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Macro-level Drivers of Multidimensional Poverty in Sub-Saharan Africa:

Measuring Change in the Human Poverty Index

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Presented at the Annual Fall Research Conference for the

Association for Public Policy Analysis and Management

November 7th, 2013

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Abstract

Poverty is increasingly recognized as a multidimensional phenomenon in the development literature, encompassing not only income, but also a range of factors related to broadening an individual's freedoms to live a life of her own choosing. Poverty so understood suggests that alternative approaches to poverty *measurement* reflecting this multidimensionality may point toward alternative policies for poverty alleviation.

This paper explores the factors that may account for changes in one metric of multidimensional poverty in developing countries, the United Nation Development Program's Human Poverty Index, and will be primarily concerned with measuring the effects on the HPI of policies and activities that relate to, or are explicitly meant to encourage, economic growth, increased literacy and improved health.

The study focuses on the outcomes of a panel data set, created for the purpose of this study, of HPI scores for a set of 47 Sub-Saharan countries, between 1990 and 2010, and a range of indicators that the development literature and theory suggest should have an effect on *income* poverty, asking, what is the relationship between these indicators and *multidimensional poverty*?

A parallel set of models has been developed to measure the response of household consumption expenditure to changes in economic growth and human capabilities indicators.

All models are estimated using fixed effects estimators and cluster robust standard errors in Stata 12.

Consistent with the development literature, household expenditure appears to be significantly and positively related to changes in GDP per capita. However, when the HPI is regressed on GDP per capita, no statistically significant relationship is observed, even when controlling for a range of other indicators, suggesting that economic growth has no bearing on multidimensional poverty in most parts of the developing world. This finding suggests that development policies that focus primarily on economic growth as a means to addressing multidimensional deprivation may be misplaced.

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Introduction

It is often said that what gets measured is what gets done, and for the bulk of the international development field's history, poverty has been expressed and measured in monetary terms, such as GDP per capita, when discussed at a national or global scale, or the $1.25 (plus periodic adjustments) per day standard commonly cited in the development literature, when discussed at the individual level. A country is said to be developing or falling back, becoming wealthier or poorer, succeeding or failing according to changes in GDP per capita or changes in the percentage of its population rising above or living below the $1.25 per day international poverty line. Because poverty is conceptualized as primarily a function of control over monetary resources, policies designed to reduce poverty and improve well-being have tended to focus primarily on economic growth and the expansion of monetary wealth in the developing world.

However, the debate over the appropriate metrics for measuring poverty at a national level has begun to bubble over, leading to the proliferation of multidimensional metrics of poverty that aim to represent better the various components of deprivation. Proponents of these multidimensional poverty indices argue that a change in metrics from unidimensional, monetary-based metrics to multidimensional metrics is critical for the creation of effective international development policy. (Alkire and Foster, 2011; Anand and Sen, 1997; Arimah, 2004; Fleurbaey, 2009; Kakwani and Silber, 2008; Stiglitz, Sen and Fittousi, 2009; ul Haq, 1995)

These multidimensional poverty indices are designed to look beyond monetary-based metrics of development and to identify indicators that better explain how people, rather than economies, are developing. The United Nations Development Program, influenced by the growth of the human capabilities approach to development in recent decades, has been at the forefront of the creation of several composite indices designed to better understand, to one degree or another, some of the more human-specific components of development; the UNDP's Human Development Index (HDI) is a composite measure of knowledge and longevity, as well as standard of living, measured in terms of GDP per capita (United Nations Development Program [UNDP], 2008a); and its Gender-related Development Index and Gender Empowerment Index attempt to account for differences between men and women in their ability to benefit from development. These are only a few among many composite indices created to capture the multidimensional nature of poverty (see discussion below) and to chart a country's movement toward or away from higher levels of development.

However, properly explaining poverty is, by itself, largely an academic exercise. The point of research on the topic should be to change policy in order to improve the effectiveness of poverty interventions. Fleurbaey (2009) argues that poverty measurements that depend on the GDP per capita metric are inherently flawed, relying as they do on current economic activity, but ignoring a host of other factors that may contribute to social welfare, such as disparities in wealth, social relations, economic security, health, and longevity, among others. Underscoring the importance of the connection between sound measurements of social welfare and the policies meant to address them, Fleurbaey (2009) notes,

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> "The practical importance of a measure of social welfare can hardly be overstated.
> Policy decisions, cost-benefit analysis, international comparisons, measures of growth,
> and inequality studies constantly refer to evaluations of individual and collective well-
> being. *The fact that monetary measures still predominate in all such contexts is usually
> interpreted as imposed by the lack of a better index rather than reflecting a positive
> consensus.*" (emphasis added) (Fleurbaey 2009, p.1030)

The primary concern of this study is accounting for poverty reduction or increase in Sub-
Saharan Africa (SSA), as measured by the HPI. The HPI was designed to tell a different story
than the HDI. The HPI value reflects the proportion of people affected by any one of three key
deprivations— adult illiteracy, death before age 40, and a composite measure of the
percentage of children underweight for their age and the percentage of a population who lack
access to clean water—providing a comparative, multi-dimensional measure of the prevalence
of human poverty (UNDP, 2008b).[i] Where the HDI measures human development, the HPI
measures deprivation; where the HDI examines the progress of a society, the HPI measures the
percentage of people left out of this progress.

The HPI is a broad, aggregate measure of how well the poorest of the poor are faring in
a given country. While it can be argued that the selection of indicators that comprise the HPI (or
any similar multidimensional index) is arbitrary (Ravallion, 1992; Berenger and Verdier-
Chouchane, 2007; Alkire and Santos, 2009; Basarir, 2011;), it would be difficult to argue that
these indicators are not metrics of deprivation, or that they are not indicators that are typically
used to characterize extreme poverty. In this sense, it is difficult to confuse the HPI with the
more conglomerative indices, such as the HDI, that are as likely to reflect changes in the lives of
the well-off as the deprived. Indeed, this was the motivation behind the HPI's creation (Sen and
Anand, 1997), and, given this, it seems not unreasonable to measure a country's ability to
improve the lives of its poor by changes in its score on the HPI.

Focus of this Inquiry

This study is an exploration of those factors that appear to contribute to changes in the
HPI, and will be primarily concerned with policies and activities that relate to, or are explicitly
meant to encourage, economic growth, increased literacy and improved health.. In order to
draw out the distinctions between factors that drive change in a measure of multidimensional
deprivation and those that drive change in an income or consumption-based metric of poverty,
I will use fixed effects panel models that regress the HPI on various factors reported to reduce
income poverty, and will compare these findings to similar models that regress final household
consumption[ii] expenditure per capita on those same factors.

Overview of the literature and theoretical framework

In order for it to have any relevance, either to international development policy and
practice, or to the ongoing conversation about the proper theoretical frame for poverty

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reduction, an analysis of the drivers of change in multidimensional poverty must be located within its appropriate historical and theoretical context. While the rationale for monetary-based measures of poverty has been evolving since the early part of the 20th century, and is extensively covered in the literature (Atkinson, 1987; Coudouel, Hentschel, and Wodon, 2002; Ravallion, 1992; Ravallion in Anand, Segal and Stiglitz, 2010), arguments for multidimensional poverty metrics have only relatively recently reemerged in the literature. Given this, the brief review that follows will focus primarily, although not exclusively, on poverty measurement from a multidimensional perspective.

While not yet as well-developed as the literature on monetary-based metrics, the literature on alternative methods for measuring development has significantly expanded in recent years. However, gaps in the literature exist when, instead of examinations of the relationship between monetary-based metrics of poverty and development policies, the relationship between multidimensional metrics and development policies is considered. These gaps are outlined in Table 1.

