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IS A GROWING MIDDLE CLASS GOOD FOR THE POOR?
SOCIAL POLICY IN A TIME OF GLOBALIZATION

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Abstract

Despite much analysis of the rise of the middle class, little is known about the effects of an expanding middle class on the poorest in society. In the late 19th century, Europe's middle class played a critical role in the creation of social protections aimed at reducing poverty and shielding vulnerable groups from shocks. This was achieved when a political alliance was formed between the working poor and white-collar professionals—a "red-white" alliance. We examine the role of the middle class and social spending on the extreme poor using data covering a range of early- and late-industrializing countries between 1870 and the present. We find that poverty reduction occurs alongside a growing middle class, mediated in part through greater spending on health, education, and welfare, but that the effect of such social spending on poverty diminishes as the middle class expands. We then examine various components of the current social safety net in developing countries and find that, while targeted transfers to the poor are associated with a larger middle class, social insurance benefits that accrue to the upper quintiles increase three times as quickly. Given that antipoverty policies are not likely to be sustained without the tacit support of the middle class, a central implication of our findings is that developing countries aiming to eradicate extreme poverty will need to focus on raising the volume of social assistance in a package with universal programs designed so as to cover groups in nonstandard jobs.

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INTRODUCTION

Does an expanding middle class benefit society's poorest? Much has been written recently about the rapid growth of the middle class as well as the rapid fall in absolute poverty (Kharas 2017; Kochar and Oates 2015; Burrows 2015). However, few studies seek to link these two trends. It is worth emphasizing at the outset that a growing middle class and a falling poverty rate are not simply two sides of the same coin; there is a large "vulnerable" (or near poor) cohort between the poorest individuals and the middle class. Additionally, the trends can be quite different. In the United States, for example, the percentage of middle-class households has steadily fallen since the 1970s, while the portion of households in the lowest income brackets has remained steady (Kochhar, Fry, and Rohal 2015). Similar trends have occurred in the European Union since the early 2000s (ILO 2015). By contrast, in sub-Saharan Africa and Latin America, most of those lifted out of poverty appear to have joined the ranks of the vulnerable rather than the middle class (Calvo-Gonzalez 2017; Chandy 2015). There, the middle class has stagnated despite reductions in poverty.

In richer nations, the industrial revolution that shaped the political identity of the working poor also gave rise to a strata of salaried professionals who helped administer the private and public services that supported manufacturing and urbanization—the so-called "middling sort" (Hunt 1996). This middle class formed political alliances with the working poor against predominantly rural elites, and was largely responsible for, among other achievements, the expansion of the voting franchise (Moore 1966; Lang 1999; Acemoglu and Robinson 2005), the legalization of trade unions (Pelling 1963), and ultimately, the creation of the modern welfare state (Hay 1975; Esping-Andersen 1990).

We examine the effect of the rise and evolution of the middle class on extreme poverty, using the World Bank's international poverty line of $1.90 per person per day in 2011 purchasing power parity (PPP)-adjusted terms. Like the definition of poverty, the definition of the middle class used here is also set in absolute terms, comprising households where per capita income or consumption lies between $11 and $110 per person per day in 2011 PPP terms—referred to as a "global," as opposed to national, definition of the middle class (Kharas, 2017). We argue that middle-class

expansion initially is pro-poor given the incentives of the emerging middle class and the working poor to co-operate on matters of social policy. As citizens join the ranks of the middle class, they lobby for programs that provide them income stability and protections against shocks (social insurance). By allying with the working poor who seek social assistance (income transfers), middle-class constituents increase their bargaining power relative to elites who seek labor flexibility and lower taxes in a competitive global economy. Over time, however, as the middle class prospers and ac-quires greater political influence, the balance of pro-grams shifts increasingly toward social insurance and away from social assistance. In this way, the middle class begins to capture an increasing proportion of the benefits of social spending, leaving less for welfare services targeted exclusively at the poorest. One im-plication of this is that the emerging middle class has never been truly progressive, because progressivity ultimately comes at its own expense.

We attempt three separate, but related tasks. First, we investigate the effect of the middle class on the degree of extreme poverty across countries and over time. Second, we estimate the mediating effect of the middle class on poverty through social spending and through social policy choices regarding citizen eligibility for benefits. Third, we examine the effect of middle-class size on the size and distribution of benefits per capita of social assistance and social insurance programs in developing countries.

Examining cross-country, time-series (unbalanced) data covering more than 100 countries from 1870 to the present, we find a strong effect of the middle class on poverty, even correcting for country income levels, but this effect has diminished over time. Today's rich countries had far lower levels of poverty between 1870 and 1920 than today's developing countries have,

even though per capita income levels are roughly equivalent. We also find evidence that the middle-class impact on poverty reduction is both direct and medi-ated through social spending, but the marginal effect of the latter declines as middle-class size expands, with social spending having no marginal effect on poverty reduction once the size of the middle class approaches 30 percent of the population. On average, half of the total effect of middle-class size on poverty is mediated through social spending.

Turning to an analysis of current developing countries since 2000, we find that the dollar benefits available to the poorest quintile within each country get larger in the presence of a larger middle class. In contrast, the size of absolute benefits to those in the top quintile (which usually includes most of the middleclass households in a developing country context) that is about three times as great as the poorest quintile, suggesting that the middle class is capturing significantly greater benefits from national social spending programs than are the poor. Our results highlight the politically pivotal role that the middle class plays in supporting the expansion of social protection—and thus the need for cross-class solidarity—but also illustrates the disproportionate in-fluence of the middle class in shaping a country's social protection regime. A major conclusion is that it is criti-cally important to distinguish between social assistance and social insurance. In most countries, assistance programs are funded at relatively modest rates and pro-gressivity is modest. Social insurance tends to be more universal in terms of coverage (and enjoys stronger political support from the middle class) and dispenses far larger amounts of money, but benefits are strongly oriented toward the richest quintiles.[1] Our analysis sug-gests that increasing the volume of resources going toward social assistance and altering the design and re-gressivity of social insurance are the policy areas most likely to benefit the poor.

POVERTY, WELFARE, AND SOCIAL CLASS

Attention to social protection as an area of development policy is relatively new. During adjustment programs in the 1980s and 1990s, efforts were principally focused on the appropriate mix of policies to achieve stabilization and reform, with comparatively little attention paid to the problem of social costs and risks to vulnerable groups (Graham 2002). Even where issues of social welfare were addressed, the focus tended to be on short-term consequences of public sector retrenchment (see, e.g., Galal, *et al*. 1994). Since the early 2000s, however, developing countries have expanded their safety nets to include almost 2 billion people (World Bank 2015).

Two distinguishing features of advice given to developing countries on the design of social protection can be contrasted with the practice in advanced, industrialized countries (Barrientos 2010). First, social protection in developing countries has often had a stronger "targeting" preference toward the poorest rather than featuring the universality of richer countries that aim to protect living standards of their workforce. Second, social protection in developing countries tends to be complex, and fragmentary, with the average developing country now having over 20 distinct social programs, each aimed at a different sub-population (World Bank 2015).

While the development of large-scale social protection may be relatively recent in developing countries, this is not the case in most developed nations, where the creation of universal forms of social protection occurred at early stages of development and state formation. Indeed, one of the innovations of the European Enlightenment was that poverty should not be thought of as a necessary condition for economic development to occur. As Ravallion has argued, under mercantilist principles, it was widely accepted that the afflictions of extreme poverty were needed to encourage industriousness, a mindset that the Enlightenment sought to change: "The key contribution… was in establishing the moral case for the idea of public effort toward eliminating poverty" (Ravallion 2013). For the better part of a century, that "public effort" largely took the form of mutual aid societies, the workhouse, as well as compulsory education laws. It did not include any form of protection against shocks or any social "floor," however.

Class and Social Protection: Some Stylized Facts from European History

Much has been written about the class-origins of the European welfare state and the political alliances that undergird them (Esping-Andersen and Korpi 1985; Baldwin 1990; Esping-Andersen 1992). Most critical for poverty reduction is the nature of the alliance that incorporated the working poor, since as a constituency, they were too weak to impose their will unilaterally on others. In this regard, the middle class has historically proven to be a pivotal group in facilitating the development of social policy. In 19th century Britain, the essayist William Carpenter argued in his address to workers:

> "[T]he middle classes are not only not a class of persons having interests different from your own… they are not a different class from your own. They are the same class; they are, generally speaking, working or laboring men" (1831).

