjusted the expenditure-based data for quintiles where necessary in the following way: adding .0168 to the top quintile, subtracting .0008 from the upper middle, subtracting .0039 from the middle, subtracting .0009 from the lower middle, and finally subtracting.0115 from the bottom quintile (7 cases in the 1995 data and 12 cases in the 1985 data).

[6.] Ivoire, where change in inequality is only measured over three years was made in the interest of retaining as many African nations in the data set as possible.

Because income data is frequently collected in quintile shares, the two most commonly used measures in comparative studies of income inequality are the Gini coefficient, which looks at the disparity between equal and actual distribution of income among quintile shares, and the concentration of income received by the top 20% of the population. The majority of cross-national studies find no difference between models based on top quintile income concentration and those based on the Gini (although the Gini coefficient has been extensively critiqued on methodological and theoretical fronts Chan 1989; Hoover 1989; Braun 1991; Muller 1993[1984]). It is, however, for theoretical reasons that researchers should opt to use income concentration or the Gini coefficient.

Muller (1993[1984]) argues that world-system theory points to the concentration of income at the upper end of the distribution as the crucial indicator of income inequality. As there is little variation in the bottom 20%, the difference between concentration in the top percentiles and the Gini score is due almost entirely to the distribution in the middle. As Deininger and Squire (1996) note, when examining changes in inequality the use of an aggregate measure such as the Gini coefficient obscures the character of shifts in income distribution because "... there is no unique mapping between the changes in the index and the underlying income distribution... " (p. 567). That is, the Gini coefficient for a particular nation may increase, but there is no way of discerning whether the rise in inequality is due to redistribution from the bottom quintile to the top or a result of a shift from the middle to the top. Also of theoretical importance is that the use of upper proportional shares of income indirectly measures asset inequality, another significant dimension of economic stratification (Boswell and Dixon 1993). Considering these theoretical concerns, in the analyses that follow we concentrate on examining change in top quintile income share.

The dynamics of income inequality, 1980-1995

The data suggest that, overall; inequality as measured by top quintile income share has increased within nations during the 1980s and early 1990s.[7] On average, the percent of national income accruing to the top twenty percent of the population rose by 2.4%. While this may seem rather small, it is important to consider that in real terms this amount is quite substantial, especially in nations where great numbers of people live in poverty. In El Salvador, for example, 2% of national incomes is equal to roughly US$189,756,000.

[7.] Top quintile income share for all nations at both points in time are included in the Appendix.

In addition, the data indicate that the long held assumption that inequality changes rather slowly over time does not hold for the more recent time period under study. Nearly 30% of the nations in our data set exhibit top quintile changes of +/–10%, and 60% show changes of +/–5%. Of these nations, the majority experienced worsening income inequality. For example, fourteen nations (22%) exhibited increases in top quintile income share of over 10%, and twenty-four nations (37%) had increases of over 5%. An interesting issue is whether the generally held assumption that income inequality is a relatively stable feature was based on flawed or incomparable data or, alternately, whether this was true for earlier periods but no longer holds in the era of increasing economic globalization.

The advanced industrial nations as a whole tend to have lower inequality than other countries, especially the Scandinavian social democratic nations. There was not a tremendous amount of change in inequality among developed countries, with the exception of the "Anglo-American" liberal market nations: Australia (+5%), the United States (+6%), and the United Kingdom (+8%). What is striking is that the latter all began the decade with high inequality relative to other advanced industrial nations, defying any ceiling effect on inequality provided by political institutions or global convergence expected by world cultural theorists. Stallings (1995) suggests that all share similarities in their "Anglo-American" variant of capitalism and many studies have documented rising inequality in these nations in recent decades (Bluestone and Harrison 1988; Braun 1991; Nielsen and Alderson 1995, 1997).

Measurement of the Independent Variables

The independent variables we include in our regression models are representative of the theoretical perspectives that address cross-national income inequality discussed in the literature review. This will allow the perspectives to compete freely with one another and allow for a fuller specification of the empirical models. Where data is not available for the target year for a substantial number of cases, we use averages over a specified time period in order to retain as many nations as possible in the models.

World System Indicators:

TNC Penetration: Capital dependence is characterized by significant amounts of foreign control over the national economy, represented by the accumulation of stock owned by transnational corporations. The most common operationalization of investment dependence is transnational corporate penetration (PEN), the ratio between inward foreign direct investment (FDI) stock and GDP. This measure has been found to be significantly associated with high levels of inequality in developing nations. The WIR provides measures of inward FDI as a percentage of gross domestic product for multiple years (Source: World Investment Report 1998).[8]

On average, TNC penetration rose over the decade; nations averaged a 7% pen score in 1980, whereas in 1990 that average had increased to 11%. The majority of nations in the data set showed dramatic increases in foreign accumulation of stock relative to the size of their economies, the average percent increase from 1980 to 1990 was 184%. Of the 73 nations for which we have PEN data for both 1980 and 1990, all but 13 (18%) increased their PEN scores, many quite substantially. Over half of the sample (60.3%) increased PEN by over 50%. The majority of nations actually increased their dependence on foreign ownership by relatively large amounts, 42.5% increasing by more than 100% and 20.6% increasing by more than 200%.

Exploitation. Following Boswell and Dixon (1993), class exploitation is measured as wages and salaries as a percent of value added in manufacturing [(1 - WSPVA)/WSPVA]. Manufacturing is the only sector for which data is available, but is presumably correlated to other sectors. This measure captures the cross-national disparity in bargaining power between capital and labor in determining the returns to increases in productivity due to factors such as differences in capital mobility, labor laws, social welfare, and so on. In general, the Scandinavian social democratic countries have the lowest rates and the highest are found in Latin America and among heavily indebted countries, including those in Eastern Europe (even while nominally 'communist') (Boswell and Dixon 1993). Although rarely used in cross-national studies of inequality, it has been found to be positively associated with income concentration (Boswell and Dixon (1993).[9] (Source: World Data 1995)

Sectoral disarticulation. This measure is meant to capture the underabsorbtion of labor in the economic sectors of the economy; it reflects the disproportionality of productivity across sectors. Some have argued that disarticulation may be one of the mechanisms through which TNC penetration affects income distribution (Breedlove and Armour 1997). This measure is similar to the sector dualism measure, but that measure only captures dualism in agriculture. It is constructed by taking the sum of the differences between a sectors share of the

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8. See Evans and Timberlake 1980; Kohli 1984; Bornschier and Chase-Dunn 1985; Chan 1989; London and Robinson 1989; Crenshaw and Ameen 1994; Beer 1999.

9. –1986 for Nepal.

labor force and that sectors contribution to GDP, across all three major sectors of the economy: service, industry and agriculture. (Source: World Development Indicators 1998)

Change in urban population. This measure is meant to capture "overurbanization," the rapid migration of rural workers to the cities. This relocation to urban areas is assumed to be a result of the mechanization and transnationalization of the rural sector in developing nations (Prechel 1985). Overurbanization contributes to inequality by increasing the number of unemployed workers and thereby decreasing wages. We operationalize this measure as change in the percent of the population living in urban areas over a five year time period. We use this instead of a measure of percent urban population in order to capture the effects of a rapid increase in urban dwellers, rather than the slower trend of rising urbanization seen throughout the world. (Source: World Development Indicators 1998)

Change in service labor force. Evans and Timberlake (1980) argue that inequality is greater within the tertiary sector, even though average incomes are higher in the tertiary as opposed to the agricultural sector. This is because incomes are more polarized in the service sector, which contains both professionals and low-skilled workers. Growth in the tertiary sector may also contribute to inequality through its creation of a readily available reserve army of labor, which depresses wages in other sectors through is weakening of labor's bargaining power. Some have asserted that foreign investment increases the tertiary sector and that change in tertiary sector has a positive effect on income inequality (Evans and Timberlake 1980). (Source: World Development Indicators 1998)

Alternative Indicators:

Level of Development. We use real gross domestic product per capita as a measure of level of economic development. Real dollars are those adjusted for differences in domestic prices using purchasing power parities. (Source: Penn World Tables 5.6; World Development Indicators 1999)

Education. We operationalize this variable as secondary school enrollments and its inclusion in the models is meant to capture levels of domestic human capital. Nielsen and Alderson (1995) argue that high levels of secondary school enrollments indicate "skills deepening." The nature of this relationship, however, has not been fully settled by the empirical evidence. Some have found education to be negatively related to inequality (Weede 1993; Nielsen 1994; Nielsen and Alderson 1995), others have found an inverted-U shaped pattern (Simpson 1990; Crenshaw 1992) and still others have found a U-shaped association (Crenshaw and Ameen 1994). (Source: World Development Indicators 1997)

Modern Sector dualism. As per Nielsen and Alderson (1995), this variable is operationalized as the absolute value of percent of the labor force in agriculture

minus agriculture as a percent of GDP, and is expected to have a positive association with income inequality. (Source: World Development Indicators 1998)

Percent of labor force in agriculture. While some have found a large agricultural sector to be related to high inequality (Simpson 1993; Crenshaw 1993, 1992), they have not included a sector dualism measure. Nielsen and Alderson (1995) argue that, when controlling for intersectoral differences in inequality, a large agricultural sector (having a relatively more equal distribution of income) should exhibit a negative association with the inequality indicators. (Source: World Development Indicators 1998)

Natural rate of population increase. This measure is operationalized as the crude birth rate minus the crude death rate and is intended to capture the effect of the demographic transition and generalized sociocultural dualism on income distribution (Nielsen and Alderson 1995). It is expected to have a positive effect on inequality (Ahluwalia 1976; Bollen and Jackman 1985; Simpson 1990; Nielsen 1994). (Source: World Development Indicators 1999)

Agricultural population density weighted by the percentage of the labor force in agriculture. This variable is constructed as per Crenshaw and Ameen (1994) by first constructing an agricultural density measure (the ratio of the total agricultural labor force divided by arable land), and then multiplying this density measure by the labor force in agriculture and taking its square root. This variable has generally been found to have a negative effect on income inequality (Chan 1989; Crenshaw 1992, 1993; Crenshaw and Ameen 1994), but some have reported insignificant relationships with some differences in measurement (Simpson 1990; Nielsen 1994). (Source: World Development Indicators 1998)

AN ANALYSIS OF CHANGE IN TOP QUINTILE INCOME SHARE, 1980–1995

Descriptive statistics and a correlation matrix of the variables used in the panel models are presented in Tables 1 and 2. Several variables were logged to correct for skewness: TNC penetration, real GDP per capita, exploitation, agricultural density, and average exports as a percent of GDP. As mentioned earlier, income inequality increased in the majority of nations in our sample. On average, top quintile income share rose in the 65 nations for which we have data at two points in time, from 45.51% to 46.80%. Also of interest is the increase in average TNC penetration over the decade; nations averaged a 7% PEN score in 1980, whereas in 1990 that average had increased to 11%. The majority of nations in the data set showed dramatic increases in foreign accumulation of stock relative to the size of their economies, the average percent increase from 1980 to 1990 was 184%. Of the 73 nations for which we have PEN data for both 1980 and 1990, all but 13 (18%) increased their PEN scores, many quite substantially. Over half of

Table 1 – Panel Models Descriptive Statistics

	N	Minimum	Maximum	Mean	S.D.
Top quintile income share (1980)	66	32.10	68.00	45.51	8.60
Top quintile income share (1995)	86	33.80	65.18	46.80	8.56
TNC penetration	74	0.00	0.53	0.07	0.08
Real GDP per capita	83	322.00	15295.00	4416.49	3990.37
Average disarticulation	68	–25.96	8.06	–2.61	4.14
Average sector dualism	70	–1.47	61.31	22.86	17.49
Average agricultural labor force	84	1.20	93.75	42.11	28.57
Natural rate of population increase	84	–1.10	37.80	19.51	10.73
Average secondary school enrollment	78	3.00	105.00	50.35	30.76
Percent change in urban population	85	–2.18	34.12	6.79	6.86
Average exploitation in manufacturing	71	0.46	7.10	2.30	1.43
Percent change in female labor force	83	–12.42	57.79	17.48	12.53

Sources For All Tables:

Top quintile income share, circa 1980;Deininger and Squire 1996, ILO 1996, WIR 1999.
Top quintile income share, circa 1995;Deininger and Squire 1996, ILO 1996, WIR 1999.
TNC penetration, 1980; WIR 1998.
Real GDP per capita, 1980; Penn World Tables 5.6.
Average disarticulation, 1980–1985; WDI 1998.
Average sector dualism, 1980–1985; WDI 1998.
Average agricultural labor force, 1980–1985; WDI 1998.
Natural rate of population increase, 1980; WDI 1999.
Average secondary school enrollments, 1980–1985; WDI 1997.
Percent change in urban population, 1980–1985; WDI 1998.
Average exploitation in manufacturing, 1980–1985; World Data 1995.
Percent change in female labor force, 1980–1990; Wistat 1994.

the sample (60.3%) increased PEN by over 50%. The majority of nations actually increased their dependence on foreign ownership by relatively large amounts, 42.5% increasing by more than 100% and 20.6% increasing by more than 200%. The data indicate that the acceleration of global investment is indeed one of the characteristic features of the contemporary era.

Regression Analysis of Change in Top Quintile Income Share, 1980–1995

Table Three, equation A, replicates Beer's (2001) model predicting top quintile income share for a cross-section of nations circa 1995.[10] In this equa-

[10.] This model is drawn from work presented in Beer (2001), an unpublished dissertation manuscript. In this context it is used to illustrate the differences between lagged cross-sectional and panel models of top quintile income share.

tion, income inequality has a positive relationship with economic development, TNC penetration, exploitation, disarticulation, change in urban population, and change in the percent of the labor force in services. Top quintile income share is negatively associated with secondary school enrollments, the exploitation/change in urbanization interaction term, and agricultural density. However, equation B indicates that this model does not work as well when we add the lagged dependent variable to the model. That is, the set of variables included in equation A are useful in specifying *level* of income inequality cross-nationally, but are inadequate if what we wish to understand is *change* in top quintile income share over the 1980s and early 1990s. Although development, investment dependence, and exploitation are associated with increasing inequality, and education is related to smaller gains in top quintile income share, this set of variables is a poor fit when specifying change in income distribution.

A replication of Nielsen and Alderson's "dualism" model is presented in equation C. These theorists take issue with modernization arguments, asserting that the cross-national variations in income inequality are not driven by simple increases in GDP per capita, but are instead accounted for by a set of variables that capture the changes in social and economic structure that accompany the movement of nations from agricultural to industrial societies. The dualism model has proven useful for cross-sectional analyses of income inequality (Nielsen 1994; Nielsen and Alderson 1995; Alderson and Nielsen 1999). However, as was the case in equation B, when the lagged dependent variable is included in equation D, the model fails to adequately predict top quintile income share change.[11] Clearly, the equations presented in Table 3 indicate that models that work well in specifying income distribution for a cross-section of nations do not adequately predict change in inequality. As many of the theories that attempt to account for cross-national variation in income distribution contain a temporal element, it is incumbent upon scholars of cross-national income distribution to test these propositions with the improved data now available.

DISCUSSION AND CONCLUSION

As noted in the introduction, inequality is back on the agenda for many development agencies. This is in part due to the failure of the past few decades to significantly reduce global poverty in an era of increasing liberalization despite robust economic growth (Milanovic 1999). The World Bank's World

[11.] The principal components factor representing the four dualism variables also did not significantly predict change in top quintile income share.

Table 2 – Correlation Matrix for Panel Models

	top 20 (1980)	top 20 (1995)	lpen (1980)	lrgdppc (1980)	av disart (80–85)	av sec dual (80–85)	av ag lf (80–85)	pop inc (1980)	av sec ed (80–85)	% ch u pop (80–85)	av exploit (80–85)	% ch svc (80–90)	lag density (1980)
top 20 (1980)	1.000 (66)	.847** (65)	.091 (58)	–.391** (66)	.162 (53)	.568** (55)	.434** (63)	.700** (63)	–.571** (61)	.334** (64)	.386** (60)	.212 (61)	.170 (60)
top 20 (1995)		1.000 (86)	.231* (72)	–.329** (81)	.171 (66)	.384** (68)	.294** (82)	.603** (82)	–.563** (76)	.229* (83)	.355** (69)	.150 (81)	.082 (79)
lpen (1980)			1.000 (74)	.282** (73)	–.119 (61)	–.250* (62)	–.347** (71)	–.064 (71)	.194 (68)	–.340** (72)	–.192 (65)	–.112 (71)	–.377** (70)
lrgdppc (1980)				1.000 (83)	–.395** (67)	–.817** (69)	–.939** (80)	–.750** (80)	.851** (76)	–.700** (81)	–.474** (71)	–.194* (78)	–.685** (77)
av disart (80–85)					1.000 (68)	.380** (67)	.412** (68)	.331** (67)	–.394** (65)	.238* (68)	.056 (62)	–.120 (68)	.339** (67)
av sec dual (80–85)						1.000 (70)	.902** (70)	.678** (69)	–.791** (67)	.614** (70)	.308** (63)	.224* (67)	.633** (69)
av ag lf (80–85)							1.000 (84)	.705** (83)	–.862** (77)	.696** (84)	.422** (69)	.197* (81)	.716** (80)
pop inc (1980)								1.000 (84)	–.807** (77)	.481** (84)	.453** (69)	.135 (81)	.440** (79)
av sec ed (80–85)									1.000 (77)	–.620** (78)	–.490** (67)	–.228* (75)	–.566** (75)
% ch u pop (80–85)										1.000 (85)	.394** (70)	.239* (82)	.516** (80)
av exploit (80–85)											1.000 (71)	–.045 (68)	.450** (69)
% ch svc (80–90)												1.000 (83)	.064 (78)
l ag density (1980)													1.000 (81)

* significant at the .05 level (1–tailed), ** significant at the .01 level (1–tailed)

Key for Table 2:

top 20 (1980): top quintile income share, circa 1980; Deininger and Squire 1996, ILO 1996, WIR 1999.
top 20 (1995): top quintile income share, circa 1995; Deininger and Squire 1996, ILO 1996, WIR 1999.
TNC pen: TNC penetration, 1980; WIR 1998.
rgdppc: real GDP per capita, 1980; Penn World Tables 5.6.
av disart: average disarticulation, 1980–1985; WDI 1998.
av sec dual: average sector dualism, 1980–1985; WDI 1998.
pop inc: natural rate of population increase, 1980; WDI 1999.
av sec ed: average secondary school enrollments, 1980–1985; WDI 1997.
%ch urb pop: percent change in urban population, 1980–1985; WDI 1998.
av exploit: average exploitation in manufacturing, 1980–1985; World Data 1995.
%ch fem lf: percent change in female labor force, 1980–1990; Wistat 1994.
ag density: agricultural population density weighted by the percentage of the labor force in agriculture, 1980; WDI 1998.

Development Report notes that 2.8 billion of the world's 6 billion individuals live on less then $2 per day (WDR 2000/01). Although the percent of individuals living in poverty has declined somewhat, the absolute number of poor people has increased (Chen and Ravaillon 2000). Moreover, global income inequality has rapidly grown in the past few decades (Berry et al. 1983; Korzeniewicz and Moran 1997). Development agency scholars have traditionally stressed economic growth generated through integration with the world economy as the primary route to improving the lives of those in developing nations (see, for example, Dollar and Kray 2000). Now, however, there is an increasing emphasis on growth with equity, as many recent studies have found that the benefits of economic growth to the poor are highly dependent on the existing level of inequality within nations (WDR 2000/01; Weisbrot et al. 2000; Wodon 1999). Chen and Ravaillon provide empirical evidence that indicates that inequality is a constraint on pro-poor growth (2000). The sense that equitable distribution of income within nations is an important precursor to achieving widespread and beneficial economic growth is becoming more widespread."

Recently, development scholars have begun to explore the ways in which globalization puts nations at risk of increasing income inequality (Birdsall 1999). Rodrick argues that the primary challenge for the world economy is "... ensuring that international economic integration does not contribute to domestic social disintegration." (1997:2). As noted, a gap in most of these recent studies is that they focus on the effects of international trade, neglecting the significance of foreign investment.[12]

Globalization heightens the vulnerability of certain groups, not only in developing nations but also in advanced market economies (UNCTAD 2000).

The analysis presented here illustrates the usefulness of panel models in understanding the dynamics of income distribution. As Kohli et al. (1985) points out, while cross-sectional analyses may reveal long-term structural tendencies, panel analyses are essential for uncovering causal forces affecting changes in income inequality. As the global economy increases in both rapidity and volume, these changes may have greater consequence. Many scholars have discussed the deindustrialization of core nations during the 1980s, generally focusing on specific examples of increasing capital mobility and its effects on core labor (Piore and Sabel 1984; Bluestone and Harrison 1988). It is only recently that scholars have begun to look at these phenomena in terms of globalization, at how the

[12.] One important exception is Brady and Wallace, who found that FDI has a negative impact on the political and economic power of workers in U.S. states (2000).

Table 3 – Comparison of Lagged Cross-Sectional and Panel Models Predicting Top Quintile Income Share

	(a)	(b)	(c)	(d)
Constant	37.177**	1.823	58.424***	25.236***
	(18.308)	(19.249)	(6.234)	(7.323)
Top quintile income share (1980)		0.721***		0.804***
		(0.145)		(0.121)
TNC penetration – lagged (1980)	1.658**	0.984*		
	(0.699)	(0.609)		
Average exploitation in manufacturing–lagged (80–85)	7.205***	4.542***		
	(1.853)	(1.736)		
Average disarticulation (80–85)	0.902***	0.321		
	(0.330)	(0.287)		
Percent change in urban population (80–85)	0.979***	0.213		
	(0.305)	(0.292)		
Average exploitation – lagged * Change in urban population	–0.729***	–0.359*		
	(0.234)	(0.255)		
Percent change in female labor force (80–90)	0.141**	0.013		
	(0.849)	(0.074)		
Agricultural density – lagged (1980)	0.105*	–0.721		
	(0.080)	(0.909)		
Real GDP per capita – lagged (1980)	4.155**	2.985*		
	(1.995)	(1.800)		
Average secondary school enrollment (80–85)	–0.188***	–0.109**	–0.196***	–0.164***
	(0.054)	(0.909)	(0.060)	(0.055)
Average sector dualism (80–85)			0.257**	0.014
			(0.109)	(0.118)
Average agricultural labor force (80–85)			–0.292***	–0.129*
			(0.078)	(0.077)
Natural rate of population increase (1980)			0.295**	–0.094
			(0.127)	(0.141)
F	8.206***	13.643***	14.287***	27.012***
Adj. R^2	.555	.738	.458	.718
N5	3	46	64	52

* p < .10, ** p < .05, *** p < .01 – significance levels are one-tailed

global economy is changing the structure of inequality. There are many causes of income inequality and more research should be done that fully explores the contemporary dynamics of income distribution. The research presented here indicates a shift in capital/labor relations brought about by globalization that have significantly contributed to the rise in income inequality seen throughout the world. Our current ways of understanding cross-national inequality are inadequate by themselves in explaining this recent change. Several factors suggested by the world-system approach—TNC penetration and exploitation—appear to tap into this structural change.

