International Studies Quarterly

International Studies Quarterly (2011) **55**, 887–908

Counting Calories: Democracy and Distribution in the Developing World[1]

Lisa Blaydes

Stanford University

and

Mark Andreas Kayser

Hertie School of Governance

How does regime type affect the poor? Are certain types of regimes better at translating economic growth into consumption for the world's least privileged citizens? We propose an alternative measure of transfers to the poor that is nearly universally available and innately captures distribution: average daily calorie consumption. In sharp contrast to the consumption of material goods or the accumulation of wealth for which humans have shown no upper bound on their ability to achieve, biological limits make it impossible for a small number of individuals to consume most of a nation's calories. Democracies and hybrid regimes—which combine elements of autocracy and democracy—are better at translating economic growth into total calorie consumption than autocracies and perform strikingly similarly in this regard; democracies outperform both hybrid regimes and autocracies, however, in converting growth into higher quality calories from animal sources.

Does democratic governance reduce inequality? Does it deliver material benefits to the poor? Recent years have witnessed a surge in interest in the relationship between democracy, income inequality, and the well-being of the materially least well-off. Research in this area has delivered a swath of findings associating democracy with lower inequality, better healthcare, more spending on education, and even rural electrification. Yet, the most notable feature of this research might be its failure to reach consistent results or to identify key mechanisms.

Since the influential theoretical results of Meltzer and Richard (1981) demonstrated that inequality should raise redistribution in democracies, much empirical research has focused on the paradox of redistribution: explaining why the predicted redistribution meets with contradictory results in the data. Research asserts that democracy diminishes (Li and Reuveny 2003), first increases then diminishes (Chong 2004; Chang 2007), or has little effect (Timmons 2010) on income inequality; that redistribution increases (Milanovic 2000; Kenworthy and

[1] We thank Thomas Brambor, Alexandre Debs, Alberto Diaz-Cayeros, Hein Goemans, Miriam Golden, Lucy Goodhart, Jon Hanson, Christian Houle, Indridi Indridason, Simon Jackman, Karen Long Jusko, Kerim Can Kavakli, Luke Keele, Bonnie Meguid, Angela O'Mahoney, Oliver Pamp, Bing Powell, Stephanie Richard, and Guillermo Trejo for helpful comments. Previous versions of this paper have been delivered at the annual meetings of the APSA, MPSA, IPES, and ECPR as well as at the University of Rochester Comparative Politics Workshop, the Stanford Political Science Works in Progress Group, and the Leitner Political Economy Seminar, Yale University.

Blaydes, Lisa and Mark A. Kayser. (2011) Counting Calories: Democracy and Distribution in the Developing World. *International Studies Quarterly*, doi: 10.1111/j.1468-2478.2011.00692.x

Pontusson 2005) or decreases (Korpi and Palme 1998; Moene and Wallerstein 2001; Bradley, Huber, Moller, Nielsen and Stephens 2003) with inequality in democracies; and that economic policies that influence inequality favor (Acemoglu and Robinson 2006) or do not favor (Mulligan, Gil and Sala-i-Martin 2004) the poor in democracies. Some have claimed evidence of redistribution under democracy conditional on turnout (for example, Lindert 2004, 1996; Kenworthy and Pontusson 2005) while others identify political stability (Muller 1988) or other conditioning factors. Given the volume and, indeed, frequent sophistication of this work, it is surprising that such varied results emerge. The true paradox of redistribution may not be the weak empirical support for the Meltzer and Richard (1981) result, but the broad array of often conflicting empirical results that emerge from a small number of data sets.

We argue that empirical scholarship on inequality is afflicted by both a theoretical and a data problem. Theoretically, we assert that redistribution must be conditioned on growth. Economic expansion ameliorates politically costly zero-sum redistribution by allowing government to divert new revenue to the neediest. Not only is tax-based redistribution greater with higher tax revenue captured during expansions, but the political cost of raising taxes is lower. Wealthy and middle-class voters oppose parties associated with greater taxation when they expect (Durr 1993) or experience (Stevenson 2001; Kayser 2009) a weak economy. Conditioning on economic performance is even more imperative in developing countries in which growth can be volatile. Although there is no consensus among scholars seeking to link regime type to growth, autocracies do exhibit higher levels of variance in growth rates than do democracies (Weede 1996).[2] Scholars employing cross-sectional time-series data from the developing world can reach markedly different conclusions about the relationship between inequality and redistribution depending on growth rates in the time period of their sample. Thus, we argue that democracies redistribute more readily when they can distribute surpluses from growth rather than raise taxes.

Empirically, we argue that data limitations in poor countries compel scholars to choose between broad measures of inequality in unrepresentative and small samples of countries, and narrow, incomplete measures of welfare in a broader sample. Narrow measures of welfare such as infant mortality or certain social services are more widely available but offer a questionable proxy for general material welfare.[3] Broader measures such as Gini coefficients of income inequality succeed at capturing generalized income distribution but are simply absent for most developing countries.[4] Moreover, those Gini measures that do exist are often not comparable across nations or even within the same nation over time (Persson and Tabellini 2000; Atkinson and Brandolini 2001:122).[5] Finally, broad

[2] See Brunetti (1997) for a survey of this literature in economics, as well as Przeworski, Alvarez, Cheibub and Limongi (2000).

[3] In fact, they may also suffer from sample bias: In a recent and likely influential paper, Ross (2006) has meticulously documented the non-random pattern of missingness in commonly used data that leads to the listwise omission of many high-performing authoritarian states. After imputing missing observations and adding country fixed effects, he reveals that there no longer exists a robust statistical relationship between democracy and lower infant mortality rates. Other scholars have questioned the wisdom of using infant mortality at all for international comparison, since infant mortality statistics are prone to inconsistent measurement across countries (Howell and Blondel 1994; Spencer 2004; Hogberg 2006). One reason for this is that these statistics assume interaction with a health-care system, and many babies in the developing world are born outside of a hospital. In addition, many underdeveloped countries do not have functional vital registration systems. As a result, underreporting of infant births and deaths is a major source of potential bias (Adetunji 1995).

[4] Houle (2009) calculates that the commonly used Deininger and Squire (1996) Gini data set provides observations for only 11% of all possible country-years, well below any reasonable cutoff for imputation. The pattern of missingness is also non-random.

[5] Atkinson and Brandolini (2001), in fact, go further when examining commonly used data sets on income inequality and note that they ''are not convinced that at present it is possible to use secondary data-sets safely without some knowledge of the underlying sources, and [they] caution strongly against mechanical use of such data-sets.''

measures of inequality do not necessarily capture changes in the welfare of the least well-off. A given shift in a Gini coefficient could result from improvements in the welfare of the poor or from income gains by the middle class. Indeed, many empirical results that are able to show redistribution have more difficulty demonstrating that the poorest segments benefited (for example, Lindert 1994, 1996). Given these difficulties, we ask a fundamental question: What effect does democracy have on the allocation of the gains from growth once representative data are employed?

We propose an alternative measure of transfers to the poor that is nearly universally available and innately captures distribution: average daily calorie consumption.[6] In sharp contrast to the consumption of material goods or the accumulation of wealth for which humans have shown no upper bound on their ability to achieve, biological limits make it impossible for a small number of individuals to consume most of a nation's calories. In poor countries that have not yet escaped the Malthusian trap, mean calorie intake captures distribution to the poor regardless of whether it comes from direct transfers, tax benefits, employment schemes, or a host of other means.[7] Moreover, calorie data are available since 1961, thanks to the efforts of the Food and Agriculture Organization (FAO) of the United Nations, in an internationally standard format for nearly all countries of the world.

How institutions affect redistribution to the poor is normatively important in itself. But the assumption that democratization entails redistribution is also key to the most influential theories of democratization. The two most prominent theories to emerge recently argue that elites accede to democratization when the cost of redistribution is exceeded by the cost of repression (Boix 2003; Acemoglu and Robinson 2006). Empirical tests of both theories, however, have found little support for these claims (Houle 2009) which begs the question of why inequality does not have the predicted effects on democratization. One possible explanation is that a critical assumption of this literature—that democracies redistribute more than autocracies—is far from established. Even the predictions of Meltzer and Richard (1981) that redistribution should increase in tandem with inequality within democracies have found decidedly mixed empirical support (Kenworthy and Pontusson 2005). This raises the question of whether the burgeoning democratization literature is erected on unstable theoretical foundations. Should democracies fail to redistribute more than autocracies, it is simply not evident why income distribution should matter for democratization.[8]

Reassuringly, some indirect evidence does suggest that democracy does play a role in redistribution. Although not as developed as the literature on distributional consequences of different institutions within democracies (for example, Bawn and Rosenbluth 1996; Milesi-Ferretti, Perotti and Rostagno 2002; Persson and Tabellini 2003), scholars have successfully identified differences in the provision of broad, hence redistributional, goods between democracies and autocracies. Stasavage (2005), for example, investigates whether the move to multiparty electoral competition undertaken by African countries in the 1990s led these governments to spend more on primary education. He finds that when countries

[6] This project joins other efforts to find proxies for inequality including family farm ownership (Vanhanen 2005), human height (Boix and Rosenbluth 2006), and the ratio of land suitable for sugarcane versus wheat farming (Easterly 2007).