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Table 1. Gaps in the poverty measurement literature

Findings from the literature	Gaps in the literature
Average incomes of poorest fifth rise equiproportionately with average incomes of all. (Dollar and Kraay, 2003) Using panel data regressions on a dataset including 137 countries over 40 years, Dollar and Kraay find that economic growth benefits the lowest quintile as much as it benefits average incomes, that stabilized inflation rates lead to increased income for the poorest quintile, and that "pro-poor" policies, such as primary educational attainment, public spending on education and health, labor productivity in agriculture, and formal democratic institutions do not increase the income of the poor.	What is the effect on deprivation associated with rise in average incomes?
Exceptions to Dollar and Kraay's findings exist, with policy implications. Donaldson (2008) uses Dollar and Kraay's dataset to identify several exceptions to their finding that growth is good for the poor—positive exceptions, when the income of the poorest quintile rises faster than would be predicted by increases in average income; and negative exceptions when the income of the poorest is lower than would be predicted by Dollar and Kraay.	Are there exceptional cases when deprivation, instead of income, is the dependent variable, and what are the policy implications?
Human development tends to precede, and is precondition for, economic growth. Suri et al examine the empirical relationship between human development and economic growth, and find that economic growth is precipitated and sustained by public and private investment in human development. (Suri, Boozer, Ranis and Stewart, 2011)	Does prioritizing economic growth policy retard or strengthen efforts to reduce multidimensional poverty?
Inter-country differences in multidimensional poverty levels in Africa are found to be associated with human development policies. Arimah (2004) uses a cross-sectional model to test the effects that human development strategies have had in terms of reducing both income-based and multidimensional poverty in Africa. Arimah finds that inter-country differences in poverty levels can be accounted for by different levels of investment in human development, including public expenditure on education, primary school enrolment, female educational enrolment, expenditure on health, and good governance.	What factors account for change in multidimensional poverty levels *over time*?

The broad intent of this study is to contribute to filling some of the gaps in the existing literature. The intent of this section, however, is to review the relevant research related to the

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theoretical basis for poverty measurement, including the evolution in the use of monetary metrics as metrics of societal well-being and development at a national level, and the emergence of the capabilities approach to development as an alternative to development that focuses on economic growth. This section will also review the literature addressing the development of the HPI as a direct response to use of GDP per capita as the predominant metric of well-being.

A Theoretical Basis for Poverty Measurement

A great deal of conceptual ferment is fueled by varying perspectives on the causes of, and solutions to, poverty in the developing world. At the core of these varying perspectives are methods of measurement that are used to support particular policy interventions. An understanding of poverty that, for instance, locates the cause of deprivation in inadequate command over monetary resources tends to produce recommendations that countries follow policies that are believed to expand economic output. Measuring national output in monetary terms, such as the value of total goods and services produced, and dividing this sum by national population to gain some estimation of per capita wealth is consistent with this perspective.

On the other hand, an understanding of poverty as a multidimensional phenomenon that is as much, if not more, a function of quality of life as it is a function of economic growth may produce recommendations that countries follow policies that require direct investment in improving the lives of the poor. From this perspective, measuring a country's efforts to reduce multidimensional poverty requires a broader and different measure of a country's progress than one that measures poverty solely in monetary terms.

Ravallion (1992, p.vii) draws out the link between measurement and policy by arguing that it is essential that a country's progress toward reducing poverty be reliably measured in order for international financial institutions, regional development banks and bi-lateral aid agencies "to have reasonable confidence about the impacts of policy initiatives and reforms on the poor."

While one of the primary objectives of international financial institutions, regional development banks, and bi-lateral aid agencies is to either directly or indirectly reduce the incidence of poverty and improve well-being, the starting point for most of these institutions is a conceptualization of poverty as seen through the lens of neoliberal economic growth theory, which defines poverty as, primarily, insufficient income or command over resources. The policy prescriptions that flow from this formulation are coherent and consistent with this understanding of the root causes of deprivation, particularly as it manifests in the developing world. This concatenation of neoliberal economic theory and the policies implemented by donor countries and international financial institutions form a specific international development regime—one that emphasizes economic growth, the generation of wealth, and the distribution of that wealth for the purposes of improving well-being. Although the terms of the debate have shifted somewhat in recent years such that, in general, development economists acknowledge that poverty is a multidimensional phenomenon, encompassing a

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range of factors, of which income is only one, there remains a distinct delineation between those who view poverty as primarily and essentially a function of income, and those who reject this view and maintain that poverty, and its converse, well-being, are first and foremost functions of those factors that enable one to live a life of one's own choosing, which may or may not include increased income, or that generate a greater command over resources.

The Evolution of the "Income Poverty Paradigm"

Per capita income, typically measured in terms of GDP per capita, or, more recently, Gross National Income per capita, has long been the metric by which a country is said to be developing or falling behind. Changes in this metric can also signal whether a country is a "safe bet" for repaying loans given for development purposes.[iii] Reddy and Pogge (in Anand, Segal and Stiglitz, 2010) note that, in a 2001 speech to G-20 Finance Ministers, then World Bank President James D. Wolfensohn stated,

> "Over the past few years, (these) better policies have contributed to more rapid growth in developing countries' per capita incomes than at any point since the mid-1970s. And faster growth has meant poverty reduction: the proportion of people worldwide living in absolute poverty has dropped steadily in recent decades, from 29% in 1990 to a record low of 23% in 1998. After increasing steadily over the past two centuries, since 1980 the total number of people living in poverty worldwide has fallen by an estimated 200 million—even as the world's population grew by 1.6 billion." (Anand, Segal and Stiglitz, eds., 2010, p.42)

The salient point in the above quote is the metric used to communicate a drop in developing country poverty—per capita income. Changes in per capita income are used to mark a country's progress in the global ranks of countries, as well as reclassify them in terms of credit-worthiness, as indicated in the World Bank's recent promotion of Lao People's Democratic Republic to a "lower-middle income" from a "low-income" country status, based solely on economic growth and increases in per capita income. (World Bank press release, July 2011)

Improvements in per capita income are often explicitly linked to improvements in well-being, such as in a recent World Bank press release (World Bank, 2012) on Kenya's economy:

> "Kenya's per capita income has exceeded US$800 for the first time, and Kenyans have an opportunity to enjoy better standards of living as the economy progresses towards middle-income status in the coming years…The challenge for the government, particularly in an election year, is to continue to run the economy well, to support private sector efforts to increase manufacturing and exports, and to remove bottlenecks to regional trade, so that Kenya stays on a higher growth path." (www.worldbank.org/en/news/2012/06/17/walking-tightrope)

The use of a "money-metric" to measure progress toward development is rooted in the assumption that national-level increases in per capita income translate into increased

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purchasing power and, therefore, increased well-being at the individual level. As a country's mean income increases, so the argument goes, so does the income of the poorest, and at the same rate. (Dollar and Kraay, 2003)

In a report commissioned by former French President Nicholas Sarkozy (Fittousi, Sen and Stiglitz. 2009), Nobel Laureates Amartya Sen and Joseph Stiglitz warn that

> "What we measure affects what we do; and if our measurements are flawed, decisions may be distorted…*(W)e often draw inferences about what are good policies by looking at what policies have promoted economic growth; but if our metrics of performance are flawed, so too may be the inferences that we draw."* (p.7) (emphasis added)

The report was commissioned in order to explore alternatives to measuring societal well-being, guided in large part by an assumption that the standard, monetary-based metrics are insufficient on their own, given their roots in market production rather than in activities that more directly relate to quality of life.

Dasgupta (1993) neatly summarizes both of the contending positions regarding the measurement of well-being, and the link between national accounts, such as GDP per capita, and poverty measurement:

> "If we wish to estimate changes in social well-being, there are two routes available. The first is the direct one. The idea is to measure changes in the constituents of well-being, such as health, longevity, basic liberties, literacy, and also real income, as indicators of the extent of commodity choice. In so doing, we measure changes in well-being itself…. The other route is roundabout. It is to measure changes in the value of the *determinants* of well-being. Since commodities are inputs in the production of well-being, we measure changes in the accounting (or shadow) values of goods and services. In short, the idea is to measure changes in real national income." (p.184)

Its ease of calculation, the superior availability of financial data, compared to data measuring human development, and its intuitive appeal, have helped to sustain GDP per capita in its position as the predominant metric of national well-being. These factors may have contributed to Grusky and Kanbur's (2006, p.11) suggestion that "it is perhaps unsurprising that economics has seized on income as a major indicator of well-being and has accordingly treated income-enhancing policies as the centerpiece of any strategy to reduce poverty and inequality."

Critiques of Income-based Measurements of Poverty

There are multiple arguments put forward for relying less on money-metrics for assessing poverty. Among the reasons given by Sen and Stiglitz for moving away from a reliance on the income poverty paradigm is the observation that, despite the apparent ease afforded by these metrics in adding up quantities of very different natures, the picture is more complex.

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> "First, prices may not exist for some goods and services (if for instance government provides free health insurance or if households are engaged in child care), raising the question of how these services should be valued. Second, even where there are market prices, they may deviate from society's underlying valuation. In particular, when the consumption or production of particular products affects society as a whole, the price that individuals pay for those products will differ from their value to society at large. Environmental damage caused by production or consumption activities that is not reflected in market prices is a well-known example." (Fittousi, Sen and Stiglitz. 2009, p.21)

Added to these concerns are concerns regarding asymmetry in information among consumers within a given market. In order for market prices to correspond to the value placed on them by consumers, it is essential that consumers are free to exercise a degree of choice in how they take advantage of this information. Even in advanced industrial economies, information asymmetry persists; in developing countries, it is compounded by generally weak regulatory infrastructures and systems of communication. Moreover, this leaves aside entirely the question of how equally additional wealth, as measured by GDP, is distributed within society.