In addition, some factors associated with alternative theories receive support. Although not curvilinear, development has a positive relationship with income inequality net of the other factors included in the model. While this does not fit a traditional modernization view of the world, it tells us a great deal about the kind of unfortunate world we live in today. Nielsen and Alderson (1997) have argued that the Kuznets "inverted-U" actually takes the form of a wave if the relatively recent increase in inequality among the wealthy nations is considered. The empirical evidence also supports the importance of education for decreasing inequality; the education variable consistently had a robust and highly significant negative association with change in top quintile income share. Nations with high levels of secondary school enrollments appear to experience fewer increases in income concentration, as human capital becomes more widely dispersed. Nielsen and Alderson argue that this variable indicates a "skills deepening," where the accumulation of various productive skills generates income for greater proportions of the population by providing them with the expertise to fill more positions, thereby equalizing incomes. This suggests that nations with a desire to decrease income inequality within their borders would do well to invest in programs that increase secondary school enrollments. Expanding human capital, especially among women, is the surest way to increase labor's share of the productivity gains.

What besides increasing education does our research imply will succeed for countries that seek to reduce inequality without sacrificing economic development? The world-systems approach suggests that reducing exploitation in manufacturing and elsewhere would increase their income share. However, this is tricky as capital reinvested from the capitalist's share (as opposed to consumed or sent abroad) increases growth and development. As mentioned above, the most productive, although highly limited, route is to expand education and skill training; especially among women and other more easily exploited populations. Related productive steps include banning child labor and sweatshops, guaranteeing occupational and environmental safety, improving public health and welfare and so on, although the cost of these rises for poorer countries. Increasing

bargaining power through unionization and pubic policy would be the broadest and most direct route, but is the most fraught with risk from capital flight. Long term success under globalization will require international union organizing and changing the rules of global exchange in the WTO, IMF, and other institutions.

Finally, TNC penetration has an impact on income distribution beyond what one would expect based on prior levels of inequality and various domestic factors. Can a country reduce TNC penetration, which increases inequality, without reducing foreign investment, which increases growth? At first, this may seem impossible, as penetration is a factor of FDI. However, one of the main problems of FDI in developing countries is the lack of linkages to domestic businesses. Policies that expand linkages, including ones that make local capital more useful, would multiply domestic growth (and a local middle class) alongside FDI, keeping the degree of penetration in check. Even if penetration were to increase, the negative effects would be muted, especially as matched with the policies listed above.

Globalization does indeed appear to put nations at risk of increasing inequality (Birdsall 1999). Although some have dismissed the fears of those who have expressed apprehension regarding the effects of accelerated globalization on social welfare as "protectionist" or "inward-looking," the study presented here supports the idea that undue reliance on foreign investment may in fact benefit elite segments of the population over others. The empirical evidence supports the view that globalization puts certain populations at risk (Rodrick 1997). Moreover, the results of the study indicate that this effect is not limited to only developing nations. The data suggest that those advanced industrial nations with relatively high and increasing levels of foreign investment, such as the United States and the United Kingdom also saw increased inequality over the 1980s and early 1990s. That these very nations, along with the majority of global financial institutions, vigorously espouse the continuing trend toward liberalization of foreign investment policies and assert that fears of globalization are unwarranted is somewhat ironic. Global investment may certainly be likened to a rising tide, and it may be a tide that lifts all boats, but the empirical evidence presented here indicates that it surely lifts some boats higher than others. The question of whether indeed foreign investment improves the incomes for all citizens is an empirical question. This study suggests that dependence on foreign investment as a development strategy, especially compared to domestic and human capital investment, may be misguided for nations concerned with equality. Net of other factors, foreign investment dependence benefits the elite segments of the income-earning population over the poorer eighty percent.

APPENDIX

Country	Top Quintile Income Share (1980)	year	Top Quintile Income Share (1995)	year	Change in Top Quintile Income Share (1980–1995)	TNC Penetration (1980)
Australia	44.200	1981	46.400	1990	.05	.087
Banglades	45.320	1981	37.900	1992	–.16	.004
Belgium	36.100	1979	35.030	1992	–.03	
Brazil	61.600	1980	65.180	1989	.06	.069
Bulgaria	32.930	1980	39.247	1992	.19	
Canada	37.930	1981	34.840	1991	–.08	.204
Chile	51.400	1968	63.000	1989	.23	.032
China	36.660	1980	41.650	1992	.14	
Colombia	58.760	1978	54.350	1991	–.08	.032
Costa Rica	51.400	1981	50.700	1989	–.01	.139
Cote d'Ivoire	47.430	1985	44.080	1988	–.07	.052
Czechoslovakia	32.100	1980	35.570	1992	.11	
Denmark	37.210	1981	37.830	1992	.02	.063
Dominican Republic	47.800	1984	55.700	1989	.17	.036
Egypt	43.200	1974	41.090	1991	–.05	.096
El Salvador	53.200	1977	54.400	1995	.02	.043
Ethiopia	41.300	1982	47.700	1995	.15	.027
Finland	40.000	1980	33.800	1991	–.16	.011
France	41.820	1979	40.100	1989	–.04	.034
Germany	37.420	1981	37.100	1989	–.01	.045
Greece	40.170	1981	41.180	1988	.03	.113
Guatemala	53.900	1979	63.000	1989	.17	.089
Honduras	59.500	1986	56.330	1992	–.05	.036
Hong Kong	46.500	1980	49.370	1991	.06	.063
Hungary	32.240	1982	38.680	1991	.20	
India	40.900	1977	41.100	1992	.00	.007
Indonesia	42.270	1980	41.950	1990	–.01	.142
Israel	39.600	1979	42.500	1992	.07	.033
Italy	39.050	1980	37.430	1991	–.04	.020
Jamaica	50.300	1975	45.120	1992	–.10	.187
Japan	39.570	1980	38.200	1990	–.03	.003
Jordan	51.000	1980	47.690	1991	–.06	.040
Kenya	60.900	1982	61.857	1992	.02	.048
South Korea	45.400	1980	42.240	1988	–.07	.018
Malaysia	55.800	1979	53.730	1989	–.04	.248

Country	Top Quintile Income Share (1980)	year	Top Quintile Income Share (1995)	year	Change in Top Quintile Income Share (1980–1995)	TNC Penetration (1980)
Mexico	54.500	1977	59.300	1989	.09	.042
Morocco	46.150	1984	46.300	1991	.00	.010
Nepal	59.200	1977	44.817	1995	–.24	.001
Netherlands	35.670	1981	36.360	1991	.02	.113
New Zealand	40.570	1980	44.730	1990	.10	.105
Nigeria	44.200	1986	48.290	1992	.09	.026
Norway	41.050	1979	41.550	1991	.01	.116
Pakistan	41.270	1979	39.700	1991	–.04	.024
Panama	52.420	1980	59.800	1989	.14	.108
Peru	58.190	1981	50.397	1994	–.13	.043
Philippines	53.300	1975	52.500	1988	–.02	.038
Poland	34.564	1980	37.660	1992	.09	.001
Portugal	42.500	1980	40.420	1991	–.05	.044
Puerto Rico	52.600	1979	53.200	1989	.01	
Senegal	60.900	1970	58.637	1991	–.04	.051
Sierra Leone	52.500	1968	63.417	1989	.21	.070
Singapore	46.590	1980	46.590	1988	.00	.529
Soviet Union	34.000	1980	36.600	1989	.08	
Spain	35.000	1980	35.280	1989	.01	.024
Sri Lanka	36.820	1980	39.357	1990	.07	.057
Sweden	39.450	1980	38.980	1992	–.01	.029
Taiwan	37.040	1980	38.660	1992	.04	.058
Tanzania	36.600	1976	45.440	1993	.24	.009
Thailand	51.100	1981	58.500	1992	.14	.030
Tunisia	50.000	1980	46.330	1990	–.07	.090
UK	37.660	1980	40.840	1991	.08	.117
USA	41.500	1980	44.100	1991	.06	.031
Venezuela	48.200	1981	58.410	1990	.21	.027
Yugoslavia	40.830	1978	39.035	1990	–.04	.002
Zimbabwe	68.000	1969	62.357	1990	–.08	

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ABSTRACT

This paper shows how Japanese firms and the Japanese state constructed a development model based on the steel industry as a generative sector that drove Japan's economic ascent in the world-historical context of U.S. hegemony. We make three arguments in this paper. First, there is a new model of capital accumulation that does create new forms of social inequality by redistributing costs and benefits in very different ways than earlier models. Second, Japanese firms and the Japanese state created this new model of capital accumulation and social inequality via mechanisms including joint ventures, long term contracts, and other forms of international trade and investment, not U.S.-based transnational corporations, as is usually assumed. Third, world-systems theory reconstructed through the lens of the new historical materialism explains this restructuring of the capitalist world-economy as the outcome of Japan's economic ascent over the last fifty years. Further, we argue that this new model of capital accumulation has had similar impacts on redistributing the costs and benefits of development between core and peripheral regions of the capitalist world-economy in a wide range of global industries.

These strategies created a tightly linked set of technological and organizational innovations to overcome the natural and social obstacles to Japanese development, dramatically increase Japan's international economic competitiveness by lowering production costs in all sectors of the economy, turn Japan into the world's largest exporter of manufactured products, restructure a range of global industries, and recreate the world-system hierarchy in support of Japanese development. In particular, organizational innovations in the use of long term contracts and joint ventures in raw materials industries to foster global excess capacity and lower rents to resource extracting firms and states reallocated the costs of providing the material building blocks of Japanese development to the states and firms of its new raw materials periphery. This competitive advantage drove Japanese capital accumulation and economic ascent, and simultaneously drove underdevelopment in Japan's periphery.

These Japanese innovations became key elements of globalization as U.S. and European transnational corporations and states sought to compete with Japan. Joint ventures, long-term contracts, and other forms of interfirm cooperation have replaced vertically integrated foreign direct investment, the earlier U.S. model of capital accumulation and international economic linkage, as the model for global industries.

International Inequality in the Age of Globalization: Japanese Economic Ascent and the Restructuring of the Capitalist World-Economy

Paul S. Ciccantell
Stephen G. Bunker

I. INTRODUCTION

At the end of the twentieth century, many analysts argue that development theory is in crisis and unable to explain the functioning and consequences of the "new world economy" (see, *e.g.*, Evans 1999; Hamilton 1999; McMichael 1999). Contentious debates focus on the benefits and costs of globalization, on whether there is anything truly "new" about the world economy, and on whether the national state has been superceded (Amin 1996; Arrighi 1998; Biersteker 1998; Boxill 1994; Dunning 1998; Garrett 1998; Harvey 1995, 1996; Holm and Sorenson 1995; Kiely 1998; Robertson and Khondker 1998; Shaw 1997; Sklair 1998; Tussie 1998; Yaghmaian 1998; see Ciccantell 2000 for an analysis of these debates).

Materially, a fundamental new characteristic of the world economy over the last fifty years is the tremendous increase in both the volume of raw materials traded internationally and the distances these raw materials travel. In 1960, seaborne petroleum, coal, iron ore and bauxite trade totaled 2,093 billion ton-miles (a measure that combines both the volume of trade and the distance each ton moves from the point of extraction to the point of industrial processing). Twenty years later, in 1980, these four raw materials accounted for 11,015 billion ton-miles of seaborne trade, an increase of 426%, as these industries became global.

Paul S. Ciccantell
Department of Sociology
Western Michigan University
Sangren Hall
Kalamazoo, MI 49008
paul.ciccantell@wmich.edu
http://www.wmich.edu/sociology/

Stephen G. Bunker
Department of Sociology
University of Wisconsin-Madison
1180 Observatory Drive
Madison, WI 53708
bunker@ssc.wisc.edu
http://www.ssc.wisc.edu/soc/

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Coal, historically one of the most localized industries in the world, experienced the most dramatic globalization, with seaborne trade increasing from 145 billion ton-miles in 1960 to 1,849 billion ton-miles in 1990. At the same time, prices fell in real (inflation-adjusted) terms from US$86.65 in 1959 (in 1992 dollars) to US$43.63 in 1998 for coal imported into Japan. Surprisingly, the existing hegemon, the U.S., had little to do with either the expansion of trade or the drop in prices. Instead, the strategies of Japanese firms and the Japanese state to resolve the fundamental obstacles to economic ascent in the face of U.S. hegemony drove both of these changes. Contrary to claims that globalization supercedes the national state, we find that the actions of the Japanese state were crucial in developing and applying these strategies. We also find clear interactions between Japanese firms and the state and the firms and states of nations in the periphery that Japanese strategies restructure.

We make three arguments in this paper. First, there is a new model of capital accumulation that does create new forms of social inequality by redistributing costs and benefits in very different ways than earlier models. Second, Japanese firms and the Japanese state created this new model of capital accumulation and social inequality via mechanisms including joint ventures, long-term contracts, and other forms of international trade and investment, not U.S.-based transnational corporations, as is usually assumed. Third, world-systems theory reconstructed through the lens of the new historical materialism explains this restructuring of the capitalist world-economy as the outcome of Japan's economic ascent over the last fifty years.

The following section will outline our theoretical model, which we term the new historical materialism. Section three outlines the key issues in the development of the Japanese steel industry, the central generative sector that drove Japanese economic ascent from the 1950s through the 1980s. Section four examines key factors in Japan's construction of its periphery in the post-World War II era in support of its economic ascent. Section five highlights the key impacts of Japan's restructuring of the capitalist world economy over the past fifty years, and the conclusion outlines how the new historical materialism provides a model for understanding the causes and consequences of international inequality.

II. NEW HISTORICAL MATERIALISM

In *The Long Twentieth Century*, Giovanni Arrighi invites us to follow him beneath the hidden abode of production into the realms of politics, finance, and war (1994:25), where Braudel has claimed that the capitalist stratum has the flexibility to keep its investments in lines of business that do not face the problem of diminishing returns (1994:8). Arrighi takes the revealed preference of capitalists

for ever-more rapid turnover times on investment and for liquidity to indicate a deeper goal of using money to make more money without passing it through the production of commodities. By focusing his arguments on highly abstract monetary relations as the goal and ultimate end of all systemic cycles of accumulation, Arrighi has constructed a powerful model of the stages from maturity to decadence of different hegemons, the contradictions of hegemonic overaccumulation being partially resolved by investment in other rising economies.

Part of this model's power lies in Arrighi's use of McMichael's (1990, 1992) strategy of incorporated comparisons to account for what we call the cumulatively sequential increase in size, scope, volume, and density of productive, financial, political, and commercial relations across ever broader spaces. In achieving a coherent model of how these cumulatively sequential increases simultaneously create the conditions of subsequent hegemonic ascent and structure the relations between mature or declining hegemon and new centers of accumulation (*i.e.* Amsterdam to Britain, Britain to the U.S., the U.S. to Japan and East Asia), Arrighi overcomes the stasis imposed by Wallerstein's (1974, 1982) dependence on tripartite categories whose relations remain fundamentally unchanged. In this paper, we attempt to incorporate an analysis of the very material processes that Arrighi sees the capitalist stratum as bent on avoiding into an expanded model of cumulatively sequential increase.

We will do this by focusing on the emergence of hegemonic potential rather than on its maturity and decline. We posit that the beginnings of hegemonic ascent require successful coordination of internal or domestic technological advances, particularly in heavy industry and transport, with the external solution of access to cheap and steady sources of the raw materials used for heavy industry. We believe that the raw materials used in greatest volume present the greatest challenge and best opportunity for economies of scale. These economies of scale, however, drive a contradictory increase in transport cost, as the closest reserves of raw materials are depleted more rapidly as the scale of their industrial transformation increases. The tension of this contradiction between the economies of scale and the cost of space foments technological innovation a) in transport—vessels, loaders, ports, rails, *etc.*, and b) in chemical and mechanical means of reducing component inputs per unit of output (*e.g.* coal and iron in steel), and c) improvements in control of heat, pressure and the mix of chemicals that make the unit material inputs stronger and thus enable smaller, lighter amounts to perform the same work. All of these technological fixes drive each other, and all of them tend to generate increases of scale, thus exacerbating over the long-term the very contradiction between scale and space that they are designed to solve. The national economies that have most successfully initiated technological and organizational solutions—internal and external—of this contradiction have simul-

taneously (a) generated their own rise to economic dominance, (b) restructured the mechanisms and dynamics of systemic and hierarchic accumulation, and (c) expanded and intensified the commercial arena of raw materials trade and transport. We call these sectors generative (see also Bunker and Ciccantell 2000, Ciccantell and Bunker 1999). The linkages from these generative sectors spread throughout the ascendant economy, including, for example, supplying direct inputs such as wood in Holland, Great Britain and the U.S. and steel in Japan for shipbuilding, and iron and then steel for producing textile machinery in Great Britain. The myriad direct and indirect linkages from the generative sector lower raw materials costs, increase labor productivity, and improve international competitiveness in many sectors of the ascendant economy.

This exacerbated tension between the contradictions of scale and space is sequentially cumulative, so each systemic cycle of accumulation has confronted more complex tasks, requiring greater and more efficacious state participation, promotion, and protection, together with more and greater coordination of firms and sharing of both the costs and the benefits of technological innovation within and across sectors (even if they continue to compete for market share). These internal dynamics must also achieve reduction in the costs of the raw materials and of the transport infrastructure in the external zones from which they are exported. The cumulatively sequential increases in scale of raw material transformation and in the size and capacity of transport vessels and infrastructure corresponds to and makes economically viable the expansion of the practical commercial space in each systemic cycle of accumulation.

We will show how the technological developments generated in response to the contradiction between scale and space for the most voluminously used raw materials provide part of the impulses that create, expand, and restructure the world system as a series of punctuated cumulative sequences. Commerce in the most voluminously traded raw materials—from wood and grain to iron ore and coal—has proceeded from river-based to lake-based to ocean-based transport through the Dutch, British, and American systemic cycles of accumulation and Japan's successful restructuring of these trades into truly global sourcing. Each step of this expansion allows and employs huge increases of scale in transport technologies. We will then show how the introduction of new scales of transport and of industrial transformation, by broadening the sources of raw materials from river basin to lake system to global networks, systematically reduce ground rents (see Ricardo 1983, Marx 1967, Coronil 1997) available to the resource-rich economies which export them. The interaction between scale, scope, technological innovation, denser political and material relations between firms, sectors and state increase the productivity, the profitability, and the financial and political power in the national economies that initiate, regulate, and structure each systemic cycle of accumulation. Simultaneously, the same set of skills and interactions lowers the rents to and increases the infrastructural investments of raw materials exporting economies.

Thus, we believe that each hegemonic cycle has simultaneously increased the commercially integrated space, the movement of raw materials in this space, and global inequalities between raw materials exporters and raw materials importers (see Bunker and Ciccantell 1999). In this paper, we illustrate these patterns through an analysis of the most recent sustained national economic ascent. We will examine the mechanisms underlying enhanced inequality in an expanded commercial space in an examination of (a) the Japanese steel industry, and in particular of the technological advances in the scale of blast furnaces and in the scale and precision of the basic oxygen furnace whose use and integration the Japanese pioneered and dominated, (b) the Japanese shipbuilding and shipping industries, especially as these generated economies of scale, and (c) the political, financial, and material synergies between these industries. We emphasize particularly (a) the development of Maritime Industrial Development Areas (MIDAs) that reduced Japanese raw materials landed costs, increased Japanese productivity and economic competitiveness across all sectors of the economy, and linked the internal and external sectors of the Japanese model of capital accumulation, and (b) the dependence of steel and shipping in Japan on and their long-term impoverishment of rents to their key suppliers of coal and iron.

Our concept of generative sector extends and refines Rostow's (1960) notion of leading sector. Generative sectors drive technological, financial, organizational, and political relations, stimulating cooperation across firms, sectors, and states in strategies and actions both domestic and international. The technological advances fomented within the generative sectors follow both forward and backward linkages (cf. Hirschman 1958), most importantly by providing templates (cf. Chandler 1977) for direct application to other sectors which directly or indirectly constitute clusters or linked nodes in chains of production (Marx 1967, Schumpeter 1934). The spread of innovation through such clusters constitutes a consistent theme in economic history. For example, Landes (1969) follows Marx in identifying the complex mutual stimulus that coal mining fomented between (a) advances in the technologies of generating heat and pressure from steam and of transforming heat into mechanical energy in order to lower water tables in the deepening mine shafts, (b) advances in metallurgy required to contain pressures in the boilers, (c) advances in metal working required to sustain vacuums and pressures in moving pistons and their cylinders, (d) standardization of components used in these boilers, pumps and machines, and (e) advances in the fuel efficiency of all of these processes. The chemical advances in technology, particularly in metallurgy, and the control over the pressures generated, required

collaboration between firms and surveillance and support by the state. All of these technological advances fed into other sectors, including into rail and ship transport needed to move the raw materials whose consumption each technical advance cheapened and thereby accelerated.

The generative quality of the innovations in these clustered nodes contrasts with the position of cotton within the economy (Landes 1969, Hobsbawm 1968). Where coal, iron and steam fed and cheapened production in multiple other sectors, cotton as a product was primarily aimed at an end use. Lazonick's list of the multiple other industries for which cotton served as a leading sector all provided inputs to cotton, so all of the linkages were backward from cotton. Because the technical advances in spinning and weaving were specific to textiles, they could not be extended to other sectors.

Historically, those sectors with the densest forward and backward linkages to other sectors are those involving the most voluminously used raw materials, especially when we include the chemical transformations and improvements of these raw materials and the ways in which they are transported. Historically as empirical process and chemically or logistically as material process, technical advances in the fuel efficiency and the strength of these materials and in their transport have consistently created cumulative sequences toward ever-greater scale. Heat and pressure both become more economical in larger containers, and higher heats and pressures create chemical transformations and mechanical energy more efficiently (Landes, 1969). The basic oxygen furnace, for example, is cheaper and faster to operate, more amenable to automatic controls, allows for more precise alloys at higher temperatures, and is capable of a larger capacity than either the basic Bessemer or the open hearth furnaces. We have shown similar processes at work in maritime transport and bulk-breaking or handling (Bunker and Ciccantell 1995a, 1995b).