[7] We define such countries with per capita GDP of less that 10,000 US dollars (constant 2,000 dollars).

[8] It is also possible that democracies do redistribute more than autocracies, but not in the zero-sum method suggested in the recent democratization literature. As we argue here, democratic governments, consistent with Wagner's Law, may simply expand social spending as an economy grows. Tax rates need not change; only the increased revenues from growth under a constant tax rate need to be directed disproportionately to the poor. In such a case, income inequality would matter for democratization, albeit in a different manner than that posited by prominent theories of democratization. It may be other costly changes, such as the rule of law, that inhibit autocratic elites from democratizing.

are subject to multiparty competition, African governments have spent more on education and more on primary education, in particular, without altering the amount spent on universities. Using a newly created data set of night lights visible from satellites, Min (2008) argues that democratization is associated with a substantial increase in electrification. Li and Reuveny (2006) find that democracies outperform autocracies over a wide range of environmental measures. In contrast, however, Mulligan et al. (2004) find no significant difference between autocracies and democracies in terms of social and economic policies.

Assuming that institutional quality, rule of law, and property rights are generally stronger in democracies allows for more insight. Azfar (2005) finds that higher levels of institutional quality lead to faster growth for society's poorest quintile. Sadler and Aknmadi (2004) find that regions of Indonesia with better institutions experienced faster rates of poverty reduction. An empirical study of property rights and poverty found that well-established property rights help the economic prospects of all citizens, not merely those who have the most property in need of protection as was previously believed (Knack 2003). This suggests that better property rights are at least neutral to the poor, while others claim substantial benefit for the poor (DeSoto 2000). In contrast, Dollar and Kraay (2002) find that rule of law has no systematic effect on pro-poor growth. In what is the probably the most comprehensive of these studies, Kraay (2006) finds little evidence that institutional factors, like regime type or institutional quality, are correlated with changes in measures of inequality.

In the remainder of this paper, we argue that many of the conflicting findings on inequality stem from poor data and offer an alternative measure of inequality that is universally available in nearly all countries after 1961 and, unlike Gini coefficients, offers the additional advantage of gauging the material well-being of the poor. Using data on average daily calorie intake, we ask two questions: (i) what role does regime type play in the relationship between growth and inequality? And (ii), since measures of income inequality do not necessarily capture the well-being of the worst off, how do political institutions govern the effect of growth on the poorest members of society?[9] We find that a larger share of economic expansion, in the form of an increase in total calorie consumption, reaches the less-privileged in poor democratic regimes than in their autocratic counterparts, but that the difference in calorie change between democracies and hybrid regimes is negligible. This suggests that it is not full democratic accountability, *per se*, that matters for pro-poor growth as measured by change in total calories, but rather the institutional features associated with hybrid regimes, including but not limited to competitive authoritarian elections. Democracies do, however, outperform both autocracies and hybrid regimes in the distribution of high-quality animal calories, suggesting that there does exist some form of a democratic ''advantage'' in terms of certain types of distribution.

How Democracy Conditions Growth Dividends

While there do not currently exist well-established theories linking elections and democracy to pro-poor growth, there are at least three hypotheses that find support in the theoretical literature. The first is what might be called the democracy—wage rate connection which argues that democracies pay higher manufacturing wages than autocracies and that growth allows workers—who tend to be poor—to capture a larger percentage of economic expansion. The second is the democracy—human capital connection which suggests that democracies invest in human capital at higher rates than autocracies and that human capital development helps the poor to take advantage of growth. A third possible mechanism is the

[9] For example, even if growth increases inequality, the poor may enjoy higher levels of absolute welfare.

poverty—electoral connection which suggests that elections—particularly in poor countries—promote clientelist linkages between patron-politicians and voters and that growth increases the resource pool available for such transfers.

The first mechanism linking democracy to larger transfers of growth dividends draws on Rodrik (1999) which finds a robust and statistically significant relationship between a country's level of democracy and the level of manufacturing wages after controlling for labor productivity and income levels. This result exists both across countries and within countries over time. According to Rodrik (1999), what explains the finding? Democracies are more likely to follow the rule of law and also enjoy enhanced freedom of association and collective bargaining. Political participation may also increase the bargaining power of workers by producing legislation and institutions that are more partial to workers' interests. If democracies are particularly good for workers, then growth should allow these individuals, who tend to be from the lower-middle classes, to enjoy a larger percentage of transfers from expansion which occurs. Timmons (2010), however, finds that while democracies may have paid higher average wages in manufacturing than autocracies, democracy did not dampen wage dispersion between industries.

Second, scholars have also suggested that democracies are forced to produce more public goods as a result of accountability introduced through the electoral process (Lake and Baum 2001) and that democracies particularly attempt to provide services that improve human capital in a broad manner (Lake and Baum 2001; Baum and Lake 2003; Stasavage 2005). For example, Besley and Kudamatsu (2006) find a robust link between life expectancy at birth and democracy after controlling for income; they argue that health policy interventions are superior in democracies than in nondemocracies. If democracies are better than autocracies at investing in human capital, under what circumstances will this investment create pro-poor growth? Economists have suggested that investment in human capital is critical for the creation of growth that benefits the poor. Aghion, Caroli and Garcia-Penalosa (1999) argue that there are decreasing returns with respect to individual human capital investment and describe what happens to inequality when credit constraints make it hard for people to invest in themselves. When *government* invests in human capital, however, this offers the poor an opportunity to take advantage of growth, particularly growth in nonfarm sectors. In a study of pro-poor growth in Bangladesh, Sen, Mujeri and Shahabuddin (2004) argue that an unequal distribution of the benefits of growth can largely be accounted for by unequal access to assets, especially human capital and education. In a cross-regional study of India, Ravallion and Datt (2002) find that pro-poor growth occurred in areas where initial conditions offered the poor the best opportunity to take advantage of growth. This suggests that under certain circumstances, the poor can be locked out of growth opportunities but that government policies that combine human resource development with economic growth can create real benefits for the poor. This is also consistent with researchers who have argued that the positive influence of democracy may not be direct (Baum and Lake 2003) and that one potentially important indirect influence of democracy may be that democracies help to position the poor to take advantage of growth opportunities by investing broadly in human capital development.

A third link between democracy and pro-poor growth assumes that the electoral connection works in a slightly different way. Rather than democracy creating growth opportunities for the poor as a result of a broad investment in human capital, economic benefits may be directed at the poor as elections force candidates to compete for the support of voters. Candidates, of course, get the largest return for their campaign dollar from the poorest classes of society. This is consistent with a series of previous empirical and theoretical studies which have argued that poor voters are more susceptible to clientelistic practices than wealthy voters since the marginal benefit of the consumption good is greater for them than for the rich. Dixit and Londregan (1996) argue that ''swing'' voters, or those with fewer ideological constraints, represent the cheapest votes to purchase in the context of developed countries; in the developing world, these voters very often come from the lower political classes. Calvo and Murillo (2004) argue that patronage targeting the poor is more effective than patronage targeting the middle or upper classes. Stokes (2005) finds that political machines target the poor, for whom the payoff of even a small reward outweighs the expressive value of voting for one's preferred party.[10] Blaydes (2011) finds that clientelistic voting in Egypt leads illiterates to turnout to vote at twice the rates of literates. This would suggest that clientelistically based voting, or the electoral mobilization of lower-class individuals by more established elites, may be broadly redistributive.[11] Economic growth provides a larger resource pool from which to distribute benefits; government budgets may be bigger as well, assisting incumbent candidates. Rather than democracy interacting with growth as a result of democratic government's tendency toward broad-based human capital development or higher wages, it is also possible, therefore, that growth simply increases the pool of available resources from which patron-politicians can offer clientelistic payment to poor voters and that economic redistribution to the poor occurs in this way.

Although the clientelistic aspects of the electoral connection are believed to operate most effectively in democracies, there is increasing evidence that the same types of vote buying and targeting of clientelistic benefits taking place in poor democracies may also be at work in authoritarian regimes that hold competitive elections. Authoritarian elections in Jordan have been described as exercises in ''competitive clientelism'' (Lust-Okar 2006) where voters expect state employment and other types of benefits from the candidates they support. Funds associated with the PRONOSOL poverty alleviation program in Mexico were distributed in a politicized manner, allowing the PRI to develop a system of patronage distribution across the country (Magaloni 2006; Diaz-Cayeros, Estevez and Magaloni 2007). There is also a growing body of evidence to suggest that authoritarian countries exhibit evidence of budget cycles related to the electoral calendar. A number of studies find evidence of budget cycles in authoritarian Mexico (Grier and Grier 2000; Gonzalez 2002; Magaloni 2006). In Egypt under Mubarak, public sector bonuses and retirement pension payments (Blaydes 2011) have been linked to the electoral calendar. Pepinsky (2007) demonstrates that Malaysian fiscal expenditure increased before elections. The Peruvian Social Fund also ramped up expenditures prior to national elections (Schady 2000). In many of these cases, clientelist outlays represented substantively large transfers of funds with likely important impacts on social welfare.

