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## The Decline of International Income Inequality? Cross-National Income Convergence Revisited

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**ABSTRACT** Prior research shows global income inequality declined over the last few decades because of a reduction in income disparities *between* countries. However, concerns over the sustainability of this trend have grown with increases in income disparities *within* countries. Yet, despite these contrasting trends, few studies examine the extent to which the latter affects the former. Based on dynamic panel models of 108 countries from 1981 to 2017, we find that the rate of convergence in incomes between countries is moderated by the income inequality within countries. The national incomes of egalitarian countries are converging, while the national incomes of inegalitarian countries are diverging. Overall, this study calls into question the sustainability of decreasing international income inequality amid increasing national income inequality. More importantly, it shows that national redistribution policies are increasingly important in the twenty-first century, not only to reduce income disparities within countries but also to potentially reduce income disparities between countries. **KEYWORDS** Development, Inequality, Income Convergence, Econometrics

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Over the last few decades, a voluminous literature has emerged in the social sciences to explain historical and contemporary trajectories of global income inequality. Global income inequality is broadly composed of two components: inequality *between* countries and inequality *within* countries (Milanovic 2011:8). Prior to the Industrial Revolution of the nineteenth century, income inequality within countries accounted for nearly 80 percent of global income inequality (Bourguignon and Morrison 2002; Milanovic 2011, 2013, 2016). However, the rapid development of Western countries during the nineteenth and twentieth centuries drastically improved average standards of living in these countries, which fundamentally reshaped the composition of global income inequality. In fact, Milanovic (2012) estimates that between the early 1800s and 1950, income disparities between countries increased from a factor of 3.5 to a factor of 20 or more. As a result, income inequality between countries now accounts for nearly 67 percent of global income inequality (Alderson and Pandian 2018; Bourguignon 2015; Clark 2007; Firebaugh 2003; Milanovic 2011, 2016).

The growth in *international* income inequality since the early twentieth century contributed to an increase of global income inequality despite a decrease in *national* income inequality (Alderson and Pandian 2018; Firebaugh 2003; Hung 2021; Hung

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and Kucinskas 2011; Sala-i-Martin 2002). However, international income inequality started to decrease in the late twentieth century with the globalization of production and the rapid industrialization of emerging and developing economies (Bourguignon 2015; Firebaugh 2003; Milanovic 2016). At the same time, these forces contributed to an increase in national income inequality (Ravallion 2014). Yet, despite these contrasting trends, few studies investigate the interplay between national and international income inequality.

This consideration is central to the sociology of development. Early developmental studies in sociology were dedicated to explaining the persistence of international inequality in the twentieth century with reference to the underdevelopment and exploitation of countries in the global South (Bornschiefer and Chase-Dunn 1985; Frank 1971; Wallerstein 1974). However, in the past few decades, scholars have begun to challenge these early studies with evidence of the decline of international inequality in the late twentieth century (Firebaugh 2003; Firebaugh and Goesling 2004; Friedman 1992; Pinkovskiy and Sala-i-Martin 2009, 2014; Quah 1993).

For example, it is estimated that international income inequality decreased by as much as 30 percent between 1980 and 2005 (Hung and Kucinskas 2011:1498) and as much as 17 percent between 2000 and 2014 (Alderson and Pandian 2018:267). However, these studies are based on measuring sigma ( $\sigma$ ) convergence in national incomes—that is, a reduction of cross-national variation in GDP per capita. And this approach is problematic because it obfuscates the processes driving cross-national income convergence and is unable to identify heterogeneity in that convergence (Johnson and Papageorgiou 2020; Plumper and Schneider 2009:998–1001).

This study addresses this empirical gap by using a modeling approach to examine cross-national income convergence. Specifically, we draw on a common methodology in development economics which measures the decline of international inequality with a beta ( $\beta$ ) convergence in national incomes: a negative correlation between GDP per capita and growth (Barro 2015; Barro and Sala-i-Martin 1992; Sala-i-Martin 1996; Young, Higgins, and Levy 2008). Based on neoclassical growth theory, we should expect convergence through faster economic growth in the global South compared to the global North. In fact, some studies show countries are converging at 2 percent per year (Barro 2015; Barro and Sala-i-Martin 1992). However, developing economies in the global South still have the slowest growth in the world economy, which has led most researchers to argue that cross-national income convergence is primarily driven by the rapid growth of emerging economies, especially in East Asia (Bourguignon 2015; Milanovic 2016; World Bank 2023). And estimates of  $\beta$ -convergence are heavily disputed in empirical literature, with a recent review concluding that “there is a broad consensus of no evidence supporting absolute convergence in cross-country per capita incomes—that is poor countries do not seem to be unconditionally catching up to rich ones” (Johnson and Papageorgiou 2020:165).

We contend the lack of unconditional convergence is attributable to national income inequality moderating cross-national income convergence by creating distinct “clubs” of convergence among egalitarian and inegalitarian countries in the world economy. This expectation is consistent with early sociological studies on international inequality which

argued income inequality within countries was a fundamental barrier to economic growth because of underconsumption and underinvestment (Evans and Timberlake 1980; Sullivan 1983). However, contemporary research on the sociology of development has mostly ignored the role of national income inequality in economic growth and the decline of international income inequality. This is surprising because recent developmental studies indicate inequality may hamper economic growth in the global South by reducing the capacity of households to participate in consumer markets (Berg et al. 2018; Elsenhans and Babones 2017; Shen and Zhao 2023).

The present study addresses these gaps in the literature by using an alternative theoretical framework and modeling strategy for  $\beta$ -convergence. Recently, calls have emerged in the literature for a renewed engagement with post-Keynesian and Kaleckian (PKK) economics to understand how development is determined by consumption and class conflict (e.g., Stockhammer 2021). This study draws from PKK theories of growth to understand the extent to which income inequality within countries *conditions* the rate of cross-national income convergence between countries. We argue that cross-national differences in income inequality moderate the rate of cross-national income convergence because of the impact of inequality on consumption. Specifically, we contend that the national incomes of egalitarian countries are converging because less inequality promotes greater consumption, while the national incomes of inegalitarian countries are diverging because greater inequality suppresses consumption.