Fittousi, Sen and Stiglitz (2009, p.143) pose, and answer in the negative, the question: "Is command over resources an adequate metric to assess human well-being?"

> "The standard economic argument that changes in (suitable deflated)(sic) measures of real income or wealth lead to changes in the same direction of consumer satisfaction provides only a weak connection between resources and human well-being: it says something about the direction of change, but it does not inform about its magnitude or about the level of well-being of individuals with different preferences. *The standard argument that people's command over resources is the relevant metric for determining how well-off people are similarly ignores that people with different characteristics will have different capacities to transform income or wealth into actual well-being, and that these differences cannot be ignored*... (M)any of the determinants of human well-being are not monetary resources but aspects of people's life circumstances (health, social networks, quality of institutions) or activities (home activities, quality of work, leisure). *It would be far-fetched to describe them as resources with imputable prices, even if individuals do make trade-offs among them.*"(emphases added)(p. 143)

Alternatives to the "Income Poverty Paradigm"

The criticism of income-based poverty metrics in recent years has opened the door to alternative approaches to measuring development. These alternative approaches attempt to incorporate sociology, behavioral economics and, in the case of some of the more subjective metrics of development, such as Bhutan's index of Gross National Happiness, psychology,

among other disciplines, in order to produce a more holistic assessment of whether and to what extent a country is addressing poverty.

In their collection of essays on poverty and inequality, Grusky and Kanbur (2006) suggest that the most pressing problems of poverty policy cannot be addressed without making conceptual advances beyond the current income-based paradigm. One such conceptual advance, they propose, would include new measures of inequality and poverty that can work within the context of a multidimensional space. For Grusky and Kanbur, it follows from this that another "conceptual challenge is that of devising new approaches to remediation that remain viable under this more expansive definition of poverty and inequality." (Grusky and Kanbur, 2006, p.2)

The Capabilities Approach and the Turn Away from the Money-metric

Grusky and Kanbur credit the growth of the capabilities approach to development for the rapproachement between theory and empirics that characterizes their "third phase." Popularized by Amartya Sen and elaborated on by many others (Anand and Sen, 2004; Kuklys, 2005; Alkire, 2005; Deneulin, 2005; Fukuda-Parr, 2003; Nussbaum, 2000; Robeyns, 2005), the capabilities approach to development stresses that development should focus on broadening an individual's set of capabilities (health, education, security, political voice, etc.) in order for him to live a life of his own choosing, rather than focusing on simply increasing his "utility."

The conceptual foundations of the capabilities approach are rooted in Sen's critique of welfare economics, and its tendency to conflate well-being with either income or utility. While he acknowledges that economic growth and the greater availability of goods and services are vital to human development, Sen views command over resources or income as means to other, more inherently valuable, ends. Instead of measuring development in monetary-based terms, development, according to the capabilities approach, should be measured in terms of the expansion of capabilities to convert income and command over resources into a life of one's own choosing and design.

Sen presents the capabilities approach as an alternative to the welfare or utility approach to development by arguing that individuals are motivated by more than simply desire fulfillment, but also factor other conditions, such as rights and freedoms, into their behavior. (Sen, 1999)

As defined by the capabilities approach, poverty is a result of "capability deprivation," or a limitation on the set of choices available to people to live lives of their own choosing. Development policies derived from this conceptualization of poverty would focus on expanding this set of choices. Instead, the dominance of the money-metric and the income poverty paradigm has meant that development policies have been primarily driven by a focus on economic growth, supply-side economics, and the conviction that the poor benefit equally from economic growth.

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While the multidimensional metrics of social achievement (the HPI, HDI, MPI, Gender Development Index, etc.) that have emerged out of the human development approach are built around directly measuring well-being—in order to measure progress toward attaining the "good" of a nation through the expansion of individual capabilities—modern neoliberal microeconomic theory and, by extension, current international development policy, is guided by the presumed need for the attainment of economic efficiency, in service of maximizing productivity. This, it is argued, is a necessary precondition for poverty reduction, for only through increasing the production of goods can there be poverty-reducing wealth to redistribute. This sequence of activities—attaining economic efficiency, maximizing production, generating wealth, and reducing poverty—undergirds development policy, but represents a fundamentally different value premise to approaches to poverty reduction that are human, rather than economic growth, focused (see discussion of Suri et al below).

In his review of World Bank and the IMF through their Poverty Reduction Strategy Papers, Sumner notes that,

"despite frequent references to 'noneconomic' indicators, other indicators (other than income-based measures) are seen as less basic to the definition of poverty than lack of income…However, arguably more influential than technical factors is the perception among policy makers that 'economic' measures of poverty are more 'objective' or 'rigorous': hence income measures dominate the MDGs, the HDIs, and the PRSPs." (Sumner, 2007, p.9))

"Growth is Good for the Poor"

With nearly 300 citations in other studies, and as recently as May 2012, (*Web of Science Database* search, July 1, 2012) David Dollar and Aart Kraay's "Growth is Good for the Poor" (2003) has proven to be one of the more influential, and contentious, studies regarding the connection between policies that spur economic growth and income poverty. In it, Dollar and Kraay define the poor as those in the bottom quintile of the income distribution of a country, and set about empirically examining the relationship between growth in average incomes of the poor and growth in overall incomes, using a large sample of developing *and developed* countries between the 1960s and 1990s. Dollar and Kraay (2003, p.3) report that they find that "on average incomes of the poor rise equiproportionately with average incomes," and conclude that "a basic policy package of private property rights, fiscal discipline, macroeconomic stability, and openness to trade on average increases the income of the poor to the same extent that it increases the income of the other households in society."[iv] (Dollar and Kraay, 2003, p.27)

A broad and deep literature has emerged on the relationship between income poverty and various factors assumed to be associated with economic growth (Easterly and Fischer, 2000; Todaro and Smith, 2003; Perkins, Radelet and Lindauer, 2006), but there have been

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relatively few studies of the relationship between these economic growth factors and human development, and fewer still on the relationship between these factors and human deprivation.

Human Development and Economic Growth

One recent study expands on standard endogenous growth models prevalent in the current literature and examines the empirical relationship between human development and economic growth, finding that economic growth is precipitated and sustained by public and private investment in human development. Working from within a human development and human capabilities framework, Suri et al (Suri, Ranis, et al, 2011, p.519) find that

> "HD (human development) levels are important for determining (economic) growth trajectories and that policies to improve HD must precede or at least complement growth-oriented policies if growth is to be accelerated and sustainable. *Structuring policy to produce strong HD is therefore a necessary condition for tipping an economy toward a virtuous cycle*. These findings are consistent with a threshold-type growth model and certainly contradict the view that investments in HD may be postponed until economic resource expansion makes them affordable." (emphasis added)

With their findings, Suri et al make the case that development economics typically puts the proverbial cart before the horse in focusing first on economic development, assuming that this will produce improvements in human development as a by-product. Economic growth is clearly needed to sustain improvements in human development, but economic growth is not sustainable without, first, investing in human development.

The Washington Consensus

While emergent since the Bretton Woods agreements, this practice of addressing poverty reduction efforts in monetary terms took a more definitive shape under the so-called "Washington Consensus." Throughout much of the 1980s and 1990s, the "Washington Consensus" approach to development, encapsulated in Dollar and Kraay's recommendations and elaborated on extensively in the literature, focused the development field's attention on the implementation of specific neoliberal interventions designed to open developing economies up to the world market, make national governments more efficient, and create the sort of economic growth that Dollar and Kraay suggest filters its way down to the poor, gradually reducing poverty. Well prior to the recent global economic contraction, this approach had already begun to be questioned, shaping as it had IMF and World Bank granting and lending policies throughout the 1990s (Cornia, 2004; Jolly, 2003; Committee on Financial Services, U.S. House of Representatives, 2007).