In this paper, we offer some tentative findings on the relative importance of these various mechanisms though an important area for future research will be to operationalize these and other competing theories more specifically to determine whether there exists a strong empirical basis for one over the other. First, however, we consider the empirical link between democracy and pro-poor growth where an increase in calorie availability serves as a proxy for growth that benefits the poor.

---

[10] Also see Auyero (2004) and Brusco, Nazareno and Stokes (2004).

[11] Clientelism is generally defined as a relationship between parties of unequal status that involves some form of exchange. Clientelist benefits may include dividends from vote buying, though these types of relationships can develop over the long or the short term and may not involve cash money but rather goods or services rendered on the part of the patron in exchange for the client's vote. Clientelistic practices can be distinguished from constituency service by the extent to which reciprocity is enforced and are further distinguished from broad-based investments in human capital development as described above.

Calories as a Measure of Inequality

Before we turn to the relationship between democracy and calories, we first consider the calorie data itself and how calories relate to Gini scores, the most common measure of income inequality. Food consumption data are taken from the FAO food balance sheets and are some of the most important data collected by the organization as these data provide the basis for the UN estimation of global and national undernourishment assessments (FAO 2001). Food balance sheets measure consumption from a supply perspective. The total quantity of all primary and processed food commodities are added to the total quantity of food imported. The data also take into account food that is exported as well as changes in existing food stock. The data comprise derived statistics based on information from national official statistics, as well as marketing authorities, farmer stock surveys, and industrial censuses. It is subject to inconsistencies, and the FAO makes adjustments to the data and imputes missing values to maintain consistency to the overall data set (FAO 2001). Per person food consumption is obtained by dividing the total quantity of available food by the national population.

Despite a variety of attempts at quality assurance, a number of conceptual problems remain. First, the amount of food actually consumed may be lower than the quantity shown in the food balance sheet, depending on losses of edible food in preparation, as platewaste or as animal feed, and it is very hard to estimate these quantities. Expert opinion obtained in a variety of countries is used to estimate the type and quantity of food that is wasted, lost, or put to other use (that is, as animal feed or seed). While it is impossible to know the exact quantity of food that is wasted, we believe that these quantities are not large in most developing countries; while the poor are unlikely to waste food, the table waste of the rich may be consumed by domestic workers or by the unfortunate class of individuals who are frequently seen sorting the trash. Second, subsistence agriculture may be underreported in the data and this might be an appreciable part of total production in some countries. In such instances, estimates are extrapolated from household survey data multiplied by population numbers in an attempt to estimate production figures (FAO 2001).

The alternative to the use of FAO food balance sheets would be reliance on household surveys that collect information on the quantity and type of food being consumed, though there are potential sources of bias in such data as well. In addition, it would be very expensive and time consuming to collect survey data on this scale. Therefore, in the absence of a comprehensive international data set from household surveys, the food balance sheets represent the only source of standardized data that permits international comparisons over time (FAO 2001). We are cognizant of many of the potential criticisms of these data and make every effort to try and mitigate the potential biases through our statistical estimation techniques. For example, as long as inaccuracies in reporting are consistent within countries over time, they should not bias the results once country-specific effects are taken into account.

Summary statistics for the calories data are presented in Table 1. Throughout the paper, we limit our analysis to countries with per capita incomes of less than $10,000 per year as measured in constant year 2,000 US dollars. We have chosen a $10,000 cutoff because it is not clear whether the quest for food security would remain relevant for higher levels of per capita income. During the period under study, 1961–2003, per capita calorie consumption averaged about 2,400 with animal calories representing about 13% of total calories. There exist important distinctions in per capita calorie consumption both across space and over time. Countries in sub-Saharan Africa had the lowest per capita calorie consumption, by region. Although residents of the Middle East and North Africa enjoyed higher overall levels of calorie consumption, citizens of Latin America enjoyed a

Table 1. Summary Statistics

	Mean	*Standard Deviation*	*Observations*
Total Calories	2,399	6.5	4,057
—Animal Calories	320	3.7	4,057
Total Calories, sub-Saharan Africa	2,180	7.7	1,550
—Animal Calories, sub-Saharan Africa	186	3.8	1,550
Total Calories, Latin America	2,461	12.2	820
—Animal Calories, Latin America	417	6.5	820
Total Calories, Middle East and North Africa	2,712	22.7	361
—Animal Calories, Middle East and North Africa	281	5.5	361
Total Calories, Asia	2,298	14.9	503
—Animal Calories, Asia	243	8.1	503
Total Calories, 1965	2,173	35.7	67
—Animal Calories, 1965	234	20.0	67
Total Calories, 1975	2,328	42.8	78
—Animal Calories, 1975	286	24.6	78
Total Calories, 1985	2,432	41.1	98
—Animal Calories, 1985	320	23.5	98
Total Calories, 1995	2,481	38.7	124
—Animal Calories, 1995	369	23.1	124

Sample includes countries with per capita incomes of less than $10,000 per year, 1961–2003.

higher percentage of total calories derived from animal sources. Both total calories and animal calories increased steadily over time.

Two reasons underpin our conviction that mean national daily calorie intake proxies for income distribution. First, the poor have the most capacity and demand to increase their food consumption. In fact, food security is the single most immediate concern of the very poor. The poor spend a disproportionate share of their income on food—over 60% of the poorest Moroccans' income, for example (World Bank 2001)—and they are most likely to spend marginal increases in income on food.[12] This is reflected in the positive and concave relationship between calorie consumption and per capita income found in research (see, for an example based on ASEAN countries, Soekirman, Jus'at, Sumodiningrat and Jalal 1992: fig 4.02). It also motivates us to study how *changes* in income translate into calories. The wealthy do not spend increases in income on food, while the poor do. Second, food is difficult to hoard. While most commodities—real estate or money, for example—can be held by a small percentage of the population, there is, beyond a certain level, no reason to accumulate food, which tends to be perishable and offers poor returns. Combined with the fact that there is a biological limit on the amount a single human can consume, we have grounds to infer that non-trivial shifts in mean daily calorie intake on the national level are widely distributed.

Allowing that calories should theoretically capture inequality is quite different from establishing their empirical validity, however. Here, we directly address the question of how well and under what circumstances calorie intake can serve as a proxy for income inequality.[13] Implicit in this concern is the question of how calories are distributed. We have argued that calories proxy for the distribution of income to the less well-off because of biological limits on calorie consumption. In other words, wealthy individuals are unlikely to spend increases in

[12] The *average* Afghan and Egyptian households spend about 45% of income on food (See Ban Ki-Moon, "The New Face Of Hunger," *The Washington Post,* March 12, 2008 and *The Egyptian Gazette,* October 17, 2007 for more details).

[13] The implications matter as well. Scholars have argued that basic needs deprivation captured by calories in inequality can predict government stability, see Reenock, Bernhard and Sobek 2007.

Table 2. Calories and Inequality

	Gini	*Bottom Quintile*	*Top Quintile*
Total Calories	−20.619 (1.995)	4.734 (0.483)	−17.444 (1.748)
GDP/Cap	9.431 (1.181)	−2.301 (0.287)	8.726 (1.037)
No of Observations	130	117	117
R^2	0.471	0.480	0.494

Total calorie levels prove a strong predictor of income inequality, controlling for income level. Total calories is denominated in thousand calorie units. Gini is scaled from 0 to 100.

income on food, whereas the poor are likely to increase calorie consumption with increasing income. But do increases in mean calorie intake actually benefit the poor or might changing patterns of consumption among the middle class drive our results?

To confront these questions, we examine the relationship between mean calorie intake and three measures from the Deininger and Squire (1996) inequality data set: Gini coefficient estimates of income inequality and the cumulative proportion of income going to the lowest and highest quintiles of earners. We have pared down the Deininger and Squire data set to only those observations identified by the authors as ''high quality.''[14] We then also removed data from single-observation studies to ensure greater comparability between observations within the same country.

Table 2 estimates a simple linear model of the relationship between Total Calories and three measures of inequality, controlling for per capita income levels. One quickly sees that once the covariation between the (logged) income level, calories, and each dependent variable is accounted for, mean calorie intake emerges as a strong and significant predictor of inequality.

The first column reveals that a 100-calorie increase is associated with a drop of approximately two points in the Gini coefficient of inequality.[15] Of course, changes in an aggregate measure of inequality can arise from multiple shifts in income, not all of which involve the poor. The next two columns address this concern. Regressing calories and per capita income on the proportion of national income going to the bottom income quintile shows that the poor indeed do gain. A 100-calorie increase in average food consumption is significantly associated with an increase in the bottom quintile's share of national income of nearly half a point. This is a substantively large effect and argues that income gains among the poorest members of society are reflected in increases in the average national calorie consumption. As we argue above, it is the poor who are most able to increase their intake of food (Figure 1).

It is difficult to identify the source of income (and, hence, calorie) gains for the poor, but results presented in the third column suggest that at least some of it may be attributable to redistribution. Increases in average national calorie intake are associated with a large drop in the proportion of national income captured by the wealthiest quintile. Causality, of course, likely runs from the changes in the income share of the top 20% of income recipients to changes in mean calorie intake, so we reverse the interpretation: a 1.7% point drop in the share of national income going to the top quintile corresponds to a one hundred-calorie increase in average calorie intake. The effects that we observe in the three models presented in Table 2 suggest that average calorie intake has a strong

[14] This removed all observations (i) based on surveys with less than national coverage, (ii) from inconsistent sources, (iii) missing clear references to a primary source, (iv) based only on the income earning population, or (v) from non-representative tax records.