Drawing on panel data from 108 countries between 1981 and 2017, we find mixed evidence for  $\beta$ -convergence in national incomes. Specifically, we find no evidence of unconditional  $\beta$ -convergence in national income. We do find that the rate of convergence in national income is moderated by the degree of national income inequality. The national incomes of egalitarian countries are converging at 1.5 percent per year, while the national incomes of countries with moderate inequality are not converging, and the national incomes of inegalitarian countries are diverging at about 0.76 percent per year. This indicates that the growth of national income inequality may stall the decline of international income inequality in the coming decades. Therefore, it is imperative for national governments in the global South to enact redistribution and industrial policies to reduce national income inequality and promote faster economic growth.

Overall, this study makes three important contributions to the sociology of development literature. First, this study extends the  $\beta$ -convergence approach to adjudicate the empirical debate over the extent to which the decline of international income inequality is attributable to faster growth in developing countries. This methodology is important for understanding the heterogeneous nature of cross-national income convergence, which has been largely ignored in the empirical literature on international income inequality. Second, this study revitalizes an early theoretical argument in the sociology of development on the effects of national income inequality on economic growth and development. Specifically, it demonstrates the utility of synthesizing perspectives on development from heterodox economics and dependency and world-systems perspectives in sociology. Finally, this study provides evidence on the role of national income inequality in the

cross-national convergence in income. The interplay between national and international income inequality is important for explaining the trajectory of global income inequality in the twenty-first century.

### THE DECLINE OF INTERNATIONAL INEQUALITY?

Prior to the Industrial Revolution of the nineteenth century, global income inequality was primarily driven by income inequality *within* countries rather than inequality *between* countries (Bourguignon 2015; Bourguignon and Morrison 2002; Milanovic 2011). The intensification of colonial exploitation in the global South and the industrial development of Western countries fundamentally changed the composition of global income inequality by creating a substantial income disparity between the West and the rest of the world. And this gap only widened over time, which contributed to the steady increase in global income during most of the twentieth century (Firebaugh 2003; Milanovic 2005, 2016). It is estimated that by the mid-twentieth century international income inequality accounted for 65 to 75 percent of global income inequality (Anand and Segal 2015; Clark 2011; Sala-i-Martin 2006).

Accordingly, most research has focused on explaining income disparities between countries, since this is the largest component of global income inequality (Barro 2015; Korzeniewicz and Moran 1997, 2000, 2009; Firebaugh 1999, 2003; Firebaugh and Goesling 2004; Hung and Kucinskas 2011; Sala-i-Martin 2006). Notably, studies find that global income inequality recently started to decline because of a reduction in international income inequality, starting in the last decade of the twentieth century. In particular, the rapid growth of the largest emerging economies—China and India—reduced the degree of inequality between countries by raising the average standard of living in the most populous countries (Clark 2011; Firebaugh 2003; Hung and Kucinskas 2011). Inequality between countries was further reduced by stagnant growth in advanced economies alongside accelerated growth in emerging economies and a small subset of developing economies (Alderson and Pandian 2018).

A prominent explanation for this reduction in international inequality is the industrialization of developing and emerging economies with the globalization of production (Bhalla 2002; Bourguignon 2015; Firebaugh 2003). Increasingly, multinational corporations have offshored and outsourced production to firms in emerging and developing economies for greater efficiency or access to new consumer markets. This “global shift” in manufacturing induced the industrialization of developing and emerging economies, which greatly accelerated their development (Feenstra 1998; Firebaugh 2003; Frobel, Heinrichs, and Kreye 1980). Consequently, the intensification of globalization should decrease international income inequality through a cross-national convergence in standards of living by industrializing the global South and deindustrializing the global North (Bourguignon 2015; Clark 2011; Hung and Kucinskas 2011; Lakner and Milanovic 2016; Milanovic 2016). However, the observed decrease in international income inequality is largely attributable to the development of East Asian and emerging economies over the last four decades (Alderson and Pandian 2018; Clark 2015; Firebaugh and

Goesling 2004; Friedman 1992; Hung and Kucinskas 2011; Pinkovskiy and Sala-i-Martin 2009, 2014; Quah 1993). The lack of growth in developing economies, especially among African countries, suggests that the decrease in international income inequality is not entirely driven by industrialization and globalization.

## INTERNATIONAL INCOME INEQUALITY AND CROSS-NATIONAL INCOME CONVERGENCE

The decline of international inequality with  $\sigma$ -convergence is quite intuitive: a reduction in the variation of GDP per capita across countries indicates a decrease in income disparities between countries. However, a necessary condition of  $\sigma$ -convergence is  $\beta$ -convergence: a reduction in variation of national incomes in developing countries (with their faster growth) compared to developed countries. Indeed, the impressive growth rates of emerging economies, especially in East Asia, and stagnant rates in advanced economies are largely responsible for the observed decline in international income inequality (Alderson and Pandian 2018). Yet, it is unclear whether the growth dynamics of developing economies are homogeneously contributing to  $\sigma$ -convergence because this approach obfuscates the convergence process.

Table 1 shows a basic framework for conceptualizing convergence processes (Plumper and Schneider 2009). They are classified according to two dimensions: completeness and conditionality. The former refers to the degree of convergence (partial or full), while the latter refers to heterogeneity in convergence across countries (absolute or “club” convergence). The main limitation of  $\sigma$ -convergence is its inability to account for conditionalities of cross-national income convergence because this approach does not incorporate any information on the factors driving convergence and whether these factors are producing distinct subsets of countries with differing rates of convergence or divergence. As a result,  $\sigma$ -convergence may over- or under-estimate the completeness of national income convergence, depending on the degree of conditionality.

In contrast,  $\beta$ -convergence is designed for the factors creating conditional and incomplete processes of national income convergence by directly modeling economic growth rates. However, the empirical evidence of  $\beta$ -convergence in national incomes is mixed and inconsistent (Johnson and Papageorgiou 2020). We argue this is attributable to the modeling strategy of prior studies and their reliance on the assumptions of neoclassical growth theory. In particular, prior studies account for the conditionality of cross-national

TABLE 1. Basic Framework for Convergence Processes in National Incomes

	Unconditional	Conditional
Incomplete	Reduction in the variation of national income between all countries	Reduction in the variation of national income within subsets of countries
Complete	No variation in national incomes between all countries	No variation in national income within subsets of countries

income convergence by holding constant cross-national differences in developmental factors (e.g., capital stock) rather than examining how these factors *moderate* the rate of convergence. This is surprising because researchers have increasingly observed that national income convergence is only occurring within subsets of countries (Bourguignon 2015; Milanovic 2016). This study extends the work on  $\beta$ -convergence by identifying the factors which produce incomplete and conditional cross-national income convergence in the world economy.