In Scandinavian countries, the establishment of social protections such as pensions resulted from the famous "red-green" alliance of urban workers and the rural middle class—a coalition that, in Sweden, thwarted legislation until they were granted a pension law extending benefits to all citizens. As industrialization and

urbanization proceeded, white-collar professionals who formed a "red-white alliance" gradually replaced farmers in the alliance (Pempel 1998: 207). In subsequent decades, this (often-uneasy) alliance remained powerful enough to fight against predominantly rural, aristocratic elites.

Because the middle-class valued stability, its interests coincided with those of the working class; social "protection"—the collection of policies designed to reduce poverty and vulnerability by limiting people's exposure to risk—was used to tamp down radicalization and social upheaval among the industrial workforce and its accompanying political movements—socialist parties and revolutionary communes. Between 1883 and 1889, largely with middle-class support and the support of "bourgeois parties" against a social-democratic threat, Bismarck's government enacted three basic components of social protection: healthcare (1883), accident insurance (1884), and unemployment and old age pensions (1889) (Blackbourn and Evans, 2014; Spohn 1991; Holborn 1969). Similarly, France established free medical assistance and support programs for the elderly in the 1890s.[2] Facing similar trade union mobilization and electoral threats from the newly formed Labour Party, the governing Liberals in Britain established worker pensions, unemployment, and health insurance between 1906 and 1911. In each case, these programs were universal and, as we shall show below, a feature that ultimately allowed the middle-class to capture the lion's share of the monetary benefits.

The Limits to Cross-Class Solidarity

The working poor are not the only group with an interest in expanding social insurance. As Baldwin put it, "[T]he proletariat has had no monopoly on uncertainty or on an interest to ameliorate such circumstances"

(1990: 12). The middle class are also predisposed to supporting social insurance against risk, but their demands for social policy do not always match the preferences of the working poor. For example, wherever they appeared, the new middle classes enjoyed a relatively privileged position in the workforce, and thus full employment for them was a "peripheral concern" while it was of central importance for the working class (Esping-Andersen 1992: 31). While middle-class groups had incentives to ally with the poor to obtain larger welfare state protections, they also resisted efforts to expand non-contributory, pro-poor programs financed out of taxes, pushing instead for contributory schemes in which they were participants.

Consequently, in each period of red-white solidarity, tensions inevitably appeared between the universalism preferred by the middle classes and the more progressive demands of the working poor. In Germany following the Second World War, for example, alliance between the middle class and working class splintered over means testing of unemployment assistance (Mares 2003). In Britain, the red-white coalition broke apart following the First World War, when Labour ascendancy created divisions within the Liberal Party over the role of trade unions funding political parties, as well as social programs that targeted the increasingly vocal working poor. In *The Strange Death of Liberal England*, Dangerfield wrote of the middle-class reaction to David Lloyd George's support of reforms to the Health Insurance Act:

> "[H]e represented—or seemed to represent—all those dangerous and possibly subversive opinions which Liberalism, in its grave game of progress, was forced to tolerate… If his convictions had been otherwise than emotional, he would have been a Socialist by this time" (Dangerfield 1935: 29).

The story of welfare state building in industrialized nations, in sum, is that policymakers strove to dampen social unrest through the extension of benefits to the working poor, but at the same time, to accommodate the needs of the growing middle class by providing services for which they would be willing to pay taxes. The middle classes—initially including farmers, artisans, clerks, shopkeepers, and managers—each facing their own unique vulnerabilities, also had pressing needs for social protection, and the red-white alliance guaranteed the political success of those protections. With middle-class expansion, however, policy differences within the red-white alliance widened, with the middle class resisting most programs aimed at more dramatic income redistribution.

Implications

One of the enduring puzzles in the development of social protection around the world is the divergence between welfare-state development in high-income OECD, when contrasted with developing countries in this regard (Rudra 2003; 2010). Social protection in low- and middle-income countries today has evolved in an environment in which labor movements have found themselves in a weaker bargaining position relative to the emerging middle class. For developing nations with large surpluses of low-skilled labor, global pressures for lower unit-labor costs and, in many countries, repressive policies toward organized labor in the face of capital mobility, have left workers in a weaker relative bargaining position (Rodrik 1999; Bellin 2000; Berliner *et al*., 2015). Many workers end up in non-standard jobs, often in the informal sector (Auer 2006).[3] Another feature of developing countries is sharp sectoral cleavages between workers within sectors facing shocks—e.g., manufacturing sectors exposed to international competition—relative to workers in more protected

sectors. Distributional conflict between high- and low-risk sectors, rather than between classes, has led both workers and middle-class members facing high volatility to support social insurance programs that compensate them for losses of income (Zeitinoglu, *et al*. 2000). Meanwhile, workers and the middle class in low-risk sectors (such as teachers and nurses in the public sector) have opposed the programs that turn them into subsidizers of high-risk sectors (Mares 2005).

The size of the middle class has two effects—direct and indirect—on poverty. The direct effects reflect the composition and structure of the economy. Comparing two countries with the same income levels, the one with the larger middle class would have lower poverty because the middle class would be a source of entrepreneurship and small enterprise creation, resulting in opportunities for more employment and higher wages. Similarly, middle-class consumption contributes to aggregate demand and more economic growth. Additionally, improvements in agricultural productivity on the part of middle-class family farmers can result in lower food prices paid by the poorest.

The indirect effects take place through middle-class efforts to expand the social protection regime. It follows that cross-class alliances supporting expanded social protection are also more likely in countries where the middle class has significant political influence. Marginalized groups may be critical political allies for middle-class groups vying for benefits. For the poorest citizens, middle-class allies are needed to maintain critical support for social programs. As the middle class expands, however, we expect the red-white alliance to fray for two reasons. First, as additional programs are added to the social protection regime, there is a natural tendency for social planners, in order to restrain costs, to shift toward means-testing or other forms of targeting of social assistance programs in order to sep-

arate the non-poor from the poor. These programs then quickly lose the political support of the middle class, who have little stake in policies from which they derive little benefit and become quantitatively modest in size (Besley and Kanbur 1990; Gelbach and Pritchett 2002). Second, there is a parallel tendency for middle-class groups, as their political weight increases, to rely less on their solidarity with the poor, and to capture a larger share of the benefits of social policies by placing a greater emphasis on contributory social insurance programs.

MEASUREMENT AND DATA

The Middle Class and the Extreme Poor

E. P. Thompson's classic, *The Making of the English Working Class,* argued that class formation was inextricably linked to emerging occupational categories and the risks they faced (1964). In fact, just as the industrial revolution sharpened the political identity of the working poor, it also catalyzed the rapid expansion of the middle class. As a social category, the "middling sort" always referred to a broad band of the population, but this diversity increased following industrialization. The period saw a rise in small entrepreneurs, retail merchants, clerks, managers, and salaried professionals to staff banks, insurance firms, shipping companies, and railways. Industrialization also saw the massive expansion of municipal and local governments to manage growing cities, providing occupations for civil servants, teachers, nurses, doctors, lawyers, and public officials.

Although the middle class is usually thought of in socio-political terms, we rely on an economic definition to measure its size, given that a defining feature of middle-class status is a certain degree of economic stability and resilience to shocks. Following Kharas (2017), we define the middle class as those living on between $11 and $110 a day (all figures in 2011 PPP terms, equivalent to the more commonly used $10 to $100 in 2005 PPP terms).[4] The key difference between our approach and that of others is the use of an absolute band, common across countries, rather than a relative band (e.g. middle three quintiles). Among others using an absolute band, our upper threshold of $110/day is higher compared to, e.g., the $50/day threshold used by Ferreira, *et al*. (2013), López-Calva and Ortiz-Juarez (2011), and Milanovic and Yitzhaki (2002). This

higher threshold is consistent with the idea of a "global" definition of the middle class, namely, households that have similar access to a basket of consumption goods regardless of where they live. In choosing the upper threshold, we note that in 2010, the average U.S. per-capita daily income was $98.77; at least some members of a "global" middle class should be able to enjoy the same purchasing power that the average American holds.

For the "extreme poor" we rely on the World Bank's definition—the so-called "dollar-per-day" threshold. In 2015, following 2011 PPP adjustments, the global extreme-poverty line was raised to $1.90 per day. The new line preserves the real purchasing power of the previous line (of $1.25 a day in 2005 prices) in the world's poorest countries.