Despite relatively recent pronouncements of its decline, the "Washington Consensus'" principles continue to exert substantial influence over development policy. These principles include:

- fiscal discipline;
- reorientation of government spending;

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- tax reform;
- interest rate liberalization;
- unified and competitive exchange rates;
- trade liberalization;
- openness to foreign direct investment;
- privatization;
- de-regulation; and
- security of property rights

Part of the argument for using unidimensional, monetary-based metrics to measure poverty states that, from a policy perspective, if poverty is equated with lack of income, then policies that promote economic growth would be sufficient to reduce poverty, given a reasonable degree of equality in income distribution. If, instead, poverty is a multidimensional phenomenon, then, as Ravi Kanbur and David Grusky have put it, "The task (of remediating multidimensional poverty) .... *requires targeting those aspects of inequality and poverty (e.g. residential segregation) that are causal with respect to many outcomes and hence likely to bring about cascades of change* (emphasis added)." (Grusky and Kanbur, 2006, p.3)

The Human Poverty Index

This rejection of well-being and deprivation as concepts reducible to a measure of income is reflected in Anand and Sen's rationale for creating the Human Poverty Index. In describing the motivation behind the HPI, Anand and Sen argued that the measurement of development had too long focused on the "conglomerative perspective," a perspective that makes no distinction between the well-off and the deprived. Instead, Anand and Sen proposed that development be measured from a "deprivation perspective," in which the concern of development is focused specifically on the deprived. By measuring development in this way, Anand and Sen argue that "lack of progress in reducing the disadvantages of the deprived cannot be 'washed away' by large advances—no matter how large—made by the better off people." (Anand and Sen, 1997, p.1)

"Both the HPI and the income-poverty indicators share the deprivational perspective, but while the latter see nothing in poverty other than the low-ness of incomes, the HPI must take a much broader view, in line with the approach of human development. *It would, in fact, be useful to see how the values and rankings of HPI relate to the results of income-based poverty analysis* (emphasis added)" (ibid., 1997)

Unlike measures of individual or household poverty, the HPI is an aggregate measure of societal deprivation. Unlike the Multidimensional Poverty Index, which succeeded the HPI as the UNDP's metric of deprivation, the HPI is not easily decomposed by geographic area, ethnicity or other characteristic (although it could be argued that the HPI is easily decomposed by its constituent domains, measuring quality of life, health and education), but, instead, aims to provide an *overarching* assessment of a given country's ability to provide for its poorest.[v]

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Introduced in the UNDP's 1997 Human Development Report, the HPI remained essentially true to its original formulation (with one exception, which I describe below) until it was replaced in 2010 by the MPI, making possible the comparative analysis to which Anand and Sen refer above, as well as an analysis of how the HPI responds over time to various factors.

Human Poverty Index Formula

$HPI = [1/3(P_1^\alpha + P_2^\alpha + P_3^\alpha)]^{1/\alpha}$

P_1= Probability of not surviving to age 40

P_2= Adult illiteracy rate

P_3= Unweighted average of: population not using an improved water source and children underweight for age

α=3

A country's HPI score equals the proportion of its population affected by any one of these deprivations, providing a comparative measure for the prevalence of deprivation.

Over the thirteen years for which the UNDP compiled data for the HPI, a majority of developing countries were able to demonstrate improvements along the index, but a significant minority recorded increasing scores, indicating that an increasing proportion of their populations fell into extreme deprivation (Mali—52.8 in 1997, 56.4 in 2007; Mozambique—48.5, 50.6, respectively; Central African Republic—40.7, 43.6, respectively, and to name only a few). Moreover, a small number of countries recorded increases in poverty as measured by the HPI at the same time that average income, as measured by GDP per capita increased, calling into question the notion that increasing average income equates with decreasing (multidimensional) poverty.

Subramanian (in McGillivray, ed., 2007) points out that income-based measures of poverty are often poor proxies for a capabilities-based definition of deprivation and disparity, pointing to China, Costa Rica, Kenya, Peru, and the Philippines, "which have displayed greater success in reducing human poverty than income-poverty". The experience of these countries points "to the possibilities of enhancing achievements in the space of human functionings by routes different from those centered exclusively on income growth and the percolation of that growth to the poor." (Subramanian in McGillivray, 2007)

The reliance on the money-metric, and the dominance of the income-poverty paradigm in assessing poverty, is rooted in an understanding of human nature and motivation that posits that human welfare is maximized through an increasing command over resources. This understanding of what constitutes well-being drives toward the adoption of policies designed to reduce poverty primarily through increasing income. The development literature is rich with studies demonstrating the relationship between economic growth policies and GDP per capita.

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However, this relationship is called into question when, instead of income, a measurement of multidimensional poverty is considered, one that considers factors other than income as not only constituent parts of well-being, but also worthy of being measured and used as a gauge of a country's progress. This is the guiding theory behind the capabilities approach to development, the inspiration behind a growing number of multidimensional indices, and the motivation for the analysis that follows.

DATA AND METHODOLOGY

This study focuses on the outcomes of a panel data set (created for the purpose of this study) of HPI scores for a set of 47 Sub-Saharan African countries, between 1990 and 2010 (calculated using the formula above with current data), and a range of indicators that the development literature and theory suggest should have an effect on poverty. Several models have been created to empirically test the relationship between both the HPI and household consumption expenditure, and indicators relating to economic growth-based and capabilities-based approaches to development.

Data for this study have been compiled from a range of international development databases, including the World Bank's World Development Indicators, the World Bank's Privatization Database, the Penn World Table, the World Health Organization, the Millennium Development Goals, and the International Monetary Fund's International Financial Indicators.

See the Appendix for a more thorough treatment of the methodology used for this study.

Rationale for empirically testing outcomes for 2 dependent variables

Human Poverty Index

The HPI, as noted in Anand and Sen (1997), is premised on the understanding of poverty as a multidimensional phenomenon, and was created to provide a fuller accounting of human deprivation than those based simply on some measure of income. The United Nations Development Program adopted it and promoted it as a tool for planning and advocacy, as well as a tool for research into changes in multidimensional poverty. Country HPI scores were reported annually in the UNDP's Human Development Report until 2010, at which time the HPI was replaced with the Multidimensional Poverty Index. [vi]

The observation of annual changes in HPI scores invites inspection and analysis as to the factors behind them. However, there have been relatively few studies into this question. Arimah (2004) used cross-country data in a cross-sectional model to study the extent to which investments in human development resulted in poverty reduction, as measured by the HPI, and by the percentage of the population falling below national poverty lines. In their study, Collicelli and Valerii (2001) found that changes in GDP were uncorrelated with changes in the HPI for several Mediterranean countries, and that some countries have a low incidence of income poverty but simultaneously high HPI scores. Norton's study (2002) of the relationship between well-being and the relative wealth of the rich and poor in developing countries uses cross-

sectional models to find that increases in income for both the poor and the wealthy tend to correlate with well-being. Noorbaksh (2002) includes the HPI in his study of inter-provincial rankings of poverty in Iran, and Acharya (2004) uses the HPI to compare income poverty and multidimensional poverty in Nepal.

While several of these studies compare multidimensional poverty to income poverty, none of them examine the factors driving change in multidimensional poverty over time. In addition to examining change in the HPI over time, this study will, in keeping with the existing literature, compare the significant factors in models of HPI with similarly determined factors in models of a monetary-based metric of well-being, household final consumption expenditure per capita, to determine important and informative differences between the two sets of factors.

Household final consumption expenditure per capita as a percent of GDP

A central question addressed in this study is whether or not there is a difference in those factors that reduce multidimensional poverty and those that reduce some monetary-based measure of poverty. The question is: which monetary-based measure of poverty should be used? Coudouel, Hentschel and Wodon (2002) make the case, with regards to monetary based measures of poverty, that consumption expenditure, rather than income, is a more appropriate measure of well-being. They note that consumption is a better outcome indicator, is more accurately measured, and more closely reflects standard of living than income.

Consistent with Coudouel, Hentschel and Wodon's recommendation, I will use household final consumption per capita as the dependent variable against which I will compare findings from the HPI models.

Independent variables

The selection of variables for this study is intentionally focused on those that have some relationship to state policy decisions, rather than those that are naturally occurring (geography, natural disasters, e.g.) or those that are more individual in nature (family size, wages, e.g.). By focusing on variables that are the result of policy decisions, it is the aim of this report to suggest that state interventions and state policies have, perhaps, as important a role to play in reducing deprivation as do market and civil society actors.[vii]

Economic growth-based variables

Neoliberal economic theory, as well as the proponents of the Washington Consensus and its various permutations, suggests that opening up to imports and increasing exports, privatizing state-owned enterprises or other government assets, and implementing exchange rate controls, to name a few, should result in poverty reduction, measured in GDP per capita and compared to specified poverty levels, as the economies of developing countries grow (Asian Development Bank, 2004; Dollar and Kraay, 2003). However, while a developing country may have managed to increase its GDP per capita over a period of time, it does not necessarily follow that multidimensional poverty, as measured by the HPI, will have declined.