## ECONOMIC GROWTH, AGGREGATE DEMAND, AND CONSUMPTION

The logic underlying a  $\beta$ -convergence of national income is derived from neoclassical growth theory, in which the stock and productivity of capital are the fundamental causes of economic growth. From this point of view (e.g., Solow 1956), national incomes should *unconditionally* converge in the long run because the global stock of capital should increasingly be redirected into developing and emerging economies, where the marginal productivity of capital and returns to investment are higher. However, the empirical evidence for unconditional  $\beta$ -convergence is inconsistent and mixed (Johnson and Papa-georgiou 2020). As a result, most studies have observed *conditional*  $\beta$ -convergence in national incomes by holding constant initial cross-national differences in capital stock and other supply-side factors (Barro 2015). Specifically, drawing on endogenous growth theory (e.g., Romer 1994), researchers have increasingly accounted for cross-national differences in total factor productivity—the degree to which the productivity of capital and labor is augmented by endogenous and exogenous factors (e.g., technology)—when measuring convergence in national incomes. Therefore, we may expect:

**H1:** There is a negative association between GDP per capita and annual growth when holding constant capital stock and total factor productivity.

A fundamental problem of neoclassical growth theory is its overemphasis on supply-side factors to explain growth rates. As a point of departure, this study draws on an alternative theoretical framework to evaluate  $\beta$ -convergence in national incomes. Recently, researchers have called for greater engagement with PKK theories of growth to understand demand-side factors in development (Baccaro and Pontusson 2016; Stockhammer 2021; Stockhammer and Kohler 2022; cf. Hope and Soskice 2016). PKK theories emphasize the role of *aggregate demand* and the distribution of income in economic growth. In the context of the sociology of development, engagement with PKK theories is important for recentering social conflict and power relations as determinants of economic growth. However, these theories of growth have largely been used to explain the macroeconomic foundations of growth in *advanced* economies. It is unclear whether aggregate demand or the distribution of income affects the growth of developing and emerging economies.

A key concept in PKK theories is *growth models*: regimes of economic growth based on components of aggregate demand (Baccaro and Pontusson 2016; Hein and Mundt 2013; Lavoie and Stockhammer 2013). Growth models are defined by factors affecting the

*marginal propensity of consumption* (MPC)—the degree to which actors will consume more with additional income—across major economic sectors. For example, growth models in advanced economies are frequently defined by the extent of foreign or domestic consumption, where export-led growth is driven by higher MPC among foreign households while endogenous growth is driven by higher MPC among domestic households. Drawing on this concept, greater domestic household consumption and net exports should accelerate income convergence among developed *and* developing countries by increasing consumption-driven growth.

Indeed, research on advanced economies shows that an increase in aggregate demand through exports and household consumption leads to a long-run equilibrium in growth rates across national economies after accounting for existing constraints on sectoral composition, openness, and fiscal and monetary policy (Baccaro and Pontusson 2016; Dutt 2013). Based on this evidence, we should expect this effect to be amplified in developing and emerging economies, because the MPC among domestic consumers and foreign consumers seeking cheaper goods is greater in these economies than the MPC in advanced economies. In fact, contemporary studies on the underdevelopment of the global South contend that the cultivation of domestic consumption is critical for promoting economic growth (Cripps et al. 2011; Elsenhans and Babones 2017; Saad-Filho 2014). Accordingly, we should expect:

**H2a:** Household consumption amplifies the negative association between GDP per capita and annual growth.

**H2b:** Net exports amplifies the negative association between GDP per capita and annual growth.

## ECONOMIC GROWTH AND NATIONAL INEQUALITY

National income inequality has steadily increased in most economies over the last few decades, while growth accelerated in a limited subset of developing and emerging economies (Clark 2011, 2020; Milanovic 2016; Ravallion 2014). However, few studies examine the extent to which national income inequality affects international income inequality. Most studies on economic development and income inequality have tested the “Kuznets curve” hypothesis (Alderson and Nielsen 1999; Barro 2000; Bourguignon and Marrison 2002; Nielsen 1994). According to Kuznets (1955), national income inequality has a curvilinear association with economic growth because the industrialization of national economies induces a demographic transition from the traditional to the modern sector. During the onset of industrialization, a small portion of the low-wage agricultural labor force migrates to the higher-wage industrial sector, which increases earnings inequality within the labor force. Further development and maturation attract a larger portion of the labor force to the industrial sector, which eventually reduces this inequality. However, the growth of national income inequality in most developed countries since the 1970s has raised concerns over the validity of this argument (Alderson and Nielsen 2002).

Figure 1 shows locally weight averages of national income inequality from 1960 to 2017 across levels of development (World Bank income classifications).<sup>1</sup> In

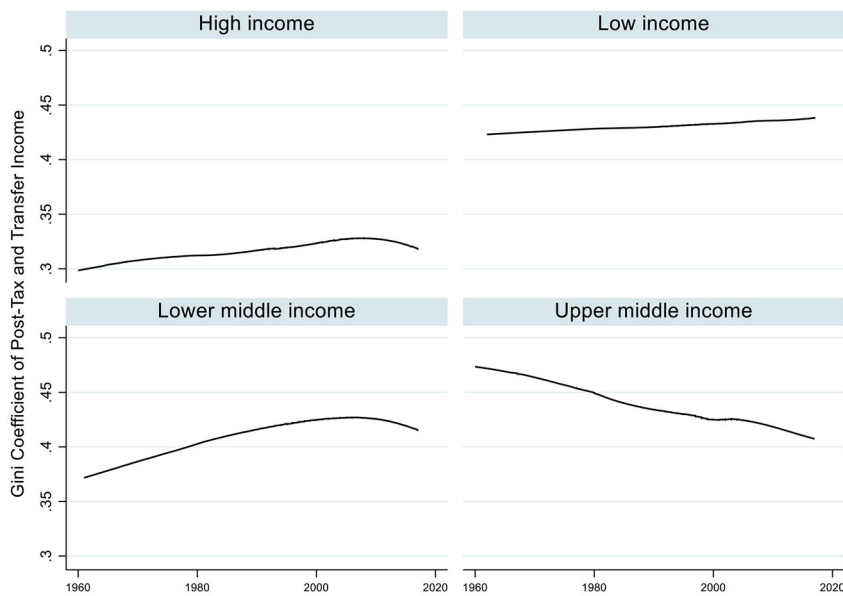


FIGURE 1. Locally weighted average trends in disposable-income inequality by level of development, 1960–2017.