A historical materialism focused on the mechanisms underlying generative sectors facilitates comparative methods appropriate to the cumulatively sequential processes of a spatially expanding and intensifying world-system. McMichael's (1990, 1992) incorporating comparisons, Tilly's (1995a, 1995b) encompassing comparisons, and Tomich's (1994) commodity circuits all assume larger, and potentially global, systemic unities within which comparable instances, differences, or simply cases may occur. All three authors confront the problem of how to compare phenomena which may be linked to each other though various complex causalities of relations; none, however, (a) problematize the explanatory status of the larger systemic unities, (b) acknowledge or offer a means to account for different degrees of intensity or significance of the relationship between the instance or cases and the larger processes of which they are instances or cases, or (c) address the explanatory status of the mechanisms that constitute the complex

causalities that link instances and cases to the larger systemic unities.

We propose that matter and space, as naturally given aspects of physical reality, manifest themselves socially and economically in built or manipulated environments as cost, scale, and distance. In these and related manifestations, matter and space pose regular, specifiable conditions of production and exchange. The conditions, once specified, may reveal their explanatory status and the intensity of their links both to the local and temporal particularities of instances and to temporally evolving global systems in which they participate and which they partially form.

In other words, we propose that comparison based in highly specified, physically and spatially grounded material analysis resolves some of the problems in recent comparisons of cases or instances that participate in complex systems of highly dense interaction, especially when the system itself evolves over time, driven by and driving changes in its component parts. We will work this out by explaining why and how the generative sectors in the most rapidly rising national economies have consistently been sectors that have been most driven to develop technologies that resolve the contradictions between economies of scale and costs of space, and why these sectors are defined by their dependence on procuring, transporting, and transforming those raw materials that are used most voluminously (a) in building the environment, (b) in fixing capital in plant, and (c) in the infrastructure and vehicles of bulk transport.

Since the second industrial revolution, or since the growth of economies that build machines to make machines, steel is the most voluminously used raw material, and its major inputs have included coal, iron, and oil. One of the major sites for the social incorporation of these materials has been in the means of integrating space and matter, that is, in the means and infrastructure of transport which themselves serve most significantly to cheapen the spaces across which these voluminously used materials are transported.

The social processes of production depend fundamentally on matter; production-enhancing technologies entwine comprehensively with the historically accumulating social knowledge of and capacity to manipulate ever-more precise differentiations between the chemical and physical properties and attributes of different material forms (in their pure instances, their transformation into energy, and their reaction to and incorporation of each other) under different conditions and combinations, including particularly temperature and pressure. Space defines and organizes the world economy as a system because of the ways that matter is distributed in and across space.

Different kinds of matter are located in different places. As technology advances, material forms used for particular production processes or for particular products become progressively more specific. The locations of specific kinds

of materials correspondingly become more rare, so that the total distance, *i.e.* the space, between the locus of production and the locus of extraction increases. Thus, space and matter are integrally entwined in both production and extraction. Expanded production consumes more matter across broader spaces, and thus the expanding interaction of scale and distance of matter and space drive the expansion and the intensification of the world system.

Space is simultaneously a means of production, a condition of production, a barrier or cost of production, and an obstacle to circulation of commodities. Space impinges on extraction even more directly than on production, as the space in which the resource extracted occurs is naturally, or geologically and hydrologically, determined. The attributes of this space include not simply location on a two-dimensional plane, but (a) the topographic characteristics of the site and of the entire space between the site of extraction and the site of transformation, and (b) the amount of space across and within which a given amount of the resource occurs (in minerals, space is reduced to a percentage of pure ore and a measure of overburden, that is, to the amount of other matter in whatever space must be excavated to extract a given amount of the mineral in question). The composition—hardness, friability, moisture, *etc.*—of the surrounding matter combines with this space to determine cost of extraction and processing, as well as environmental impacts of the extraction. Thus, the relevant space of matter (or the space that matters) in extraction includes depth and extent of one form of matter within other forms of matter (*i.e.* the ground) as well as the naturally determined distances between the sites of natural occurrence and of social transformation.

In reducing the cost of this space, expanded production generates large and complex technological innovations in material and energetic forms, innovations that permit increased economies of scale in transport vehicles, loaders, and infrastructure. Marx (1967), Mandel (1975), Innis (1956), Landes (1969), Chandler (1965, 1977), and Harvey (1982) have in different ways explained the multiple and complex links between expanded production, technological advance in material use and in energy capture and containment, and new means of transport. Marx (1967), Innis (1956), and Harvey (1982) have all noted the high-cost of building the environment required for rail and shipping, and the role of the state and of high finance in overcoming the inadequacies of individual capitals or of private ownership of land. Though the role of raw materials procurement and transport and the technical or physically determined economies of scale in heavy industry are consistently undertheorized by all of these authors, the cases or instances in which they have discovered and then present these relationships of capital and innovation consistently involve the movement of matter across space, and the questions of property in both matter and space.

This confluence of space and matter in the formation, expansion, and intensification of the world-system demands a specific focus on the strategies to procure and transport raw materials as these have structured cumulatively sequential systemic cycles of accumulation. The resolution of the contradictions between scale of transformation and cost of space has created generative sectors in all of the economies that have become serious candidates for hegemonic status. The material processes and physical attributes of the raw materials and their extraction and transport can be specified in precise, regular and commensurable, and thus in comparable, terms theoretically independent of any of the social processes that constitute a relational analysis of the world economy or comparison of its component parts. We can explain their links to the generative sectors that drive the expansion and reorganization of the world system. Their explanatory status can thus be quite high, as the synopsis of our research on the development and consequences of the Japanese model of capital accumulation in the following sections will show.

III. STEEL, SHIPS AND MIDAS IN JAPAN: THE CENTRAL GENERATIVE SECTORS

After Japan's defeat in World War II, the U.S. initially sought to prevent Japanese re-militarization and the reconstruction of its key industrial suppliers, steel and shipbuilding. The geopolitics of the Cold War forced the U.S. to "Reverse Course" and support economically and diplomatically Japanese reindustrialization. This joint U.S.-Japanese effort, however, confronted a myriad of obstacles, most notably the exhaustion of domestic raw materials, capital shortage, long ocean voyages from potential supply sources, and bitter resentment among potential Asian raw materials suppliers, particularly Australia, to trade and investment relations with Japan as a result of Japan's actions in World War II. Japanese firms and the Japanese state, supported by U.S. and World Bank financial assistance, created a new model of domestic development based in the steel, shipbuilding, and shipping industries. In the external sector, without which these industries could not develop, U.S. financial and diplomatic assistance helped create a new model of raw materials supply via long-term contracts and minority joint venture partnerships in Australia that Japanese steel firms and the Japanese state, led by the Ministry of International Trade and Industry (MITI) refined and expanded into a highly coordinated global model of raw materials supply and capital accumulation that drove Japanese economic ascent.

MITI was assigned regulatory duties for the steel industry by its establishment law of 1952 of "promotion, improvement, and coordination of production, distribution, and consumption of mineral products; guidance, assistance, and fostering necessary for promotion of rationalization of the mineral industry;

furtherance and coordination of development and utilization of coal and other mineral resources" (cited in Wang 1962:33–34). MITI in the early 1950s actively opposed the targeting of the steel industry by the government because of concerns over the industry's ability to be internationally competitive. The economic boom that began in 1955 led to a reevaluation of the potential of the steel industry as a leading economic sector. MITI became involved as a coordinating agent for the steel sector in a number of areas, including control over capacity expansion in an effort to keep steel plants operating at full capacity without severe price competition (Yonekura 1994:212–237; O'Brien 1992).

This new model of state-firm-sector coordination only developed out of a protracted series of conflicts between these groups. MITI confronted the vested interests of the old steel companies and their still highly influential leaders, but the industry was highly dependent on MITI and the ExIm Bank of Japan for access to raw materials, negotiations with the U.S. government, and capital. MITI was able to parlay this leverage into regulatory powers over the entire industry, which it used to promote new technologies of unprecedented scale and efficiency.

The Japanese government focused its resources on promoting economic development through heavy industrialization in steel and shipbuilding during 1950s and 1960s. In addition to financing and export promotion, the Japanese government also

> set out to establish huge industrial parks. The first was on land reclaimed from Tokyo Bay. Kawasaki Steel, a new company, was given three million square meters of land on which it built the most modern integrated steel facility in the world. Located close to a new, modern harbor, a continuous production line was established covering all stages of production from raw materials to finished products on the same site and using the most modern technology in the world. With labor still relatively cheap, Kawasaki steel became the cheapest in the world. Here the results of dividing up the old zaibatsu came into play. Neither Yawata Steel nor Fuji Steel was prepared to allow a newcomer, Kawasaki Steel, to steal a march on them. Both launched similar developments, creating a large and modern Japanese steel industry in the world-beating class (Reading 1992:70–71).

The Maritime Industrial Development Area (MIDA) program begun in the 1950s coordinated firm and state investment in new greenfield ports and steel plants utilizing the latest technological advances developed in Japan and imported from other nations to reduce costs and increase Japanese economic competitiveness in steel, shipbuilding, and all other sectors that used steel and the steel-based transport infrastructure.

Beginning in the 1950s, Japanese steel firms undertook a long series of efforts to increase the scale of blast furnaces used to produce pig iron, the first stage of

processing iron ore and metallurgical coal. Led by Japanese technological innovations, blast furnaces increased in capacity from 1,500 tons per day in 1950 to 4,000 tons per day by the late 1960s (Manners 1971:27;34) and to 22,000 tons per day by the early 1990s (McGraw-Hill 1992:425–426). The Japanese adopted, perfected and diffused a second significant improvement in blast furnace operation, the improvement in the quality of the burden (the charge of raw materials into the furnace) through the sizing, agglomeration, and beneficiation of iron ore (Manners 1971:160). Limiting the variation in the size of iron ore, sinter and pellet feed increases the efficiency of the furnace, reducing the volume of coal required and increasing the productivity of the furnace and lowering production costs (Manners 1971:36–37). Japan's global sourcing of iron and coal facilitated blending and allowed the Japanese significant raw materials cost savings.

A similar process of blending varieties of metallurgical coal has had similar impacts on the costs of blast furnace operations. The premium prices commanded by metallurgical coals because of their useful properties for metallurgical use have been reduced by Pulverized Coal Injection (PCI). PCI allows metallurgical coal to be partially replaced by a wider variety of grades of coal which are injected into steel direct reduction furnaces rather than being processed into coke before being added to a blast furnace. PCI allows both the use of lower cost coal and eliminates the need for coking batteries, the most environmentally destructive aspect of steel making (Phelps 1992:54–61). Japanese steel firms thus reduced production costs by escaping the "tyranny of metallurgical coal" by substituting less expensive steam coal.

Japanese steel firms also reduced the amount of coke (processed metallurgical coal) needed to produce each ton of pig iron in the blast furnace. The average amount of metallurgical coal required to produce coke declined from 1.1 tons per ton of pig iron in 1950 to 0.83 tons per ton of pig iron in 1965 (Manners 1971:35) and to 0.4 tons per ton of pig iron in the early 1990s (McGraw-Hill 1992:425). This dramatically cuts raw materials cost for a blast furnace, since only about 36% as much coal must be acquired and transported to the blast furnace. For the Japanese steel industry, faced with a lack of domestic metallurgical coal and the need to import this essential input thousands of miles, increasing efficiency of coal consumption was a critical need. Increasing the scale of blast furnaces also contributed to lowering energy costs, as has computer control of the process of blast furnace operation (McGraw-Hill 1992:425–426), another technology pioneered by the Japanese steel firms.

As Manners concludes, "all iron- and steel-producing countries benefited from the improvements of blast-furnace technology, but none perhaps quite so rapidly as Japan" (Manners 1971:38). This rapidity resulted in large measure from the role of MITI and other agencies in providing both capital and raw materials

access support and imposing critical regulations. By combining increasing scale of the blast furnace with careful control of blending multiple ores and controlling the size of feed, Japanese steel mills became the largest and most efficient in the world by the mid-1960s. These efficiencies and reduced transport costs, by diminishing the amounts of iron ore and coking coal required to produce each ton of pig iron in Japan, were critical components of Japan's competitive advantage in steel production since the late 1950s.

The major fuel economies in steel production were driven by the size of the blast furnace that produces pig iron, but the scale of the second steel making stage limited the potential for scale increase, and therefore fuel economy, as the blast furnace and the second stage had to be made compatible. Fuel economy depends on scale of processing, and the scale of processing advances through myriad technical discoveries that progressively cheapen steel making, but does it through scale increases that progressively accelerate the consumption of raw materials. This increases the cost of space across which raw materials must be transported, and within which there is an ever-smaller number of deposits large enough to support the consumption of ever- larger integrated smelters.

The Japanese steel firms led the way in adopting a new technology, the basic oxygen furnace, that had significant advantages over the open hearth furnace that dominated U.S. steel production and adapting this technology to increase scale and efficiency. The basic oxygen furnace reduces the time required to produce one batch of steel to half an hour from the four to five hours per heat required in an open hearth furnace by injecting pure oxygen under high pressure (Ohashi 1992:542). Japan was by far the most rapid adopter of the basic oxygen furnace (Whitman 1965:853–855). This innovation dramatically increased the scale of production, since a basic oxygen furnace in Japan could produce eight to ten times as much steel in a given length of time relative to a U.S. open hearth furnace.

The economies of scale of integrated steel works have grown rapidly since World War II. In the early 1950s, scale economies were thought to exist up to 1 million tons per year of capacity, while by 1965 economies of scale were recognized up to 5 million tons per year and potential economies of scale were identified up to 10 million tons per year (Manners 1971:59). Planned plants in Japan in the late 1960s called for total capacities of 12 million ingot tons (Manners 1971:70). This created a tremendous incentive to increase the scale of blast furnaces in Japan to match the speed and output of the basic oxygen furnace. The capital barriers to establishing this scale of smelting and the potential for crippling overcapacity in the still underdeveloped Japanese and Asian markets set the stage for state-sector-firm cooperation, regulation, and resolution of disputes. On this stage, various agencies of the Japanese state, most notably MITI and the

ExIm Bank, took the lead in the creation of the most tightly coupled relationship between capital and the state in history. MITI learned technical and political skills that made it essential to the steel, shipbuilding and shipping industries. MITI's competence and power allowed it to combat and restrain the self-interests of particular steel companies in the interests of the sector and those of the national economy as a whole. Much of what MITI essentially became originated in its critical role in the adoption and improvement of the Basic Oxygen Furnace.

Rapid growth in the Japanese steel industry necessarily meant construction of greenfield projects, which do not suffer the innovation-retarding drag of capital vested in obsolete plants, depleted sources, and restrictive distribution networks. As a result, Manners argues, "there is a good deal of evidence…to suggest that, on average, Japanese steelmaking costs in 1965 were substantially below those of the United States iron and steel industry, and that Western European costs by and large lay somewhere between the two" (Manners 1971:116). Savings in raw materials and transport costs, combined with technological innovations and adoptions, had in less than twenty years transformed the Japanese steel industry into the world's lowest cost, fastest growing steel industry. As a consequence:

> today, for a wide variety of steel products, a Japanese manufacturer of steel products can buy Japanese steel at prices ranging from 15 to 30 percent lower, depending on the gauge, than his American counterpart can buy it in the United States. This handily gives the Japanese manufacturer a cost advantage of 5 to 8 percent less over his U.S. competitor for products such as forklift trucks, construction equipment, automobiles, and ball bearings (Abegglen and Stalk 1985:77–78).

This cost advantage for domestic steel consumers in Japan also translated into international competitiveness in steel exports. As a result, Japanese steel firms have dominated world steel trade since the early 1960s. Japanese steel exports rose from 8.8% of total world exports in 1960 to a peak of 40.8% in 1976; in volume terms, the increase was from 2.3 million tons to 36 million tons over the same period. Japanese steel exports have ranged from 19 million to 33 million tons per year over the last 25 years, constituting 20–30% of total world steel exports during this period (data calculated from OECD 1985 and USBM/USGS Various Years).

In short, as the U.S. government and Japanese development planners foresaw in the late 1940s, the steel industry has become the linchpin of a number of linked industries which have complemented one another in a "virtuous cycle" of economic development. With the steel industry as a generative sector providing the raw materials foundation for reducing production costs for many sectors of the

Japanese economy, Japan transformed into the world's second largest economy and the United States' most formidable economic competitor.

All of these innovations have led to larger scale and increased distance across the needed spaces. The cost of distance offsets the savings of processing steel. This contradiction generates state-firm-sector collaboration to design and implement more efficient transport technologies, more effective transport infrastructures, and the incorporation of ever-broader spaces as potential sources. These transport technologies have required and promoted larger transport scale.

The technical achievements and scale increases in steel production and their development over time have both required and provided the means for increased fuel efficiency of transport. For different but complementary physical causes (relating to inertia, momentum, and hydraulics), size of ship, or scale of transport, is directly associated with fuel economy. The advances in steel quality that are associated with scale-dependent fuel economies in smelting contribute to the tensile strength requirements of the hulls of larger ships and to the capacity of the boilers and engines to withstand the temperatures and the pressures that are directly associated with efficiency of transfer from heat energy to mechanical energy.

The transport strategy developed via the coordinated efforts of MITI, the ExIm Bank, and the Japanese shipping, shipbuilding, and steel firms allowed Japanese steel firms to take advantage of the tremendous economies of scale available in bulk shipping to dramatically reduce production costs of steel in Japan and to capture all of these benefits for themselves, rather than sharing them with coal and iron ore producing firms and exporting regions.

One of the key elements of transport as a Japanese raw materials access strategy was large government subsidies to shipbuilding and shipping firms via the Programmed Shipbuilding Scheme (first introduced in 1947) that carefully controlled the number and types of ships built to suit the importing and exporting needs of the nation (Chida and Davies 1990:66–90). The Japanese government also arranged an innovative lease of a former naval shipyard to a U.S. shipbuilding firm, in return for allowing unlimited access to Japanese engineers, managers and workers. This provided the foundation for research and development on the construction of larger petroleum tankers and bulk carriers and the construction of large shipyards capable of building such large ships, as well as a variety of other innovations that reduced the cost and labor requirements of shipbuilding (Chida and Davies 1990:98–112; Todd 19991:13). For example, during the 1980s, Japanese labor requirements for building a 62,000 dwt bulk carrier fell from 380,000 hours in 1981 to 170,000 hours in 1991 (UNCTAD 1992:39).

Labor saving was of critical importance in Japan because of the high wages of shipyard workers. During most of the post-World War II era, shipyard workers

were the highest paid workers in Japan (Chida and Davies 1990). Just as was the case in the steel industry, heavy industrialization based on raw materials was a major component of domestic consumption in Japan both directly and indirectly through workers' wages, providing a market for the industrial products that utilized steel and other processed raw materials.

Technological and organizational improvements in Japanese shipyards during the 1950s and especially the 1960s gave Japanese "shipbuilders sufficient economies of scale that they could lead the world in the new technology" of building larger and larger ships (Chida and Davies 1990:98–99). A Japanese shipyard built the first large oil tanker in 1962, at 130,000 dwt, and continued to lead the way in increasing scale with a 210,000 dwt ship in 1966, a 370,000 dwt ship in 1971, and a 480,000 dwt ship in the early 1970s (Sasaki 1976:8). Japanese shipyards pioneered similar innovations in bulk carriers, launching the world's then largest ore carrier at 224,666 dwt in 1983 with a fuel consumption of 6 kilograms per ton of cargo, versus 10 to 11 kilograms for conventional 130,000 dwt bulk carriers (*Zosen* May 1983:28). In order to build these large ships, Japanese shipbuilding firms constructed fifteen shipyards between 1964 and 1976 with the ability to build ships between 300,000 and one million dwt (Nagatsuka 1991:14–15).

This government direction and subsidization reflects the importance of transport as a strategic component of both raw materials access and economic development efforts on the part of the Japanese government. This tightly coordinated system of state-firm relations explicitly sought to balance the interests of shipbuilding, shipping and steel firms and broader industrial and societal interest in low-cost raw materials imports and industrial export transport, with the state as arbiter. This system allocated scarce Japanese capital resources to supply low-cost transport without wasting resources on the notoriously cyclical shipbuilding industry, a delicate balancing act of restricting capacity and output in pursuit of broader state developmental goals.

Although the Japanese steel firms initially intended to build their own fleets of ore carriers, the Japanese government's control over concessionary financing and refusal to supply financing to firms other than the major shipping lines forced the Japanese steel firms to invest in shipping firms in order to secure partial ownership of bulk shipping (Chida and Davies 1990:119). State-firm coordination served to control potential competition in a capital intensive and cyclical industry, balancing the interests of steel, shipbuilding and shipping firms with broader societal interests in conserving scarce capital and ensuring low-cost supplies of raw materials.

The Japanese government also provided financing on concessionary terms for the export of Japanese-built ships through the Export-Import Bank of Japan. Additionally, the government during the 1950s provided funding for the modern-

Table 1– Operating Cost Per DWT (dollars per year)

Ship DWT	Annual operating cost per DWT (dollars)
40,000	80
65,000	59
120,000	40
170,000	35

Source: Stopford 1988:103 (based on Drewry Shipping Consultants data)

ization of the Japanese steel industry, with one important result being the reduction in the cost of steel plate used in shipbuilding, making Japanese ship exports much more cost competitive (Chida and Davies 1990:108–109).

With this support from the Japanese government, the Japanese shipbuilding industry increased from only 15.6 % of world production (829,000 tons) to 43.9% in 1965 (5.4 million tons) and peaking at 18 million tons in 1975, 50.1% of world production. The Japanese shipbuilding industry became the largest in the world in 1965 and produced about half of total world output from the mid-1960s through the mid-1980s (Nagatsuka 1989:17). Shipbuilding was also Japan's most important export industry between 1956 and 1960 (when the steel industry surpassed it in exports) and has remained one of Japan's three major export industries until recently (Chida and Davies 1990:106).

Economies of scale in building costs and operating costs of bulk raw materials ships are quite significant. Larger ships cost far less to operate on a per ton basis than smaller ships, and economies of scale increase with ship size and distance of voyage (see Tables 1 and 2).