We first assemble data on the share of total income accruing to each centile of the population for each country for which data are available and use this to estimate the middle-class headcount. Our data are from the World Bank's global poverty monitoring *PovCalNet* database (for 1990 onwards), and Bourguignon and Morrison (2002) (for distributions in the period 1870 to 1990). The data between surveys is interpolated to reflect the path of real household expenditure (where available) or of GDP growth. Sources for this are the World Bank's *World Development Indicators* measure of household expenditure in 2011 PPP terms, and the *Maddison Project* database (Bolt and van Zanden 2014). We also use population data from the *Maddison Project* and from the U.N. Population Division.

From these data, we generate a distribution of income and consumption shares for all countries for which they are available, covering 1820-2015. Following Datt (1998) we then transform these distributions into parameterized, beta Lorenz curves for each country.

These parameters are then used to calculate both the share of the middle class ($11 to $110) and of the extreme poor (<$1.90) in the population. Full details on the methodology used to calculate the middle class and the extreme poor are in the appendix.

Figure 1 shows the trends for the size of the middle class, and the percent of extreme poor in the population, between 1870 and 2000 for current OECD and non-OECD countries. Both have seen rapid expansion in the middle class and falls in extreme poverty. The middle class surpassed the poor in advanced, industrialized nations in about 1920, but this crossover has only happened very recently in developing countries, within the past decade. For comparison, we add the percentage of agricultural land held as family farms from Vanhannen (1997; 2005). This has been used elsewhere as an historic proxy for the size of the middle class (Boix 2003; Easterly 2007; Houle 2009). Our measure of the middle class mostly conforms to the family farms measure across OECD and non-OECD countries, although the percentage of family farms does appear to "top out" at approximately 65 percent in OECD countries and at about 40 percent in developing countries.

Figure 2 shows the relationship between extreme poverty rates and GDP per capita for advanced and developing countries, at equivalent income levels, smoothed over five year periods. The data in span country-years between 1820 and 2015. The first graph indicates that, at every level of per-capita income, today's developing countries have rates of extreme poverty that are 5-10 percentage points higher than today's rich countries. This gap can be seen—dramatically, in some cases—in the bottom graph, which compares five richer and five poorer countries. Once again poorer nations consistently suffer from higher rates of extreme poverty than OECD counterparts at each comparable income level (with the exception of China and India in earlier years).

Social Protection

We assemble two datasets—one historical, another contemporary. For the historical data, we rely on: (i) benchmark data on social spending across a number of countries from 1880 to 1930, as detailed in Lindert (2004); (ii) OECD data on social spending covering OECD countries between 1930 and 1980; (iii) OECD data on social spending—with adjustments to the

Figure 1. The Middle Class and Extreme Poverty, 1870 – 2010
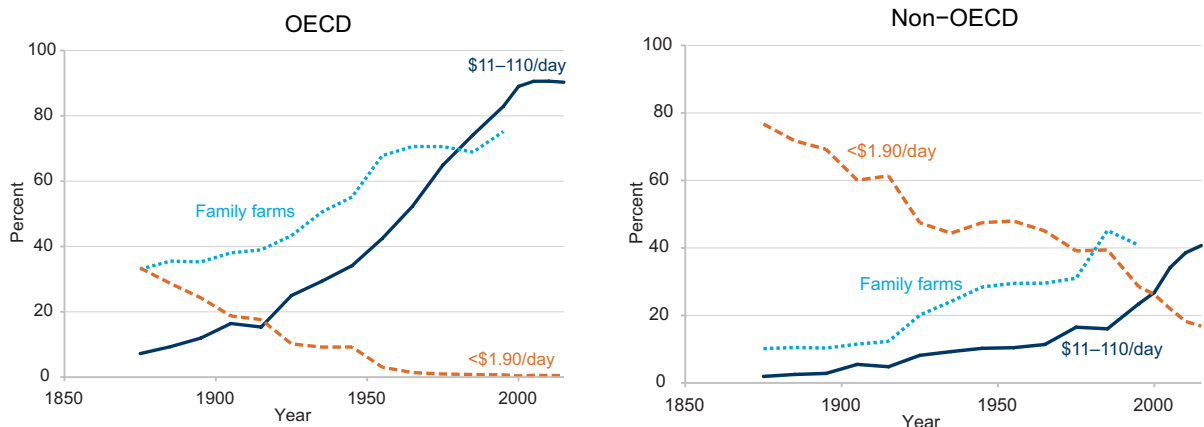
Figure 2. Poverty and Income for OECD and non-OECD Countries
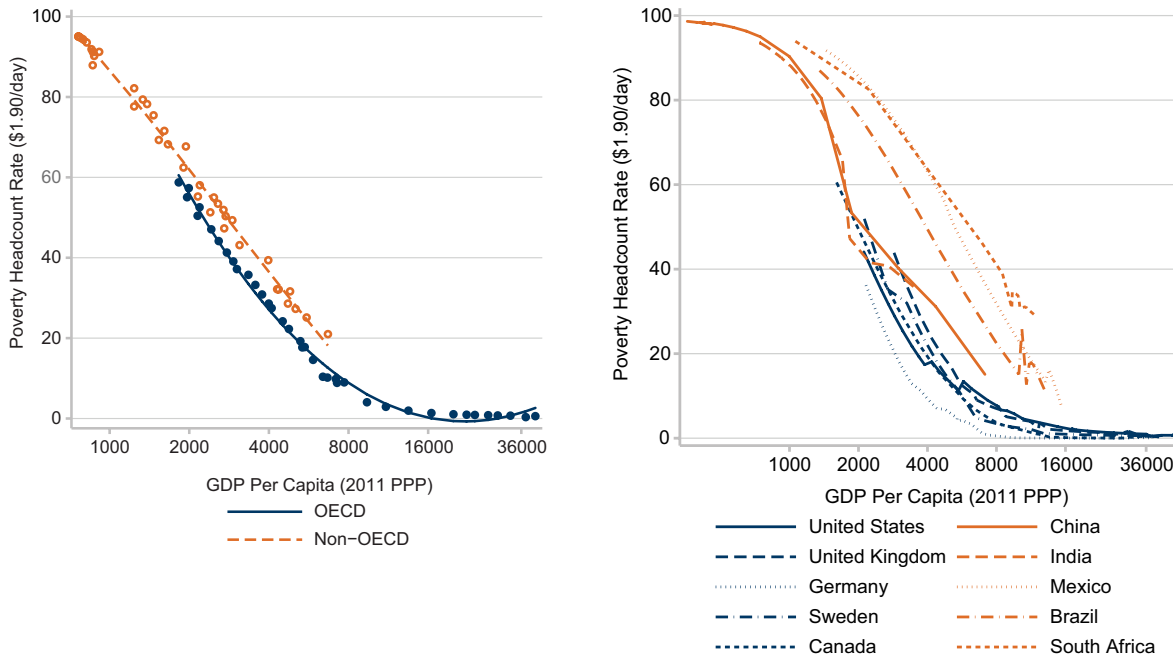
methodology used for the 1930-1980 data, covering OECD countries from 1960 to the present; and (iv) the World Bank's data on social spending comprising public health, education, and welfare expenditures, between 1960 and 2000.

Our contemporary data relies on the World Bank's *Atlas of Social Protection—Indicators of Resilience and Equity* (ASPIRE) database for indicators of social protection, covering a sporadic number of years between 2004 and 2011. We rely on a simple measure of total expenditure on all forms of social protection, as well as measures of coverage of various components of social protection, i.e., the percentage of population participating in social protection and labor programs (including direct and indirect beneficiaries) by program type.

Programs are divided into social assistance and social insurance. Social assistance consists of non-contributory programs that generally involve transfers targeted toward the poor, such as cash transfers, in-kind provisions, subsidies, fee waivers, (non-contributory) pensions, as well as public works and workfare. By contrast, social insurance refers to contributory programs aimed at reducing exposure to risks, including old age, survivors', and disability pensions, along with employment-related benefits such as paid leave for sickness, parental benefits, as well as health and injuries benefits.

METHODS AND RESULTS

The data are used to investigate the impact of the middle class on extreme poverty, mediated through social spending. We also review the effect of the middle class on the level and composition of social assistance and social protection programs.