Source: Standardized World Income Inequality Database (Solt 2020).

contradiction to the Kuznets curve hypothesis, we observe a growth in national income inequality in three out of four developmental levels during this period (Clark 2011, 2020; Ravallion 2014). In general, average disposable income inequality increased by 4.1 percent across countries during this period. However, there is notable heterogeneity. Average disposable income inequality increased by 7.3 percent in low-income countries while increasing by 2.9 percent in lower-middle-income countries and 6.7 percent in high-income countries. Meanwhile, it *declined* by 10.4 percent in upper-middle-income countries.

Overall, the observed association between development level and average national income inequality seen in Figure 1 is more consistent with the concept of a “Kuznets wave.” Milanovic (2016) observes that income inequality expands during the initial phases of development and then plateaus and declines with moderate development, before increasing again at higher levels of development. This is helpful for understanding the link between inequality and growth where declining national income inequality corresponds to faster growth in upper-middle-income countries while slower growth corresponds to increasing income inequality in low-, lower-middle-, and high-income countries.

Most importantly, the empirical inconsistency of the Kuznets curve is suggestive of a more complex interplay between economic growth and income inequality. While earlier studies in sociology concentrated on the impact of economic development on income inequality (e.g., Nielsen 1994), studies in economics investigated whether income



inequality affected economic growth (Alesina and Rodrik 1994; Banerjee and Duflo 2000; Bleaney and Nishiyama 2004; Elsenhans and Babones 2017; Forbes 2000; Kwon 2016; Person and Tabellini 1994). However, despite this extensive empirical literature, the effects of inequality on economic growth remain unclear and heavily disputed. On the one hand, studies show that greater income inequality is associated with lower levels of growth and development (Barro 2008; Birdsall, Ross, and Sabot 1995). On the other hand, studies find positive relations between income inequality and development (Banerjee and Duflo 2000; Forbes 2000; Partridge 1997). Yet, despite these empirical inconsistencies, national income inequality is associated with development, which indicates it may be an important factor moderating cross-national income convergence.

According to PKK theories of growth, aggregate demand is driven by the distribution of income between capital and labor, as well as among households, because of the MPC: the relative differences in changes of consumption resulting from changes in income (Bhaduri and Marglin 1990; Keynes 1973 [1936]; Stockhammer and Kohler 2022). Capital owners, who derive their income from profits, have a lower MPC because capital income is more likely to be directed into savings and investment. In contrast, an increase in the relative share of incomes to wages and salaries should promote greater economic growth by increasing aggregate demand among households. Accordingly, the profit share of income is associated with higher savings and investment, while the wage share of income is associated with greater consumption (Blecker 2016). Put simply, if the distribution of income is skewed toward capital rather than labor, aggregate demand should decrease as workers are less able to consume because of lower wages and salaries. Therefore, we may expect:

**H3:** The wage share of income amplifies the negative association between the level of development and annual growth.

Economic stagnation in advanced economies illustrates this fundamental argument with respect to national income inequality and consumption. Studies show the slowing growth among advanced economics is partially attributable to rising income inequality within these economies: inequality lowers aggregate demand in advanced economies because affluent households are more likely to invest and save rather than purchase normal goods and services (Keifer and Rada 2015; Petach and Tavani 2020; Piketty 2014). Similarly, lower labor shares of income reduce aggregate demand by concentrating income into capital. Therefore, consumption-led growth is highly contingent on national income inequality.

The MPC of households and workers is determined by the availability of income, and differences in MPC are directly related to the distribution of income between households and capital and labor. Specifically, consumption in households is likely to decrease with greater income inequality as affluent households redirect their income into investment and savings when the distribution of income is skewed toward these households. In contrast, household consumption should increase in economies where the distribution

of income is more equal, and this effect should be amplified in developing and emerging economies, where the MPC is greater. Put simply, income inequality induces underconsumption, which retards economic growth. Therefore, we should expect:

**H4:** National income inequality suppresses the negative association between level of development and annual growth.

## SAMPLE AND MEASUREMENT

We test our hypotheses using an unbalanced panel sample of 108 countries between 1981 and 2017. The selection of countries was based on data availability as well as cross-national and longitudinal coverage.<sup>2</sup> The countries in the sample contain over 80 percent of the total population in the world (as of 2015) and include each major world region and income group according to World Bank classifications. The cross-national coverage in the sample is comparable to or better than other recent studies on international income inequality (Barro 2015; Bergeaud, Cette, and Lecat 2020; Clark 2015). The longitudinal coverage in the sample is important because most research contends international inequality started to decline in the 1980s and 1990s and accelerated in more recent decades (Alderson and Pandian 2018; Clark 2015; Hung and Kucinskas 2011).

### National Incomes

Milanovic (2005:10–11) distinguishes between two concepts of international income inequality: weighted and unweighted. In the unweighted version the unit of analysis is the country; the other version is weighted by population, and the unit of analysis is the “average person.” According to prior studies, the unweighted approach is more useful for understanding convergence between countries, especially in the context of mobility in the world economy (Alderson and Pandian 2018:270; Babones 2005; Clark 2016). Therefore, we use the unweighted approach in modeling annual growth in national incomes.

An important consideration when studying international income inequality is whether to harmonize national currencies using purchasing power parity (PPP) or market (FX) exchange rates (Anand and Segal 2008, 2015). FX rates require converting national currencies into current dollars for comparison, while PPP exchange rates convert national currencies into constant dollars, adjusting for price differences across countries. Firebaugh (1999) and Pritchett (1997) contend FX exchange rates are flawed because they are estimated from a restricted set of goods and services that are internationally traded and susceptible to distortion from government policies and speculative capital flows. And earlier studies critiqued the application of PPP exchange rates because the limitation of price data requires statistical extrapolation for estimates (Korzeniwicz and Moran 2000), but the methodology and data for PPP estimates have vastly improved over the last couple of decades (Anand and Segal 2015).