Japanese industrial groups control ocean shipping of raw materials on an FOB raw materials exporting port basis so that any reductions in transport costs caused by technological improvements or changes in world shipping market conditions are captured by Japanese importers. The shipping of Japanese raw materials imports is typically arranged by the firms that consume the raw materials:

> because Japanese industry needs to control the transport of raw materials very closely, long-term stable freight arrangements are generally preferred. The retaining of a vessel by guaranteeing cargoes for much or all of the vessel's working life is probably the most favored (particularly for Japanese flag newbuildings for which the obtaining of a cargo guarantee would almost certainly have been a pre-requisite for obtaining Japan Development Bank loans), although Japanese interest are responsible for the employment of a large number of vessels operating under privately concluded long-term timecharters and contracts of affreightment (Drewry 1978:58).

Table 2 – Relative Economies of Scale by Ship Size and Voyage Length

Percent of Cost Per Ton Mile

		Ship Size (dwt)		
		15,170	65,500	120,380
Voyage Miles	1,000	*100*	*47*	*37*
	6,000	*56*	*27*	*20*
	22,000	*52*	*24*	*17*

Source: Stopford 1988:277

This is an innovative alternative to the U.S. model of raw materials firms' vertical integration into shipping, a model the Japanese steel firms initially sought to replicate. Long-term contracts for the majority of coal and iron ore transport are supplemented by short-term arrangements, allowing Japanese steel firms to take advantage of cyclical downturns in freight rates to charter additional required capacity at even lower cost as shipping firms operate bulk carriers at operating cost or less in order to earn revenues to try to survive until the next boom market.

A new element in the Japanese iron ore access strategy during the 1980s was the construction and employment of ore/bulk/oil carriers and 300,000+ dwt bulk carriers to allow Japanese steel firms to expand their iron ore supply relationship with Brazil with the opening of the Carajas mine, the world's lowest cost iron ore producer, 12,000 miles from Japan. This new strategic element was based on learning from experiences in the coal and iron ore trade with Australia, Canada, Brazil and South Africa and from experiences in managing long distance shipping of oil. This learning led to the expansion of Japanese transport networks beyond the relatively short 3,600 mile haul from Australia to 12,000 mile coal and oil shipments. The key to lowering costs on these even longer hauls is another dramatic increase in scale from 100,000–200,000 dwt ships to 300,000+ dwt ships. Oil tankers had reached this scale by the early 1970s, but iron ore, with a stowage factor of 0.5 cubic meters per ton, more than twice as dense as crude oil (1.2 cubic meters per ton) and almost three times as dense as coal (1.4 cubic meters per ton) (Stopford 1988:255), presented a tremendous technical challenge. The technological advances in ship construction and in the quality, weight, and size of steel plate and beams—most notably the mass production of high tensile steel due to this demand from shipbuilding—were combined by Japanese shipbuilding firms first to build larger oil tankers but then for

the much more difficult task of ore/bulk/oil and dedicated bulk iron ore carriers.

Shipbuilding was thus a key generative sector in the Japanese government's post-World War II development plans. The industry consumed huge quantities of Japanese steel and other inputs, was one of the most important export industries in Japan for many years, served as a model for the import, adaptation and improvement of industrial and organizational technologies, and provided the increasing scale of ships needed by Japanese shipping firms to import huge volumes of raw materials for the Japanese steel mills. The only way to link massive exporting and importing systems in the steel industry with their rapidly increasing scales of operation was to develop shipbuilding and shipping technologies and organizations that could supply bulk carriers of similarly increasing scales. Just as had been the case in earlier periods in Holland, England, and the U.S., shipbuilding created a tremendous range of material, economic, organizational, and technological linkages to other industries.

The construction of large-scale port and railroad infrastructures in raw materials exporting regions paid for by extractive region governments and/or raw materials transnational corporations is based on long-term contracts for raw materials supply with Japanese importing firms to allow the efficient use of these large ships. The impact of these costs on raw materials exporting firms and states will be discussed below.

These Japanese transport strategies for raw materials access have been strikingly successful at guaranteeing long-term access at low-cost to huge volumes of imported raw materials. Just during the 1960s, Sasaki (1976) estimated that Japanese government efforts to reduce the 20–30% share of freight charges in the total cost of imported raw materials through transport subsidies bore the following results: "during the ten years beginning in 1961, the freight costs for both crude oil and iron ore were reduced by 40 per cent.…The effects of this reduction were significant and the consequent reductions in the price of electricity, petrol, iron and steel and many other products have made an immeasurable contribution to the national economy" (Sasaki 1976:7). Ocean transport closes the "virtuous circle" of generative sectors in steel, shipbuilding and shipping. Japanese strategies have restructured these global industries and turned remote ecosystems in western Australia, the Brazilian Amazon and western Canada into raw materials peripheries that have provided the material ingredients for Japan's economic ascent. Equally important, the processes of technological, organizational and institutional innovation and learning inseparably linked these international relations with Japanese internal development. Economic ascent was the product of complex coordination between firms and nature, between firms in Japan and in its emerging raw materials peripheries, between the Japanese state

and states in these raw materials peripheries and the U.S., and between the Japanese state, firm and sectors. In overcoming complex challenges presented by material, economic and political processes across multiple ecosystems and multiple political boundaries in the shadow of a powerful existing hegemon, the Japanese state and Japanese firms learned and innovated repeatedly to make Japan the global competitive leader in a wide range of industries.

The Japanese model of capital accumulation that emerged out of the conflictual efforts to promote coordination between the Japanese steel firms, MITI, and the ExIm Bank and directly linked to state-firm-sector coordination in shipbuilding and shipping (involving the parent firms of these steel firms and the same state agencies) assumed the physical manifestation of the MIDAs. The MIDAs simultaneously served as ports to unload ever-larger ships carrying raw materials from around the world at the new steel mills using the latest technology. The steel mills, in turn, supplied shipyards, automobile factories, and other major steel consumers located in the very same industrial parks built with state subsidies on land reclaimed from the ocean. MIDAs are in effect a human-produced change in topography involving the reclamation of land, the digging of new ocean and river channels, and other modifications in port areas to provide both location and transport facilities for industrial plants. MIDAs represent a very high degree of manipulation of nature.

These two mechanisms of scale-dependent fuel economy, *i.e.* in transport and in smelting, support and reinforce each other. If we consider them within an adequately spatialized understanding of the world economy, we note (1) that scale increase of transformative processes leads to (a) increased heavy industrial consumption of raw materials, (b) accelerated depletion of the most accessible sources, and thus (c) cost-increasing distance to raw material sources and (2) that economies of scale in transport are required to resolve the contradiction between savings in processing driven by economies of scale and the increased cost of transport across ever-greater spaces.

The resolution of this contradiction has led to an ever-greater volume of increasingly cheap steel in the world economy and to an ever-expanding space in which coal and iron are mined and transported. In the sequence from wrought iron to Bessemer steel to open hearth to basic oxygen, the sourcing of raw materials has progressed from river basin to lake drainage to global ocean. This has been made possible by and required the huge increase in the size of ships, ports, docks, and loading equipment.

This increase in the space in which iron and coal are provisioned and transported, however, have also eliminated the "natural tariffs of distance" (compare Innis 1956, Mandel 1975, Harvey 1982). This consequence of cheaper transport has usually been addressed in terms of the increased competitiveness of

imports against locally manufactured goods, but extractive industries suffer similar impacts. As the technology of transport globalizes raw materials sources, the importing countries are no longer constrained to more proximate sources. As the cost of transport is diminished, all mines or sources compete in the establishment of rent, which tends to lower prices. Additionally, in a situation where there are relatively few deposits of the size required to realize economies of scale, this kind of global competition reduces any element of monopoly rents.

The Japanese state and firms have enhanced this technological assault on rent and thus on the prices they pay to exporting countries by using joint ventures, long-term contracts, and various kinds of aid to create excess capacity in both coal and iron. The Japanese have been extremely aggressive in their strategies to play off North American, South American, Asian, and African sources of raw materials against each other, and their success has involved considerable learning and manipulation of information, institutional relations, and contract arrangements, but the effects of these social and political strategies would be far less without the globalization of raw materials sources that the Japanese-led revolution in maritime transport technology made possible. The revolution in transport technology would not have occurred without the massive increase of scale and fuel efficiency that the Japanese achieved with the basic oxygen furnace. By setting in motion multiple mechanisms to reduce raw materials rents, the intersection of two different mechanisms of scale-dependent fuel saving and precision enhancing technologies, one in smelting, the other in transport, directly accelerates the globalization of raw materials markets and exacerbates inequalities between the exporters and the importers of raw materials.

IV. JAPAN'S CONSTRUCTION OF ITS PERIPHERY SINCE WORLD WAR II

The characteristics of the U.S.-led systems of capital accumulation and global inequality are well-known and well-understood. U.S. economic and political hegemony from the late 1940s through the late 1960s was manifested internationally by transnational firms based in the U.S. These TNCs' major strategies during this period included: expanding globally to sell U.S.-made products in other countries; investing in local production facilities to supply local markets when necessary and repatriating profits to U.S. headquarters; exporting products from these facilities to U.S. markets; and exporting raw materials to the U.S. (Barnet and Muller 1974; Hymer 1979; Jenkins 1987; Chase-Dunn 1989). Transnational raw materials firms and other neocolonial apparatuses that exported profits from the periphery and semiperiphery to the core (Jalee 1968; Mandel 1975; Said and Simmons 1975; Amin 1976; Sunkel 1995) replaced imperialism as the central mechanisms of global inequality (see Ciccantell 2000 for a fuller discussion).

In contrast, the Japan-driven model of capital accumulation and global inequality that emerged over the last fifty years is widely misinterpreted and misunderstood. One hallmark of globalization—the rapidly growing share of world trade taking the form of transfers between joint ventures, partnerships in long-term contracts, and other mechanisms that link firms (Harvey 1995), rather than trade as transfers from wholly-owned subsidiaries to parent companies—was most fully developed first by the Japanese steel firms to overcome the problems of capital shortage and obstacles to Japanese foreign direct investment outlined earlier. Japanese firms have used long-term contracts, joint ventures, and other forms of interfirm cooperation as competitive strategies to reduce costs in the increasingly integrated and competitive world market (Ciccantell 2000).

The first major step in creating the raw materials supply system to sustain Japan's economic ascent was obtaining access to Australian coal in the late 1940s and early 1950s. The U.S. State Department, U.S. Military Occupation Forces in Japan, the Japanese steel firms, and the Japanese state worked together to initially buy Australian coal indirectly, via U.S. military procurement channels, and then to establish direct short-term and then long-term supply agreements with Australian coal producers.

A series of long-term contracts beginning in the early 1960s, sometimes linked to minority Japanese participation in joint venture investments, and increases in ocean transport scale via Japanese shipbuilding innovations transformed Australia into the world's largest metallurgical coal exporter and Japan's most important source of metallurgical coal. Australian coal saved the Japanese steel firms money in comparison with more expensive U.S. coal; the average CIF savings per ton ranged between US$3.85 and US$14.25 between 1960 and 1972, a savings range of 22% to 53%. These contracts with Australia did not seek to minimize costs during the 1960s and 1970s, but instead included escalation clauses that provided an incentive and guarantee to mining firms in Australia to undertake these capital intensive investments that allowed Japan to diversify away from its huge dependence on the U.S.

The Japanese steel firms coordinated their negotiating efforts with the coal-producing firms in Australia (some Australian-owned, but many owned by British and U.S. mining firms), giving the Japanese steel firms a high degree of bargaining power in the price negotiations and allowing them to play the coal-producing firms against one another, and the two competing coal-producing states in Australia, New South Wales and Queensland, off against one another as well. The majority of coal production in New South Wales came from higher-

cost underground mines, while most coal production in Queensland came from much lower cost surface mines (Fisher 1987). New South Wales also charged a much higher per ton royalty than did Queensland; during the 1960s, New South Wales charged up to A25 cents per ton royalty on metallurgical coal for export, while Queensland charged royalties of only A5 cents per ton (McKern 1976:72). Coal producers in the two states competed for Japanese coal export contracts, often leading to severe price competition that benefited the Japanese steel mills (Koerner 1993; Fisher 1987:186). This outcome, first recognized in the early 1970s, led to lower prices for Australian coal than for U.S. coal even after adjustment for quality differentials (McKern 1976:184), a problem that continues today.

The Queensland surface mining firms and the state of Queensland effectively sacrificed an important share of the differential rent from their more favorable natural mining conditions and resulting higher labor productivity and lower costs in an ongoing effort to gain market share and earn a higher total volume of profit via expanded production, rather than maximizing rent. This strategy benefits Japanese steel mills and helps ensure the maintenance of long-term excess capacity in the metallurgical coal industry. The microeconomic logic is clear: lower-cost producers expand production because their marginal costs are lower than competitors. This strategy ignores the consequences for industry structure of this seemingly rational behavior in the face of a strategically acting cartel of buyers, the Japanese steel mills. The Japanese steel mills are willing to sign long-term contracts and make small equity investments with low profit potential to ensure steady, long-term supplies of low-cost coal that is simultaneously a lever to drive down market prices (*e.g.* the 50% real reduction in metallurgical coal import costs in Japan) and secure more favorable contract terms with other producers. This diversification strategy is in turn a lever to secure more favorable terms with the Australian producers who continue to follow a standard but badly flawed microeconomic strategy of expanding production in the vain hope of forcing higher-cost producers out of the industry.

Changing technological and economic conditions in a resource-rich nation, Australia, helped to pave the way for the establishment of a long-term metallurgical coal supply relationship between Japan and Australia. This relationship created a long-term growth period for the Australian coal industry from 1961 through 1982 (Fisher 1987:180). The Japanese steel firms exploited these opportunities by identifying firms and state governments most favorably disposed to promoting coal exports. As these individual actors became more invested in exports, they and their competitors increased political pressure and capital commitment to natural resource exports to Japan.

During this same period, the Japanese steel mills began efforts to further diversify their sources of supply using the Australian model. The Soviet Union

supplied between 5% and 10% of Japanese metallurgical coal imports between 1958 and 1973, and Poland, China, South Africa, Taiwan and West Germany also exported small amounts to Japan during this era. The most important diversification effort, however, focused on western Canada, increasing Canada's share in Japanese imports from 0.1% in 1958 to 19% by 1973. Other suppliers were brought onstream in the late 1980s and 1990s under similar long-term contractual arrangements, most importantly in Indonesia.

The Japanese strategies reduced the real cost per ton of metallurgical coal imported into Japan from US$86.65 (in 1992 dollars) in 1959 to US$43.63 in 1998. The Japanese steel mills, with the assistance first of the U.S. government and later of the Japanese state, had thus devised a model of long-term contracts to guarantee secure access to metallurgical coal from Australia that could be transferred to other regions. This new model accommodated the resource nationalism of host nations. It fundamentally altered the nature and composition of the world metallurgical coal industry, transforming metallurgical coal flows from domestic movement from captive mines to their steel mill owners to transoceanic trade flows governed by long-term contracts. Domestic and transnational firms assumed the capital cost and risks of opening up previously unexploited metallurgical coal deposits. Deposits that had not even been identified earlier because of the tremendous distances between these deposits and potential markets suddenly became highly attractive. The Japanese steel mills used the market opportunities in Japan, long-term contracts, and small equity investments as tools to induce mining firms in Australia to invest repeatedly in creating excess capacity in the world industry, driving down prices and the production prices of the Japanese steel mills. Typically, the coal was transported by state-owned railroads to state-owned ports, although one Canadian railroad and port and some Australian ports were privately owned. The Australian, Canadian and foreign mining firms assumed the capital risk for mining, and local and national governments assumed most of the risks and costs in transport. At the ports, the coal was loaded on Japanese ships for the trip to Japan and shipped FOB, meaning that the Japanese buyers paid for and controlled ocean transport and captured the benefits of transport cost reductions.

The strategies of the Japanese steel firms created excess capacity in the coal industry by bringing large new mines in several nations, most importantly in Australia, into production and pitted fragmented coal sellers against a tightly integrated coal buying cartel made up of all the major Japanese steel firms (Bunker and Ciccantell 1995a and 1995b; Koerner 1993; Anderson 1987). The result of this Japanese-driven process of globalization, based on an analysis of global and Australia-Japan coal trade flows, has been "world coking coal prices and trade (that) are lower than under perfect competition" and the creation of "an

oligopsonistic structure (under which) welfare gains from productivity increases in Australian coal mines might largely accrue to coal buyers" (Graham, Thorpe and Hogan 1999:210).

The consumer market power held by the Japanese steel firms was temporarily disrupted in the mid-1990s by a period of relatively high coking coal prices, a phenomenon that may have been due to cooperative efforts by Canada's largest coal exporter, Fording Coal, and Australia's largest coal exporter, BHP, to strike better bargains with the Japanese steel firms. The response of the Japanese steel firms to a sharp price increase in 1995 was swift: a new pricing mechanism called the "fair treatment system" was imposed by the Japanese steel firms during contract negotiations for the 1996 fiscal year. The fair treatment system called for prices to be linked to the coal quality requirements of individual Japanese steel mills and for the details of the contract negotiations to remain confidential. The Japanese firms argued "that prices could be negotiated to better reflect the value-in-use for specific quality specifications and hence improve the efficiency of price formation" (Swan, Thorpe and Hogan 1999:17). However, the outcome has been that "given coal prices and other contract details remain confidential both during and after the price negotiations, it is unlikely that the efficiency of the market has been enhanced with the introduction of the fair treatment system" (Swan, Thorpe and Hogan 1999:17); these researchers found in their econometric modeling of the relationship between coal quality and prices that the fair treatment system has actually weakened the relationship between coal quality and price in these contract negotiations. In other words, by tying prices more closely to coal quality the fair treatment system accomplished the opposite of what the Japanese steel firms said it was intended to do. The fair treatment system has instead reduced the ability of coal sellers to gather market information and especially to have any opportunity to work cooperatively because of negotiating secretly and individually with the still-coordinated Japanese coal buyers.

The results have been dramatic. Canadian coal export prices, for example, have fallen from C$52.80 in 1997 to C$50.50 (US$33.09) in 1998 (*Coal Age* Feb. 1, 1998:11) and to C$41.45 (US$27.19) for Fording Coal's exports in 1999 (*Coal Age* Feb. 1, 1999:13), a price cut described by the president of the Coal Association of Canada as "a reduction of historical proportions….We haven't seen a price cut of this magnitude before" (*Coal Age* Feb. 1, 1999:13). New mines have been delayed, hundreds of employees laid off, and some mines have simply closed (*Coal Age* April 1, 1999:11; *Coal Age* June 1, 1999:7).

The increasing capital intensity of coal mines and transport systems have led to less employment per ton of coal produced and eventually to a decline in total employment in coal production, despite increasing overall production. In British Columbia, for example, coal production increased from 22.6 million

tons in 1985 to 27.7 million tons in 1997 (Price Waterhouse 1998:6), despite a decline in employment from 5,821 to 3,835, reflecting a productivity increase due to restructuring and increased mechanization from 3,883 tons per employee in 1985 to 7,223 tons per employee in 1997.

Moreover, the intense global competition and excess capacity fomented by Japanese long-term contracts lowers raw materials prices and reduces or eliminates rents (as demonstrated by the halving of real costs of importing coal into Japan between 1959 and 1998 mentioned earlier), putting intense pressure on exporting firms to reduce costs or face bankruptcy. The resulting ongoing restructuring of the last twenty years has bankrupted firms, closed mines, and devastated communities. One excellent example of these processes is the Balmer mine in southeastern British Columbia which experienced a long boom, followed by bankruptcy, closure, and now ongoing restructuring in an effort to remain competitive. At the same time that joint ventures between the Japanese steel firms and their Canadian partners have faced repeated crises, the Japanese steel firms have been busy signing new long-term contracts in Australia, South Africa and Indonesia to support the opening of new mines, creating even more global excess capacity.

The iron ore trade relationship between Australia and Japan developed along similar lines. In the early 1960s, Australian iron ore producers focused on exporting iron ore to Europe, but the long distance and resulting high transport costs made this trade extremely expensive and largely uncompetitive. Mining firms in Australia that had begun selling coal to Japan in the 1950s began exploring for iron ore in Western Australia and lobbying the Australian government to end its ban on iron ore exports in the late 1950s. By offering long-term contracts and credit needed for opening new, and much larger, mines and transport systems, the Japanese contrived to orient most of the greenfield iron ore projects toward the Japanese market after the Australian government permitted iron ore exports in 1960. In the mid-1960s, Australian iron ore exporting firms began to focus on the Japanese market because of relatively proximity. The Japanese steel mills signed long-term contracts with several major Australian iron ore mines, with some of these contracts including financial and engineering assistance from Japan to develop these projects (Manners 1971:167–168).

The first two mines built in Western Australia as joint ventures to supply Japan were required to build their own rail and port infrastructure (Skillings 1969; McKern 1976:206–216), an important departure from the metallurgical coal mine model in eastern Australia. The next four iron ore mines developed in Australia (three in Western Australia and one in Tasmania) included the Japanese steel firms or Japanese trading companies as partners and also built their own infrastructure (McKern 1976:206–216). Most critically for the Japanese

steel industry, this exploration and investment by Australian and foreign mining firms revealed the huge iron ore reserves of remote regions of Australia. In 1950, Australia's known reserves were only 126 million tons of contained iron ore, a mere 0.5% of world reserves (Manners 1971:228); by the early 1990s, Australian reserves were 10.2 billion tons of contained iron ore, 16% of world reserves (USBM 1992) and eighty times as large as known reserves forty years earlier, after hundreds of millions of tons had already been extracted, mainly for export to Japan.

The Japanese steel firms were coordinated as a sector and articulated with the Japanese state and with the general trading companies that typically handled the logistics of these large-scale flows of coal and iron ore. With iron ore deposits located less than 400 kilometers from the west coast of Australia and separated by few intervening hills on the gradual downhill railroad journeys, and the coasts of Western Australia and Tasmania also amenable to the development of large-scale ports, as eastern Australia had been for coal exports, the Japanese steel firms utilized their large-scale MIDA ports in Japan for both coal and iron ore imports.

The massive scale of these iron ore mines and the dedication of transport infrastructure designed specifically for exporting iron ore had major implications for the turnaround time of the massive capital investments in these facilities. In 1969, 100,000 tons of iron ore represented 2% of the Goldsworthy mine's five million tons of annual output. This week's worth of iron production could be loaded onto railcars and shipped to the port within the same seven to eight day period over the three hour railway journey, loaded onto a ship in just over two days' time, and shipped 3,600 miles to Japan in a few days' sailing time (Skillings 1969:8) and converted into pig iron, smelted into steel, and cast into semifinished products within another three to four weeks. This tightly integrated, large-scale extraction, transport and processing system made very efficient use of the hundreds of millions of dollars of capital invested in the system by utilizing the latest technologies of mining, rail transport, port facilities, bulk shipping, and steel production in a well-organized system governed by long-term contracts linking the mining company to Japanese steel companies, trading companies, and shipping companies.