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The first growth-based variable I considered as a potential driver of the HPI was the broad measure of GDP/capita (**GDPpcap**) (Ferreira and Ravallion, 2008; Dollar and Kraay, 2002). As covariates I include variables for foreign direct investment (**FDI**) (Asian Development Bank, 2004; Spence, 2008), a measure of exports as a percentage of GDP (**expperGDP**) (Zedillo, Messerlin, and Nielsen, 2005; Todaro and Smith, 2003), imports as a percentage of GDP (**imppgdp**) (Castilho, Menendez, and Sztulman; 2012), the official exchange rate (**offexrate**) and inflation (**infl**) (Baldacci et al, 2004). The inclusion of these last variables as covariates was based on the grounds that openness to trade and prescriptions for keeping inflation and exchange rates low have been central pieces of the toolkit of international financial institutions in recent decades.

Capabilities-based variables

Human development advocates, however, argue that poverty reduction is as much, if not more, a function of investments in human capability development as it is of economic growth policies. Proponents of capabilities-based development place human beings, instead of economies, at the center of the development enterprise, and would point to investments in, and policies that support, improved healthcare, education, and social inclusion as likely to increase well-being and, therefore, address the multi-dimensional nature of poverty (Fukuda-Parr, 2002; Sen,1999; Kuklys, 2005).

This argument will be tested by estimating the effect on the HPI of a set of variables that could arguably serve as proxies for increased state-level investments in capabilities. The key indicator of interest is public health expenditure per capita (**healthex**), following Ranis and Stewart's (2000) findings that increased public sector investment in health is associated with improved human development and economic growth outcomes. The model includes as a covariate the female secondary school enrollment rate (**secschoolenrolrate**), following Lorentzen, McMillan and Wacziarg's (2005) findings of a significant and positive relationship between per capita income and postsecondary school enrollment rates. The model also includes a variable measuring the percentage of women in a given country's parliament (**wnppercent**), on the grounds that an increase in participation in national parliaments by women may be a proxy for social inclusion of women and, therefore, improvements in their capabilities. (Kabeer, 1999)

In addition to these indicators, the labor force participation rate (**labfrcpartrat**) is included as a covariate on the grounds that employment is key to expanding capabilities (Nussbaum?, 20xx), and improvements in the ability to derive income from labor through employment may have an effect on multidimensional poverty, in addition to household consumption expenditure. To the extent that ownership of livestock assets is a key wealth indicator in many parts of the developing world, changes in livestock productivity (**liveprod**) may be related to components of the HPI, and thus it is included as a covariate (Barrett et al,

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2006; Hoddinott et al, 2007). I also include a measure of agricultural productivity (**foodprodind9901**) as a covariate.

Three research questions

The primary purpose of this study is to better understand the factors that may account for changes in SSA countries' HPI scores, and therefore to better target policy and programmatic interventions designed to reduce deprivation and improve well-being. To respond to the fundamental research questions for this study, quantitative analysis using cross-country panel regressions is used. Specifically, this study will use panel regressions to address the following questions:

RQ1: To what degree do economic growth-based policies affect levels of deprivation in developing countries, as measured by the Human Poverty Index?

RQ2: To what degree do human capabilities-based policies affect the HPI in developing countries?

However, a related, and perhaps unavoidable, research question has to do with the comparison between how economic growth and human capabilities development strategies relate to a metric of multidimensional poverty, and how they relate to a monetary-based metric of poverty, in this case household final consumption expenditure per capita. If one believes that a monetary-based metric of poverty is an inadequate measurement of human deprivation, then it would be useful to examine how factors that drive change in multidimensional poverty differ, if at all, from those that drive change in monetary-based metrics. This leads to a third research question:

RQ3: How do factors that drive change in household final consumption expenditure per capita differ from those that drive change in the HPI?

Conceptual model

The primary purpose of this study is to identify factors that drive change in the HPI, in addition to determining how this set of factors may differ, when a monetary based measure of poverty is considered. To this end, several models will be estimated. However, conceptually, the models are intended to demonstrate that the HPI is responsive to specific policies adopted by, or conditions that exist in, individual countries. In particular, the models will demonstrate that:

- HPI values change over time, and

- Growth, capabilities, and assets-based policies or interventions contribute to this change in a country's HPI.

This conceptual model may be presented as an equation:

$$HPI_{it} = f(zg, zc, t) + Ci + E_{it}$$

in which the HPI for country i at time t is explained as a function of zg, a vector of economic growth based variables, zc, a vector of capabilities-based variables, and t, representing time. The model includes a set of indicators Ci representing the countries in the model. The variable time is key since it will show whether a change in policy contributes to a change in HPI, potentially providing the strongest evidence of "cause."

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Summary Statistics

Table 3 lists the 48 countries included in the analysis. Table 4 lists means and standard errors for all variables.

Table 3: Countries included in panel regressions

Sub Saharan Africa (n=47)

Angola	Ghana	Seychelles
Benin	Guinea	Sierra Leone
Botswana	Guinea-Bissau	Somalia
Burkina Faso	Kenya	South Africa
Burundi	Lesotho	Sudan
Cameroon	Liberia	Swaziland
Cape Verde	Madagascar	Tanzania
Central African Repub.	Malawi	Togo
Chad	Mali	Uganda
Comoros	Mauritania	Zambia
Dem. Rep. of Congo	Mauritius	Zimbabwe
Rep. of Congo	Mozambique	
Cote D'Ivoire	Namibia	
Equatorial Guinea	Niger	
Eritrea	Nigeria	
Ethiopia	Rwanda	
Gabon	Sao Tome & Principe	
The Gambia	Senegal	

Table 4: Means and standard deviations for all indicators included in panel models

Variable	Obs	Mean	Std. Dev.	Min	Max
HPI	861	37.5	12.9	8.73	68.44
GDP per cap	953	1405.36	2336.71	50.04	14901.35
Household Exp.	660	730.46	852.75	91.23	5984.13
Inflation	977	90.14	1113.35	-121.54	24411.03
FDI	977	4.1	9.77	-82.9	145.2
Export GDP	933	30.65	19.72	1.95	107.3
Import GDP	933	42.75	23.4	7.07	173.5
Food Production	981	89.55	20.7	35.12	170
Livestock Production	981	90.42	20.38	33.92	179.36
Labor Force Part.	966	71.52	11.14	48.2	91.3
Women in Parliament	630	13.55	9.3	0	56.3
Secondary School Enr (F)	393	23.66	25.03	0.93	115.38
Health Expend.	734	67.08	108.19	0	928.05

Table 5 lists countries ranging from largest increases to largest declines in HPI scores between 1990 and 2010.

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Table 5: Countries in order of largest increases to largest declines in HPI scores, 1990-2010

Country	Percentage decline in HPI from 1990-2010	Percentage point change	Country	Percentage decline in HPI from 1990-2010	Percentage point change
Cape Verde	0.54	14.42	Mozambique	0.20	10.48
Rwanda	0.48	24.35	Sierra Leone	0.18	10.08
Uganda	0.41	16.77	Namibia	0.17	4.04
Burundi	0.41	19.69	Equatorial Guinea	0.16	5.00
Mauritius	0.40	5.76	Zambia	0.15	6.11
Ghana	0.38	13.59	Sudan	0.14	4.70
Comoros	0.36	11.10	Togo	0.12	4.71
Gabon	0.33	7.21	Guinea	0.09	5.01
Senegal	0.32	16.55	Nigeria	0.05	2.07
Guinea-Bissau	0.32	17.11	Benin	0.05	2.58
Eritrea	0.31	13.19	Kenya	0.04	1.29
Malawi	0.30	13.02	Swaziland	0.00	-0.01
Mauritania	0.28	12.96	Liberia	-0.04	-1.71
Niger	0.26	17.49	Sao Tome and Principe	-0.10	-2.38
Cote d'Ivoire	0.25	11.94	Zimbabwe	-0.24	-5.39
Burkina Faso	0.24	15.31	Botswana	-0.36	-8.57
Cameroon	0.24	8.52	South Africa	-0.40	-6.53
Ethiopia	0.24	14.61	Lesotho	-0.78	-13.55
Chad	0.23	15.53	Congo, Rep.		
Angola	0.23	9.98	Madagascar		
Gambia, The	0.22	10.16	Seychelles		
Mali	0.22	14.15	Somalia		
Central African Republic	0.21	10.05	Tanzania		

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Table A1 in the Appendix presents the mean HPI, GDP/capita, Household Consumption Expenditure and Health Expenditure by country over the course of this study.