In this study, national incomes are measured using PPP-adjusted GDP per capita in constant 2017 USD. The GDP per capita data are from the Penn World Table (PWT) 10.0 (Feenstra, Inklaar, and Timmer 2015). The PWT uses surveys from the International Comparison Program (ICP) to compute PPP-adjusted GDP per capita. The PWT

10.0 draws on information from the latest ICP survey and from earlier surveys. In contrast to the World Bank, the PWT 10.0 uses all available ICP data, which improves the temporal coverage. For example, World Bank data on PPP GDP per capita only begins in 1990. We adjust the scale of GDP per capita using a log transformation for better univariate normality and interpretation of marginal effects.

### National Income Distributions

The focal independent variables in the analysis are the distribution of income between households, the distribution of income between capital and labor, and the ratio of capital to income. We measure the first of these using the Gini coefficient of disposable income from the Standardized World Income Inequality Database (Solt 2020). These are the most temporally and cross-nationally comprehensive and comparative data on national income inequality. We measure the distribution of income between capital and labor using the labor share of income, which is the percentage of economic output that accrues to workers in the form of compensation. The capital-to-income ratio is an important distributional indicator because it measures the share of national income flowing to owners of capital and thus the concentration of wealth. The data on labor share of income and capital-to-income ratio are from the PWT 10.0.

### Aggregate Demand and Consumption

The other focal independent variables are indicators of aggregate demand. We use indicators of household, government, business, and foreign consumption to approximate the components of aggregate demand in national economies. For households and government we take consumption as shares of total consumption. Business consumption is measured as gross capital formation as a percentage of GDP; and foreign consumption is measured as total merchandise exports as percentage of GDP. These data are also from the PWT 10.0.

### Supply-Side Factors and Baseline Controls

Drawing on neoclassical theories of economic growth, we also examine the extent to which annual changes in GDP per capita are driven by supply-led factors. We examine three supply-side indicators: total factor productivity, domestic credit, and inward foreign direct investment (FDI) stock. Total factor productivity is a standard indicator of productive efficiency in an economy. This is measured by comparing total output to total inputs. Domestic credit is the total flow of credit to the private sector, which indicates the availability of investment for firms. And inward FDI stock indicates the cumulative investment by foreign actors. Consistent with studies on foreign capital penetration (Curwin and Mahutga 2013; Dixon and Boswell 1996; Firebaugh 1992), we control for the inward FDI rate when estimating the effects of FDI stock on economic growth to account for potential denominator effects. The data on total factor productivity and domestic credit are from the PWT 10.0; data on inward FDI are from UNCTAD (2020).

TABLE 2. Summary Statistics of Outcome and Covariates

	Mean	SD	Min.	Max.
GDP per capita	18,701	17,741	428	166,520
Household consumption	61.33	13.45	8.55	123.79
Government consumption	17.9	6.46	0.52	51.77
Gross capital formation	22.52	8.53	0.45	84.03
Merchandise exports	27.42	26.2	0.39	282.22
Gini coefficient of disposable income	38.54	9.44	20.2	67.4
Labor share of income	52.83	11.1	15.01	90.3
Capital-to-income ratio	5.47	4.10	0.38	53.47
Total factor productivity	0.96	0.20	0.26	2.21
Domestic credit	57.56	46.72	0.19	361.76
Inward FDI Stock	43.02	132.33	0.00	1,961.19
Age dependency ratio	0.31	0.03	0.12	0.46
Terms of trade	0.08	4.89	-49.03	41.73
Inflation	0.10	0.28	-0.61	6.50
Political rights	2.78	1.94	1.00	7.00

Note:  $n = 2,828$  country-years;  $N = 108$  countries;  $t = 36$  years.

We control for demographics, macroeconomic conditions, and institutions when estimating the effects of aggregate demand, income distributions, and supply-led factors on growth and cross-national income convergence (Barro 2015).<sup>3</sup> Specifically, we control for terms of trade, inflation, political rights, and the age dependency ratio. Terms of trade is an important factor because the relative price of exports to imports affects foreign demand and investment in a country. Inflation is an important indicator of aggregate demand and investment because it measures how much prices change over time. We account for cross-national differences in the quality of institutions by controlling for political rights within countries. Lastly, we account for demographic changes related to growth with the age dependency ratio, which is the size of the population between the ages of 0 and 15, plus 65 and older, relative to the working-age population. Data on terms of trade, inflation, and population are from the PWT 10.0. Data on political rights are from Freedom House (2021).

Table 2 provides estimates of summary statistics for the variables in the analysis.

### ANALYTICAL STRATEGY

Studies measuring  $\beta$ -convergence regress economic growth rates on lagged level of development to determine whether there is a negative correlation between GDP per capita and

economic growth (Barro 2015; Barro and Sala-i-Martin 1992). The logic of this approach is straightforward: a negative correlation between GDP per capita and economic growth indicates countries are converging toward a steady-state equilibrium of national income because of faster growth in developing economies than in developed economies. However, evidence for *unconditional*  $\beta$ -convergence is weak and inconsistent, which suggests that differences in the initial conditions of development matter (Johnson and Papageorgiou 2020). Accordingly, most studies hold constant cross-national differences in macroeconomic, institutional, political, and other factors when estimating  $\beta$ -convergence. We estimate the cross-national income convergence using the following model:

$$\Delta Y_{it} = \alpha + \beta_1 Y_{it-1} + \sum \beta_k X_{kit-1}$$

where  $\Delta Y_{it}$  is the annual growth in GDP per capita in country  $i$  and year  $t$ ;  $Y_{it-1}$  is lagged GDP per capita; and  $X_{ki(t-1)}$  is a vector of  $k$  covariates lagged by a year. The most important parameter in the model is  $\beta_1$ , which is the “rate of adjustment” in national incomes. Convergence is indicated when  $\beta_1 < 0$ ; that is, growth is faster in less developed countries than in more developed countries. In contrast, divergence is indicated by  $\beta_1 > 0$ , when growth is faster in more developed countries. And  $\beta_1 = 0$  indicates a lack of convergence or divergence.