The efficiencies and synergies that made Japanese steel and shipping crucial generative sectors came at the cost to Australia and other raw material exporters of rent reduction because of excess capacity in over-supplied world markets and state and/or firm commitment of huge capitals or debt rigidly sunk in mining and transport infrastructure. These long-term contracts and later annually negotiated price and quantity terms were not ideal instruments from the perspective of raw materials exporting firms and states. Even before the Western Australian

iron ore mines came into production, mine development costs had exceeded estimates by 15% to 30%, while contract prices with the Japanese steel mills were as much as 15% below world market prices. One analysis argued that the reason was that the mining company operators "had one disadvantage in dealing with the Japanese: they competed against one another on price. The result: Japan sewed up one of the best iron-ore import deals in history"(*Business Week* August 13, 1966:99). Japan's iron ore prices from other sources at the time ranged from 20.5 to 26 cents per pound of contained iron, while the Australian contract prices were 14.5 to 21 cents and an average of 18 cents per unit of contained ore. Efforts to renegotiate the contracts were undertaken with only limited success as other iron ore exporting countries, most notably India, filed formal protests with the Australian government and the national government investigated the terms of the contracts (*Business Week* August 13, 1966:98–100). This disadvantage of uncoordinated negotiations on the exporting end confronting tightly coupled firm-sector-state coordination at the importing end would become a hallmark of iron ore-exporting nations' relations with the Japanese steel firms.

Australian iron ore exports to Japan increased from nothing in 1963 to 13.8 million tons in 1968; Australia became Japan's largest iron ore supplier in only five years. By 1973, exports reached 64 million tons, more than three times greater than Japan's second largest supplier and 56% of Japan's total iron ore imports. Australia has remained Japan's largest iron ore supplier throughout the past thirty years, and this same model of long-term contracts was utilized in Brazil and other iron ore-exporting nations during this period.

Our focus on evolving material process as cumulatively sequential in space and over time allows us to ground comparisons between systemic regimes of accumulation as historical transition and to incorporate within that comparisons of different instances of subordination within a restructured periphery at particular moments in time. Thus we see Canada bound into the formation of new global markets with the same general mechanisms that the Japanese firms and state learned and adapted in Australia, but we can also see how the Japanese adjusted their strategies to the different material and spatial characteristics of the Canadian resources, most notably their far greater distance from Canadian ports, the far rougher terrain between the mine and the port, and then the far greater distance to Japan. These differences enter into both the contractual relations that Japan established with Canadian firms and provincial states, and with their treatment of these coal exporters once the mines and transport infrastructure were established.

Similar comparisons are possible with iron exporters. The basic strategies employed in Brazil were those learned and perfected in Australia, but their actual implementation was adapted to the spatial, material, and political realities of

Brazil. The major Brazilian supplier of iron to Japanese firms is the Carajas mine in the Southeastern Amazon, the largest iron mine in the world. Owned by CVRD, which was a mixed public and private but very much national firm until its privatization in 1996, Carajas was financed through a complex mix of Japanese, American, European, and Korean public loans coordinated by the World Bank under policies that had originated under U.S. concerns in the 1970s to ensure adequate raw materials supplies (see Bunker and O'Hearn 1992). In this case, Japan played a far less central role in financing and in contracts, using instead U.S. and European Union interests in the mine to stimulate finance, and working instead to influence the Brazilian national state and CVRD to develop the mine in such a way that it fed into Japanese global sourcing strategies at local cost. Thus the costs of a 690-mile-long railroad to a port capable of handling 385,000 dwt ships were left to World Bank coordination of a trans-core loan to CVRD for the mine and a joint venture with Docenave, a CVRD subsidiary, to build the huge ships that would allow economic shipments of iron ore all the way to Japan. The promise of Japanese long-term contracts led CVRD to choose the far longer rail lines, the far bigger port, and the huge investment in ships that could only dock in Japan and in Rotterdam over the much cheaper infrastructure that its original partnership with U.S. Steel had envisioned. The initial arrangement with U.S. Steel had entailed barging the ore downriver to the existing port of Belem and then on to the U.S. in the smaller ships appropriate to regional, rather than global, trade in cheap bulk raw materials.

Comparison with Australia shows that Japanese strategies in Brazil responded to (a) the topographies and locational characteristics of the Amazon, (b) the far more centrally controlled structure of the Brazilian federal system, (c) the political power of CVRD relative to both the national state and the much weaker Amazonian states, and (d) the greater distance from Brazil to Japan. In order to achieve its own incorporation into Japanese globalizing strategies, CVRD used the national congress and national ministries to undermine local state control over land and taxes. CVRD pushed the establishment of new federal agencies that controlled land use on a military model and promoted national state initiatives that preempted land formerly under local state control. At the same time, it collaborated with Japanese development agencies to promote fiscal incentives that would support the infrastructure required for access to the Japanese market, while manipulating federal decrees that reduced its tax and rent debt to the local state. In these ways, the Amazon's incorporation into Japan's resource-supplying periphery led to huge capital costs, rent reduction, and impoverishment of local administration.

The fundamental problem of how to move huge volumes of bulky raw materials, iron ore and metallurgical coal, thousands of miles to Japan at costs low

enough to allow the Japanese steel industry to be competitive in the world economy was resolved through a combination of technological, organizational and institutional innovations at the firm, industry, and state levels. One analyst had already noted by the late 1960s the tremendous influence that Japan's rapidly growing demand for iron ore imports had on the world iron ore market between the early 1950s and late 1960s:

> the importance of the Japanese market far exceeded the volume of imports moving into that country. Partly because of the rapid rate of growth of demand for iron ore, but also because of the highly aggressive purchasing policies adopted by their iron and steel industry, the Japanese tended to set the pace and the style of change in the ore markets of the world. Faced with exceptionally high raw-material costs at the beginning of the period, the Japanese steel industry systematically set about to ensure a reduction of its raw-material transport costs. By accepting the responsibility and the economies of long-term and large-scale ore purchases, and by skillful bargaining with its suppliers, Japan by 1965 had established for itself a much admired and an almost enviable position (Manners 1971:253).

Technological and organizational innovations in extracting, transporting, and processing iron ore and coal made Japan the world's lowest cost steel producer by the 1960s, driving Japanese economic ascent by lowering costs throughout the Japanese economy and increasing its global competitiveness.

V. JAPAN'S RECONSTRUCTION OF THE WORLD ECONOMY AND ITS CONSEQUENCES

The experience gained from accessing coal and iron ore in Australia via long-term contracts with minimal Japanese capital investment laid the foundation for the tremendously successful program for diversifying sources whose capital expenses were largely met by exporting states and firms: the "ABC policy (Australia, Brazil, and Canada)…a term applied to describe this approach, and to recognize the need for vigilant management of security of supply, quality, and delivery…the strategy has been clear: supply basic intermediate feedstock materials to downstream assembling and processing manufacturing industries at the lowest possible cost" (McMillan 1985:79–80).

This model, in various forms and combinations (Ozawa 1986), has since the late 1940s provided the material foundations for Japan's economic ascent. The challenge of gaining access to Australia's metallurgical coal began a learning process for the Japanese state on how to create the raw materials supply relations Japan would need to support industrialization. Australia became the first major raw materials supplier directly dependent on Japanese markets; Brazil and Canada became during the 1960s the other two major pillars of Japan's raw materials supply chains. Locationally, topographically, and politically, these countries

presented very different sets of problems and opportunities for Japanese raw materials access strategies. In learning how to respond to and exploit these differences, the Japanese state and Japanese firms developed highly useful flexibility and agility that later served them well in other countries.

The Japanese steel firms and the Japanese government, with initial support by the existing hegemon, the United States, successfully restructured the world coal and iron ore industries to supply low-cost coal and iron ore to Japan, while transferring the vast bulk of costs and risk to mining firms and state and national governments in Australia and, later, in Canada, Brazil, South Africa, Indonesia, and even the U.S. itself. The new combination of large-scale mines and large-scale transport facilities, while reducing the cost per ton of production and transport, have greatly restricted the markets available for these mines' production, since these low costs are dependent on the utilization of large ships that can only berth in a very small number of ports outside Japan. The coordination of Japanese steel firms in negotiating prices for coal and iron ore, the high capital costs of these mines that make sales even at a loss essential in order to service high debt loads, and the construction of dedicated infrastructure by extractive states and firms all combine to give Japanese steel firms tremendous advantages in bargaining over purchase terms with coal producers. This restructuring of the world coal and iron ore industries was a fundamental material and economic pillar of Japan's rise as an industrial power and challenger to U.S. economic hegemony.

MIDAs, the linchpin and physical manifestation of the Japanese model of capital accumulation, restructure nature, the Japanese economy, and the world economy through state policies and investment in combination with private firms in order to manipulate nature, space, topography, and existing economic and social structures in search of private profits. The MIDAs represent a clear case of state-firm-sector organization of unprecedented scope and cost in response to the increasing scale, geographical scope of sources and markets, and technical complexity of the bulk raw materials industry as the result of the cumulatively sequential punctuated evolution of the world economy.

Japan could only compete against the regionally based comparative advantages of a U.S. dominated world market by using the ocean to become global. This inevitable next step for the system of global sourcing was only possible by creating new institutions for the tight coupling of firms, sectors, and states. The Japanese government and MITI's successful response to this challenge restructured both domestic and global social and economic organization. MIDAs are the central element and the epitome of tightly coupled internal and external restructuring and reorganization to support Japan's industrial transformation. MIDAs were located and constructed in order to efficiently articulate with a

network of far-flung sources of precisely distinguished types of coal and iron that were economically viable to transport only with the scale of transport the MIDAs made possible. The MIDAs also were critical to the tightly coupled internal system of very large-scale, very efficient downstream distribution, and the quality control that the continuous casting basic oxygen furnace operating at full capacity required. In other ways, MIDAs looked inward to the domestic economy, sustaining economies of scale and distribution and outward to global sources, making possible very large cargoes and also providing the capacity for efficient storage and movement needed for precise blending of coal and iron ores.

The MIDA is one of the clearest examples of how Japanese strategy and organization have linked the domestic and the international. The strategy for raw materials access is so tightly coupled with the organization of production in Japan that the internal and the external are continuous in their organized relationship of the flows of raw materials, while at the same time strong incentives for state-firm-sector collaboration within Japan draw the internal-external distinction very clearly in terms of how the cost savings and profits are distributed. The tightly-coupled flow of raw materials from mine to market is so closely organized, and the various phases so interact, that the internal-external line is obliterated. At the same time, the shared interest of the firm-sector-state alliance in promoting national economic growth, pooling information, and socializing risk heighten the internal-external division by systematically favoring Japanese domestic interests at the level of the firm, the sector, the national economy, the society, and the world economy.

At the same time that this model of capital accumulation has had such salutary effects in Japan, the consequences for raw materials exporting regions have been equally dramatic and, on balance, often very negative. Perhaps the most striking example of both the positive and negative impacts of becoming part of Japan's raw materials periphery can be found in the coal mining country of southeastern British Columbia. The Elk Valley region began producing coal a century ago for railroads and local coke ovens. Dieselization of railroads in the 1950s brought the industry in the area into what appeared to be its final decline. Coal reserves were and still are extremely large (measuring several hundred million tons of proven reserves today), but the largest customer had disappeared and the small coal-dependent towns in the area appeared headed for oblivion.

In the early 1960s, however, one coal firm began selling metallurgical coal to the Japanese steel mills from the Balmer mine. The Balmer mine was a joint venture of a subsidiary of U.S.-based Kaiser Steel Corporation and minority partners Mitsubishi Corporation and a consortium involving all of the major Japanese steel firms (by 1991, Balmer was the largest open pit coal mine in the

world) (MEMPR 1992:33). By the late 1960s, long-term contracts for millions of tons per year of exports to the Japanese steel mills from Balmer and other new mines transformed the region from a fading, localized coal industry into a major global center of coal production for export. During the 1970s, a period of generally high and rising coal and other energy prices, this joint venture earned an average profit rate of 16% per year (*Canadian Mines Handbook 1980-81* 1980:137), or as one former executive put it, "Kaiser was printing money" because coal production was so profitable.

By any measure, the impacts of coal exports to Japan have been profound. Canadian metallurgical coal exports increased from 600,000 tons in 1963 to 39 million tons by 1991, with the vast majority coming from southeastern British Columbia and going to Japan. Coal was Canada's most important export to Japan by the early 1990s (*The Elk Valley Miner* May 21, 1991:20). In British Columbia, the coal industry employed over 3,500 people and paid C$180 million in wages in the mid-1990s (SECDA 1995:5). The coal and linked industries account for approximately 1% of Canada's GDP and a much larger share of British Columbia's GDP and export revenues. Employment in the British Columbia coal industry overall increased from only 457 in 1967, the low point in the historical decline of the industry, to a peak of 5,821 in 1985, and the local population grew rapidly. Obviously, coal is of major significance nationally and locally and developed from a dying industry in the early 1960s into a major economic force by the mid-1980s.

However, intense global competition because of excess capacity developed to fulfill long-term contracts with the Japanese steel firms provoked restructuring over the last fifteen years that lowered total employment in the province's coal industry to only 3,835, with 2,360 of those jobs in the Elk Valley. All of the mines in the area have laid off workers, experienced temporary shutdowns, and declined dramatically in profitability. Moreover, local populations today are smaller than they were in 1981, reflecting declining employment due to restructuring.

Exports to Japan thus brought a boom to the region during the 1970s and early 1980s, but restructuring since the early 1990s has dramatically altered the earlier boom conditions and presented a series of profound challenges for the region. Similar stories can be told about other Japanese raw materials peripheries in Australia, Brazil, Venezuela, Indonesia, and other nations.

VI. CONCLUSION: NEW HISTORICAL MATERIALISM AND INTERNATIONAL INEQUALITY

This paper showed how Japanese firms and the Japanese state constructed a development model based on the steel industry as a generative sector that drove

Japan's economic ascent in the world-historical context of U.S. hegemony. These strategies created a tightly linked set of technological and organizational innovations to overcome the natural and social obstacles to Japanese development, dramatically increase Japan's international economic competitiveness by lowering production costs in all sectors of the economy, turn Japan into the world's largest exporter of manufactured products, restructure a range of global industries, and recreate the world-system hierarchy in support of Japanese development. In particular, organizational innovations in the use of long-term contracts and joint ventures in raw materials industries to foster global excess capacity and lower rents to resource extracting firms and states reallocated the costs of providing the material building blocks of Japanese development to the states and firms of its new raw materials periphery. This competitive advantage drove Japanese capital accumulation and economic ascent, and simultaneously drove underdevelopment in Japan's periphery.

These Japanese innovations became key elements of globalization as U.S. and European transnational corporations and states sought to compete with Japan. Joint ventures, long-term contracts, and other forms of interfirm cooperation have replaced vertically integrated foreign direct investment—the earlier U.S. model of capital accumulation and international economic linkage—as the model for global industries. This new model of capital accumulation has had similar impacts on redistributing the costs and benefits of development between core and peripheral regions of the capitalist world-economy in a wide range of global industries.

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Zosen. Various Issues.

ABSTRACT

There exists a rather widespread professional consensus that income inequality both within and between societies in the world system has increased over the last quarter of a century. This, however, does not represent a secular trend since inequality between WWII and the 1970s was rather stable or decreasing. For the increasing inequality both within and between societies since the 1970s we present fresh evidence which helps to settle open questions of previous research.

Less consensus has been achieved until now with regard to explanations. Arguing that mono-causal explanatory schemes are of little help, the paper suggests eight propositions for an explanation. The evaluation of them is also enriched by diverse pieces of preliminary empirical evidence. The paper also briefly considers which factors are responsible for a rather transitory increase and those which suggest a lasting higher level of inequality in the world.

Changing Income Inequality in the Second Half of the 20th Century: Preliminary Findings and Propositions for Explanations

Volker Bornschier

INTRODUCTION

This paper represents work in progress. It first presents the stylized facts for inequality within and between societies over the post-war era. Then eight propositions are discussed and empirically evaluated to account for the shifts in inequality over the last quarter of a century. We use income inequality as a measure of overall inequality. The first reason for doing so is that we have comparable information for cross-country and world comparisons. But this is less a limitation than one should think. In market societies income is the common denominator of social stratification. Formal education and occupational status—which are powerful predictors of income—are less unequally distributed than income while wealth and formal authority—the other two predictors—are more unequally distributed than income. This sequence in inequality ranging from formal education to formal authority is established for a sample of countries representing about two-thirds of the economically active population of the core of the world system (Bornschier 1988: 249). Therefore, income inequality is taken here as a summary measure of inequality in the stratification of a social system.

CHANGING INEQUALITY: THE STYLIZED FACTS

Looking at the whole postwar era we observe that overall economic growth in the world system was high between 1950 and 1972, while it was much lower between 1972 and 1992 (see Appendix, Table A1). Since the middle 1990s eco-

Volker Bornschier
Sociological Institute
University of Zurich
Raemistrasse 69, 8001
Zurich, Switzerland
vobo@soziologie.unizh.ch
http://www.suz.unizh.ch

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nomic growth is again increasing. Taking all facts together which we will discuss below, we can say that in the high economic growth era of the postwar world system, *i.e.*, between 1950 and 1972, inequality both within countries, between world regions, and between countries was lower than in the second period, from 1972 to 1992. Thus we can point to a first observation, *i.e.*, that overall inequality seems not necessarily linked to the speed of overall economic growth.

If we look in more detail at the data we have at hand for evaluating the development of inequality in the first period, we observe that in fact inequality diminished somewhat within countries—OECD countries and several but not all developing countries—and was roughly stable for the income distribution of the whole world.

In the second phase, 1972–1992, wherever data are available, inequality typically increased, both within the majority of countries from a sample of 51 as well as between 103 countries (analyzed from 1980 to 1997). The increase in inequality within countries (albeit of different degree) pertains to about 87 percent of the sampled population and is therefore relevant for an overwhelming portion of world population.

After having detailed a bit more these stylized facts in Section One we will make this general increase in inequality the topic of our theoretical explanations in Section Two. We will furthermore present preliminary evidence for these explanations. In this paper we do not, however, evaluate the interactions between the different factors, nor do we suggest a ranking in the importance between them.

SECTION I

Details of the Available Evidence for the Change in Income Distribution and Fresh Empirical Analysis

The previous societal model—characterized by Keynesianism in the politico-economic regime and by Fordism/Taylorism in the realm of the industrial production system—started with democratic innovators in 1932–1934 (Sweden, U.S., Switzerland). This social arrangement culminated between the mid-1960s and the mid-1970s while it increasingly decayed from the 1970s onward (see Bornschier, [1988] 1996). The 1980s and the 1990s witnessed different approaches to the new societal model of the "extented market sphere in the telematics era."

Toward the end of the Keynesian societal model we observe a resurgence of globalization, manifested (among other things) by the increased weight of trade, finance and corporate investment across national borders which endured until the 1990s. Although the increase leveled off in recent years with regard to trade, it continued with regard to foreign direct investment.

As compared to the first half of the 20th century, the Keynesian societal model resulted in a decrease of inequality, at least in core countries. And until the culmination of the societal model (1960s to 1970s), inequality actually decreased in many core countries.

Inequality in Single Countries Over Time Until the 1970s

The most detailed evidence for inequality over longer time periods in the 20th century is available for the U.S.. Between 1946 and the second half of the 1960s, inequality in the U.S. (as measured by the Gini index for family incomes) had a clear decreasing trend while it increased since then rather monotonically until the early 1990s (the latest available data). This was demontrated for example by Kerbo (1991: 35, 1996: 24).

The astonishing fact of considerable increase in U.S. inequality since the end of the 1960s must be contrasted with the dramatic decrease following the New Deal of the 1930s (Williamson and Lindert 1980) which thus allows U.S. to extend the above-mentioned *decreasing* trend (1946–1969) backward to the 1930s. Parallel to this pattern we observe the same decrease for the distribution of wealth in the U.S. where the percentage of wealth held by the top one percent went considerably down from the early 1930s to the late 1960s, increasing considerably thereafter (Kerbo 1996: 34).

The scattered evidence for other core countries—although not covering a similar long period of the Keynesian societal model—tells the same story which we have detailed for the U.S.. The second best long run time series for which we have data is for the United Kingdom. Atkinson (1995: 17) reports Gini coefficients and income shares of quantiles in the United Kingdom for the period 1949–1985. Between 1949 and 1976 inequality was decreasing, especially since 1964. After the middle of the 1970s inequality increased again. Although we observe a very similar pattern in Britain there is a delay of the turnaround of several years as compared to the U.S.. This seems not only to be typical for the UK but also for other European countries. Take for example Switzerland, where—similarly to the UK—a decrease was still observed between the second half of the 1960s and the second half of the 1970s (Zwicky 1988) when U.S. inequality was already on the move up.

When we consider the new World Bank data set published by Deininger and Squire (1996) and restrict our analysis only to those data classified by the two authors of being of high quality (see later in the paper) then additional cases can be analyzed in order to show that the pattern for the U.S. and the UK (with the mentioned delay in the turnaround *vis à vis* the U.S.) is also visible in the data on other cases. In Canada inequality decreased between 1951 and 1973 in order to increase since 1973. In Japan there was a decrease between 1962 and

1972, and an increase after 1972. Again the pattern is similar for Sweden: decrease between 1967 and 1975 and increase after 1975.

Outside the Core Countries

From the mentioned Deininger and Squire data set we can also add information for a few developing countries. For India we observe a decrease of inequality since the early 1950s until about 1970 and an increase after 1970. Sri Lanka's situation is quite similar: decrease from 1953 to 1973 and increase after 1973. South Korea's inequality decreases from 1953 to 1969 and remains about constant or increases only somewhat after 1969. Taiwan's inequality also decreased between 1964 and 1979 and increased afterwards.

Although the four developing countries for which we have the necessary information follow a similar pattern as core countries, mention should be made also that some do not, *i.e.* they increased their inequality during the heyday of the Keynesian era: Mexico from 1950 to 1975, Brazil from 1960 to 1970, and Trinidad and Tobago from 1958 to 1971. Therefore the pattern in the Keynesian era seems to be mixed for cases *outside* the core.