[15] Scaled 0–100.

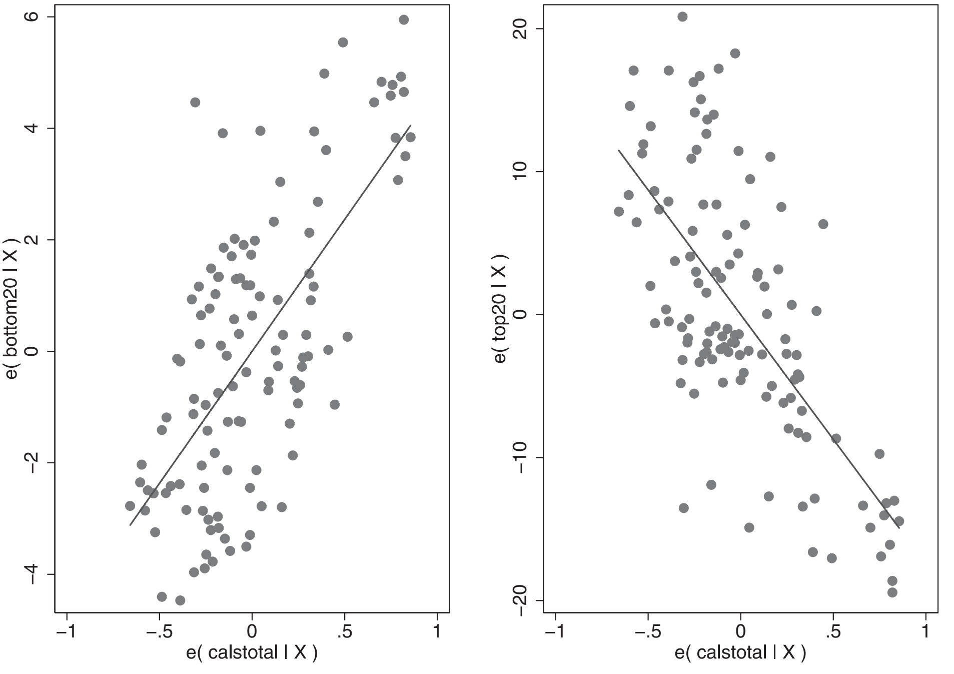

Fig 1. Partial regression plots of total calories and the proportion of national income going to the bottom and top income quintiles after controlling for income

relationship to income distribution and, more specifically, that it is the poor who are driving this relationship.[16]

Democracy, Growth, and Calories

Description of Models and Variables

To estimate the effect of regime type on changes in the quantity and quality of per capita calorie availability, we use the previously described data set that includes all country-year observations between 1961 and 2003 where GDP per capita (measured in constant 2,000 US dollars) is under $10,000 per person. Expansions in income are simply less likely to be invested in food in countries in which the preponderance of the population has already secured its sustenance. Thus, our data set includes all country-years for those countries that are currently classified as low-income by the World Bank and also includes some observations from countries that would currently be classified as high income. The data set, therefore, includes observations from countries like Italy and Israel in the 1960s but not, thereafter, countries like South Korea and Greece through the mid-1990s, yet no observations for very wealthy countries like the United States, the UK, and Switzerland. These data are characterized by some missingness that was largely introduced as a result of using the Polity IV data (19% of observations are missing) to create our variable for regime type.

[16] We also replicate every model on a sub-sample that excludes any state for which more than 50% of export value comes from oil (as identified by Alvarez, Cheibub, Limongi and Przeworski 2000) as well as all communist states and find the same result: increases in the proportion of national income going to the poor increase average national calorie intake while increases in the income share captured by the wealthiest quintile decrease average national calorie intake.

Variables

There are two dependent variables employed in the analysis: the total consumption of calories per person and the total consumption of per capita calories derived from animal products.[17] Calories as a Measure of Inequality section describes how these data are collected as well as some basic summary statistics.

There are two key independent variables in this study. The first is a measure of regime type based on the Polity IV data set. The distribution of this 20-point variable shows a strong bimodal distribution where most countries fall into the highly democratic or highly autocratic category, with lower densities in between. We recode this variable into three discrete and roughly equally populated categories that correspond to the lower mode, autocracies (Polity ≤3), democracies (Polity ≥17), and those cases in between, which we describe as ''hybrids.'' We borrow the term ''hybrid regime'' from Diamond (2002), who defines hybrids as those regimes that combine both democratic and authoritarian elements.

Our justification for a trichotomous measure is theoretical. While scholars previously considered countries occupying the ''halfway house'' between democracy and autocracy inherently unstable, it is increasingly clear that hybrid regimes do not represent countries on the path to democratic transition. Levitsky and Way (2002) have argued that competitive authoritarian regimes—hybrids in which opposition forces electorally challenge authoritarian incumbents—represent a unique regime type. Many of these regimes are what might be otherwise called electoral autocracies, hegemonic party regimes, or ''pseudodemocracies'' where, very often, opposition parties or candidates compete freely in subnational (and sometimes national) elections but the ruling regime cannot be, or has not been, dislodged via the electoral process for a variety of reasons. Examples of such regimes also include countries where the military remains a major veto player even in the presence of highly contested elections (Diamond 2002). One key characteristic that distinguishes hybrid regimes from what we classify as autocracies, therefore, is the multi-party character of elections. For example, Egypt under Nasser and Sadat's early years has a Polity score of 3, which would place it in the autocracy category. After multi-party elections are introduced in 1976, however, Egypt is considered a hybrid regime with a Polity score of 4. Hybrid regimes are generally distinguished from democracies by the extent to which electoral institutions determine leadership alternation. Mexico remains a hybrid regime in the data set until 2000 when its Polity score jumps from 16 to 18 with the election of the country's first non-PRI (Institutional Revolutionary Party) president since 1929.[18]

A trichotomous measure of regime type also allows for a test of the poverty—electoral connection, which posits that the positive impact of democracy on inequality operates through crude, clientelistic channels rather than as a result of the propensity of democracies to provide higher wages and/or more investment in human capital. If hybrid regimes and democracies perform similarly, yet distinctly from autocracies, this would provide suggestive evidence for the poverty—electoral connection as the mechanism linking democracy to better outcomes for the poor.

The second key variable, which will be interacted with dummies for the regime type categories above, is the year-to-year change in real (constant 2,000 US dollars) gross domestic product per capita (GDPC). As discussed above, we theorize

[17] In this paper, we use the terms calorie ''consumption'' and calorie ''availability'' interchangeably. While the data collected more precisely measure calorie availability, the FAO describes the data as related to consumption. To assume that most food that is available in a country will eventually be consumed is similar to assuming that markets ''clear.'' This may not be true for all countries, particularly those marked by civil strife, and provides an area of future research.

[18] See Magaloni (2006) for a full description of how the PRI used elections to perpetuate its hold on power.

that changes in income distribution are most likely to emerge from the disproportionate directing of the gains from economic growth to the less well-off than from actual zero-sum redistribution through progressive taxation and transfers or similar means. Consequently, institutional effects must enter through an interaction: the effect of growth in GDP per capita on calorie intake should be conditioned by whether a state is autocratic, democratic, or a hybrid. For presentation purposes, GDPC is scaled in 100-dollar units. The lag of GDP per capita effectively controls for *wealth* levels, which otherwise could be easily confounded with the Polity variables. Additionally, wealthy countries may be associated with smaller calorie increases because more of their population have met their sustenance needs.

Model

As one might suspect, both versions of the dependent variable—total and animal calories—exhibit signs of non-stationarity. Unit roots are also found in the independent variables, both individually and as a panel. We consequently employ an error correction model, after reassuring ourselves of panel cointegration. The advantage of an error correction model (ECM) over the main alternative method of working with non-stationary time-series—differencing the data until they are stationary—is the ability to estimate both short- and long-run effects.[19] In general, error correction models regress a first-differenced dependent variable on (i) its lagged level, (ii) the lagged levels of all potentially co-integrating covariates, and (iii) the first differences of the covariates that change quickly enough to generate meaningful variance. The general error correction model is given by:

$$\Delta y_{i,t} = \alpha + \beta \Delta x_{i,t} + \phi(y_{i,t-1} - x_{i,t-1}\gamma) + \epsilon_{i,t} \tag{1}$$

where $y_{i,t}$ is the dependent variable in country i during year t, and x is a cointegrated independent variable. The error correction mechanism, $(y_{i,t-1}-x_{i,t-1}\gamma)$, measures how far out of equilibrium the dependent and independent variables vary following short-term changes, and the parameter ϕ captures how quickly the relationship returns to equilibrium. In practice, the model that is estimated is:

$$\Delta y_{i,t} = \alpha + \beta_0 y_{i,t-1} + \beta_k \Delta x_{i,t} + \beta_j x_{i,t-1} + \epsilon_{i,t} \tag{2}$$

where β_k captures the effect of short-run changes and β_0 captures the same thing as ϕ in Equation 1.[20] Long-run effects, which obviously depend on the persistence of changes, are estimated as the product of the short-run effect $\beta_k \Delta x_{i,t}$ and the long-run multiplier, $-\frac{\beta_j + \beta_k}{\beta_0 - 1}$.