Models of the rate of adjustment are estimated in panel samples, which violate the basic assumptions of case independence of ordinary least squares regression (Halaby 2004; Wooldridge 2011). This dependence is usually accounted for in the models by including fixed intercepts for countries (fixed effects). However, such a model specification introduces notable bias into the estimate. Nickell (1981) finds considerable bias in model estimates when they include unit fixed effects in lagged-dependent-variable models because of the endogeneity between the fixed effects and the dependent variable. Moreover, Barro (2015) shows that the inclusion of country fixed effects upwardly biases the rate of adjustment, as well as the standard error and coefficients of the covariates, even when using a dynamic panel estimator such as the generalized method of moments. Therefore, it is recommended to omit country fixed effects and only include year fixed effects ( $\alpha_t$ ) in the model.

We extend this modeling strategy for measuring  $\beta$ -convergence by estimating the *interaction* between lagged GDP per capita and other covariates in the model. The purpose of this extension is to examine heterogeneity in the rate of adjustment across levels of the covariates. We estimate the following model:

$$\Delta Y_{it} = \alpha_{it} + \beta_1 Y_{it-1} + \beta_2 Y_{it-1} X_{1it-1} + \beta_3 X_{kit-1} + \sum \beta_k X_{kit-1} + \alpha_t$$

Here we measure the variation in the rate of adjustment by the sum of  $\beta_1$  and  $\beta_2$ . If  $\beta_2 > 0$ , the rate of convergence decreases as  $X_1$  increase; if  $\beta_2 < 0$ , the rate of convergence increases as  $X_1$  increases. Plumper and Schneider (2009) say this analytical model is preferable to the sigma convergence approach because it permits the direct modeling of convergence as an incomplete and heterogeneous process. Thus this approach should produce more valid and reliable estimates of cross-national income convergence and the factors contributing to it.

## RESULTS

Table 3 shows model estimates of annual economic growth for measuring unconditional and conditional convergence with the rate of adjustment. Model 1 estimates the unconditional rate of adjustment, where annual growth is regressed on lagged GDP per capita. We see no statistically significant association ( $p > .05$ ), which suggests a lack of unconditional convergence in national incomes. This finding is consistent with a recent review of the economics literature showing no clear evidence of unconditional beta convergence (Johnson and Papageorgiou 2020). Thus the process of convergence of national incomes may be conditional.

Model 2 includes indicators of aggregate demand among households, firms, governments, and foreign consumers to hold constant cross-national differences in consumption. Model 3 adds baseline controls. Interestingly, Model 2 shows a negative correlation between annual growth and lagged GDP per capita when controlling for cross-national differences in aggregate demand. Specifically, an increase in lagged GDP per capita reduces the annual rate of growth, which suggests countries are converging in national incomes at a rate of 0.5 percent when holding constant cross-national difference in consumption. This rate of adjustment is slower than the “iron law” rate of 2 to 2.5 percent observed in prior studies (Barro 2015; Sala-i-Martin 1996).

In both Models 2 and 3, merchandise exports are positively associated with annual growth in GDP per capita ( $p < .05$ ). This suggests that export-led growth regimes account for the observed growth of developed *and* developing economies, which demonstrates the importance of globalization for economic development. More importantly, this finding shows the validity of export-led growth models for developed *and* developing economies and raises questions about the validity of neoclassical growth theories (e.g., Dasgupta 1954; Rao 1952).

Model 4 adds indicators of income distribution, and Model 5 uses these indicators plus the baseline controls. In these models, the negative association between lagged GDP per capita and annual growth is not significant when holding constant indicators of the distribution of income between households and between capital and labor. More importantly, we find that both these distributions are negatively associated with the annual rate of economic growth. Surprisingly, a greater wage share of income corresponds to slower economic growth, which is inconsistent with the expectation of post-Keynesian perspectives on growth. On the other hand, a greater Gini coefficient of disposable income also slows growth, which is consistent with the expectations of Kaleckian perspectives. Nonetheless, these findings raise questions of whether development is wage-led and whether greater national income inequality slows economic growth.

Model 6 includes supply-side factors, and Model 7 uses these factors plus the baseline controls. These models test the expectations of neoclassical theories of economic growth, which emphasize the supply-side factors of investment, credit, and productivity. Most surprisingly, we find evidence of conditional income *divergence* in these models, where lagged GDP per capita is positively associated with annual growth when holding constant supply-side factors. This suggests higher-income countries grow faster than lower-income

TABLE 3. Dynamic Panel Models of Annual Growth

	1	2	3	4	5	6	7	8
Log of GDP per capita	-.043 (.15)	-.50* (.21)	-.80*** (.22)	-.31 (.20)	-0.76** (.25)	.41* (.17)	.08 (.02)	-.33 (.23)
Aggregate demand								
Household consumption		-.02 (.02)	-.01 (.02)					-.00 (.03)
Government consumption		.01 (.03)	.00 (.03)					-.01 (.03)
Gross capital formation		.05 (.03)	.03 (.03)					.03 (.03)
Merchandise exports		.01* (.00)	.01* (.00)					.01 (.01)
Distribution of income								
Gini of disposable income				-.06** (.02)	-.06** (.02)			-.04* (.02)
Labor share of income				-.04* (.02)	-.05* (.02)			-.04 (.02)
Supply factors								
Capital-to-income ratio						.05 (.05)	.07 (.05)	.04 (.05)
Total factor productivity						-2.00 (1.65)	-2.13 (1.43)	-2.55 (1.55)
Domestic credit						-.02* (.01)	-.02* (.01)	-.02*** (.00)
Inward FDI stock						.01* (.00)	.01* (.00)	.01** (.00)
Inward FDI rate						2.71*** (.32)	2.57*** (.36)	2.61*** (.37)
Baseline controls								
Terms of trade			-1.65 (3.970)		-1.73 (3.97)		-1.35 (3.98)	-1.37 (3.94)
Inflation			-0.843		-.98		1.10	-1.01

*(continued)*

TABLE 3. Dynamic Panel Models of Annual Growth (*continued*)

	1	2	3	4	5	6	7	8
			(1.280)		(1.22)		(1.29)	(1.38)
Political rights			-0.227		-.23		-.13	-.17
			(.150)		(.15)		(.15)	(.15)
Age dependency ratio			-1.540*		-1.86**		-1.79**	-1.39*
			(.623)		(.63)		(.60)	(.66)
Intercept	-1.42	2.45	.971	5.34	6.81*	-3.50	3.55	3.05
	(1.42)	(2.93)	(3.560)	(2.72)	(3.35)	(2.41)	(2.57)	(3.82)
R <sup>2</sup>	.10	.110	.12	.11	.11	.13	.13	.14

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

Note:  $n = 2,828$ ;  $N = 108$ . All models include year fixed effects. Robust clustered standard errors in parentheses. Coefficients  $\times 100$  reported. Each covariate is lagged by one year.

countries when accounting for cross-national differences in capital stock and productivity. Our estimate is that countries' annual GDP growth varies by 0.4 percentage points when controlling for these supply-side factors.