Our benchmark specifications take a simple interactive form:

$$H_{i,t}^{P} = \beta_0 + \beta_1 H_{i,t-1}^{M} + \beta_2 s_{i,t} + \beta_3 (H_{i,t-1}^{M} \times s_{i,t}) + \beta_4 \mathbf{X}_{i,t} + \beta t_{i,t} + \varepsilon_{i,t} \qquad (1)$$

Where H^P is the headcount ratio of the extreme poor in the population (those with consumption of less than \$1.90/day in constant 2011 PPP-adjusted dollars). H^M is the size of the middle class (consumption between \$11 and \$110 per day in constant 2011 PPP-adjusted dollars), s is any measure of social protection benefits per capita in natural logs, $\mathbf{X}$ a vector of controls, and t a trend. For controls, we include GDP per capita (also in constant PPP-adjusted dollars), total trade (gross imports + exports as a percentage of GDP) as a proxy for the effects of greater global integration and openness, and a Herfindahl index of ethnolinguistic fractionalization , where F_c is the fractionalization score for country c, and x is the fraction of ethnic group g in country c, on the assumption that ethnic fragmentation can influence poverty levels. We also include the Polity index of democracy, ranging from -10 (autocracy) to +10 (democracy), to allow for the fact that democratic governments may be more pro-poor (Ross 2006). As we have social spending data from four sources that may have differences in coverage, (Lindert 1994, old OECD, new OECD, and World Bank), we include dummy variables for each data source. All variables are indexed by country i and time period t, and ε is a random, i.i.d. disturbance. We use lustrum (five-year) averages, thus each period represents a five-year timespan. We lag the middle-class indicator by one five-year period to control for potential simultaneity.

We begin with an analysis of long time-span data (roughly 1870 to 2015) using pooled ordinary least square (OLS) and fixed-effects models with error corrections for contemporaneous and serial autocorrelation, where we model the error term as a first-order autocorrelated AR(1) process: $\varepsilon_{i,t} = \rho \varepsilon_{i,t-1} + \mu_{i,t}$. We also estimate a more complex, dynamic-panel model using a system-generalized method of moments (GMM) estimator that is well suited for persistent cross-country, time-series data, and which can also address endogeneity concerns regarding some of our independent variables.

Panel Regression Results

Our benchmark cross-national types of time-series panel regression results are presented in Table 1: pooled OLS, OLS with fixed effects, and system GMM.[5] In column (1) we show results from a pooled OLS regression with error correction for contemporaneous correlation as suggested by Beck and Katz (1995). We also structure the within-panel error as an AR(1) process to correct for country-specific serial correlation. Column (2) shows results from a standard fixed-effects regression where the disturbance is, similarly, modeled as first-order autoregressive term. Both sets of results show that the independent effects of middle-class size and per-capita social spending reduce extreme poverty. These effects occur across as well as within countries over the period. The effect of the interaction term combining middle-class size and social spending, however, is positive on poverty, indicating that the negative effect of social protection on poverty reduction gets smaller as the middle class expands. This

interactive relationship is graphically presented in Figure 3, in which we can analyze marginal effects based on the error-correction regressions in columns (1) and (2). The graph on the left is derived from the pooled OLS results, while the one on the right is from our fixed effects estimates. In both cases, the marginal effect of social spending per capita on the poverty headcount is negative. However, as the middle class approaches 30 percent of the population, the effect of social spending on poverty approaches zero. Thereafter, the effect reverses itself, although the errors are much larger given the small number of countries where the middle class is larger than 60 percent.

Other variables behave as expected. Average per-capita income provides a large-magnitude effect on

Table 1. Extreme Poverty and the Middle Class, Panel Results

	(1)	(2)	(3)
	Panel-corrected standard errors	Fixed effects	System GMM
Middle class headcount ratio (% of population)	-1.064*** (0.134)	-0.565*** (0.103)	-0.955*** (0.145)
Social spending/capita (US$, Ln)	-4.574*** (0.476)	-2.890*** (0.587)	-5.333*** (1.957)
Middle class × Social spending	0.163*** (0.015)	0.091*** (0.012)	0.142*** (0.016)
Polity score	-0.102 (0.093)	-0.220** (0.085)	-0.370* (0.214)
Trade (% of GDP)	-0.057** (0.022)	-0.009 (0.024)	-0.073 (0.050)
GDP/capita (US$, Ln)	-16.639*** (2.211)	-19.205*** (2.535)	-12.858*** (4.131)
Ethnic fractionalization	8.195*** (3.040)		6.302 (5.787)
Trend	-0.035 (0.022)	0.101*** (0.010)	0.052 (0.062)
N	676	575	676
n	111	105	111
R^2	0.804	0.767	
ρ	0.603	0.691	
Country-fixed effects	no	yes	no
Region-fixed effects	yes	no	yes
$p > χ2$, F	0.000	0.000	0.000
AR(2) test (p-value)			0.738
Hansen's J (p-value)			0.958

Notes: Dependent variable is share of population living below $1.90/day (2011 PPP-adjusted US$). Estimates are generated with OLS with errors corrected for contemporaneous correlation and within-panel first-order autocorrelation in parentheses in column (1). Column (2) presents results from a within-country estimator (with fixed effects) where the disturbance term is first-order autoregressive, and with errors clustered at the country level in parentheses. Results from a dynamic two-step system-GMM estimation, with robust standard errors in parentheses, are in column (3), with two lags (one and two 5-year periods). Intercepts are estimated but not reported. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Figure 3. Middle-Class Size and Social Spending, Interactive Effects
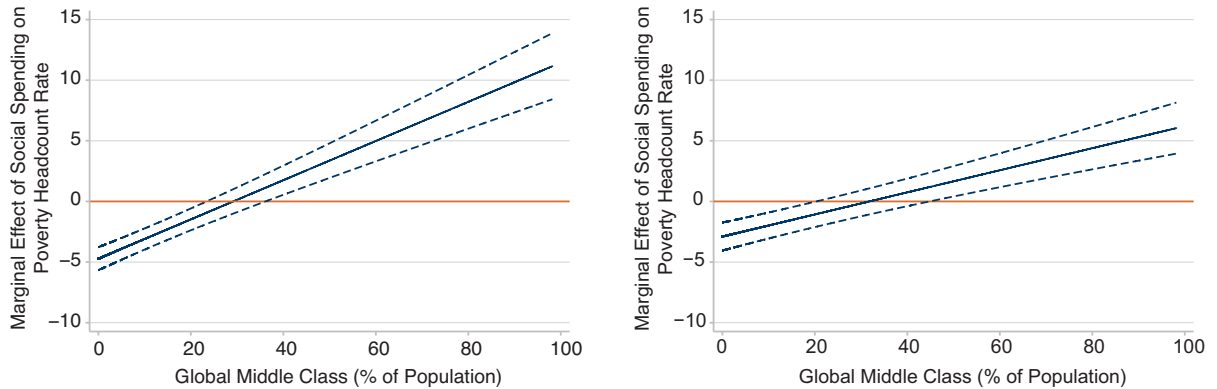
Note: 95% confidence intervals

poverty reduction, and democracy does appear to be "good for the poor" in terms of reducing poverty. Ethnically fragmented states, by contrast, exhibit greater poverty, confirming findings of the past two decades linking fractionalization to lower long-term growth rates (Easterly and Levine 1997; Alesina *et al*., 2003). In our first set of results, trade is also associated with lower poverty, although this result is not stable across specifications; we do not see evidence, however, that globalization has harmed the poor.

The system-GMM estimator uses lagged values of variables in levels as instruments in a first-difference equation, along with lagged differences of variables as instruments in a levels equation in a system (Arellano and Bond 1995; Blundell and Bond 1998; Roodman 2006). The system-GMM estimator yields efficient estimates in the presence of time-invariant unobserved heterogeneity, and provides consistent and unbiased estimates in the presence of endogeneity where there is a dynamic relationship between current values of the explanatory variables and past values of the dependent variable. We allow lags of middle-class size, social spending, and the interactive term to enter the system-GMM instrument matrix. Our results are in col-

umn (3).[6] These results are consistent with the panel estimators in the previous columns, showing a strong, significant effect of social spending on poverty reduction, but one that is declining in as the middle class expands. AR(2) tests indicate an absence of serial correlation in second differences, with which estimates would be biased. A second test, the Hansen's *J* test of over-identifying restrictions does not reject the null of the exogeneity of the instruments, indicating that our instrument set is valid.