Mean values range from, at the lower end, Mauritius, with a mean HPI of 11.4%, to Niger, with a mean HPI of 62% over the 21 year period of this study. In terms of GDP per capita, amounts range from a high of approximately $10,000 per year in the Seychelles, to a low of approximately $151 in both Liberia and Ethiopia. With regards to mean household consumption expenditure, amounts range from a high of $2,855 in South Africa, to a low of approximately $120 in the Democratic Republic of Congo. Finally, in terms of health expenditure per capita, amounts range from a low of $5.82 in Somalia, to a high of $392 in the Seychelles.

Panel Regression Results

Economic growth-based variables and Household Consumption Expenditure

Looking first at those variables meant to measure the effect of changes in indicators of economic growth on household consumption expenditure for all countries in the dataset, displayed in Table A4, only GDP per capita behaves as predicted by the economic growth literature, with a one unit increase associated with an approximately $.50 increase (p<.01) in household consumption expenditure. None of the other indicators are statistically significant.

Economic growth-based variables and the HPI

Table A4 also presents the results of a panel regression model that regresses the HPI on the same economic growth indicators. Among these indicators, only the rate of inflation is statistically significant, with a one unit increase resulting in a modest .0025 (p<.01) increase in the HPI. None of the other indicators are statistically significant.

Capabilities-based variables and Household Consumption Expenditure

Table A5 presents the results of the panel regressions of the HPI and household consumption expenditure on the capabilities-based variables. Using the fixed effects estimator and regressing household consumption expenditure on the set of capabilities-based variables for all countries in the dataset finds none of the variables to be statistically significant.

Capabilities-based variables and the HPI

However, when the HPI is considered several of the indicators are found to be associated with significant reductions in multidimensional poverty. As shown in table A5, a one unit increase in both the food production index and livestock production index are associated with a .05 percent reduction in the HPI (p<.05); and each percentage increase in percentage of parliamentary seats held by women is associated with a .13 percent reduction in the HPI (p<.01). Curiously, neither the labor force participation rate nor the secondary school enrollment rate among girls is statistically significant, and an increase in health expenditure per capita is associated with a statistically significant (p<.05), but economically insignificant 0.005 percent increase in the HPI.

Discussion

Dollar and Kraay (2003) famously reported that growth enhancing policies and institutions "tend to benefit the poor—and everyone else in society—equiproportionately," and that "pro-poor" policy interventions, such as those related to primary school attainment, public expenditure on health and education, and labor productivity in agriculture have little to no effect in terms of raising the share of income for the poorest. The findings from this study confirm that economic growth, as measured by GDP per capita, does tend to benefit households, as measured by household consumption expenditure, although not on the 1:1 ratio claimed in Dollar and Kraay's examination of income poverty of the poorest quintile.

However, a closer look at drivers of multidimensional poverty in Sub-Saharan Africa would suggest that, in fact, deprivation is considerably reduced by factors other than economic

growth, including increases in food production, livestock production, and the percentage of women in national parliaments, which may be a proxy for gender equity.

The primary aim of this study has been to identify from among the range of potential macro-level drivers those that have an influence on multidimensional poverty. It has as its starting point the premise that poverty is a multidimensional phenomenon, and, as a corollary premise, a better understanding of what drives change in a particular multidimensional index—the HPI—would help to shape policies designed to improve well-being, as measured in terms other than monetary terms.

Growth, as measured by increases in GDP per capita, is not, it would seem, an unalloyed good for the poor, as Dollar and Kraay argue, if one measures poverty not by lowness of income, but by a multidimensional metric that more closely reflects human capabilities. As Fittousi, Sen and Stiglitz cautioned, if the metrics used in measuring poverty are wrong, then so, too, will be the inference that we draw about what makes for good policy. It would seem that the inferences will vary widely if, rather than an income-based metric, we use a multidimensional metric to measure poverty.

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Appendix

Data preparation and Methodology

Test of inter-item covariance and scale reliability

As an initial step in the analysis, and using data from the 2007/2008 HDR (HDR 2008a), I conducted a Cronbach's Alpha test in Stata 12 on the individual factors that comprise the HPI— probability of not surviving until age 40, adult illiteracy rate, and the unweighted average of population not using an improved water source and children underweight for age— in order to determine the reliability of the index.[viii] The scale reliability coefficient produced by Stata was 0.88, suggesting that the individual items composing this particular combination are well correlated, but not perfectly, and reflect some single underlying factor.

Calculating HPI Scores

As an index, the HPI is subject to similar limitations of other deterministic indices. Specifically, the individual components of the HPI, presented as additive, may in fact not be independent of each other, and thus be more appropriately measured by including multiplicative terms. Nonetheless, I argue that the limitations with the HPI are no more problematic than those associated with the GDP/capita, and the benefits of a measurement of the multidimensionality of poverty, if somewhat imperfect, is the better choice.

Also, one might suggest that the different components of the HPI merit different weights, and that the data used to calculate the various components are subject to various types of error (see *Limitations* below). However, Anand and Sen note the difficulties of using a fixed set of weights, when the relative importance of the components could vary so greatly among the countries being measured. For this reason, they argue for applying equal weights to each dimension (Anand and Sen, 1997).

In 2001, the Human Development Report Office of the UNDP changed the formula used to calculate the HPI by dropping an indicator—"access to health service." This change in the formula made longitudinal analysis between 1998 and 2007 difficult, if not fatally suspect. For the purposes of this study, I have recalculated the HPI for each of the countries in my subset, between the years 1998 and 2000, using the same formula (described above) for each year between 1998 and 2007. While limitations related to data quality and reliability persist, and are beyond the scope of this study to address, the adjustments made to the HPI values for 1998 and 2000 at least make these figures comparable to values reported in later years.

In addition, I calculated the HPI for the years 1990-1997 using its current formula with data compiled by the United Nation Population Division's World Population Prospects: 2012 Revision, UNESCO Institute for Statistics, UNICEF and the World Health Organization. Approximately thirty percent of the data used to construct the HPI for 1990-1997 was missing at random, so I used a simple linear interpolation method to replace missing values with estimates.

Imputation of missing data

Despite efforts to create a complete dataset for my indicators of interest, approximately eight to twelve percent of the data, depending on the variable, was missing from my dataset once most publicly available databases were examined. Following Maxim (1999) and Wayman (2003), I employed a multiple imputation method in Stata 12 (uvis) to impute missing values for several of my key variables of interest.

Hausman test for fixed or random effects models

To determine whether fixed effects or random effects is the more appropriate model specification for each of my outcomes, I conducted Hausman tests. For each outcome, a null hypothesis that the random effects specification will produce consistent estimates had to be rejected due to significant evidence of correlation between the random effects and other covariates in the model (p=.0001). A rejection of the null hypothesis implies that there are unobserved, country-specific factors that are correlated with the dependent variable. A fixed-effects model controls for these unobserved effects, permitting consistent estimations of the coefficients. (Allison, 1994; Wooldridge, 2002; Firebaugh and Beck, 1994). A fixed effects estimator has also been demonstrated in the literature to address other potential endogeneity problems, such as unit heterogeneity (Halaby, 2004). As Halaby notes,

> "Allison (1994, pp. 181) asserts that "the [fixed-effect] estimator is nearly always preferable [to the GLS random effects estimator] for estimating effects. . .with nonexperimental data." Nickell (1981, p. 1418), an early proponent of the modern econometric position on the subject, writes "[I]f one takes the view that, in any particular model, the individual effects are likely to be correlated with all the observed exogenous variables, then one is led inexorably to the fixed effects model." (Halaby, 2004)

Wooldridge (2006) points out:

> "The key issue that determines whether we use FE (fixed-effects) or RE (random-effects) is whether we can plausibly assume a_i (the unobserved effect) is uncorrelated with all x_{itj} (explanatory variables). Nevertheless, in some applications of panel data methods, we cannot treat our sample as a random sample from a large population, especially when the unit of observation is a large geographical unit (say, states or provinces). Then, it often makes sense to think of each a_i as a separate intercept to estimate for each cross-sectional unit. In this case, we use fixed effects: remember, using FE is mechanically the same as allowing a different intercept for each cross-sectional unit. Fortunately, whether or not we engage in the philosophical debate about the nature of a_i, FE is almost always much more convincing than RE for policy analysis using aggregated data." (p.498)

> As a result, all analyses in this study are based on fixed effects models, which are assured of producing consistent estimates.