However, we find no evidence of income convergence or divergence when including baseline controls with supply-side factors. Moreover, we find evidence that FDI increases economic growth in developed and developing countries, based on the positive association between long-run and short-run foreign investment and annual growth ( $p < .05$ ). In contrast, we find evidence that domestic credit reduces economic growth in these countries ( $p < .05$ ). This again shows the importance of globalization for contemporary economic development. More importantly, this finding contradicts HI on the conditional convergence in national incomes when holding constant initial cross-national differences in supply-side drivers of growth.

Model 8 is a fully saturated model, with all indicators and controls, for measuring convergence with the conditional rate of adjustment. Here we see no evidence of conditional income convergence, with an insignificant association between GDP per capita and annual growth in GDP per capita ( $p > .05$ ). This null finding indicates cross-national income convergence might be a heterogeneous process, where national incomes are converging in one subset of countries while diverging in another subset. Overall, the model estimates in Table 3 provide very limited evidence of either unconditional or conditional cross-national income convergence and thus fail to support neoclassical growth theory's expectations.

Table 4 shows estimates of the interactions between lagged GDP per capita and indicators of aggregate demand, income distributions, and other covariates in models of annual growth. As mentioned, the interaction effects measure the extent to which the rate of adjustment varies with the levels of covariates. All estimates are derived from the



TABLE 4. Interaction Effects between GDP per Capita and Indicators of Aggregate Demand, Income Distributions, and Supply-Side Factors

	Point estimate	Standard error	Lower estimate	Upper estimate
Aggregate demand				
Log GDP per capita × household consumption	0.015	0.011	-0.007	0.036
Log GDP per capita × government consumption	-0.005	0.025	-0.054	0.044
Log GDP per capita × gross capital formation	-0.026	0.026	-0.077	0.024
Log GDP per capita × merchandise exports	-0.028	0.008	-0.043	-0.012
Distribution of income				
Log GDP per capita × Gini of disposable income	0.066	0.02	0.026	0.107
Log GDP per capita × labor share of income	0.014	0.017	-0.018	0.049
Supply factors				
Log GDP per capita × capital-to-income ratio	0.08	0.025	0.031	0.129
Log GDP per capita × total factor productivity	-0.891	1.269	-3.406	1.624
Log GDP per capita × domestic credit	-0.011	0.004	-0.019	-0.004
Log GDP per capita × inward FDI stock	-0.01	0.004	-0.018	-0.003
Log GDP per capita × inward FDI rate	1.266	0.848	-0.415	2.948

**Note:**  $n = 2,828$ ;  $N = 108$ . Coefficients  $\times 100$  reported. Both variables in the interaction terms are lagged by one year. Robust clustered standard errors reported. Lower and upper estimates from 95% confidence interval.

saturated model in Table 3 (Model 8). According to the estimates in Table 4, total factor productivity, capital-to-income ratio, domestic credit, inward FDI, and Gini coefficient of disposable income all moderate the rate of adjustment in average incomes. But the effects are not all in the same direction. Both domestic credit and inward FDI *increase* cross-national income convergence; a unit increase in these factors amplifies the rate of adjustment by about 0.01 percent each year. In contrast, indicators of income distribution between households and capital and labor *reduce* income convergence; a unit increase in these indicators slows the rate of adjustment by 0.01 to 0.07 percent each year. The Gini coefficient of disposable income has the strongest effect.

We find no evidence in Table 4 to support Hypothesis 2a, on the moderating effect of household consumption on income convergence. We do find support for Hypothesis 2b, on the amplifying effect of net exports on income convergence. Here, a unit increase in net merchandise exports increases the rate of adjustment by about 0.03 percent per year. Surprisingly, we find no support for Hypothesis 3, on the moderating effect of the labor share of income on convergence. Most important, we do find support for Hypothesis 4, on the moderating effect of national income inequality on cross-national income convergence: a unit increase in the Gini coefficient of disposable income slows the rate of

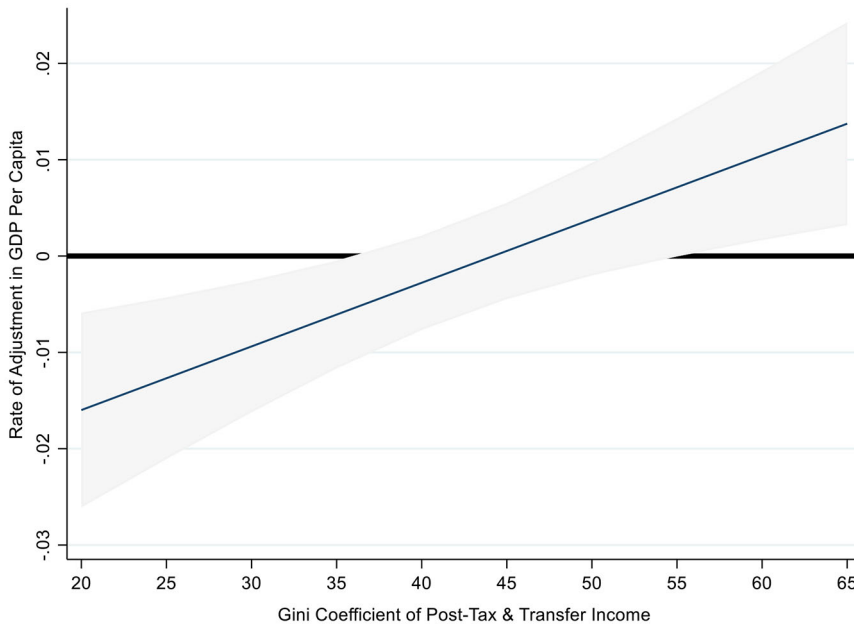


FIGURE 2. Rate of annual income convergence by level of disposable-income inequality.

adjustment by 0.07 percent each year. This is consistent with the theoretical expectations of PKK perspectives on growth, suggesting that income inequality creates heterogeneity in cross-national income convergence by suppressing the negative association between lagged GDP per capita and annual growth.