Inequality in World Society as a Whole

There exists an early and pioneering study of inequality within and between countries of the world for the years 1950, 1960, 1970 and 1977 (Berry, Bourguignon and Morrison 1983). Berry *et. al.* report evidence for an almost unchanging world income distribution, as demonstrated by Gini coefficients as well as by quintile share figures. If any change is worth mentioning in the results these authors have presented, it is the fact that the bottom 60% of world population to some degree lost income share over time, a trend more pronounced after 1960. The share in total income of the bottom 60% in 1950 was 11.6%, in 1960, 11.5%, in 1970, 10.4%, and in 1977, 10.3%.

Another earlier study of overall inequality in the world system is one by Arrighi and Drangel (1986). They find three layers in the world income stratification from 1938 to 1983: the core, the semiperiphery and the periphery. The structure of inequality—as evidenced by the differences in logged income—between the three layers was as follows: until 1970 the semiperiphery somewhat caught up with the core. But after 1970 (until the end of their series in 1983) the semiperihery fell back again. The periphery more or less maintained its overall position until 1960, and since then the distance from the core has gradually increased (*i.e.*, a trend of polarization). This suggests a stable or a slightly decreasing inequality in world incomes until 1970 and a slight increase afterwards. This corroborates with the evidence in Table A1 (in Appendix) with which we started this paper, although there the focus was on the difference between regional groups.

Over the first three decades after World War II, *i.e.*, during the era of the Keynesian societal model, overall income inequality in the world was astonishingly stable. The small shifts we mentioned should not be exaggerated given the limits of the quality of data. Furthermore, while income until the heyday of Keynesianism tended to become less unequally distributed in core countries, there was no overall trend deducible from the few cases with data outside the core.

Remarks on Differences in Inequality

Although the relative degree of inequality within various countries is not the focus of this paper since we are interested in the broadly changing trends of inequality, we would like to add here some basic information on differences between countries. Income inequality in core countries is on the average considerably lower than in the average developing country. However, in both groups there are marked differences in the extent of inequality. Such differences are more pronounced for developing countries. The famous Kuznets hypothesis that suggests a relationship between the degree of inequality and the level of develoment is not supported by the data for developing countries as a recent study by Deininger and Squire (1996) shows.

Here is not the place to review the predictors of inequality in cross-national studies, but mention should be made that earlier research demonstrated forceful predictors of income inequality: inequality in wealth (as measured by agricultural land distribution), structural traits of organizations in the economy, bargaining power of labor, and organizational links with the transnational economy and differences in state action (see Bornschier and Ballmer-Cao 1979). The most recent study in this long history of research is by Alderson and Nielsen (1999).

A second remark relates to the role of state action in terms of taxing and redistributing income. In general this role is much more pronounced in core countries. Especially for core countries this factor in relative inequality should not be underestimated. The state—in what it is or is not doing—is quite influential in shaping final levels of inequality. There exists a very informative and detailed study by Swank and Hicks (1985: 134) on 13 developed countries. They compare the income distribution generated in markets and organizations (primary income distribution) with the distribution after social security transfers (but before taxation) and with the distribution after transfers and after taxation (both directly and indirectly).

Comparing the primary and secondary distribution of income one can state (see Swank and Hicks 1985) that the income distribution generated by processes in the economy (earnings, profits) is the most unequal. With an average Gini

coefficient of 0.43 for their sample of 13 developed countries around 1970, this average Gini decreases after transfers to 0.37 and further to 0.35 after transfers and taxes. This pattern itself is not very astonishing. But at the same time the differences in inequality between the 13 countries increase with state intervention as evidenced by the coefficient of variation which we computed from their published figures: V=0.07 for the primary distribution, V=0.09 for the one after transfers and V=0.12 after transfers and taxes. Thus highly developed countries are more equal in their income distribution with regard to market-generated income and less similar after state intervention. The state therefore not only matters: its impact is quite different across countries.

The Growing Inequality in the Transition from the Old to the New Societal Model of the "Extended Market Sphere in the Telematics Era"

Income inequality in single countries over time after the 1970s

Growing inequality in the United States over the last quarter of the 20th century has been widely recognized and debated (Kerbo 1996, Braun 1997). Over the 1990s several comparative studies have been undertaken to evaluate the trend in inequality outside the U.S..

There exist already several summarizing studies which especially address the trends in OECD countries and distinguish between earnings inequality and income inequality (Gottschalk and Smeeding 1997, Gottschalk 1997, Atkinson et al. 1995, Atkinson 1995). And there exists a broad consensus based on the available evidence in the 1980s and early 1990s.

Let us start with the summary of Gottschalk and Smeeding (1997: 636), who state that there exist wide differences across developed countries both with regard to earnings inequality and income inequality (disposable income after transfers and taxes):

> Almost all industrial economies experienced some increase in wage inequality (...) during the 1980s (Germany and Italy are the exceptions). But large differences in trends also exist across countries, with earnings inequality increasing most in the United States and the United Kingdom and least in Nordic countries ...
>
> Income inequality increased in most, but not all, OECD nations during the 1980s and early 1990s. Trends in inequality were not closedly associated with levels of inequality. Some nations with low levels of inequality experienced some of the largest increases. Increases in household income inequality were more muted than were changes in earnings inequality in most nations. Still increased earnings inequality among men was probably the most important factor in explaining rising income inequality. (...) Reductions in social welfare spending for the non-aged and regressive changes in the structure of income taxes for some countries during the 1980s account for only a small part of the trend in post-tax and transfer inequality in most nations." (Gottschalk and Smeeding 1997: 636)

An empirically-based consensus thus emerges. Yet, except the significant contribution of earnings inequality to overall household income inequality, no obvious single source seems to be responsible for the trend in income inequality. Although politics matters (as we have mentioned above) and political styles—pluralist *vs.* neocorporatist regimes of different intensity—are obviously associated with different inequality outcomes, politics does not seem to be the only factor. Gottschalk (1997: 5) concludes from his study that "it is difficult to attribute the common trend in inequality experienced in western European countries during the 1980s to the emergence of conservative governments."

So far there is little empirical work available on the trends in income inequality outside the OECD world. Therefore, after having finished the review we will present preliminary results of our own research covering 51 countries, the large majority of them from the developing world.

Inequality in the world as a whole

Studies of the type which Arrighi and Drangel (1986) have presented were updated but not published in final form (Arrighi and Korzeniewicz 1996). Peacock, Hoover and Kilian (1988) tried to decompose world income inequality (with observations between 1950 and 1980) into two components, *i.e.*, into inequality within layers and between layers of the world system: core, semiperiphery and periphery. However, their work was based on the results of the flawed block modeling method of Nemeth and Smith (1985), a flaw discovered by Trezzini (1996).

In order to distinguish between different layers in the world system Ebert and Trezzini (1992) employed the block modeling method, using population-weighted aggregate export and import data for 115 countries in 1975. They found an overall structure comprising four subgroups: a core, a semiperiphery, a strong periphery, and a weak periphery. Over the period from 1960 to 1985 a clear income polarization could be observed. Using their country groupings for 1975, Ebert and Trezzini find—in terms of average real per capita income for the time period between 1960 and 1985—evidence for a growing polarization in the world system. There is a clear-cut image of four different average income layers, with the highest growth at the core and absolute stagnation at the weak periphery. These originally unpublished findings from a MA thesis were reprinted in Bornschier and Trezzini (1997: 442).

The world income distribution was studied from 1965 to 1992 by Korzeniewicz and Moran (1997). They temporally extended the pioneering study by Berry *et. al.* (1983). Korzeniewicz and Moran found that world income inequality

increased somewhat in the 1970s and went up considerably in the 1980s. The differences in average income between countries was the most important component of overall world inequality (income within and between countries). This was already the conclusion of Berry *et. al.* (1983) for an earlier period.

The widening gap in average income across the countries of the world which Korzeniewicz and Moran found was in part, however, disputed by the replication study of Schultz (1998). According to him, the increasing gap in average income is only observable if international exchange rates are used to translate national currencies into U.S. dollars. If the series of purchasing power parity-corrected average income data are employed, no increasing income disparities between countries can be detected.

In a similar critical vein Firebaugh (1999) questioned the finding of Korzeniewicz and Moran (1997). Firebaugh also found stable variance in the distribution of logged income across nations and claimed that if income inequality in the world has increased over the 1980s, then the increase must be due to increases within nations.

We conclude this review with the following observations: The information on the increase in inequality within countries outside the OECD world is still shaky, and the widening gap between average incomes across nations has come under severe dispute recently. Therefore, we undertake additional original research in order to clarify these issues.

Our own additional empirical research

First we analyze the latest available set of comparable data of income distribution (Deininger and Squire, 1996) in order to assess the dominant trend in income distribution since the 1970s for a broad range of countries. This analysis allows us to include 51 countries with a population of about 4.2 billion—representing a vast majority of the world population living in countries outside the former second world (since 1990, the transformation of former state socialist systems to more formal democracy and market regulation). The results are summarized in Table 1.

Secondly, we analyze the time series for income (GDP per capita) provided by the World Bank (World Development Indicators, 1999). These series contain data from 1960 to 1997 expressed both in international exchange rates and corrected for purchasing power parity. The gaps in information before 1980 are frequent; therefore, we start in 1980 with yearly observations for a constant sample of 103 countries until 1997.

Fresh evidence on the change in inequality within countries

The basis of the analysis summarized in Table 1 is a sample of observations

which Deininger and Squire (1996) term a "high quality data set." This high quality data set we again screened for comparability over time. If a high quality estimation of income distribution at time 1 relates to households and at time 2 to persons then it is not comparable and not included in estimating trends. The same qualifier applies to information based on gross income at one time and on net income at another. We also excluded those observations which do not have information on parameters which significantly determine inequality. Nor do we consider entries where there is no exact information on whether the measure relates to comparable income units (households, persons).

Most observations on inequality relate to income (in many cases also to expenditures) and the income unit is the household and the figures are gross (before taxes). But many other data entries are found, too. Since we compare trends in the change of inequality rather than relative levels, these differences are not important as long as we compare strictly comparable figures over time. The mentioned selection was done in the already screened "high quality" data set provided by Deininger and Squire.

Furthermore, we considered only cases with at least two pieces of information on income distribution (many cases have much more) and where the last entry is at least in the second half of the 1980s (1986 and beyond). If available we started with observations around 1970.

It is not always easy to classify countries according to trends. Therefore, we distinguish in the first stage of analysis reported in this paper only three categories: increasing inequality, roughly constant inequality and decreasing inequality. The information we consider is the change in Gini coefficients as well as the changes in the shares of income that go to the bottom quintile (20%) and to the top quintile of income units. This additional criterion was used since the Gini coefficient is not very sensitive to inequalities at the bottom and the top of the distribution. Admittedly, there are some questionable classifications likely to be left in our analysis but it nevertheless allows us to draw conclusions about general trends due to the sheer number of cases.

Included are 51 countries, all of them non-transformation countries (to control for the change in inequality due to the profound revolutions which the formerly planned economies have experienced). Our 51 sample countries are those in which the vast majority of the world population is living, *i.e.*, 4,158 million or about 77 percent of the total world population outside the 22 transformation countries.

Table 1 summarizes the findings. A clear majority of the sample countries are classified as having experienced "increasing inequality" since the 1970s until the early 1990s. This increase, however, was of different size and in most cases

Table 1 – Summary of the analysis of the change in national income distribution in the 1970s, 1980s and early 1990s

Classification	Increase	Roughly Constant	Decrease	Total
Number of non-transformation countries	27	17	7	51
Percentage of all sample cases	53%	33%	14%	100
Number of people living in these countries (billions)	3.632	390	136	total sampled population =4.158*
Percentage of *sampled* world population	87.3%	9.4%	3.3%	100

* The share of the sampled population in total world population (except transformation countries) is 77.4%

does not cover the whole period, the 1970s to the 1990s. Preliminary though they may be, the results tell us that for 53% of the sampled countries inequality was increasing, for 33% it remained rather stable, and only for 14% was inequality decreasing.

This predominant trend of increasing inequality from the 1970s to the 1990s does not only hold for the vast majority of the OECD countries but also for the overwhelming majority of all other countries. Thus, we conclude that increasing inequality within nation-states was a general phenomenon of world society over the last quarter of the 20th century.

If we consider the populations in the three different groups of Table 1 we can punctuate our conclusion even further. The overwhelming majority of the world population (outside transformation countries)—the percentage share is actually 77.4%—live in national societies which experienced an increase in inequality—in some cases a pronounced increase, in others a moderate one.

Looking at individual societies we can thus conclude that inequality did generally increase from the 1970s until the 1990s. What about the differences in income between countries? The summarizing results from 1980 to 1997 are listed in Table 2.

Inequality between countries

There exist various measures for inequality. In Table 2 we employ one that is decomposable (Bourguignon 1979). Among the decomposable inequality measures we chose for Table 2 is one that is not too sensitive with respect to extreme

Technical Note 1

$$L = \log\left(\frac{1}{n}\sum_{i=1}^{n} y_i - \frac{1}{n}\sum_{i=1}^{n}\log y_i\right)$$

where: n = number of countries
y_i = income of the country i (GDP er capita)

If we would like to divide our total sample into subgroups, then the total inequality is the sum of the weighted inequalities within groups:

$$L = \sum_{i=1}^{m} w_i L_i + \sum_{i=1}^{m} w_i \log(w_i / v_i)$$

where: i = subgroup (i = 1.....m)
w_i = weigh of the group: number of countries in the subgroup i as a share of the total sample
L_i = inequality between countries in the subgroup i
v_i = income weighting: income of the subgroup i in relation to the income of the total sample.

values and thus allows us to evaluate the general pattern. We employ in Table 2 therefore the mean logarithmic deviation (L) described in Technical Note 1.

In summarizing the results over the period 1980 to 1997, Table 2 lists the growth rates of this inequality measure for 103 countries. The first entry relates to national per capita incomes converted at international exchange rates and the second to purchasing power parity (ppp)- corrected income data from the same World Bank source.

Table 2 tells us that inequality between the 103 countries was in fact increasing from 1980 to 1997. This increase in the inequality measure for income is quite dramatic when we analyze the income data *not* corrected for ppp. The non-corrected data indicates an increase of 43% during the whole period from 1980 to 1997. Considering ppp-corrected figures we still find a substantial increase in inequality of more than 20% between 1980 and 1997. This considerable difference between the movement of the two measures of income may in part explain why earlier findings for ppp-corrected data came to different conclusions (see below).

Table 2 – Change in world inequality – 103 countries and groups of countries*

	1980–1989	1990–1997	1980–1997
Percent growth in inequality (L) between 103 countries*			
income p.c.**	25.6%	10.9%	43.4%
income p.c. ppp	10.5%	7.1%	20.1%
Percent growth in inequality (L) between five country groupings***			
income p.c.**	35.9%	7.8%	49.6%
income p.c. ppp	15.4%	7.0%	23.9%

* Inequality is measured by mean logarithmic deviation (L)

** The first entry relates to real income per capita, the second to purchasing power corrected (ppp) figures

*** The five country groupings are: OECD (21), East Asia (9), subsaharan Africa (32), North Africa (4), Latin America (25)

Source: World Bank, *World Development Indicators, 1999*, on CD-ROM

But we find also a substantial increase in inequality for the corrected income data.

Splitting the whole period in two subperiods, *i.e.*, 1980–89 and 1990 to 1997, reveals that the increase in inequality was greater in the 1980s than in the 1990s. But we hesitate to make an issue out of this since the years after 1997 when the Asian crisis became manifest are not covered by the data.

Furthermore, we did additional analyses not reported in the summarizing Table 2. These relate to different regional groupings—inequality within and between groups. The findings are the following:

- Among the 21 OECD countries in the sample we observe the smallest inequality in income and a trend toward diminishing inequality over time in this group. Thus the OECD world is *converging* with regard to income per capita.
- The largest differences in income is found in the sample of 9 East Asian countries and this inequality is increasing over time implying a *divergence* in this subgroup.
- The sub-Saharan African countries (N=32) differ considerably in income inequality and these differences are again increasing over time (*divergence*).

Table 3 – Test of robustness of the increase in inequality in average income levels with regard to different population sizes

Variance of log naturalis of income per capita (ppp)	1980	1989	1997	% change 1980-97
All cases N=103	1.01	1.11	1.28	26.7%
Without China N=102	1.00	1.11	1.29	29.0%
Without China and India N=101	0.99	1.11	1.29	30.3%
Without 28 countries below 5 million population N=75	1.21	1.31	1.48	22.3%
In addition without China and India N=73	1.18	1.32	1.50	27.1%

- Latin American societies (N=25) show an inequality among themselves that is in between the mentioned extremes of the OECD world and East Asia and this status is rather stable over time.

The graph from part of the information in Table 2 presents the movement of our inequality measure (L) characterizing 103 countries with yearly observations between 1980 and 1997 (see Appendix).We use only the ppp-corrected values for income in that graphic demonstration since only the increase in ppp-corrected income inequality between countries is under dispute in the literature. We find a clear and almost monotonic increase in inequality between countries, covering both more recent years as well as earlier studies.

The increase of inequality in average income per capita (ppp-corrected) that we find between 1980 and 1997 for our full sample of 103 countries does not necessarily tell us whether this increase in inequality was affecting the majority of world population since the differences in population size between these 103 countries are immense. In order to find out whether the majority of the world population was affected by the increase in income inequality between the 103 countries we performed additional tests reported in Table 3.

Significant cases like China and India which represent about one-third of the world population may affect the overall result. But removing these two cases from the sample leaves the overall result almost unchanged (see Table 3).

The many small countries which represent only a tiny fraction of the world population may be responsible for the result. Excluding the very small countries with a population below 5 million from the sample removes only about 100 million population from the sample but 28 of the 103 countries. In the 75 remaining countries inequality is higher but the increase over time is similar to that in the full sample of 103 countries (see Table 3).

In addition, removing the extremely populated countries of China and India also results in a sample of 73 countries which excludes all the mentioned extremes. Again, the level of inequality between these more comparable countries is higher but the increase over time is very similar (see Table 3). Therefore, the increase of average level of income inequality between countries is rather robust and affects the majority of the world population.

The conclusion from our additional analysis is obvious and helps to settle the mentioned questions left from previous research. If we put all available evidence together, we have to conclude that incomes since 1972 into the 1990s have become more unequally distributed within countries and between countries. How can we explain this? This will be the topic of Section Two.

SECTION TWO

The major reasons for increasing inequality since the 1970s

We propose an explanation that combines a multiplicity of factors. The single propositions are:

(1) Transnational economic integration and national disintegration
(2) More economic openness in the world economy and deregulation
(3) The shift from the old technological style to the new technological style of the telematics era
(4) The shift from peripherization to marginalization in parts of the world system
(5) The shift in the alliance of organizational elites from stakeholder to shareholder orientation
(6) Increasing capital income derived from world stock markets changing the functional distribution of income in favor of capital income

(7) The increased importance of continuing education increasing the inequality in the distribution of qualifications
(8) Pacts between capital and labor tending to shift from collective to intrafirm bargaining

Details on the Propositions and First Empirical Evaluations

(1) The role of transnational economic integration and national disintegration

This argument is old and was first spelled out by Osvaldo Sunkel (1970) and applied to the system of transnational corporations by Stephen Hymer (1972). It was further developed by the extensive research on transnational corporations since the middle of the 1970s.

The empirical work of Bornschier, Chase-Dunn and others always found a positive relationship between the degree of foreign capital penetration (by transnational corporations) and income inequality in non-core countries (Chase-Dunn 1975, Bornschier and Ballmer-Cao 1979, Bornschier 1983, Bornschier and Chase-Dunn 1985). Recent research by Alderson and Nielsen (1999) consolidated this earlier finding for a wide range of 488 observations over the whole postwar era.

Given that this relationship between transnational economic integration and national disintegration has manifested in greater income inequality, we can predict an increase in inequality if the system of transnational corporations (TNCs) increases its weight in the world economy. There is a lot of evidence that TNCs have become increasingly important in the world economy since the 1970s. The world stocks of foreign direct investment in relation to world product (percent) was 4.4 in 1960 and 4.5 in 1975. Until 1991 these figures almost doubled to 8.5 (Bornschier and Chase-Dunn 1999: 295). This increase continues in the 1990s and the figure for 1996 is 10.6. According to the latest World Development Report 2000 (p. 4) this figure for 1999 stands now at 15.9%. "The gross product [value added] of all TNC systems together—that is, including parent firms—was an estimated $8 trillion in 1997, comprising roughly a quarter of the world's gross domestic product (GDP)" (World Investment Report 2000: 3). The weight of the overall TNC system in world production increased by a factor of about 3.5 since the 1970s.

If transnational economic integration via the system of TNCs has increased so notably over the last 25 years, then one might anticipate that income inequality has risen considerably, too—yet only if national policies did not or not fully counteract the inequality-enhancing effect induced by TNC investment. In earlier periods, however, this was not the case for the majority of peripheral and

semiperipheral countries, as Bornschier and Ballmer-Cao (1979) demonstrated with their study. In the era of deregulation and cutting back of state intervention this is unlikely to have happened more than in the 1960s.

Thus we have a first cause for the increase in inequality since the 1970s which is substantiated quite solidly by already accumulated research.

(2) The role of trade

Greater economic openness of the world economy since the 1970s has tended to contribute to factor price equalization, also implying that real wages for skill levels have a tendency to converge across the world under a free trade regime (Thurow 1996: 166ff.). The production of internationally traded products with a considerable low-skill component is therefore difficult to maintain in developed countries unless the real wages for low-skill work go down.

This produces a tendency of decreasing low-skill real wages in developed countries if they open their borders for imports from LDCs and especially from NICs which then compete for industrial production with the old industrial world. Indeed, we find a positive correlation for OECD countries between the share of imports from LDCs and income inequality as evidenced by Gustafsson and Johansson (1999: 592, 595). They use the Gini coefficient as the inequality measure, but we would particularly expect increasing inequality of low incomes *vis-à-vis* the median income.

If governments and/or unions act against the decrease of low-skill real wages by imposing minimum wages, for example, then imports from developing countries are likely to contribute to (temporary) unemployment. Unemployment itself is not related to income inequality (see Gustafsson and Johansson, 1999: 595), since unemployment benefits may compensate the loss of earnings. Losers of North-South trade can thus be compensated in the North.

Against temporary income losses in developed countries stand the gains from North-South trade in parts of the developing world. Yet, the increasing incomes may then contribute to worsening the income distribution due to more pronounced economic dualism. In principle, governments could counteract the deleterious effects of this dualism. We conclude, therefore, that free trade must not inevitably worsen the distribution of incomes across the world. If it does, it is not free trade per se but the unwillingness of governments to compensate from losers—in my view necessary—structural change in the world economy.