VIF for multicollinearity

Tests for multicollinearity among the independent variables were conducted for each of the three primary models, using the ***estat vif*** postestimation command in Stata 12 with an OLS estimator. The VIF indicates how much the variance of the coefficient estimate is being inflated by multicollinearity. Results, as provided in Tables 2 and 3 below, suggest that there is no multicollinearity and that the parameter estimates can be uniquely computed.

Table A1: Variance Inflation Factors for independent variables in economic growth models

Variable	VIF	1/VIF	Variable	VIF	1/VIF
HHEX			**HPI**		
exppergdp	2.74	0.364535	**exppergdp**	2.6	0.384732
imppercgdp	2.22	0.449903	**gdppercapc~s**	1.8	0.557052
gdppercapc~s	2.03	0.491551	**imppercgdp**	1.7	0.588836
fdiimp	1.7	0.589097	**fdiimp**	1.16	0.858772
offexrate	1.45	0.68785	**offexrate**	1.14	0.875788
inflimp	1.35	0.742746	**inflimp**	1.11	0.900127
privpergdp	1.15	0.87308	**privpergdp**	1.05	0.949739
Mean VIF	1.81		**Mean VIF**	1.51	

Table A2: Variance Inflation Factors for independent variables in capabilities models

Variable	VIF	1/VIF	Variable	VIF	1/VIF
HHEX			**HPI**		
secschenrf	4.12	0.242434	**secschenrf**	3.62	0.27661
hlthex	4.02	0.248575	**hlthex**	3.54	0.282422
livstpr~9901	3.71	0.269762	**livstpr~9901**	2.99	0.334566
foodpro~9901	3.66	0.273339	**foodpro~9901**	2.98	0.33585
labforcpar~e	1.44	0.696192	**labforcpar~e**	1.4	0.714761
womparl	1.24	0.808657	**womparl**	1.33	0.75137
Mean VIF	3.03		**Mean VIF**	2.64	

Data Limitations

A significant limitation to this study concerns the source of the data, and the resulting variation in its quality. National social statistics and national accounts data—data that form the core of the Human Poverty Index as well as other aggregate measures—are dependent upon the data collection capacities of respective governments, and are subject to retroactive recalculation by the international agencies that collect the data. Developing countries' ability to

consistently collect reliable and representative data is, in many cases, lacking. This is particularly true for data related to human development. Most of the traditional methods for collecting national-level data—censuses, sample surveys, the Civil Registration System, administrative records, international data sources, and data collected by international NGOs— each have limitations that are compounded in developing countries (Prabhu, 2005; Harkness, 2007).

Moreover, a study of the causes of the types of deprivation measured by the HPI invites misspecification and threats to internal validity. It is difficult, at best, to anticipate (never mind find data for) all factors that could contribute to changes in any one of the factors that comprise the HPI. However, this study will argue, and the literature suggests, that there is a finite and measurable set of indicators that could account for much of the change in a country's HPI over time, and that identifying these indicators is an essential first step in refining policy interventions designed to reduce poverty.

To respond to the fundamental research questions for this study, quantitative analysis using cross-country panel regressions is used. It should be noted here, however, that the use of cross-country panel regressions to address questions of policy effectiveness is not without its critics (Madalla, 1999). The practice is, nonetheless, widely used in development economics, largely because, despite their many imperfections, there are few alternatives to cross-country studies when the objective is to assess how policy change has brought about actual, measurable, macro-level change in the rates of deprivation experienced in the developing world. Case studies and random assignment, perhaps the two leading contenders, are often cost-prohibitive, and neither lends itself easily to the study of how multiple factors may interact to bring about a given outcome on a national scale.

Estimation model

This paper analyzes the effects of economic growth and human capabilities-based policies on deprivation, as measured by the Human Poverty Index, focusing on the primary research question: what is the effect of these policies and interventions on the HPI for selected developing countries? To examine this question, a panel regression model is applied to measure changes in the HPI between 1990 and 2010 for SSA countries countries. In the models above, I estimated the relationship between the Human Poverty Index and economic growth and human capabilities.

In each model, the dependent variable is either the HPI or household final consumption expenditure per capita. In the economic growth models estimated above, the key explanatory variable of interest is GDP per capita, measured in constant international dollars. In the capabilities models, the key explanatory variable of interest is per capita total public expenditure on health, measured in PPP international dollars. Covariates are included in each model to control for other factors that may drive change in the HPI or household consumption expenditure.

The models I estimate are fixed effects models[ix], which control for country-specific unobservable determinants of multidimensional poverty and household consumption

expenditure[x], which are major concerns with panel datasets similar to the one that I have used in this study.[xi] One limitation of using fixed effects estimators is that time-invariant variables, such as geographic characteristics, drop out of the models, making estimations of the coefficients for these variables impossible to determine. Instead, all of the effects of time-invariant factors are absorbed in the error term in fixed effects models. Random effects models are better suited to the use of time-invariant variables. However, Wooldridge (2002, 2006) notes that fixed effects models are the more appropriate models when using panel data to determine policy effects.

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Table A3. Mean HPI, GDP per capita, Household Expenditure and Health Expenditure per capita

countryname	stats	HPI	GDP per capita	Household Exp.	Health Exp.
Angola	mean	38.00676	1572.198	662.939	71.42261
	min	32.8171	993.898	662.939	18.5318
	max	42.7944	2597.05	662.939	236.551
Benin	mean	50.23714	506.7954	388.4086	23.33761
	min	46.93	456.966	355.748	15.704
	max	53	553.657	424.709	34.1686
Botswana	mean	28.52286	4608.309	1225.938	252.4214
	min	23.46	3287.74	404.957	124.778
	max	32.24	6295.88	1998.39	465.541
Burkina Faso	mean	59.07095	351.9935	344.7539	20.67777
	min	48.12	269.324	168.037	10.7242
	max	63.43	457.229	2056.7	39.0964
Burundi	mean	36.69524	166.1189	191.5377	11.93213
	min	28.37	143.783	105.799	6.17984
	max	48.06	223.513	307.114	22.5774
Cameroon	mean	30.67857	882.9903	489.8898	40.46024
	min	26.8	783.622	102.158	25.1338
	max	35.59	999.742	682.03	63.8344
Cape Verde	mean	18.87952	1730.104	836.5801	93.92639
	min	12.37	1095.41	604.304	56.5852
	max	26.79	2764.22	1303.92	147.724
Central African	mean	43.59048	375.3225	919.1033	13.44398
	min	38.68	338.609	300.869	9.88171
	max	49.16	429.755	1759.13	20.1674
Chad	mean	58.44762	377.8866	344.8925	19.15368
	min	50.78	293.121	300.228	10.5731
	max	66.31	529.433	520.192	30.6446
Comoros	mean	25.13667	654.3062	481.872	23.47689
	min	20.05	604.771	306.713	11.246

HJP

	max	31.15	732.741	657.031	40.4659
Congo, Dem. Rep.	mean	.	160.9279	119.9105	8.460539
	min	.	118.645	100.85	4.2493
	max	.	297.477	142.065	15.9666
Congo, Rep.	mean	.	1692.999	342.2916	36.72501
	min	.	1523.05	119.313	21.186
	max	.	1909.83	535.868	68.1003
Cote d'Ivoire	mean	42.25286	990.5357	635.5277	45.59092
	min	35.4	932.792	505.795	23.1273
	max	47.5	1083.63	772.036	71.8341
Equatorial Guine	mean	29.39524	6810.091	1362	259.4395
	min	25.81	1042.01	339.13	21.8315
	max	30.81	14901.3	2591.95	928.054
Eritrea	mean	38.2281	229.7326	1194.531	8.607141
	min	29.85	176.675	183.201	6.77898
	max	43.04	275.76	5984.13	12.7115
Ethiopia	mean	55.19952	151.2346	121.2604	7.605789
	min	47.02	113.008	91.2329	3.80563
	max	61.63	231.314	191.924	15.5477
Gabon	mean	19.25	6729.48	1568.355	170.7566
	min	14.68	5974.7	145.901	102.365
	max	22.12	7628.72	2440.46	308.669
Gambia, The	mean	42.84333	429.0914	584.3809	21.22078
	min	35.86	402.849	329.053	14.493
	max	46.02	466.653	2400.98	26.8417
Ghana	mean	30.29048	461.9037	387.9343	32.95507
	min	21.75	376.59	345.57	12.3245
	max	35.34	610.194	409.121	68.5272
Guinea	mean	54.36571	289.1835	226.354	24.14201
	min	50.96	265.043	226.354	17.4678
	max	57.76	311.648	226.354	30.2448