We illustrate the marginal effect of income inequality in Figure 2 by visualizing the rate of adjustment across levels of national income inequality. Low-to moderate disposable-income inequality (Gini coefficient less than 35 points) is associated with an annual rate of cross-national convergence in national income of 0.4 to 1.7 percent. However, with moderate national income inequality (Gini coefficient of 37 to 55 points), the rate of adjustment is statistically zero, which indicates the persistence of cross-national income differences. At high levels of income inequality (Gini coefficient over 55 points), the rate of adjustment is positive, indicating cross-national income *divergence* at an annual rate of 0.5 to 1.3 percent.

Overall, model estimates of  $\beta$ -convergence suggest that national income inequality matters for economic growth and the decline of international income inequality. The null findings in the models of unconditional convergence suggest that the processes driving the decline of international income inequality are contingent on demand and supply factors of growth. Consistent with the theoretical expectations of PKK perspectives, greater national income inequality slows economic growth while creating heterogeneity in cross-national income convergence, where the national incomes of egalitarian countries are converging while the national incomes of inegalitarian countries are diverging. This means that the interplay between national and international income inequality is important for the trajectory of global income inequality.

## DISCUSSION AND CONCLUSION

The decline of global income inequality into the twenty-first century calls for a deeper examination of the relationship between national and international income inequality. Prior studies found that this decline is primarily driven by a reduction in international income inequality, since differences *between* nations are the primary component of global income inequality (Firebaugh 2003; Milanovic 2011, 2016). However, the near-ubiquitous growth of income inequality *within* nations during this period indicates that the decline of global income inequality may stall or reverse in the coming decades (Alderson and Pandian 2018; Hung and Kucinskas 2011). Yet, despite these contrasting trends in national and international income inequality, few studies have investigated the interplay between these components. Accordingly, the present study examined the extent to which national income inequality *moderates* cross-national income convergence.

Specifically, we measure the  $\beta$ -convergence in national incomes to determine the extent to which cross-national income convergence is moderated by national income inequality. Prior studies on global income inequality have primarily measured  $\sigma$ -convergence in national incomes and found a precipitous decline in the variation of national incomes since the 1980s (Alderson and Pandian 2018; Firebaugh and Goesling 2004; Hung and Kucinskas 2011). However, this approach can be inaccurate when cross-national income convergence is heterogeneous across subsets of countries. Consistent with this critique, we find little evidence of homogeneous convergence in national incomes among the 108 countries in the sample. Instead, we find strong evidence that income convergence is heterogeneous across countries.

The main finding of this study is that the rate of convergence of national incomes is moderated by the degree of national income inequality, where the incomes of egalitarian countries are converging while the incomes of inegalitarian countries are diverging. Accordingly, with the intensification of national income inequality we may expect a decline or reversal in the downward trajectory of global income inequality. For example, Clark (2013) found that countries were converging in their level of income inequality over the last few decades, with more egalitarian countries getting worse and less egalitarian countries getting better. This convergence in national income inequality may fundamentally change the trajectory of international income inequality in the coming decades.

Overall, the main findings indicate class-based dynamics of economic growth are important for understanding how cross-national income convergence is moderated by national income inequality. Specifically, the marginal propensity of consumption is a key factor for economic growth, especially in the global South, where underconsumption is a persistent problem for development. A greater proportion of income going to capital and more affluent households appears to hinder rapid development in countries in the global South because of the propensity of these actors to underutilize consumer markets, compared to labor and less affluent households. Therefore, the enactment of redistribution policies by national governments and enhanced wage growth in the global South are critical for accelerating economic growth and sustaining cross-national income

convergence by reducing inequality and enhancing the consumption of less affluent households and workers (Hujo 2021).

It is also important to note the extent to which cross-national income convergence is moderated by other macroeconomic factors. We find domestic credit and inward FDI are contributing to national income convergence; that is, increases in credit and FDI are associated with a higher rate of adjustment. Based on PPK theories of economic growth, this suggests that the availability of capital for debt-led consumption and/or investment promotes cross-national income convergence, supporting the fundamental proposition that the marginal productivity of capital is greater in developing economies than in developed economies. Nonetheless, the countervailing moderating effects of income distribution and investment show the dynamic nature of international income inequality and the importance of accounting for macroeconomic factors that moderate cross-national income convergence.

This study has the following limitations. First, our models of income convergence are estimated from a limited sample of developed and developing countries, based on data availability. Subsequent studies should aim for more representative samples. Relatedly, our study period of 1981 and 2017 limits the longitudinal component; future studies should extend the temporal dimension by including earlier observations.

Second, an implicit argument in this emerging theoretical framework for economic growth is that the distribution of incomes may impact aggregate demand. Subsequent studies should develop a more robust theoretical framework for economic growth that accounts for the complex relationships between income distribution and aggregate demand. The null findings on the growth effects of aggregate demand in this study call for future research on the relationship between inequality and consumption within countries.

Lastly, given the growing dispersion of income within countries, national-average incomes may be a bad way to measure international income inequality. Subsequent studies should use more robust measures of central tendency (e.g., the median) in national income distributions (Clark, forthcoming).

Overall, the trajectory of global income inequality remains an important topic for the sociology of development. While studies show international income inequality has declined over the last few decades, their evidence does not account for the factors driving this trend or the degree to which convergence is heterogeneous across subsets of countries. This is especially important given the concomitant rise of national income inequality and the potential for this to affect economic growth. The present study shows that the convergence of national income is moderated by the extent to which income is unequally distributed within countries. Therefore, the growth of income disparities within countries may mitigate the extent of income convergence between countries, resulting in the persistence and potential growth of global income inequality in the coming decades. ■

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## NOTES

1. The Gini coefficient is a standardized index measure of dispersion which ranges from 0 (perfect equality) to 100 (perfect inequality).
2. We conducted a modified Little (1998) test for whether observations in the pooled and panel-specific data were systematically missing. We accepted the null hypothesis of the test and found no severe systematic missingness in the observations ( $p > .05$ ).
3. We initially included measures of the human capital index, schooling, and unemployment in the models. However, these data are largely missing for most developing countries prior to 1990. We also found that these variables were highly collinear with the other covariates in the model.

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