Causal Mediation Analysis

These baseline regressions support the conclusion that social spending and middle-class size impact poverty levels independently and in combination with each other. Our findings of the ameliorative effect of social spending on poverty confirm a range of analyses showing welfare gains by the poor from anti-poverty social policy (Barrientos 2013; Lustig et al., 2012; Fiszbein, Kanbur, and Yemtsov 2014). However, there is extensive historical evidence, as we have seen, of the role of the middle class in demanding greater social protection for itself. If so, we would need to determine

the extent to which the effect of middle-class size on poverty is "mediated" through the social-spending channel.

In the classic framework, mediation analysis is conducted in a system of three equations: the outcome is regressed on a "treatment" indicator, the mediator is regressed on the treatment, and the outcome is then regressed on both the treatment and the mediator:[7]

$$E(H_{i,t}^{P} | H_{i,t-1}^{M}), \mathbf{X}_{i,t}) \quad (2)$$
$$E(s_{i,t} | H_{i,t-1}^{M}, \mathbf{X}_{i,t}) \quad (3)$$
$$E(H_{i,t}^{P} | H_{i,t-1}^{M}, s_{i,t}, \mathbf{X}_{i,t}) \quad (4)$$

where the variables H^P, H^M, and s, and the vector $\mathbf{X}$ are identical to those specified in equation (1) above.

A mediation path, to be valid, requires "sequential ignorability"—first, that the treatment is "ignorable" given observed confounders and second, that the mediator is "ignorable" given both the treatment and confounders. In randomized experiments, of course, the first condition is satisfied. In observational analyses, however, regression techniques requiring control variables related to the treatment are required to satisfy this assumption. For the second condition, observational analyses require controls for variables related to both the mediator and the outcome.

In our example, the first assumption implies that that no confounding differences between countries with different middle-class sizes exist once controls are included to correct for confounding factors. The second condition presupposes that different levels of social spending occur randomly within groups of countries that are roughly similar in terms of middle-class size. These conditions, especially the ignorability of the mediator, are extremely onerous and can never be fully verified with observational data where there are

multiple potential mediators—some of which may be unobserved. Mediation tests constitute the best available method for investigating causal mechanisms in a cross-country context, but sensitivity analysis is needed to evaluate the robustness of results to the existence of such confounders. Imai, *et al*. (2010) argue, given that the errors co-vary across equations (2), (3), and (4), a linear system of equations does not satisfy the sequential ignorability assumption. As an alternative, therefore, they rely on the non-parametric technique that resolves some of the problems surrounding the assumptions required to identify causal mechanisms (Imai, *et al*. 2011).

Our mediation analysis is presented in Table 2, in which we consider whether the effect of middle-class size is mediated through different channels. The coefficients in column (1) are consistent with our baseline results that middle-class size reduces extreme poverty. The average causal mediated effect (ACME) and average direct effects (ADE), which represent the sample averages of the causal and direct effects, respectively, confirm that social policy constitutes an important mechanism for poverty reduction. We find that over one-half of the effect of middle-class size on poverty reduction is mediated through per-capita social spending.

In columns (2) and (3) we analyze the degree of universalism in welfare states, measured as an index representing the legal eligibility of citizens to receive benefits in each country for six types of benefits: pensions, unemployment compensation, maternity, sickness, family allowances, and disability (Knutsen and Rasmussen, 2017). This universal welfare index is scored from zero to 54 representing the sum of all six scores (each is scored from zero to 6). The results indicate that universalism is also a mediating channel, although the effect is weaker.[8]

Table 2. Poverty and the Middle Class, Causal Mediation Analysis

	(1)	(2)	(3)	(4)
Middle-class size	-0.227*** (0.045)	-0.550*** (0.043)	-0.550*** (0.043)	-0.499*** (0.034)
Polity	-0.417*** (0.122)	-0.379*** (0.119)	-0.377*** (0.119)	-0.697*** (0.113)
Ethnic fractionalization	12.226*** (2.702)	10.895*** (2.794)	10.819*** (2.793)	14.519*** (2.616)
Trade (% of GDP)	-0.018 (0.026)	-0.131*** (0.030)	-0.132*** (0.030)	-0.046 (0.029)
GDP/capita (US$, Ln)	-10.805** (4.608)	-24.479*** (5.006)	-24.437*** (5.003)	-29.031*** (5.224)
Trend	0.227*** (0.034)	0.093*** (0.027)	-0.115*** (0.026)	0.031 (0.023)
Mediator:				
Social spending/capita (US$, Ln)	-7.358*** (0.572)			
Universalism index		-0.761*** (0.091)		
De-trended universalism index			-0.766*** (0.091)	
Government revenue (% GDP)				0.217*** (0.075)
N	678	887	887	805
R^2	0.653	0.522	0.522	0.495
ACME	-18.181***	-40.944***	-15.411***	-75.141***
Direct Effect	11.759***	-25.809***	-29.281***	-57.059***
Total Effect	-6.422***	-66.754***	-44.692***	-132.200***
Total Effect Mediated	2.831***	0.613***	0.345***	0.568***

Notes: Dependent variable is share of population living below \$1.90/day (2011 PPP-adjusted US$). Estimates are from linear equations, with robust standard errors in parentheses. Mediating variables for the causal effect of middle class on poverty are estimated using the non-parametric procedures described in Imai, *et al*. (2010). *P* values for mediating effects are derived from 95 percent confidence intervals based on non-parametric bootstrapped errors with 1,000 resamples. Intercepts are estimated but not reported. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

But with 20 percent of the middle-class effect on poverty mediated through universalism, it seems as if this captures some of the indirect effect of the middle-class impact on poverty through social spending. Given that universalism is strongly increasing for each country over time (as legal changes expand the range of eligible citizens), we regress universalism on a trend with fixed-effects, and generating the residual. This residual can be considered a "de-trended" universalism index. The de-trended index appears to be identical to the regular universalism channel as a mediator, suggesting that the effect is not due to some unobserved, temporal factor. Finally, we examine total per-capita government expenditures as a channel given that general government spending can also affect the level of poverty. Expenditures are a weak mediating channel,

Table 3. Poverty and the Middle Class, Causal Mediation Analysis by Sub-Sample

	(1) OECD	(2) Non-OECD	(3) Democracy	(4) Autocracy	(5) OECD	(6) Non-OECD	(7) Democracy	(8) Autocracy
Middle-class size	0.118**	-0.258***	-0.293***	-0.571***	-0.124	-0.756***	-0.506***	-1.164***
	(0.049)	(0.073)	(0.039)	(0.128)	(0.102)	(0.060)	(0.038)	(0.089)
Polity score	-0.433***	-0.135	-0.084	-0.094	-0.468*	-0.094	0.425**	-0.816***
	(0.157)	(0.169)	(0.186)	(0.334)	(0.280)	(0.147)	(0.195)	(0.235)
Ethnic fractionalization	-10.514***	17.897***	13.543***	8.300*	-14.656**	11.187***	17.032***	10.655***
	(2.706)	(4.126)	(2.792)	(4.896)	(6.348)	(3.328)	(3.447)	(3.554)
Trade (% GDP)	0.004	-0.092*	0.018	-0.290***	-0.081**	-0.225***	-0.042	-0.262***
	(0.018)	(0.048)	(0.024)	(0.057)	(0.039)	(0.040)	(0.031)	(0.043)
GDP/capita (US$, Ln)	6.074	-6.531	-17.183***	-14.383*	-6.951	-28.294***	-26.625***	-32.394***
	(6.726)	(6.029)	(5.198)	(7.512)	(14.866)	(5.593)	(5.890)	(6.547)
Trend	-0.021	0.119	0.229***	-0.381***	-0.212**	-0.037	0.200***	0.062*
	(0.042)	(0.073)	(0.034)	(0.112)	(0.095)	(0.037)	(0.031)	(0.036)
Mediator:								
Social spending/ capita (US$, Ln)	-5.467***	-8.285***	-4.442***	-10.812***				
	(0.526)	(0.928)	(0.585)	(1.159)				
Universalism index					-0.231	-0.888***	-0.538***	-1.096***
					(0.150)	(0.124)	(0.089)	(0.151)
N	302	376	417	211	136	621	400	487
R^2	0.689	0.626	0.621	0.655	0.608	0.508	0.599	0.486
ACME	-18.181***	-40.944***	-15.411***	-75.141***	2.061	-18.111***	-6.661***	-24.999***
Direct Effect	11.759***	-25.809***	-29.281***	-57.059***	-12.408	-75.628***	-50.588***	-116.373***
Total Effect	-6.422	-66.754***	-44.692***	-132.2***	-10.347	-93.739***	-57.249***	-141.372***
Total Effect Mediated	2.831	0.613***	0.345***	0.568***	-0.199	0.193***	0.116***	0.177***

Notes: Dependent variable is share of population living below $1.90/day (2011 PPP-adjusted US$). Estimates are from linear equations, with robust standard errors in parentheses. Mediating variables for the causal effect of middle class on poverty are estimated using the non-parametric procedures described in Imai, *et al*. (2010). *P* values for mediating effects are derived from 95 percent confidence intervals based on non-parametric bootstrapped errors with 1,000 resamples. Intercepts are estimated but not reported. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

and explain less than one-tenth of one percent of the total middle-class effect.