We then include an interaction to capture the key relationship of interest in our analysis, the effect of GDP growth on calorie intake as conditioned by the level of democracy. With explicit notation to match our model, we estimate:

$$\Delta y_{i,t} = \alpha + \beta_0 y_{i,t-1} + \beta_1 \Delta x_{1_{i,t}} + \beta_2 x_{1_{i,t-1}} + \beta_3 x_{2_{i,t-1}} + \beta_4 \Delta x_{1,t} x_{2,t-1} + \epsilon_{i,t} \tag{3}$$

where x_1 is GDP per capita and x_2 is the level of democracy. Note that only the lagged level of democracy is included since it is highly time invariant. The conditional short-run effects of change in per capita GDP on calorie intake, dropping unnecessary subscripts, are given by $\frac{\partial \Delta y}{\partial \Delta x_1} = \beta_1 + \beta_4 x_{2_{t-1}}$. The conditional total

[19] See DeBoef and Keele (2008) and Greene (2000:733–35), for a good overview.

[20] Equation 2 can be derived from Equation 1 by defining $-(\phi\gamma)$ as β_j.

effect (that is, long- and short-run effect) of a permanent shift in per capital GDP is then the product of the short-run effect and a long-run multiplier conditioned on the level of $x_{2_{t-1}}$: $(\beta_1 + \beta_4 x_{2_{t-1}})(-\frac{\beta_2 + \beta_1 + \beta_4 x_2}{\beta_0 - 1})$.

For each dependent variable, we estimate a progression of three models: without fixed effects, with country fixed effects, and with country and year fixed effects. Each has innate trade-offs. The first, and simplest, is unable to control for country-specific features omitted from the model and consequently may be susceptible to omitted variable bias, should features of some countries be systematically related to variables in the model. Including country fixed effects addresses this pitfall but at the cost of controlling for all cross-country variation and deriving all estimates from within-country dynamics. Of course, temporally specific effects—global trends or shocks in agricultural technology, for example—might also be inadvertently captured by covariates when excluded from the model, so the third model for each dependent variable also adds year dummies. In practice, adding unit and time fixed effects sets a high bar for most models to clear but the atheoretical inclusion of so many dummies may absorb variation of legitimate and theoretically important covariates, making otherwise significant variables insignificant (that is, Type II error). As each model has inherent drawbacks, we opt for a conservative approach and employ all three.

Results

Short-Run Effects

Table 3 is divided into two sections. The dependent variable in the first three columns is the first difference for total calorie intake. The dependent variable for the next three columns is the first difference for calories from animal products. The first column of each section, that is, models 3.1 and 3.4, shows the results of an OLS regression with robust standard errors but no country or time dummies for total and animal calories.[21] In both cases, the change in per capita income shows a positive association with calorie intake in the baseline autocracy category. Other than this similarity, the effect on total and animal calories differs substantially in magnitude and across regime types. In autocracies, the total and animal calorie models estimate a 5.8 and 1.1 short-run increase in average daily calorie intake in the short-run, respectively. In hybrid regimes, short-run total calories increase significantly from the autocracy baseline to 14.3 in response to the same 100 dollar increase in GDP per capita while the change in animal calories rises to 3.8. Compared to hybrid regimes, democracies exhibit a smaller total calorie increase but larger animal calorie increase over the autocratic baseline. Indeed, when fixed effects are not estimated, the total calorie response to expansions in GDP per capita in hybrid regimes exceeds the response in democracies, although this relationship reverses with animal calories.

Of course, structural differences among countries other than regime type might influence calorie consumption or how growth conditions shifts in calorie consumption. More perniciously, omitted country characteristics might covary with regime type or other independent variables and induce bias through correlation between the error term and a covariate. This is an especially strong concern in such a parsimonious specification. Models 3.2 and 3.5 address this possibility by adding country fixed effects. The final two models, 3.3 and 3.6 will also add year fixed effects but as such a cumbersome specification invites multicollinearity, inflated standard errors, and unstable estimates, we employ these

[21] All calculations of statistical significance assume a 95% confidence level (α = .05) and use two-tailed tests.

TABLE 3. How Institutions Condition Redistribution

	Total Calories			*Animal Calories*		
	No fixed effects (3.1)	*Country FE (3.2)*	*Country-Year FE (3.3)*	*No fixed effects (3.4)*	*Country FE (3.5)*	*Country-Year FE (3.6)*
Calories_{t-1}	−0.024 (0.004)	−0.080 (0.007)	−0.093 (0.008)	−0.012 (0.004)	−0.101(0.013)	−0.102 (0.013)
ΔGDPC	5.751 (1.542)	3.629 (1.371)	3.378 (1.361)	1.096 (0.630)	0.673 (0.590)	0.626 (0.578)
GDPC_{t-1}	0.174 (0.103)	0.324 (0.257)	−0.108 (0.268)	0.082 (0.044)	0.706 (0.140)	0.622 (0.139)
Hybrid	3.028 (3.157)	12.510 (3.765)	8.067 (4.205)	−0.909 (0.833)	−0.229 (0.963)	−0.694 (1.101)
Democracy	−3.554 (3.891)	7.791 (5.105)	−0.550 (5.891)	−0.909 (1.238)	−0.229 (1.588)	−0.694 (1.699)
Δ GDPC * Hybrid	8.525 (3.087)	9.793 (3.302)	10.212 (3.342)	2.654 (1.210)	2.902 (1.238)	3.259 (1.226)
Δ GDPC * Democracy	7.691 (2.925)	10.436 (3.077)	10.413 (3.131)	4.897 (1.179)	4.920 (1.334)	5.016 (1.349)
Constant	62.619 (9.406)	187.804 (15.514)	214.580 (19.534)	4.094 (0.833)	21.793 (3.078)	19.322 (3.352)
No of Observations	3333	3333	3333	3333	3333	3333
R^2	0.042	0.075	0.097	0.054	0.091	0.109
Countries		113	113		113	113

The dependent variable is changed in average daily total calories in models 3.1 to 3.3 and changed in average daily animal calories in models 3.4 to 3.6. All models omit five GDP growth outliers more than seven standard deviations from the mean. Robust standard errors in parentheses. Fixed-effects coefficients estimated but omitted for presentation. Gross domestic product per capita (GDPC) is denominated in hundred-dollar units. The sample omits all countries with a per capita income greater than 10,000 constant 2,000 US dollars.

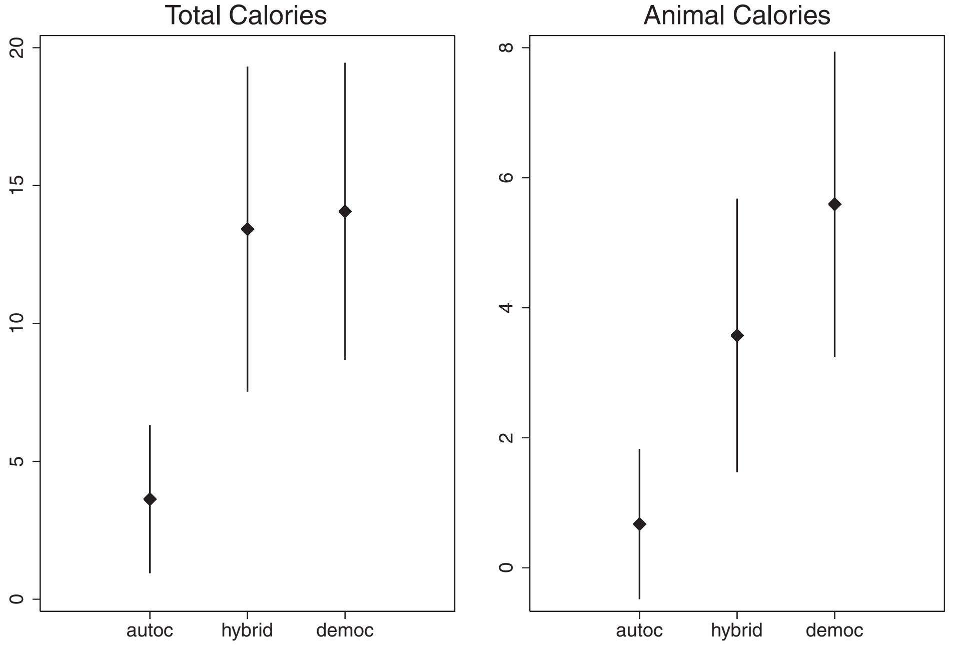

Fig 2. Short-run effects of a 100 dollar increase in GDP per capita on calorie intake under various regime types. Diamonds represent point estimates; spikes represent 95% confidence intervals. Based on estimates from Models 2.2 and 2.5 in Table 2

final models primarily as a robustness check. Consequently, our most extensive analysis rests on the country fixed-effects models 3.2 and 3.5.[22,23]

The results of these country fixed-effect models are noteworthy: For both total calories and animal calories, democracies and hybrid regimes yield significantly higher pro-poor growth than do autocracies when country fixed effects are included. The effects are illustrated in the first panel of Figure 2. In the short run, a hundred-dollar increase in GDP per capita is associated with a 3.6 average daily total calorie increase in autocracies, a 13.4-calorie increase in hybrid regimes, and a 14.1-calorie increase in democracies. The largest difference is that between autocracies and the other regime types. While the difference between the effect in hybrid regimes and democracies is substantively small and statistically insignificant, the gap between the autocracies and the other regime types is striking. It seems that most of the economic gains for the poor from democratization are captured early, well before a regime reaches levels of what would conventionally be considered full democratization.