(3) The role of technological change

The new technological style (Perez 1983, 1985; Bornschier [1988] 1996) which has been emerging since the 1970s is obviously more knowledge-based as compared to the previous one. It has produced highly productive new lead sectors—telematics and biotechnology. Even if the new style will also reorganize production, distribution and consumption throughout the old economy, it contributes for the time being to a sharp economic dualism between old and new economies.

There are two reasons for a worsening of income distribution in this process: (i) increasing returns on tertiary education and (ii) the sectoral inequality in average income between the old and new economy.

For the U.S., where the new technological style has developed most, we already have indications of increasing returns on tertiary education (Gottschalk 1997: 15). Katz and Murphy (1992) found that the college premium in terms of earnings (as compared to high school) increased between the 1970s and 1980s from 40% to 90%. We did our own analysis on earnings returns to tertiary education covering the years 1979, 1986, 1991, 1994, and 1997 for the United States (using the Luxembourg Income Study data) and found considerable increases over that time span. At the moment we are analyzing other cases, like Switzerland, to find out whether this is indeed a common feature of the push toward the new, more knowledge-based technological style.

For the earnings distribution, the increasing returns on tertiary education means that the high income segments in the distribution are increasingly moving away from median earnings. This has been demonstrated with detailed figures in the literature (see Gottschalk 1997). As compared to the free trade effect we discussed before, the technology factor thus affects quite a different segment of overall income inequality.

But also controlling for education, we expect that technological dualism between the old and the new economy is worsening the distribution of earnings in the aggregate. Again we take the most advanced diffusion of the new economy in the U.S. as an example. The telematics sector there has become a growth engine absorbing about 10 million employees whose average salary is 60% above the average for the whole private sector. Turnover per employed person in the U.S. Internet sector (with 2.3 million employees in 1999) was $250,000 as compared to $160,000 in the automobile sector, the growth engine of the previous technological style (see www.internetindicators.com). Another piece of evidence comes from California where telematics and biotechnology have become the largest economic sectors by far in terms of employees whose average salary is between 85% and 105% above that of the California average (NZZ no. 128, June 3/4, 2000).

The gap in productivity and thus average salaries between the old and the new technological sectors is therefore a strong force increasing earnings inequalities. This can be demonstrated by two sector models which, in the course of transition, predict increasing inequality.

Table 4 – Evidence for divergence in Internet usage diffusion in the world*

Log Internet diffusion; variance of Logs are displayed			
	N=70	N=36	N=21
July 1997	0.88	0.71	0.144
Jan. 1999	1.02	0.75	0.129

* Internet hosts per 10,000 population

N=21 Subsample of rich countries.

N=36 Subsample of rich countries enlarged by NICs (with 4 large developing countries, in terms of population).

N=70 sample which includes, in addition, 34 peripheral countries, randomly selected
Note: this analysis does not include transformation countries.

Source: Volker Bornschier, computed on the basis of data from World Development Reports of the World Bank

Up to now the diffusion of the new technological style has been very uneven around the world—even if we look only at rich countries (see Bornschier 2000). And this is likely to be one of the major reasons for differences in the increase in income inequality if we compare countries. Governments frequently push the development of the new economic sectors and therefore accept increasing inequality.

Moreover, the new technological style is very unevenly diffused comparing the core, the semiperiphery, and the periphery of the world economy. Table 4 demonstrates the divergence in the world by taking the Internet hosts per 10,000 population as an indicator. Except for the rich countries where we observe a slight convergence in Internet usage, divergence (increase in variance of logs) is obvious over the 1997 to 1999 period.

Thus the shift from the old to the new technological style as a basis of economic development worsens the income distribution within core countries and increases—other things being equal—the income gap between the developed and the underdeveloped world, becoming more pronounced for the periphery and somewhat less for the semiperiphery.

(4) From peripherization to marginalization

The development of the world economy away from the previous importance of agricultural and mineral raw materials toward knowledge-based industry and services marginalizes the typical peripheral country. Though peripheral countries have a subordinate role in world production, they nevertheless were functionally important for the world economy as a whole. Previous export specialties of the Third World, however, increasingly lost ground due to substitution of

natural products through modern agriculture and biotechnology at the core. Thus productive capacities in peripheral countries became obsolete and increasing portions of the economically active population became marginalized. This long lasting trend started before it was accentuated through the new technological style towards information society with its diminishing strategic value of raw materials.

Elites in peripheral countries as well as international organizations like the World Bank did little to counteract the long foreseeable trend towards marginalization. Actually, World Bank advisors for a long time recommended specialization according to natural advantage. This was bad advice since it hindered LCDs' ability to adapt early and continuously to the change of the world economy towards knowledge-based economic activities. Various segments of LCDs therefore became increasingly marginalized.

What is the evidence for this proposition? In 1990 peripheral countries in the world economy (without oil exporting OPEC countries and without NICs) had a share of 39% in world population but only of 7% in world trade (exports). The situation was, however, not always like this. In 1950 the share of these countries in world trade was still 19%, dropping to 12% in 1960 and to 9% in 1970. Since 1970 it dwindled once again to about 7%. This is only the information on the aggregate of the periphery, and so the loss of importance in world trade may be even more pronounced for many individual LDCs.

At the same time the available empirical evidence from cross-national studies shows that foreign trade as a share of overall economic activity has a very significant positive effect on economic growth (see, for example, Bornschier and Chase-Dunn 1985: 95). If the share in world trade of a group is going down this implies that they take less advantage of the income-generating contribution of world exports and thus—all other things being equal—fall back with regard to average income. This is likely to have contributed to income polarization in the world system.

(5) Shift in alliance of organizational elites from stakeholder to shareholder orientation

Already in the Keynesian era (1930s-1970s) the development of big business witnessed a separation of ownership from control. But top managers being effectively in control of many of the leading corporations typically tended to favor a corporatist alliance with their staff resulting in higher labor incomes in relation to capital incomes and in a lower differential between the income of Chief Executive Officers (CEO) in the corporation and their rank and file employees.

While—in international comparison—there have always been remarkable differences in the income of CEOs *vis-à-vis* their rank and file employees (Kerbo

1996, Braun 1997, Bornschier 1976: 305 ff.) capitalist development since the 1980s is thought of as having favored a general shift from the stakeholder to the shareholder orientation of corporatist elites. It is unclear what the deeper reasons of such a shift are. Is it the new ideology of shareholder capitalism itself which favors the higher incomes of CEOs and top segments of management at the expense of rank and file employees? Or is the shift in orientation of CEOs backed by structural factors: (i) the lower threatening power of organized labor due to decreasing unionization and the increasing fragmentation of labor, (ii) the end of the challenge to capitalism posed by the "counter-core" of state socialism, or (iii) the growing importance of institutional investors?

In any case, the improved income position of CEOs and higher segments of the management *vis-à-vis* their rank and file employees is not only favoring the organizational elite but also shareholders whose short-term profits would be lower in case of more proportionate salary increases for *all* employees.

We have little comparative evidence of what the impact of shareholder value orientation on income differentials in organizations are. Let me therefore point only to a telling example. In the Swiss banking sector (being almost exclusively dominated by big business) the salaries of the rank and file employees (about 85% of the employment in the sector) increased over the first half of the 1990s only by 5% (net of inflation) while the small top segment of high ranking employees was able to double its revenues over the same period (CASH 1996, no. 10, March 8, p. 11).

If such a shift goes on over a longer time and if it is not specific to certain sectors or countries, it is clear that this will change the income distribution in the upper segment of Western societies quite remarkably. We need more research to evaluate this factor.

(6) Capital gains at the world stock markets changed the functional distribution of income in favor of capital income

The considerable capital gains in world stock markets since the 1980s until March 2000 seem to be historically unique. While they may have contributed to considerable new wealth and to a redistribution of wealth among capitalists, the impact on income distribution is little understood.

In principle, capital gains of a certain period are part of income of the same period. This is, for example, evident in the recent discussion of the impact of stock market gains on consumption in the U.S.. But since taxing policies differ across countries (Switzerland—in contrast to the U.S.—does not tax capital gains) most of this impact does not seem to be (fully) included in official cross-national figures on income distribution.

Capital gains of such an extent and over such a long period as in the past 15 to 20 years alter the distribution of functional components of income distribution in quite a substantial way. Let me again point to an example. Since 1991 the value of the stocks quoted at the Swiss stock exchange quadrupled to reach a sum of 878 billion Swiss francs in 1997. Over this period shareowners increased their wealth considerably (more than 270%). The stock market "income" (increase in wealth per annum) is said to have overtaken by far all labor incomes in Switzerland for the year 1997 (SonntagsZeitung, December 13, 1998, p. 77). Since stock ownership is by far much more unequally distributed than income, the effective overall income distribution has worsened at the hands of this substantial increase in stock valuation. One has to add again, however, that not all of this is actually represented in income distribution figures since capital gains are taxed differently. While such capital gains (whether realized or not) are an element of income they do not seem to be fully included in income distribution figures. Therefore, the actual increase in income inequality over the long stock market boom may even have been much more substantial than the available figures tell us.

(7) The increased importance of continuing education increased the inequality in the distribution of qualifications

Continuing education and training is a phenomenon indicating a new wave of educational expansion in Western society since the 1980s (Bornschier 1996: 241 ff.). Education after school and on the job is thought of as contributing to the qualification and requalification of the labor force, especially in developed countries.

Yet, there is a special feature to this continuing education that we know from empirical research. Those persons with already comfortable formal education especially tend to take advantage of continuing education. In terms of the distribution of qualifiations the 'Matthew principle' plays: those who have will be given. Thus the factual distribution of qualifications in society may become much more unequal than the formal qualification figures are suggesting. While historically, compulsory education and its prolongation over time counteracted the trend towards inequality in formal education, a similar brake does not work for continuing education. Therefore, we may propose that the distribution of earnings has become more unequal over the last quarter of a century because the actual qualifications in the labor force have become more unequal due to continuing education and training.

(8) The bargains between capital and labor tended to shift from collective to intrafirm bargaining

More coordination among unions throughout the economy in wage bargaining reduces the wage differences across branches in the economy and across size classes of firms within branches. However, if unions bargain over wages primarily at the level of firms or establishments, the wage differentials across branches and size classes within branches are larger (Bornschier 1976: 302 ff., especially 307 ff.).

Collective wage agreements since the 1980s and 1990s have increasingly come under pressure, including in neocorporatist systems of the OECD world. This is very likely to contribute to more unequal distribution of earnings within economies. Wage bargains increasingly take place at the level of the firm or establishment—what has long since been the predominant pattern in the U.S. and Japan—and thus contribute to a more pronounced tendency to distribute wages according to productivity, dependent on the sector and size of firms.

While firms seem always to have preferred wage bargains at the level of firms, the pervasive unionization of labor enforced collective bargaining, especially in most European countries and thus reduced overall wage inequality. Yet, decreasing levels of unionization in the OECD world changed the pattern. It is difficult to attribute the loss of labor strength to a single factor, but the absolute level of income and individualization seem to be a fruitful starting point to explain decreasing levels of unionization.

If our proposition is correct, the degree of unionization should have an impact on differences in earnings differences and thus overall income inequality. Indeed, we have strong empirical evidence for this. Gustafsson and Johansson (1999: 595) show a strong relationship between strength of unionization and income inequality in OECD countries. An earlier finding for a sample of countries point to the same link. Bornschier and Ballmer-Cao (1979) find that—other things being equal—income inequality in a cross section of 72 countries inversely varies with the threatening power of labor. Where effective labor organization with proven ability to act is strong, inequality of incomes turned out to be lower.

Prospects for the Future Development of Inequality

The first two propositions to explain the increasing inequality in the last quarter of the 20th century point to factors political actors could counteract, at least in principle. Neither transnational economic integration nor freer trade must inevitably result in increasing inequality, at least not to the considerable degree now prevailing.

More inevitable, in principle, is the worsening of income distribution in the course of the first phase of the diffusion of the new technological style. This is relevant for core countries as well as for the periphery.

Core countries

The famous Kuznets thesis for the development of inequality over the economic history of core countries implied an inverted U-shape form for the inequality in the transition from agriculture to industry (Bornschier 1983). Actually, core countries have to a different degree started to enter a new kind of transition, this time from the old industry of the mass production era to the knowledge-based new economy. If this is a correct description, inequality should have started to increase for some, while further increasing levels of average productivity it should decrease inequality. Indeed, this is the pattern Gustafsson and Johansson (1999: 592) have found in their panel observations for 16 OECD countries over the last two and a half decades. Since the transition as well as the level of productivity is still very uneven in this group we find parts of two inverted U-shape curves present in the overall pattern which thus can actually be described as a U—not an inverted U.

Political action to shorten the transition by speeding up the structural change with policy measures implies to some extent accepting earlier a higher level of inequality, albeit for a shorter overall period. There thus seems to be a trade-off involved.

At the periphery

The change of technology in the economy will most probably foster marginalization at the periphery, much more than at the semiperiphery. Looking at the development of labor productivity between 1960 and 1990 for a world sample (Temple 1999: 117) it is obvious that for quite a large group of countries not convergence but divergence in average levels of income was the destiny up to 1990 and will be beyond. Given the experiences of the postwar era it is hard to imagine that national political responses will be sufficient to counteract polarization. To prevent increasing marginalization in the world is thus the task for the world political community.

The first four propositions then suggest either that political action in principle could counteract aggravating inequality or that the technology factor will be transitory in its impact, albeit active for quite a long time still ahead. The last four propositions suggest rather that despite possible equalizing political responses and the end of the diffusion of the new technological style, the world is likely to stabilize at higher levels of inequality as compared with the ones that characterized the first four postwar decades.

Quite obviously further research is necessary on such a broad and complicated topic. We have modestly made a step in this direciton by presenting fresh empirical evidence and a series of possible explanations.

APPENDIX

Table A1 – The development of per capita income in two growth periods after WWII*

	GDP per capita** 1950	Upswing*** % p.a. 1950-73	GDP per capita** 1973	Downswing*** % p.a. 1973-92	GDP per capita** 1992
World (199)	2.138	2.9	4.123	1.2	5.145
U.S., Canada, Australia and New Zealand (4)	5.126	3.9	12.289	1.8	17.387
West Europe (23)	2.021	4.9	6.015	1.7	8.287
South Europe (7)	2.487	2.5	4.387	0.5	4.820
Latin America (44)	2.631	3.5	5.745	–1.1	4.665
Asia+Oceania (56)	765	3.8	1.801	3.2	3.252
Africa (56)	830	2.0	1.311	–0.1	1.284
Variance of ln (log. natural.)	0.81		0.74		0.94
Coefficient of variation		0.60		1.34	

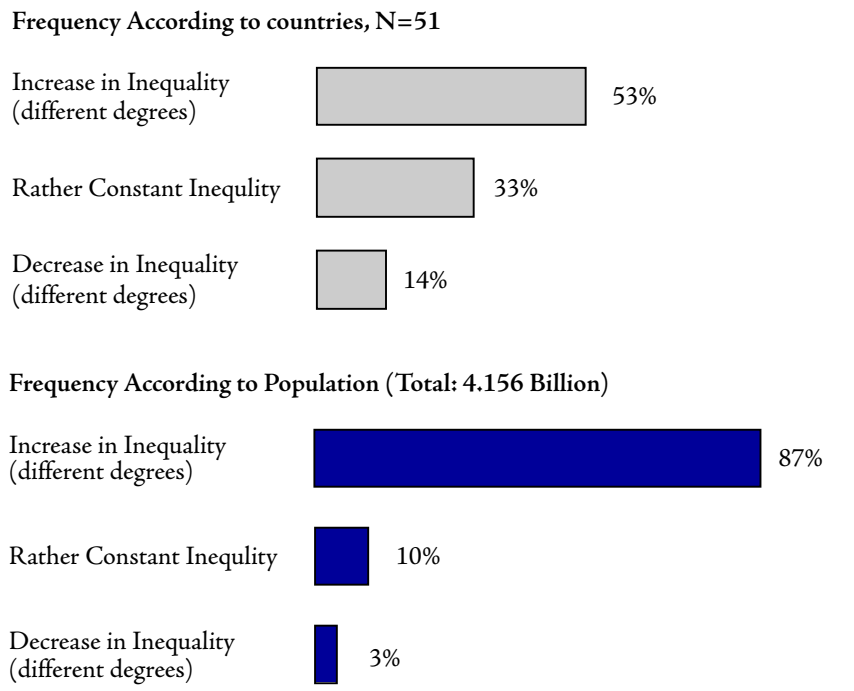
* Average for the world and for regions (in brackets the number of countries)

** Gross domestic product per capita, corrected for purchasing power parities (in 1990 Geary-Khamis Dollars).

*** Growth rate: "average compoand growth rate."

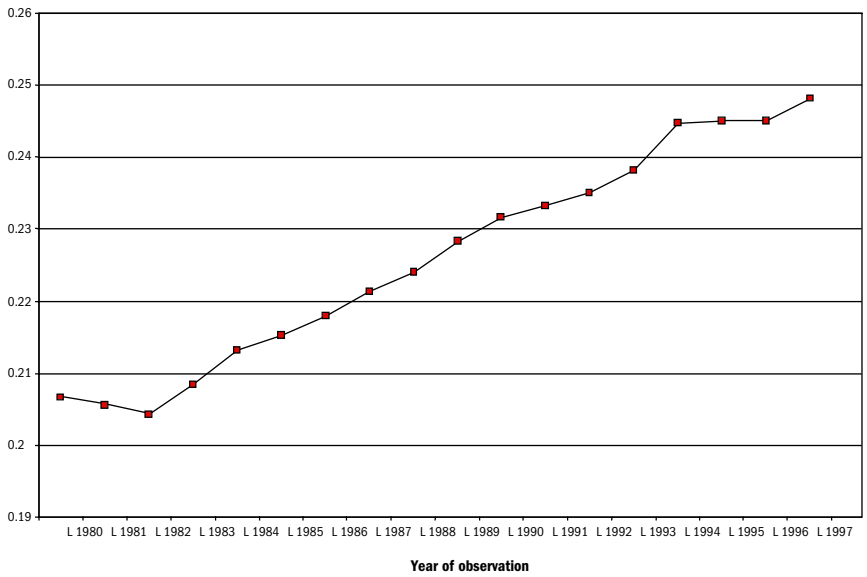
Source: Angus Maddison, *Monitoring the World Economy* 1820–1992, Paris: OECD, 1995: 60, 228.

Graph to Table 1 – Summary of the Change in National Income Distributions in the 1970s, 1980s, and early 1990s



Source: Volker Bornschier, own classification according to World Bank Data (Deninger & Squire 1996)

Graph Addition to Table 2: Income per capita (PPP-corrected) inequality for 103 countries Mean logarithmic deviation (L) is the measure of inequality



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ABSTRACT

Most studies consider the trends of income inequality between nations and between individuals within nations separately. In this paper, we analyze between-nation and within-nation inequality together. We find that income inequality both within and between nations has been increasing over time. Furthermore, we show that the rate of change for both are synchronous. We speculate that this synchronicity is due to the formation of a global class system. We also find evidence that these inequalities can move in opposite directions—during the only period the global income gap declines, inequality within non-core countries reaches its peak. We conclude by hypothesizing that the observed convergence might result from global opposition (i.e., increasing global inequality between nations) producing national cohesion, causing the observed lessening of income inequality scores within non-core countries.

Global and National Inequality: Are They Connected?

Albert J. Bergesen
Michelle Bata

Inequalities between individuals (within social systems) and between nations (within the world-system) seem to be the principal components of global inequality. They are, though, very rarely considered together. Income inequality has been explained in terms of economic growth (Kuznets 1955, Deininger and Squire 1996), demographic change (Gustafsson and Johansson 1999, Crenshaw et al. 1997, Nielsen 1994, Kuznets 1955), political democracy (Bollen and Jackman 1985) and sector dualism (Alderson and Nielsen 1999, Nielsen 1994), while others suggest it is influenced by foreign capital penetration and trade (Alderson and Nielsen 1999, Dixon and Boswell 1996, Firebaugh 1996). For a summary of this research see Table 1.

On the other hand, research on the global gap between rich and poor countries has been primarily concerned with identifying the gap and debating whether between-nation inequality is likely to converge (Summers et al. 1981, Berry et al. 1983, Firebaugh 1999) or diverge (Passè-Smith 1993, Korzeniewicz and Moran 1997). In all this research though, little attention has been given to the question of whether the gap between nations is correlated with, or has an effect upon, the gap between individuals within those countries. On their own, questions of national income inequality and the global gap are obviously important, but what we would like to focus upon here is the possible interrelationship between these two aspects of global inequality.

Albert J. Bergesen
University of Arizona
Department of Sociology
Social Science Building, Room 400
Tucson, AZ 85721
albert@email.arizona.edu

Michelle Bata
University of Arizona
Department of Sociology
Social Science Building, Room 400
Tucson, AZ 85721
bata@u.arizona.edu

http://w3fp.arizona.edu/soc/default.asp

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Table 1 – Summary of Inequality Research

Authors	Year of Study	Time Frame	Sample Size (countries)	Inequality Measure	*Key Variables*
Within-Nation Inequality					
Nielsen	1994	c. 1970	56	Gini and income share of top quintile	secondary school enrollment (–) rate of population increase (+) sector dualism (+) % labor force in agriculture (–)
Alderson and Nielsen	1999	1967–1994	88	Gini	secondary school enrollment (–) rate of population increase (+) sector dualism (+) % labor force in agriculture (–) foreign investment stock (+) foreign investment rate (–) Marxist/Leninist regime (–)
Gustafsson and Johansson	1999	1966–1994	16	Gini	GDP/pc (–) % labor force in industry (–) imports (+) public consumption (–) unions (–) youth dependency (–)
Between-Nation Inequality					*Trend*
Summers et al.	1981	1950–1975	106	Gini	convergence
Berry et al.	1983	1950–1977	124	Gini, Theil	convergence
Firebaugh	1999	1960–1989	120	Gini, adjusted for PPP and weighted by population size	convergence/no change
Passe-Smith	1998	1960–1993	112	Growth rates, gap analysis	divergence
Korzeniewicz and Moran	1997	1965–1992	121	Gini, Theil	divergence

We begin with the observation that these inequality processes operate within two different social systems—one national and one international—and that the theoretical dynamics driving these two dimensions of global inequality may not be the same. The most well understood dynamics are the national ones, being the object of stratification theory from classical economics through Marx and Weber

to present empirical research. From differences in human capital to modes of production, class and status relations, a rich literature has arisen to account for domestic disparities in wealth and income. The idea of class, as aggregates of national income levels, or functionally defined economic positions (owning/controlling the means of production) has been theorized to operate within a larger holism of societal, or mode of production, dynamics, where different economic systems have been hypothesized to generate different class systems and resultant inequalities. But when it comes to such class-like categories for the world-system, theory is much less developed. As such, there is less of a sense of how a world-system would function as a social system replete with global inequalities generated by the holistic dynamics of the world economy. This is due, in good part, to the fact that the prevailing model of the world-system is in Smithian terms as a global division of labor (Wallerstein 1974) and while exchanges between core and peripheral zones are thought to be unequal, thereby disadvantaging developing countries, there are as yet no serious ideas about such globally holistic entities as global classes or a global mode of production. As a result, hypotheses about global stratification in the sense of relations between global classes do not exist and most of the research that has been done is largely descriptive. This is important, of course, but now that a body of literature and data sets on inequalities within and between countries are available, we can turn our attention to more complex hypotheses about how inequality within and between might be causally interconnected.