In Table 3 we examine mediating effects by sub-sample, splitting the sample between OECD and non-OECD countries, and by democracies and autocracies. We focus on social spending and universalism.[9]

The causal mediated effects for both are the largest in non-OECD countries and in non-democracies. Over 60 percent of the effect of middle-class size on poverty reduction is mediated in later-industrializing nations, while 57 percent of the effect is mediated through social spending in non-democratic states.

Sensitivity Analysis

These findings, as indicated, are meant to be suggestive of possible causal mechanisms rather than conclusive. Sensitivity analysis probes the sequential ignorability assumption, evaluates the validity of findings under potential violation of the sequential ignorability rule, and thus provides benchmarks for interpreting mediation results causally (Imai et al., 2011). Whenever the assumption is not rejected, estimated mediation effects can be interpreted as valid causal mediation effects. If mediation results are sensitive, they can change substantially when the sequential ignorability assumption is violated. The sensitivity parameter ρ (rho), measures the correlation between the errors in the mediation model and the error in the outcome model. This correlation arises if unobserved confounders affect both mediator and outcome variables, because these variables are part of the two error terms. The sequential ignorability assumption implies that ρ equals zero.

Figure 4 shows the sensitivity of the ACMEs to violations in sequential ignorability. The mediation effects are plotted against deviations in the sensitivity parameter from zero. The dashed lines show the ACME as estimated. Where the ACME = 0, if $|\rho|$ is large, then the implication is that some unobserved confounder is biasing the ACME estimate. We see in all graphs, that where ACME = 0, ρ is between 0.10 and 0.40—indicating relatively good sensitivity to violations in critical conditions for valid causality.

Determinants of Current Social Protection in Developing Countries

Our analyses indicate that social policy plays a critical role in the effect of middle-class size on poverty. Our panel results combined with our causal-mediation analysis, moreover, raises the question of whether the types of social policies—and the specific social program expenditures associated—are differentially influenced by middle-class size. To what extent does the expansion of the middle class benefit the poorest in terms of social benefits? More importantly, to what extent is the middle class capturing a greater share of those benefits? To examine these effects more directly, we turn to an investigation of more recent social protection measures in developing countries. From the World Bank's Atlas of Social Protection, we can estimate the effects of middle-class size on the distribution of the benefits of social protection by quintile. Figure 5 shows the distribution of benefits from two types of social programs, social "insurance," covering programs that minimize the negative impact of economic shocks, and social "assistance," or non-contributory transfers in cash or in-kind that are usually targeted at the poor and vulnerable.[10] The top graph shows average benefits per person by program and by quintile, while the bottom graph shows coverage (as percent of the eligible population). The figure shows a sharp regressivity of social insurance, by which the top quintile captures three times the benefits going to the lowest quintile. It also shows that social assistance is only mildly progressive, despite the coverage ratios being more so—with almost 45 percent of the bottom quintile being covered by some form of social assistance.

These results are not unusual. The higher average benefits that accrue from social insurance programs to the top quintile reflects the basic design of such programs to link benefits and contributions to income levels. Thus, higher wage earners pay more into social insurance schemes and correspondingly receive more. Looking at the lower panel, it is also clear that social assistance coverage declines with income, as is to be expected.

Figure 4. Average Causal Mediation Effects, Sensitivity to Violation of Sequential Ignorability
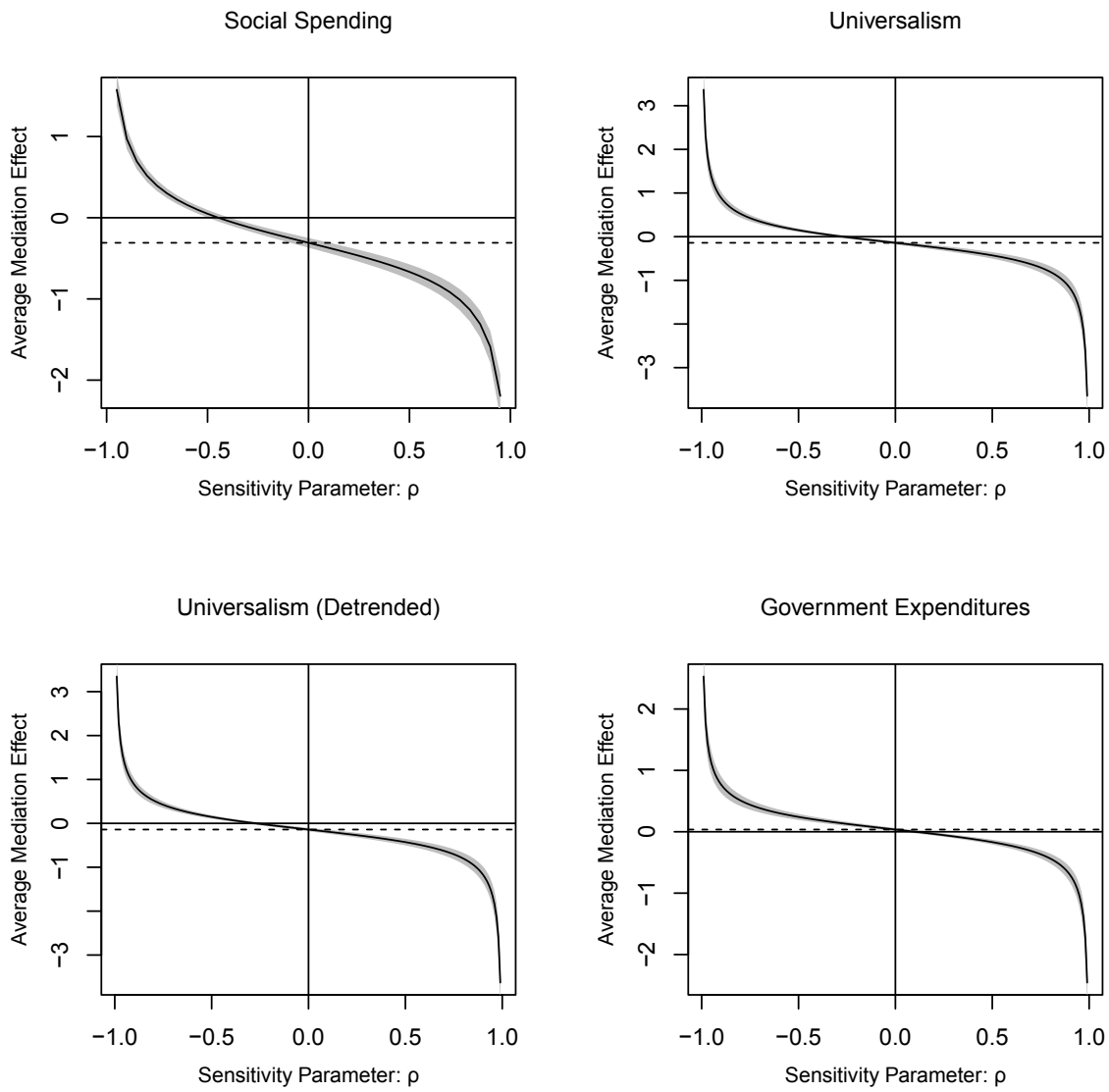
Notes: Graphs average causal mediation effect (ACME) plotted against sensitivity parameter ρ, which is the correlation between the error terms in the mediator and outcome regression equations, for different mediators. Dashed lines represent show the estimated ACME when the sequential ignorability assumption holds. The shaded region is the 95 percent confidence interval for each value of ρ.