Animal calories yield broadly similar results although, in contrast to total calories, the economic gains for the poor continue to increase as a regime transitions from hybrid to democracy.[24] More specifically, only a 0.7 animal calorie increase is associated with a hundred-dollar expansion in GDP per capita in

[22] Although, as the estimates in Table 3 show, little would change if we used models 3.3 and 3.6.

[23] These estimates are also robust to alternative specifications. Including the logs of population and arable land per capita, for example, changes the coefficients on the interactions of growth with hybrid and growth with democracy to 10.333 and 10.413 in model 3.2, respectively. In model 3.5, the corresponding numbers are 3.007 and 4.918. In no model does a coefficient on any of the key independent variables change by more than 5.5%, and the coefficients on the interactions in all of the models remain statistically significant at the 5% or 1% level.

[24] The difference between hybrid and democratic regimes is again not significant at conventional (95%) levels, but the substantive difference is much larger.

autocracies; in hybrid regimes, this number expands to 3.6; and in democracies 5.6. Unlike the case in autocracies, the increase in animal calories in both hybrid regimes and democracies is statistically significantly different from zero (and from that in autocracies).

Overall, estimates from both the total calorie and animal calorie models suggest that (i) most of the economic gains for the poor in terms of total calories accrue in the early stages of political liberalization although (ii) increases in the quality of calories (that is, animal calories) continue as hybrid regimes transition to democracies. The addition of year fixed effects, as in models 3.3 and 3.6, does not alter these results.

Long-Run Effects

It is difficult to assess the substantive magnitude of short-run results such as those presented above. In biological terms, a 14.1-calorie increase in daily per person calorie intake—the short-run increase in total calories in democracies in model 3.2—may not seem likely to matter. It is important to recall, however, that a permanent increase in income will continue to deliver benefits long into the future and many clientelistic goods involve cash transfers that persist. In other words, not all of the benefits to the least well-off are likely to materialize immediately.[25] Indeed, the bulk of the effect will accumulate over time. In order to estimate the total effects of an increase in GDP per capita, we must consider both the short-run and long-run effects.

As we discuss in Model, the long-run multiplier for an effect in an error correction model is usually estimated as $-\frac{\beta_j+\beta_k}{\beta_0-1}$ where β_j is the coefficient on the lagged independent variable, β_k is the coefficient on the first-differenced independent variable, and β_0 is the coefficient on the lagged dependent variable. Introducing an interaction with the differenced variable, as is the case here, results in a long-run multiplier in which the effect of the differenced variable, β_k above, is conditioned on the level of the interacting variable. Thus, using the notation of Equation 3, β_k is replaced by $\beta_1 + \beta_4 x_2$. The full effect, that is, the product of the short-run effect and the long-run multiplier, is then given by $(\beta_1 + \beta_4 x_{2_{t-1}})(-\frac{\beta_2+\beta_1+\beta_4 x_2}{\beta_0-1})$.

Figure 3 shows how the total effect of a hundred-dollar increase in GDP per capita accumulates over time. Each subsequent period experiences a progressively smaller effect over time until the increases fully taper off. Approximately half of the total effect emerges within the first eight years, with the remainder of the total effect taking more than three times longer to materialize. The figure serves to emphasize the primary result that emerged above: Growth in autocracies benefits the poor less than growth in democracies and hybrid regimes. Indeed, in terms of animal calories, it is not clear that growth benefits the poor at all. In the long run, a one hundred-dollar increase in GDP per capita in autocracies is associated with a very small increase in total and animal calories. Hybrid regimes and democracies perform similarly in terms of total calories over the long run, the former yielding about a 170-calorie increase and the latter a 187-calorie increase for every one hundred-dollar increase in GDP per capita. Again, the gap between autocracies and the other regime types is the single most striking result from the data. The same one hundred-dollar change in per capita income in autocracies only yields a 13 total calorie increase. Animal calories reveal an even more modest amount of pro-poor growth in autocracies. Under the least democratic regimes, a 100-dollar increase in GDP per capita is

[25] DeBoef and Keele (2008) argue that unless all movement in X_t ''translates completely and instantaneously'' to Y_t then a static model is not appropriate and an error correction model is preferable.

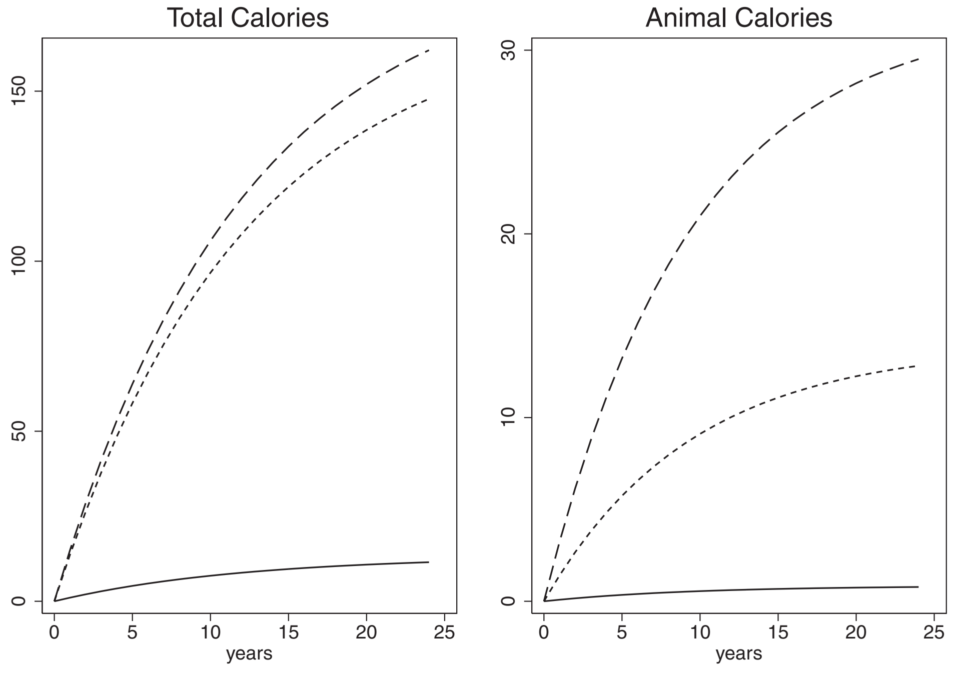

Fig 3. Total effects (short- and long-run) of a 100 dollar increase in GDP per capita on calorie intake over time under various regime types. The solid line represents autocracies; the dotted line represents hybrid regimes; and the dashed line represents democracies. Based on estimates from Models 2.2 and 2.5 in Table 2

associated with less than a single calorie increase. Compared to the respective increases of 14 and 32 in hybrid regimes and democracies, this result makes a strong case that autocracies systematically disadvantage the poor.

Robustness Check

As with all analyses, we are concerned about robustness. We include fixed effects in our models to capture possible country- and year-specific influences, but this does not preclude the possibility that some observations exert inordinate leverage on the coefficient estimates. With a sample size of 3,333 country-years, it is unlikely that a single observation could greatly influence the coefficient estimates; specific countries, however, certainly could. Even though country fixed effects absorb cross-country variation and isolate the dynamics, time-series in certain countries could still have a disproportional influence on the results. Consequently, to verify that our results are indeed robust, we run a panel jackknife analysis for Models 3.2 and 3.5. The panel jackknife systematically removes each panel unit (that is, country) and reestimates the model. Thus, each of the two models is run 113 times, omitting a different country in each regression. Tables 4 and 5 report the maximum and minimum value for each coefficient in Models 3.2 and 3.5, respectively, as well as the country that was omitted when it was generated.