THE TWO INEQUALITIES

We begin with the assumption that the gap between persons within countries and the gap between countries themselves may have separate logics such that a widening gap within nations may not be correlated with a widening gap between nations. For example, one can imagine an egalitarian world-system where inequality between countries or zones of countries, like the core and periphery, would be low, while at the same time they could vary in terms of how that wealth is distributed. Therefore, there could be (1) high degrees of international and national inequality: great distances between countries and between persons within those countries. The opposite of this would be (2) a global condition of low inequality between countries and persons. This would represent the idealized condition of a more egalitarian world order. There is also (3) the possibility of high inequality between countries accompanied by low inequality between individuals within those countries, and the opposite condition: (4) low inequality between countries and high inequality between persons. These possibilities raise the question of whether such inequalities systematically co-vary

Table 2 – Data Summary

Description of the Variable	Measurement	Data Source
Within-nation Income Inequality	Gini Coefficient	Deininger and Squire, 1998
Between-nation Income Inequality	Absolute Gap of GDP/pc Between Core and Non-Core Countries (Core GDP – Non-Core GDP)	Summers and Heston, 1991

Sample (n=72)

Core:
Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States

Non-Core:
Algeria, Bahamas, Bangladesh, Barbados, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Czech Republic, Dominican Republic, Egypt, El Salvador, Gabon, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Korea, Malaysia, Mauritius, Mexico, Morocco, Nigeria, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Puerto Rico, Romania, Seychelles, Singapore, Sri Lanka, Tanzania, Thailand, Tunisia, Turkey, Venezuela, Yugoslavia, Zambia

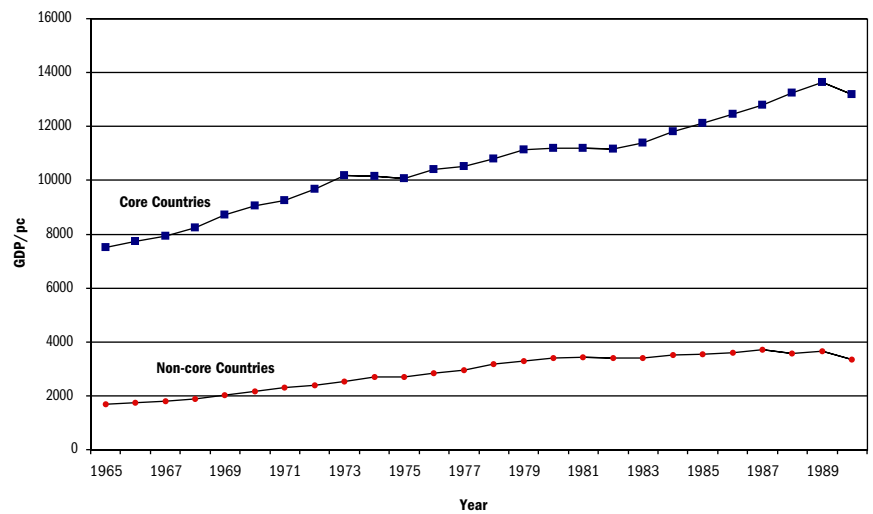
and, more interesting, whether one of these gaps or inequalities might have a determinate affect upon the other. We will consider each of these issues separately. To do this we turn to some data on the co-variation of the global gap and income inequality.

DATA AND ANALYSIS

To examine the relationship between the international gap and national inequality we created a data set of 72 countries from 1965 to 1990. The first variable, which we refer to as the global gap, is created by taking the absolute difference between the GDP/pc for core and non-core nations (see Table 2). The second variable, which we refer to as the national gap, are Gini coefficients measuring national income inequality, and are taken from Deininger and Squire (1996).

We begin with the simplest question: do the two inequalities move in the same direction? That is, when the gap between countries widens does the gap

Figure 1 – GDP/pc for a Sample of Core and Non-core Countries, 1965-1990 (n=72)



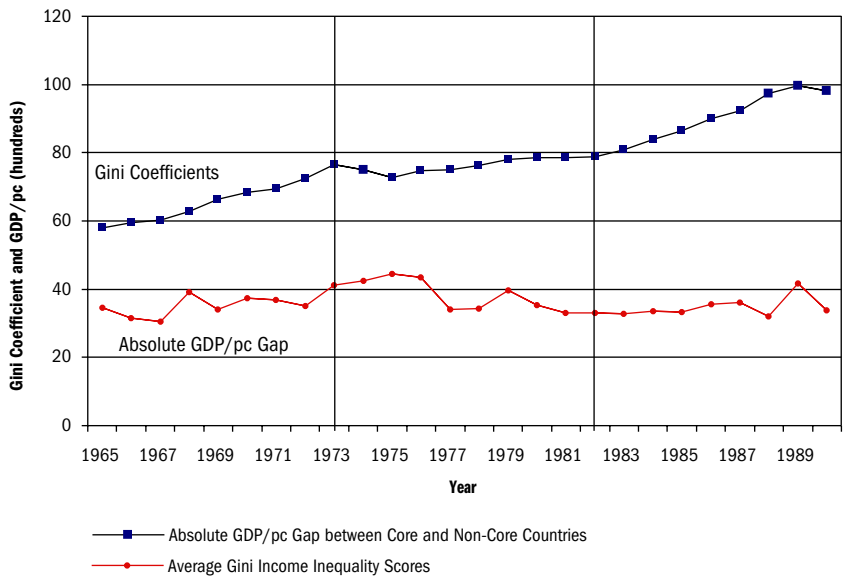
between individuals within those countries also widen, and conversely when the gap between lessens does the inequality within lessen.[1]

Figure 1 shows that between 1965 and 1990 the level of GDP/pc is growing for both core and non-core countries, but the rate is higher for the core, creating a growing global gap, which is plotted in Figure 2. One can see that, in general terms, the global gap between countries falls into three periods in terms of its rate of growth. The first is from 1965 to 1973. Here the gap is growing. During the second period from 1974 to 1982 the rate of growth noticeably slows, and in the final period from 1983 to 1990 the global gap starts to widen again.

Figure 2 also presents data for the average income inequality scores for this same set of countries, and Figure 3 presents data on the rate of growth of both the global gap and national income inequality for these three periods. These data show that the two inequalities move together. When the rate of growth for the

[1] World-system theory, of course, posits a tri-partite division of the world into core, semiperiphery, and periphery, but our interest is in a gap, not a multitude of gaps, and so we only look at the structural inequality between the rich countries of the core and the rest of the world.

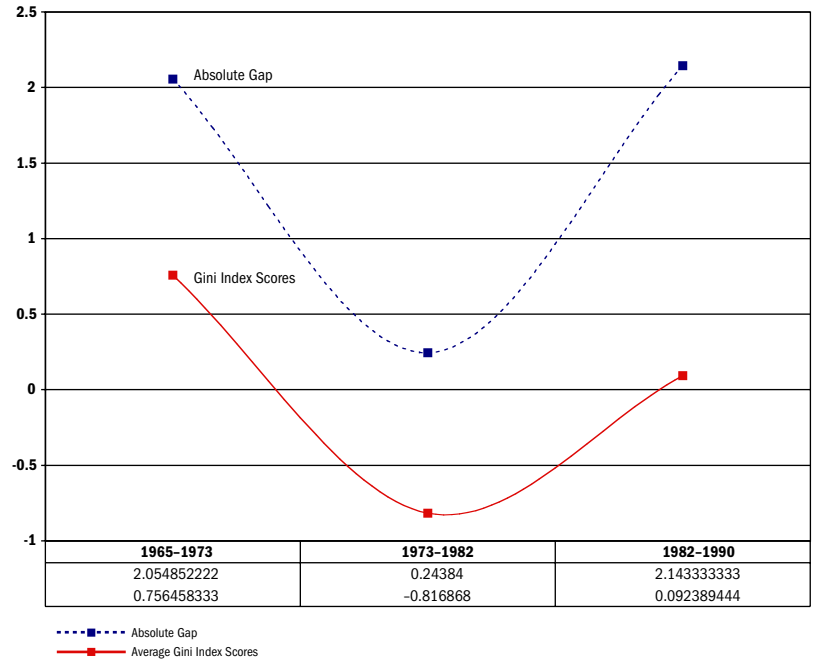
Figure 2 – The Absolute GDP/pc Gap and Average Gini Income Inequality Scores, 1965–1990 (=72)



global gap increases so does national income inequality; when the global gap declines in its rate of growth income inequality actually becomes negative. Stated otherwise, when the gap between core and non-core countries widens the gap between people widens, and when the rate of growth of gap between these countries slows so does the rate of national inequalities slow down. Therefore this preliminary data analysis supports the hypothesis that the two inequalities move together in the same direction and provides the first evidence we know of that the two components of global inequality systematically co-vary.

These findings support something like an "expanding universe" model: when categories of countries move apart, individuals move apart; when those countries are closer, individuals are closer. Income inequality measures are of dispersions while the global gap is about the distance between specific groups, categories, or classes of countries. One could compute a global Gini index (with countries rather than individuals as the unit of analysis) that would show the relative dispersion of all countries but this might not capture the more sociological notion of "class" which entails ideas about functional relations between groups of individuals, or if the term were to be applied to the world-system, between groups of whole countries.

Figure 3 – Rate of Change for Global and National Inequalities, 1965-1990 (n=72)



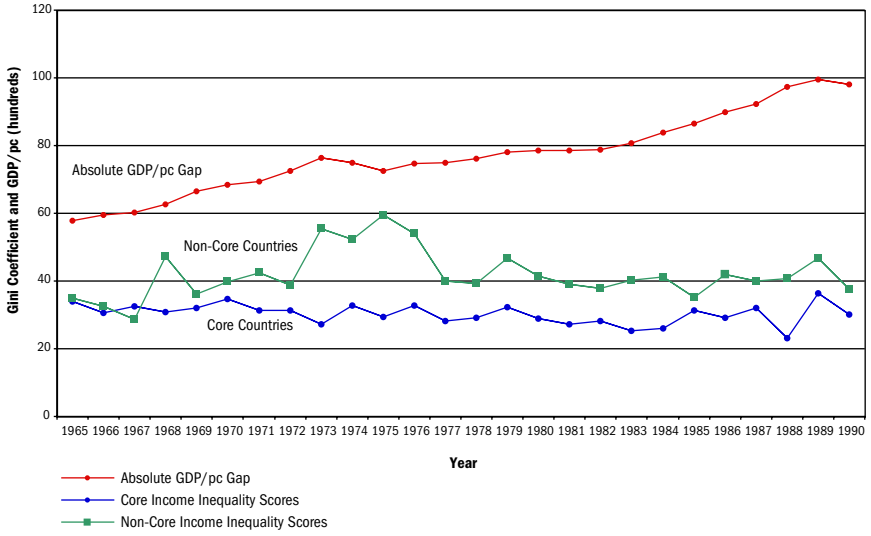
1965–1973	1973–1982	1982–1990
2.054852222	0.24384	2.143333333
0.756458333	-0.816868	0.092389444

This idea of something like global class analysis can mean different things. The internationalization of capitalism has led some to inquire as to whether the capitalist class is transnational in character and given the national rootedness of labor and the trans-national mobility of global capital, whether such globalized capital has an advantage over labor in today's world economy. This is probably the prevalent view of globalizing capitalism, but there is another perspective on class on a global scale that we want to explore here in light of some of our data that there are actually periods when the global and national gaps move in opposite directions.

CAN GLOBAL INEQUALITY PRODUCE NATIONAL EQUALITY?

Within this larger trend of co-variation there is some evidence of inequalities moving in opposite directions for non-core countries. That is, when the global gap narrows income inequality scores increase. This can be seen in Figure 4, which presents average income inequality scores decomposed for our sample of core and non-core countries. Over this whole period the global gap only reverses

Figure 4 –The Absolute Gap versus Average Gini Index Scores for Core and Non-core Nations, 1965-1990 (n=72)



itself for more than one year in the early 1970s. Interestingly, this is also the time when income inequality in non-core countries reaches its highest point (see Figure 4). We caution that the number of years here is small and these relationships may be spurious. Nonetheless, it is the case that from 1965 through 1990 the global gap only decreased for more than one year during one period of time and that was precisely the time that domestic inequality for non-core countries had a sustained spike and reached its high point.

What we would like to do now is to use this evidence–qualified as it is–to speculate a little upon what sort of globological dynamics might be producing this effect. We begin with the observation that income inequality research remains bound within a national framework. When speaking of "global" or "international" inequality the reference is to an average degree of income inequality across countries. In this sense global inequality is not about something like a global gap between whole sectors of the world system as if they were something like global social classes. Studies of the global gap are not considered in globological terms either, nor is the gap's possible effect upon income inequality studied. Each research tradition studies inequality as a separate entity.

One would hope that world-system theory would offer propositions linking the global gap to national inequalities, and to the extent that dependency relations have effects upon income inequality, then the global should be considered

an independent variable with which to predict income inequality rates. But theoretically, world-system theory does not entertain notions of distinctly collective entities like social classes at the world level in good part because it remains mired in the aggregated individualism of the core-periphery division of labor model which is devoid of such structural entities (Brenner 1977).

The emergence of ideas about class structure at the global level may be on the horizon, though, as world-system theory seems to be widening its frame of reference. First, the origin of patterns of inter-societal networks, or world-systems, is being located further and further back in human history (Abu-Lughod 1989, Chase-Dunn and Hall 1997, Frank 1998) and second theory is inching toward a post-sociological framework to conceptualize world historical dynamics (Frank 1998, Bergesen 1995c). Here the growing suspicion is that the traditional stages of development from hunter-gatherer through slavery and feudalism to capitalism represents a Euro-centric reading of world history which masks the larger dynamics of the world-system as a collective whole which now appears to have much more structural constancy over time than initially thought.

Rooting global interconnectedness back in time has been easier than identifying the structures that characterize the global totality as a collective formation. But if there is a singularity of historical continuity then there may also be a singularity of social process. Exactly what such a set of globological structures and processes would look like is still unclear, although at a minimum Frank (1998) strongly suggests that shifting balance of payments structures affects the creation of hegemonic centers across all previously theorized modes of production. While there is probably more global social structure than presently theorized, the precise nature of such global entities as global classes or global modes of production has yet to be clearly identified, and in that regard we would like to re-examine our data in light of a distinctly globological perspective on what might be driving the covariation between the two gaps.

For instance, if we extrapolate traditional sociological reasoning that component structures are usually under the control of a larger encompassing structure, then the inequality of the world-system—as indicated by the gap between core and non-core countries—would seemingly constitute the determinate context for variation in such sub-global structures as patterns of national inequality. The underlying logic here is the classic sociological assumption of the priority of the larger encompassing framework. This idea was captured nicely by Marx, who argued something to the effect that it is not individuals buying and selling that creates capitalism, but capitalism that makes individuals buy and sell. In the case of global inequality the argument would be: it is not inequality between individuals that makes for a global inequality between countries, but global inequality that makes for an inequality between individuals within those countries. The

global system, then, acts as a totality. That is, has collective dynamics that can be considered emergent properties at the global level that are not reducible to national levels of social structuring. The world-system has a life of its own, much like a national economy has dynamics that are independent of those of its constituent firms, labor pools, and sources of capital. In this sense the world-system can be considered a Durkheimian *sui generis* social fact, a functioning social system at the distinctly global level of human structuration. In that regard it probably has its own classes, such as the groupings identified in world-system theory as core, periphery, and semi-periphery.

While present understanding of such a global social system is not as advanced as the theory of societal social systems, we will assume that such a global social system exists, and that its non-reducible global dynamics have determinate effects upon national social systems in analogous ways to how societal social systems have effects upon their institutions, organizations, regions, cities, and neighborhoods. That is, what has been assumed for sociology, that the collective dynamics of the whole directs, influences, or shapes the collective properties of lower levels of social order, is assumed here for the global system, and one lower level of social order would be the national patterns of income inequality we have observed in this research.

The world economy can also be characterized as something like a distinctly global model of production, which is the traditional sociological characterization of an economic system in terms of power, force, and control. This is a way of articulating emergent properties that are more than the aggregated individualism of the neo-classical economic model. In the societal case the role of power and social class enters the picture with the idea that certain segments of the population own/control (a legal, political, or social relation, not a narrowly economic relation) the means of production requiring others to sell their labor for a wage. As a result of introducing such socio-political relations into the earlier consensual model of the free exchange of labor for capital, voluntary exchange relations were replaced by power and class relations in the emerging sociological model of the economic process.

It was also assumed that because of these relationships there was tension and antagonism between the classes. Furthermore, classes were sometimes aware of their collective condition (class consciousness) and were capable of being not just a class in themselves but also a class for themselves, and therefore capable of varying degrees of agentic class action. With this assumption social change was introduced into the more atomistic and mechanical economic model, where the division of labor, now re-cast as the mode of production, was theorized to have properties such as class relations, domination, and hierarchy, which animated action by classes to defend their material interests within the larger economic system.

Finally, it seems reasonable to assume that if such properties as class divisions, class consciousness and class agency exist, there is no reason to believe they are limited to only national economic systems. If the global economy exists as an emergent collective entity with properties of its own, there is no reason why some of the characteristics of economic systems identified at the national level should not also exist at the global level. When this assumption is made then what until now have only been seen as economic zones, or core and non-core areas within the Smithian/Wallersteinian division of labor, can now be re-seen as rudimentary outlines of global classes within something like a global mode of production. As Marx thought sociologically about the Smithian division of labor within countries, so we must now start to think globologically about the Wallersteinian division of labor between countries.

In sum, this speculation about class-like entities at the distinctly world level is the start of a second phase of theoretically modeling the inequality process of the world-system, and it advances on three tracks: (1) the historical push backward identifying earlier and earlier intersocietal connections (Boswell and Chase-Dunn 1999, Frank 1998, Abu-Lughod 1989, Chase-Dunn and Hall 1991, Chase-Dunn and Hall 1997, Sanderson 1995, Chew 2001); (2) the resultant erosion of received Eurocentric theoretical structures from Marx and Weber to Braudel and Wallerstein which had privileged European development over the rest of the world and particularly China (Pomeranz 2000, Frank 1998, Blaut 1993, Wong 1997, Chew 2001, Goody 1996); and (3) the movement toward conceptualizing the singularity of world historical structures and processes (Frank 1998, Bergesen 1990, 1995a, 1995b, 1995c).

HOW THE GLOBAL MIGHT AFFECT THE NATIONAL

Let us suppose there are two stratification systems in which all the world's people are enmeshed. One is national—the classic division of society into classes that we are familiar with since at least Marx, if not before—and the other our postulated global mode of production with core/non-core as the preliminary estimation of global class structure.[2] This, of course, is our two inequalities but put now in class-like terms, where we assume that the dynamics of income inequality reflects aspects of societal stratification and the absolute GDP/pc gap reflects the dynamics of global stratification. We also assume that global dynamics take precedent over societal ones, which means that changes in the global

[2] The place, role, or reality of the world-system theoretic concept of the semi-periphery will be temporarily held in abeyance in this analysis.

stratification system should have noticeable effects upon the societal system.

Therefore, if the absolute global gap is large, it stands to reason that within-societal classes (like capital or labor) would experience their global location in a more pronounced way than if the absolute gap was small. Capital and labor in the non-core, for example would stand closer together in a common zonal opposition to the core in a more polarized world-system. The opposite would also be true. If the global gap were to narrow the unity pressure of global location would lessen allowing intra-societal stratification to predominate. This appears to be what we found in the data for the early 1970s. As Figure 4 shows, income inequality for non-core nations only spikes in a sustained way when the global gap declines. All of this suggests a somewhat counter-intuitive set of dynamics. When the global gap widens the national inequality for non-core countries narrows and when the global gap narrows, national inequality for non-core countries widens. On the surface it would appear as if the two stratification systems are working against each other. The solution to the mystery maybe this: the widening global gap polarizes the international system, such that material interests and class consciousness become increasingly globalized in this condition. This now means one stands in an increasingly objective global position vis-à-vis the other global class as opposed to the social classes within the national formation. This has two consequences. First, one's life fate is objectively dictated less and less by one's national class position and more and more by one's global class position. Being in the non-core matters more and more, and takes precedent over social class positions within the national/societal formation.

The process should work in the other direction as well. As the global gap narrows, the global class system becomes more egalitarian and hence less polarized, and objective global class position become less and less important in structuring individual lives, and therefore local positions ever more important. The great division of the world between haves and have-nots shrinks, and is less and less the key factor structuring local life. And, if it matters less and less what part of the world one is from because all parts of the world are becoming more and more alike, then local class structures and localized polarizations are allowed to matter more and more. The imperative that the expanding global gap creates for national classes and local social groups to stand shoulder to shoulder in common opposition now disappears for it is no longer necessary and as such differences within countries can, and should, rise. One indicator of such local class divisions mattering more would be an increase in income inequality. The old social psychological adage that the greater the external threat the greater the internal cohesion, has an analog here: the greater the global gap (threat) the greater the internal cohesion (decline in income inequality). And, interestingly, this is precisely what appears for non-core countries in Figure 4.

SUMMARY

We started out investigating the global and national trends in income inequality. Upon examining some data, though, it appears as if there are various synchronizations in these two sets of gaps/inequalities. The clearest is the in-synch growing and slowing of global gap/income inequality. But there is also some evidence that these gaps can, under some circumstances, move in opposite directions. The only period of more than one year in which the global gap declines, it turns out, is the only period when national inequality for non-core countries reaches its highest points. We go on to suggest global opposition produces national cohesion, and a lessening of that opposition raises national differences, as seen in the rise in non-core inequality scores, observed only when the global gap lessens.

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