Figure 5. Distribution of Per-Capita Social Benefits and Coverage by Quintile
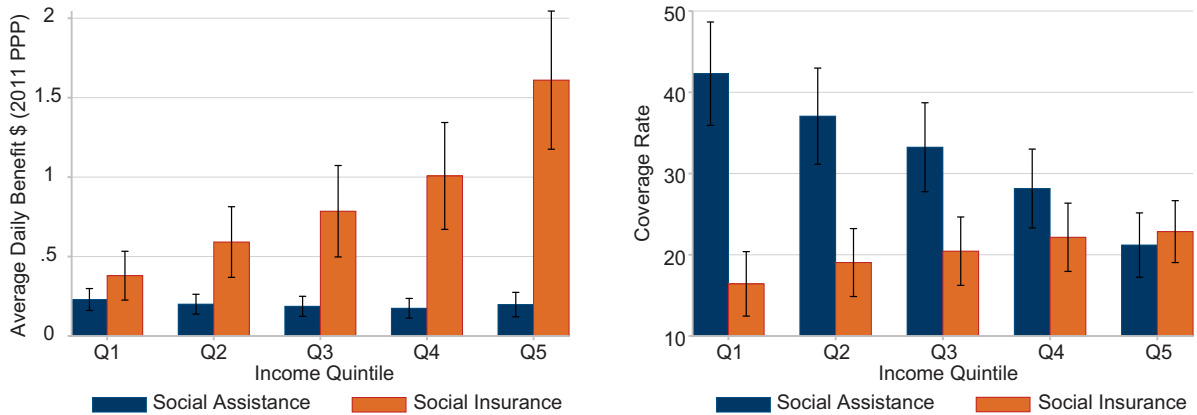

Figure 5 reveals how hard it is to design steeply progressive programs. In social insurance, the only way to increase progressivity is to increase the coverage of lower quintile populations sharply, perhaps through designs that recognize and account for informality of the labor force—something that requires capacities that most states in poorer nations do not possess. In social assistance programs, by contrast, the absolute amounts of benefits are modest, often because they rely on general budgetary resources for which there are many competing demands.

We analyze the quantitative impact of the middle class on the distribution of benefits through a seemingly unrelated regression model that allows us to estimate the allocation to the top and bottom quintile at the same time. The results are presented in Table 4, in which average absolute benefits per capita to the bottom and top quintiles are estimated simultaneously by a common set of independent variables (including middle-class size), and where errors are allowed to co-vary across equations. Middle-class size has a positive effect on total benefits accruing to the lowest and the top quintiles, but the effect on the top quintile is three times as strong as the effect on the lowest. When we examine effects on social assistance and social insurance separately, we see that a larger middle class boosts benefits to both groups but no longer has a significant effect on social assistance benefits to the top quintile. The effect on social assistance to the poorest is quantitatively small; meanwhile, the middle-class effect on social insurance for the richest is eight times as strong, and four times as strong as the effect of social insurance to the poorest. We see strong evidence, from the foregoing, that although the middle class is boosting benefits to the poorest, it is enabling the lion's share of benefits to be captured by the richest.

Table 4. Benefits per Capita, Seemingly Unrelated Regressions

Dependent variables:	Total Benefits		Social Assistance		Social Insurance	
	(1)	(2)	(3)	(4)	(5)	(6)
	Bottom quintile	Top quintile	Bottom quintile	Top quintile	Bottom quintile	Top quintile
Middle-class headcount	0.014*** (0.004)	0.037*** (0.010)	0.004*** (0.002)	0.001 (0.002)	0.008*** (0.003)	0.032*** (0.011)
Polity score	0.027** (0.012)	0.051 (0.031)	0.017*** (0.005)	0.010 (0.006)	0.017* (0.010)	0.055 (0.034)
Ethnic fractionalization	-0.115 (0.241)	-0.033 (0.643)	-0.022 (0.098)	-0.113 (0.120)	-0.099 (0.200)	0.018 (0.706)
Trade (% GDP)	0.008*** (0.003)	-0.002 (0.007)	0.003*** (0.001)	0.002 (0.001)	0.004** (0.002)	-0.005 (0.007)
GDP per capita (Ln)	-0.064 (0.108)	0.162 (0.290)	0.062 (0.049)	0.107* (0.059)	-0.075 (0.089)	0.189 (0.315)
N	121	121	107	107	112	112
n	78	78	69	69	74	74
R^2	0.657	0.565	0.556	0.245	0.629	0.533
Region-fixed effects	yes	yes	yes	yes	yes	yes

Notes: Dependent variables are average benefits per person for the bottom quintile and for the top quintile by country (in 2011 PPP-adjusted US dollars), estimated with seemingly unrelated regressions, with standard errors in parentheses. Intercepts are estimated but not reported. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

CONCLUSION

Today's developing countries have a higher incidence of extreme poverty than advanced economies did at equivalent income levels. The formation of welfare states in advanced, industrialized economies highlights the pivotal role of the growing middle class, following industrialization, in forming coalitions with the working poor to secure social benefits—the so-called "red-white" alliance. We examined the effect of middle-class size and social spending on poverty rates across richer and poorer countries, using data covering almost a century and a half. Our results show a strong, significant, and negative combined effect of middle-class size and social spending on poverty when controlling for average wealth and other country-specific factors. This effect, however, is diminishing in middle-class size; the larger the middle class, the smaller is the impact of social spending on reducing poverty.

Causal-mediation analysis confirms that the middle class has both a direct and indirect effect on reducing poverty, the latter being mediated through social spending. About half the impact of the middle class on poverty takes place because the middle class affects the size and composition of social programs. Given the inherent difficulties in identifying mediation channels in observational studies, we undertake a number of robustness checks that yield similar results.

An examination of the history of the red-white alliance, moreover, suggests that there is an inherent tension. A larger middle class supports more social spending, but it is also more likely to demand programs in which they benefit most. As the middle class grows, the mix of social programs shifts toward those whose benefits mostly accrue to the highest quintile (where most of the middle class in developing countries reside). Our results from estimates of the different components of social protection in today's lower- and middle-income countries confirms this expectation. We find that a growing middle class expands transfers to the poor, but the benefits in terms of social insurance—which disproportionately benefit the upper quintiles in which the middle class in developing countries resides—increases three times as fast. Coverage of social assistance is progressive, but absolute amounts devoted to these programs are small and the incidence of benefits is neutral—similar absolute amounts accrue, on average, to people regardless of their place in the income distribution. By contrast, larger amounts are spent on social insurance, but the incidence of benefits is highly regressive. The role of the middle class is found to be significant in these trends.

Our findings carry implications for the recent debate on the merits of targeting in anti-poverty programs versus a universal approach. Targeted programs have detractors. Identifying precisely who is and is not poor remains complicated due to unreliable data, imperfect information, and a lack of fiscal capacity in poor countries (Brown, Ravallion, and van de Walle 2016; Jhabvala and Standing 2010; Mkandawire 2005). Others have pointed out the ability of politicians to convert targeted programs into instruments of patronage (Schady 2000; Chisala and Hempill 2014). On the other hand, universal programs are far more costly, although advocates of a universal or basic income guarantee argue that a fixed transfer to all adult citizens regardless of income can entail lower administrative costs while avoiding some of the distortions in incentives associated with targeted transfers (Ravallion 2016).[11]

Our results suggest that historically middle-class support is necessary for poverty reduction but limits the progressivity of such programs. New technologies, like cash transfers through mobile money, with very

low administrative costs could offer the possibility for breakthroughs in social assistance but they will have to be properly "marketed" to the middle class to counteract the often-widespread belief that poor households will misuse income transfers, and that welfare creates dependency (Harvey, 2007; Holmes and Jackson, 2007). Indeed, this was one of the great achievements of conditional cash transfers. But there may be limits to such an approach. In many low- and middle-income countries, the growing middle class has little stake in a system of social assistance from which they are excluded (Subramanian 2013). In these countries, the middle classes send their children to private schools, use private healthcare, dig their own boreholes for water, and buy their own generators. That degree of middle-class exit means there are few demands by the middle classes to improve the public provision of services. In these cases, moving toward a universal system in which the middle class have a stake can potentially rebuild the "red-white," cross-class alliances. "Universalizing" social insurance by, for example, changing eligibility rules in order to cover a larger proportion of those in the lower quintiles and ensuring that design includes the self-employed and those in the informal sector, could simultaneously secure critical middle-class support while providing greater gains for the poorest.