The interaction of ΔGDPC and each of the regime type variables is of greatest interest. For total calories (Table 4), the potentially positive effect of autocracy increases with the exclusion of Libya from the data set. Similarly, the exclusion of Libya somewhat attenuates the positive benefits seen by hybrid and democratic regimes compared to their autocratic counterparts. The coefficients on the

Table 4. Cross-Sectional Jackknife Analysis of Total Calorie Model 3.2

	Minimum Coefficient	*Country Omitted at Minimum Coefficient*	*Maximum Coefficient*	*Country Omitted at Maximum Coefficient*	*All Countries (Model 3.2)*
Calories_{t-1}	−0.084 (0.007)	Indonesia	−0.078 (0.007)	Kazakhstan	−0.080 (0.007)
Δ GDPC	3.259 (1.342)	Chile	5.879 (1.745)	Libya	3.629 (1.371)
GDPC_{t-1}	0.229 (0.269)	Gabon	0.954 (0.288)	South Korea	0.324 (0.257)
Hybrid	11.010 (3.780)	Ghana	13.708 (3.758)	Azerbaijan	12.510 (3.765)
Democracy	6.289 (5.209)	Brazil	10.866 (5.143)	Bulgaria	7.791 (5.105)
Δ GDPC * Hybrid	7.623 (3.463)	Libya	14.228 (3.528)	South Korea	9.793 (3.302)
Δ GDPC * Democracy	8.164 (3.254)	Libya	11.050 (3.597)	Argentina	10.436 (3.077)

Table 5. Cross-Sectional Jackknife Analysis of Animal Calorie Model 3.5

	Minimum Coefficient	*Country Omitted at Minimum Coefficient*	*Maximum Coefficient*	*Country Omitted at Maximum Coefficient*	*All Countries (Model 3.5)*
Calories_{t-1}	−0.120 (0.014)	China	−0.096 (0.013)	Estonia	−0.101 (0.013)
Δ GDPC	0.475 (0.551)	Argentina	1.590 (0.715)	Gabon	0.673 (0.590)
GDPC_{t-1}	0.651 (0.140)	Estonia	0.850 (0.163)	South Korea	0.706 (0.140)
Hybrid	−0.764 (0.958)	Guyana	0.458 (0.952)	Hungary	−0.229 (0.963)
Democracy	−1.231 (1.605)	Brazil	1.716 (1.526)	Hungary	−0.312 (1.588)
Δ GDPC * Hybrid	1.918 (1.314)	Gabon	4.075 (1.334)	South Korea	2.902 (1.238)
Δ GDPC * Democracy	4.038 (1.384)	Gabon	5.244 (1.331)	Lithuania	4.920 (1.334)

interaction between change in per capita GDP and each of the two regime types remain statistically significant at the 0.03 and 0.01 levels, respectively, however even with the exclusion of this single country case. In contrast, excluding South Korea and Argentina from the analysis of total calories increases the magnitude of the coefficients on the interaction term between hybrid regimes and democracies by 4.4 and 0.6, respectively. For animal calories (Table 5), the estimated effect of a 100-dollar increase in per capita GDP for autocracies increases considerably with the exclusion of Gabon. The exclusion of Gabon also decreases the coefficient on the interaction between ΔGDPC and hybrid regime by about 1 point, diminishing the statistical significance of this result to the 0.14 level. With the exclusion of Gabon, the coefficient on the interaction between ΔGDPC and democracy decreases somewhat, though the result remains highly statistically significant. To summarize, for the analysis of total calories, excluding Libya from the data set somewhat diminishes the difference between authoritarian and other regime types, though the coefficients on each interaction remain statistically significant. For the analysis of animal calories, the exclusion of Gabon narrows the gap between the gains seen in autocratic versus hybrid regimes, though the positive effect of democracy remains highly statistically significant.

Discussion and Conclusions

The failure of developing countries to alleviate food insecurity and malnutrition is often described as resulting from a lack of political will (Pinstrup-Andersen 1993). While in authoritarian regimes the political will of an autocratic leader or ruling junta is often necessary to translate economic growth into practices that benefit the poor, in a democratic setting, the median voter—who is often a member of the lower-middle class—seems to enjoy some of the opportunities presented by economic growth. In this paper, we have shown that given similar rates of growth, democracies and hybrid regimes make increases in food—a commodity for which there exist natural limits on the amount any single person can consume—available at higher rates than autocracies, and that democracies and hybrid regimes perform similarly for the measure of total calories availability. For similar rates of growth, hybrid regimes outperform autocracies in animal calorie consumption but democracies exceed both hybrids and autocracies in this measure.

These findings highlight the two primary innovations of this paper. The first is the use of per capita calorie availability as a proxy for economic redistribution that benefits the poor. Collected by the United Nations' Food and Agriculture Organization, these data are nearly universally available and nicely capture a measure of basic human importance—calorie consumption. The second innovation of the paper is the focus on how democracy and growth interact to affect the world's poor. Previous research has failed to show that democracies grow their economies at faster rates than autocracies; while regime type may not be a good predictor of economic growth, our findings suggest that democratic government, and in some cases pseudodemocratic institutions, interacts with growth in ways that are good for the poor. Most fundamentally, the assumption that growth and regime type interact rests on an assumption about how distribution to the poor comes about. We argue that reductions in inequality are more likely to come about from the channeling of the gains from growth disproportionately to the least well-off rather than from the more common zero-sum assumption in the literature that governments tax the wealthy to redistribute to the poor. Our results suggest that growth is an important condition for transfers to the poor.

We have described three plausible mechanisms connecting democratic government to pro-poor growth, each of which enjoys at least limited support in the existing literature. The first suggests that democracy is good for workers and that democracies pay higher manufacturing wages. The second argues that democracies invest more heavily in human capital than autocracies and government investment in human capital development better positions the poor to take advantage of opportunities presented by growth. The third contends that competitive elections encourage candidates, parties, and incumbent governments to woo voters with targeted rewards and that the most effective voters to target are the poor; a growing economy creates a larger resource base from which to distribute clientelist benefits and as a result growth and democracy interact in a redistributive way. The empirical results presented here are consistent with all three hypotheses. Democracy does appear to help translate growth into increased levels of high-quality animal calorie consumption. Perhaps even more interesting, however, is the extent to which democracies and hybrid regimes perform similarly with regard to increases in total calorie consumption. While the first two hypotheses rely on the positive effect of democracy to work through actual representation of the interests of workers and poor voters, the third, what we call the poverty—electoral connection, requires only a crude link between voting and redistribution. As most hybrid regimes do hold competitive elections, albeit in an ultimately undemocratic context, the strikingly similar performance of hybrids and democracies provides the strongest support for the poverty—electoral connection hypothesis. This suggests that it may be clientelism and vote buying—not representation of programmatic interests—that matters most for redistribution. An important area of future research will be to run additional empirical tests to differentiate between these and other hypotheses.

References

Acemoglu, Daron, and James Robinson. (2006) *Economic Origins of Dictatorship and Democracy*. Cambridge: Cambridge University Press.

Adetunji, Jacob. (1995) Infant Mortality Levels in Africa: Does Method of Estimation Matter? Unpublished working paper, Harvard Center for Population and Development Studies.

Aghion, Philippe, Eve Caroli, and Cecelia Garcia-Penalosa. (1999) Inequality and Economic Growth: The Perspective of the New Growth Theories. *Journal of Economic Literature* 37 (4): 1615–1660.

Alvarez, Michael E., Jose Antonio Cheibub, Fernando Limongi, and Adam Przeworski. (2000) *Dataset for Democracy and Development: Political Institutions and Well-being in the World, 1950–1990*.

Atkinson, Anthony B., and Andrea Brandolini. (2001) Promise and Pitfalls in the Use of ''Secondary'' Data-Sets: Income Inequality in OECD Countries as a Case Study. *Journal of Economic Literature* 39 (3): 771–799.

Auyero, Javier. (2004) When Everyday Life, Routine Politics, and Protest Meet. *Theory and Society* 33 (3): 417–441.

Azfar, Omar. (2005) Institutions and Poverty Reduction. Unpublished working paper, IRIS, University of Maryland College Park.

Baum, Matthew, and David Lake. (2003) The Political Economy of Growth: Democracy and Human Capital. *American Journal of Political Science* 43 (2): 333–347.

Bawn, Kathleen, and Frances Rosenbluth. (1996) Short versus Long Coalitions: Electoral Accountability and the Size of the Public Sector. *American Journal of Political Science* 50 (2): 251–266.

Besley, Timothy, and Masayuki Kudamatsu. (2006) Health and Democracy. *American Economic Review* 96 (2): 313–318.

Blaydes, Lisa. (2011) *Elections and Distributive Politics in Mubarak's Egypt*. Cambridge: Cambridge University Press.

Boix, Carles. (2003) *Democracy and Redistribution*. Cambridge: Cambridge University Press.

Boix, Carles, and Frances Rosenbluth. (2006) *Bones of Contention: The Political Economy of Height Inequality*. Working paper, Princeton University.

Bradley, David, Evelyne Huber, Stephanie Moller, Francois Nielsen, and John D. Stephens. (2003) Distribution and Redistribution in Postindustrial Democracies. *World Politics* 55 (2): 193–228.

Brunetti, Aymo. (1997) Political Variables in Cross-Country Growth Analysis. *Journal of Economic Surveys* 11:163–190.

Brusco, Valeria, Mara Marcelo Nazareno, and Susan C. Stokes. (2004) Vote Buying in Argentina. *Latin American Research Review* 39 (2): 66–88.

Calvo, Ernesto, and Maria Victoria Murillo. (2004) Who Delivers? Partisan Clients in the Argentine Electoral Market. *American Journal of Political Science* 48 (4): 742–757.

Chang, Eric C.C. (2007) Political Transition, Corruption, and Income Inequality in the Third-Wave Democracies. Unpublished working paper, Michigan State University.

Chong, Alberto. (2004) Inequality, Democracy, and Persistence: Is There a Political Kuznets Curve? *Economics and Politics* 16 (2): 189–212.

DeBoef, Suzanna, and Luke J. Keele. (2008) Taking Time Seriously: Dynamic Regression. *American Journal of Political Science* 52 (1): 184–200.