These two ideas—building support for a larger volume of social assistance and redesigning social insurance to reduce the degree of regressivity—have the potential to reduce extreme poverty sharply and sustainably if presented as a package that benefits both parts of the "red-white" alliance.

ENDNOTES

1. This is to be expected, as contributions are also disproportionately made by the richest quintile.

2. In France, in contrast to the German case, the middle classes were more radicalized, and "white-collar unionism" was more widespread. According to Suh: middle-class shopkeepers participated in the founding of the Confédéracion Générale du Travail (CGT), traditionally under strong communist influence; postal workers played an important role in the public-sector labor movement; white-collar workers participated in one of the first post-World War I general strikes; and even bank workers became unionized after 1919 (Suh 2002).

3. "Nonstandard jobs" refer to jobs that tend to be temporary, time-limited contracts, often part-time, and offer limited job protections, such as from dismissal.

4. Note that income/consumption range is based on 2005 PPP adjustments. Under 2011 PPP adjustments, the gap is actually $11 to $110 per day.

5. Table 1 presents results using 5-year averages constructed from country-year incomes that are interpolated between years for which Bourguignon-Morrison data exist, and between survey years since 1980. All results in Table 1 are robust to the exclusion of interpolated country-years.

6. To avoid over-fitting by having too many instruments, we limit lags of potentially endogenous variables to two.

7. In order to claim mediation, the treatment should precede and be significantly related to the outcome and the mediator in the first two regressions. In the third regression, the treatment and the mediator precede the outcome, the mediator is significantly related to the outcome, and the effect of the treatment has reduced or disappeared compared to the first regression. Indirect or mediation effects are captured by this reduction. Direct effects are treatment effects in the third regression.

8. We note that the effect of universalism on poverty is negative, implying that targeting does not necessarily yield stronger effects on poverty reduction. Although countries at the lower end of the scale may have weak or non-existent social protection of any kind, the higher end of the universal welfare index implies a lack of targeting via means-testing or group-identity (Rasmussen 2016).

9. We refer to the advanced, industrialized OECD members, i.e., excluding middle-income countries, countries that industrialized in the latter half of the 20th century (e.g., Israel and Korea), and the Eastern European states: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

10. Social insurance includes publicly provided or mandated insurance schemes against old age, disability, death of the main household provider, maternity leave and sickness cash benefits, and social-health insurance. Social insurance programs are contributory and beneficiaries receive benefits or services in recognition of contributions to an insurance scheme.

11. A claim made by those recently proposing a universal basic income (UBI) scheme for India is that it will actually be more pro-poor than the existing collection of "leaky," targeted anti-poverty programs. If the UBI replaces a series of poorly targeted subsidies, it can also remain budget neutral (Government of India 2017: 189-190).

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APPENDIX

This paper is built upon a database of country-by-country estimations of the poor and the middle class that was formed as described below. For each country, data on the income distribution, mean household expenditure, and population are needed.

The dataset covers all countries and territories (like Kosovo and the West Bank and Gaza) for which these variables were found. This covers 165 countries, representing 98 percent of the world's population in 2015, 96 percent of the world's GDP, and 97 percent of total world household expenditure.[1]

We assign countries to standard geographic groupings. Several clarifications: we assign Russia to Europe due to its population center lying much closer to Europe than Asia, Iran to the Middle East and North Africa, Australia and New Zealand to Asia Pacific, and Turkey to Europe in line with World Bank country groupings.

Our source for historical income distributions is Bourguignon Morrison 2002, who provide nearly global coverage from 1820 through 1990. From 1990 onwards, we use distributional data from the household surveys included in the World Bank's *PovCalNet* database. We supplement this in the case of four countries (New Zealand, South Korea, Zimbabwe, Myanmar) with household survey information available through the United Nations University World Institute for Development Economics Research (UNU-WIDER)

World Income Inequality Database (WIID). We use distributional data from household consumption surveys if available and household income surveys otherwise. In between years in which distributional data is available, we assume distributionally-neutral growth.

When calculating the size of the middle class, we use household expenditure data that is derived from national accounts. Our primary source of data from 1990 to 2015 is household expenditure in 2011 PPP terms taken from the World Bank's *World Development Indicators* database. We use GDP data from The Maddison Project Database as a guide to determine household expenditure in 2011 PPP from 1820 to 1990 (Bolt and van Zanden 2014). Assuming that household expenditures and GDP grow at the same rate, we apply the GDP growth rate to the earliest household expenditure data available in WDI to estimate historical household expenditures. These values, divided by population, are used as the mean consumption level in each country.[2] Use of national-accounts based household expenditure mean values helps overcome two problems. It imposes consistency across countries with household income surveys and those with household expenditure surveys. It also is one mechanism to distribute all sources of income to households within a country, thereby correcting for cross-country differences in the coverage of surveys, for example in the treatment of imputed housing services or self-employment income. This method is similar to that used by Pinkovskiy and Sala-i-Martin (2016).

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[1] The following countries with a population greater than 1 million that are excluded from this study either because of an absence of survey data or household expenditure information, or both: Bahrain, Cuba, Eritrea, North Korea, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Singapore, Somalia, Syria, and the United Arab Emirates.

[2] For countries with missing values for the mean, we use alternate sources. For Kiribati and Micronesia, we use current household final consumption expenditure in current LCU and then use the country-specific PPP conversion factor. For Papua New Guinea and Solomon Islands, we use the current Household Final Consumption Expenditure, PPP series and deflate to 2011 dollars. We use the survey mean in the case of Samoa, Marshall Islands, and Tuvalu.

When calculating the number of people in extreme poverty, we use household expenditure means derived from household surveys instead of from national accounts. National accounts tend to record higher consumption than surveys, a pattern that is due in large part to consumption by wealthier households that are not captured by surveys.[3] When the focus is on the upper end of the distribution, as when calculating the size of the middle class, it is preferable to use national account means because to do otherwise could result in significant amounts of household consumption being excluded from the analysis. However, surveys do effectively capture the bottom of the distribution, and survey non-response has little impact on poverty estimates (see for example Korinek, Mistiaen, and Ravallion 2006). We therefore use survey means instead of national account means to estimate poverty. This follows the World Bank's method for computing global poverty aggregates, which uses exclusively survey means (Ferreira et al 2015). As with the distributional data, we use household consumption surveys if available. In years in which data is not available, we impute household expenditures in 2011 PPP based on the growth rate of GDP, as described above. Population from 1980 to 2015, finally, is taken from United Nations Population Division, while earlier population data is from The Maddison Project.

Computing Breakdown of Household Expenditure

We use a beta Lorenz specification using the cumulative percent of population and of income from household surveys to estimate the full distribution of all households in each country. For estimation of distributional parameters and beta-Lorenz functional forms, see Datt (1998). The most common alternative, the general quadratic specification, returned occasional negative values of people living below some thresholds and so was rejected as an alternative. For each beta Lorenz curve, the survey mean was replaced by household expenditure per capita data drawn from the national accounts.

The latest household survey is used for each country in projections.

Once the distributions are known, it is possible to compute the percent of the population below any given threshold of expenditure using the following formula:

$$\Theta HCR_z^{\gamma}(1-HCR_z)^{\delta}\left[\frac{\gamma}{HCR_z} - \frac{\delta}{HCR_z}\right] = 1 - \frac{z}{\mu} \qquad (1)$$

Where z corresponds to the thresholds ($1.90 a day for the extreme poor, and $11 to $110 a day for the middle class in constant 2011 PPP-adjusted dollars), μ corresponds to the mean consumption per capita for a given country in a given year, and Θ, γ, and δ are parameters calculated from the cumulative percent of population and income of household surveys. See Datt (1998) for further explanation.

The headcount rate calculated based on $z = 1.90$ tells us directly the percent of the population living in extreme poverty. To find the percent of the population in the middle class, we subtract the percent living beneath the $11 threshold from the percent living beneath the $110 threshold.

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[3] See Deaton (2005) for an overview of the survey-national accounts discrepancy, and Bricker et al. (2016) for empirical evidence of missing top incomes in the United States.

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