Deininger, Klaus, and Lyn Squire. (1996) A New Data Set Measuring Income Inequality. *The World Bank Economic Review* 10 (3): 565–591.

DeSoto, Hernando. (2000) *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*. New York: Basic Books.

Diamond, Larry. (2002) Elections Without Democracy: Thinking About Hybrid Regimes. *Journal of Democracy* 13 (2): 21–35.

Diaz-Cayeros, Alberto, Federico Estevez, and Beatriz Magaloni. (2007) Strategies of Vote Buying: Poverty, Democracy and Social Transfers in Mexico. Unpublished book manuscript.

Dixit, Avinash, and John Londregan. (1996) The Determinants of Success in Special Interests in Redistributive Politics. *Journal of Politics* 58 (4): 1132–1155.

Dollar, David, and Aart Kraay. (2002) Growth Is Good for the Poor. *Journal of Economic Growth* 7 (3): 195–225.

Durr, Robert H. (1993) What Moves Policy Sentiment? *American Political Science Review* 87 (1): 158–172.

Easterly, William. (2007) Inequality Does Cause Underdevelopment: Insights from a New Instrument. *Journal of Development Economics* 84 (2): 755–776.

FAO (Food and Agriculture Organization). (2001) *Food Balance Sheets: A Handbook.* Rome: United Nations.

Gonzalez, Maria de los Angeles. (2002) Do Changes in Democracy Affect the Political Budget Cycle: Evidence from Mexico. *Review of Development Economics* 6 (2): 204–224.

Greene, William H. (2000) *Econometric Analysis*, 4th edition. New York: Prentice Hall.

Grier, Robin M., and Kevin B. Grier. (2000) Political Cycles in Nontraditional Settings. Theory and Evidence from the Case of Mexico. *Journal of Law and Economics* 43 (1): 239–263.

Hogberg, David. (2006) Don't Fall Prey to Propaganda: Life Expectancy and Infant Mortality Are Unreliable Measures for Comparing the U.S. Health Care System to Others. National Policy Analysis 547, July.

Houle, Christian. (2009) Inequality and Democracy. *World Politics* 61 (4): 589–622.

Howell, Embry M., and Beatrice Blondel. (1994) International Infant Mortality Rates: Bias from Reporting Differences. *American Journal of Public Health* 84 (5): 850–852.

Kayser, Mark A. (2009) Partisan Waves: International Business Cycles and Electoral Choice. *American Journal of Political Science* 53 (4): 950–970.

Kenworthy, Lane, and Jonas Pontusson. (2005) Rising Inequality and the Politics of Redistribution in Affluent Countries. *Perspectives on Politics* 3 (3): 449–471.

Knack, Stephen. (2003) Security of Property and Contract Rights and ''Pro-poor'' Growth. Paper presented at the Measuring Empowerment Workshop at the World Bank.

Korpi, Walter, and Joakim Palme. (1998) The Paradox of Redistribution and Strategies of Equality. *American Sociological Review* 63 (5): 681–687.

Kraay, Aart. (2006) When Is Growth Pro-poor? Evidence from a Panel of Countries. *Journal of Development Economics* 80 (1): 198–227.

Lake, David, and Matthew Baum. (2001) The Invisible Hand of Democracy: Political Control and the Provision of Public Services. *Comparative Political Studies* 34 (6): 587–621.

Levitsky, Steven, and Lucan Way. (2002) The Rise of Competitive Authoritarianism. *Journal of Democracy* 13 (2): 51–65.

Li, Quan, and Rafael Reuveny. (2003) Economic Globalization and Democracy: An Empirical Analysis. *British Journal of Political Science* 33: 29–54.

Li, Quan, and Rafael Reuveny. (2006) Democracy and Environmental Degradation. *International Studies Quarterly* 40 (4): 935–956.

Lindert, Peter H. (1994) The Rise of Social Spending, 1880–1930. *Explorations in Economic History* 31:1–36.

Lindert, Peter H. (1996) What Limits Social Spending? *Explorations in Economic History* 33: 1–34.

Lindert, Peter H. (2004) *Growing Public: Social Spending and Economic Growth since the Eighteenth Century*. Cambridge, UK: Cambridge University Press.

Lust-Okar, Ellen. (2006) Elections under Authoritarianism: Preliminary Lessons from Jordan. *Democratization* 13 (3): 456–471.

Magaloni, Beatriz. (2006) *Voting for Autocracy: Hegemonic Party Survival and Its Demise in Mexico.* Cambridge, UK: Cambridge University Press.

Meltzer, Allan, and Scott Richard. (1981) A Rational Theory of the Size of Government. *Journal of Political Economy* 89:914–927.

Milanovic, Branko. (2000) The Median-Voter Hypothesis, Income Inequality and Income Redistribution. *European Journal of Political Economy* 16 (3): 367–410.

Milesi-Ferretti, Gian, Roberto Perotti, and Massimo Rostagno. (2002) Electoral Systems and Public Spending. *Quarterly Journal of Economics* 117 (2): 609–657.

Min, Brian. (2008) Democracy and Light: Electoral Accountability and the Provision of Public Goods. Presented at the annual meeting of the Midwest Political Science Association.

Moene, Karl Ove, and Michael Wallerstein. (2001) Inequality, Social Insurance, and Redistribution. *American Political Science Review* 95 (4): 859–874.

Muller, Edward N. (1988) Democracy, Economic Development, and Income Inequality. *American Sociological Review* 53 (1): 50–68.

Mulligan, Casey, Ricard Gil, and Xavier Sala-i-Martin. (2004) Do Democracies Have Different Public Policies than Nondemocracies? *Journal of Economic Perspectives* 18 (1): 51–74.

Pepinsky, Thomas. (2007) Autocracy, Elections, and Fiscal Policy: Evidence from Malaysia. *Studies in Comparative International Development* 42 (1–2): 136–163.

Persson, Torsten, and Guido Tabellini. (2000) *Politics Economics.* Cambridge, MA: MIT Press.

Persson, Torsten, and Guido Tabellini. (2003) *The Economic Effect of Constitutions.* Cambridge: MIT Press.

Pinstrup-Andersen, Per. (1993) *The Political Economy of Food and Nutrition Policies.* Baltimore: Johns Hopkins University Press.

Przeworski, Adam, Michael Alvarez, Jose Cheibub, and Fernando Limongi. (2000) *Democracy and Development: Political Institutions and Well-being in the World, 1950–1990.* Cambridge: Cambridge University Press.

Ravallion, Martin, and Guarav Datt. (2002) Why Has Economic Growth Been More Pro-Poor in Some States of India than Others? *Journal of Development Economics* 68 (2): 381–400.

Reenock, Christopher, Michael Bernhard, and David Sobek. (2007) Regressive Socioeconomic Distribution and Democratic Survival. *International Studies Quarterly* 51:677–699.

Rodrik, Dani. (1999) Democracies Pay Higher Wages. *Quarterly Journal of Economics* 114 (3): 707–738.

Ross, Michael. (2006) Is Democracy Good for the Poor? *American Journal of Political Science* 50 (4): 860–874.

Sadler, Kathryn, and Nuning Aknmadi, Eds. (2004) Governance and Poverty Reduction: Evidence from Newly Decentralized Indonesia. SMERU Working Paper.

Schady, Norbert R. (2000) The Political Economy of Expenditures by the Peruvian Social Fund (FONCODES), 1991–95. *American Political Science Review* 94 (2): 289–304.

Sen, Binayak, Mustafa K. Mujeri, and Quazi Shahabuddin, (2004) Operationalizing Pro-Poor Growth: Bangladesh as a Case Study. World Bank Working Paper.

Soekirman, Ignatius Tarwotjo, Idrus Jus'at, Gunawan Sumodiningrat, and Fasli Jalal, (1992) Economic Growth, Equity and Nutritional Improvement in Indonesia. United Nations. Administrative Committee on Coordination—Subcommittee on Nutrition.

Spencer, N. (2004) The Effect of Income Inequality and Macro-level Social Policy on Infant Mortality and Low Birthweight in Developed Countries—A Preliminary Systematic Review. *Child: Care, Health, and Development* 30 (6): 699–709.

Stasavage, David. (2005) Democracy and Education Spending in Africa. *American Journal of Political Science* 49 (2): 620–633.

Stevenson, Randolph T. (2001) The Economy and Policy Mood: A Fundamental Dynamic of Democratic Politics? *American Journal of Political Science* 45 (3): 620–633.

Stokes, Susan C. (2005) Perverse Accountability: A Formal Model of Machine Politics with Evidence from Argentina. *American Political Science Review* 99 (3): 315–325.

Timmons, Jeffrey F. (2010) Does Democracy Reduce Economic Inequality? *British Journal of Political Science* 40 (4): 741–757.

Vanhanen, Tatu. (2005) *Democratization: A Comparative Analysis of 170 Countries.* London: Routledge.

Weede, Erich. (1996) Political Regime Type and Variation in Economic Growth Rates. *Constitutional Political Economy* 7 (3): 167–176.

World Bank. (2001) *Kingdom of Morocco Poverty Update, Volume II: Statistical Annex.* Report No. 21506-MOR. Washington, DC: World Bank.