Guinea-Bissau	mean	44.6319	456.529	.	22.57278
	min	35.73	386.533	.	10.6159
	max	52.84	589.765	.	38.2167
Kenya	mean	29.22381	525.5078	379.8887	23.22798
	min	27.9	495.569	344.137	14.0337
	max	30.28	574.853	397.561	35.8385
Lesotho	mean	27.17286	656.3164	709.3681	47.16788
	min	17	510.689	414.636	22.5697
	max	33.13	879.224	882.423	115.716
Liberia	mean	41.59476	151.2246	514.5532	14.48995
	min	35.15	50.0422	189.86	0
	max	48.56	252.955	943.692	41.4482
Madagascar	mean	.	283.3353	251.2773	11.16307
	min	.	249.068	230.516	6.7362
	max	.	328.417	326.965	17.4782
Malawi	mean	36.64381	214.0624	212.7819	15.45903
	min	29.84	179.906	186.648	7.13484
	max	42.86	258.058	233.969	28.9889
Mali	mean	58.25191	398.3281	309.589	24.64392
	min	50.07	325.84	172.257	14.4131
	max	64.22	498.475	370.284	41.179
Mauritania	mean	40.14714	680.2131	428.9057	31.33392
	min	33.86	614.603	296.752	19.5969
	max	46.82	801.995	554.792	58.9098
Mauritius	mean	11.42762	4458.069	2132.143	222.6586
	min	8.73	3037.46	479.948	126.27
	max	14.49	6320.51	3472.71	464.77
Mozambique	mean	47.36429	257.3155	1114.347	16.56636
	min	42.43	175.888	191.769	7.62147
	max	52.91	380.849	4264.62	26.432
Namibia	mean	21.81952	3226.933	1436.103	188.2075
	min	19.54	2672.81	255.743	105.049
	max	24.44	4073.83	2082	283.505

Niger	mean	62.11286	267.2257	2127.638	10.92156
	min	50.95	233.68	192.919	5.21647
	max	68.44	302.852	2809.95	19.4509
Nigeria	mean	40.47286	739.474 .		48.73779
	min	39.18	660.179 .		16.1294
	max	42.43	972.546 .		87.6313
Rwanda	mean	35.81857	249.5331	216.2174	21.99299
	min	26.23	140.254	188.669	8.05469
	max	53.9	352.412	240.447	55.224
Sao Tome and Pri	mean	19.58524	749.9515	295.6844	67.08189
	min	15.57	693.966	265.834	37.2379
	max	25.32	812.639	331.688	100.633
Senegal	mean	44.51143	710.8468	542.2704	37.44858
	min	34.53	634.352	505.047	21.3195
	max	51.08	796.149	585.274	65.7465
Seychelles	mean	.	10721.06	644.745	392.6027
	min	.	8559.97	619.813	297.824
	max	.	13019.6	699.444	458.138
Sierra Leone	mean	52.12286	313.0867	249.1474	39.82663
	min	44.94	247.121	197.463	19.5077
	max	55.09	373.677	294.565	72.2793
Somalia	mean	.	.	314.6906	5.828213
	min	.	.	281.971	3.86027
	max	.	.	335.983	7.43116
South Africa	mean	19.77381	4946.413	2855.047	356.5637
	min	15.98	4472.49	2621.24	205.277
	max	22.76	5848.04	3300.92	630.926
Sudan	mean	32.8081	594.8488	1201.169	36.96776
	min	28.83	438.777	390.314	11.4749
	max	34.72	784.802	3742.66	110.776
Swaziland	mean	31.53429	2213.391	1179.599	128.1826
	min	29.16	1995.8	503.534	58.3248

	max	35.57	2450.83	1727.94	242.682
Tanzania	mean	.	334.0289	462.6241	15.42811
	min	.	278.426	170.297	6.28221
	max	.	451.547	2124.77	36.759
Togo	mean	36.66714	393.398	375.0566	22.57624
	min	33.27	319.663	261.146	13.937
	max	38.03	447.232	466.035	39.1102
Uganda	mean	33.46095	279.4554	234.0452	24.65818
	min	24.07	197.64	169.487	14.7793
	max	41.01	393.149	345.703	44.0065
Zambia	mean	37.19667	622.3303	322.1719	36.90014
	min	33.19	557.147	234.957	17.9974
	max	40.31	741.442	420.153	73.8443
Zimbabwe	mean	32.20048	577.3773	453.202	71.83667
	min	22.6	344.742	325.848	35.7119
	max	38.95	718.418	529.441	98.8542
Total	mean	37.50327	1405.364	730.4627	67.07606
	min	8.73	50.0422	91.2329	0
	max	68.44	14901.3	5984.13	928.054

Table A4, Economic Growth models

VARIABLES	hhexpercap2000	hpi
GDP per capita	0.497***	-0.000268
	(-0.146)	(-0.000287)
Inflation	2.709	0.00246***
	(-2.527)	(-0.000664)
FDI	-6.499	-0.024
	(-10.16)	(-0.0246)
Exports	-0.0627	-0.0426
	(-8.888)	(-0.0507)
Imports	4.729	-0.0171
	(-5.416)	(-0.0308)
Official Exchange Rate	-0.0773	-0.00098
	(-0.131)	(-0.00115)
Constant	-165.4	40.65***
	(-225)	(-1.629)
Observations	637	821
R-squared	0.09	0.051
Number of countries	43	41
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

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Table A5: Capabilities models

VARIABLES	hhexpercap2000	hpi
Food Production Index	-1.358	-0.0489**
	(-0.897)	(-0.0188)
Livestock Production Index	1.557	-0.0520**
	(-1.576)	(-0.022)
Labor Force Participation Rate	13.18	-0.301
	(-9.181)	(-0.196)
Percentage of Women in Parliament	-1.625	-0.134***
	(-1.705)	(-0.0425)
Secondary School Enrollment (female)	4.041	-0.0629
	(-4.275)	(-0.0707)
Health Expenditure per capita, current U.S. dollars	1.234***	0.0119**
	(-0.356)	(-0.00476)
Constant	-390.3	69.97***
	-681.5	-13.88
Observations	244	311
Number of country	0.464	38
R-squared	33	0.531

Table A6: Variable definitions

Variable	
yr	Year
hpi	Human Poverty Index
Exports	Exports of goods and services represent the value of all goods and other market services provided to the rest of the world, in constant US dollars.
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.
FDI	The net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor, in constant US dollars
Secscholle~e (female)	Gross enrolment ratio. Secondary. All programmes. Female is the total female enrollment in secondary education, regardless of age, expressed as a percentage of the female population of official secondary education age. GER can exceed 100% due to the inclusion of over-aged and under-aged students because of early or late school entrance and grade repetition.
Health Expenditure per capita	Total health expenditure is the sum of public and private health expenditures as a ratio of total population. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation. Data are in current U.S. dollars.
Agricultural Value Index	Agriculture value added per worker is a measure of agricultural productivity, and comprises value added from forestry, hunting, and fishing as well as cultivation of crops and livestock production, in constant 2000 U.S. dollars.
Labor Force Participation Rate	Labor force participation rate is the proportion of the population ages 15-64 that is economically active: all people who supply labor for the production of goods and services during a specified period.
Livestock Production Index	Livestock production index includes meat and milk from all sources, dairy products such as cheese, and eggs, honey, raw silk, wool, and hides and skins.
Womparl	Percentage of seats held in national parliaments by women
Hhldexp	Household final consumption expenditure (formerly private consumption) is the market value of all goods and services, including durable products households, in constant 2000 U.S. dollars.
Official Exchange Rate	Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).
Imports	The value of all goods and other market services received from the rest of the world, as percent of GDP
GDP per capita	L GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States.

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Endnotes

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[i] The HPI measures deprivation in what its designers argue are three essential elements of human life: longevity, knowledge and a decent standard of living.

- The first deprivation relates to survival: the likeliness of death at a relatively early age and is represented by the probability of not surviving to ages 40 and 60, respectively, for the HPI-1 and HPI-2 (a poverty index created to account for longer average lifespan and the role that social exclusion plays in well-being in industrialized countries).
- The second dimension relates to knowledge: being excluded from the world of reading and communication and is measured by the percentage of adults who are illiterate.
- The third aspect relates to a decent standard of living, in particular, overall economic provisioning. For the HPI-1, it is measured by the unweighted average of the percentage of the population without access to safe water and the percentage of underweight children for their age." (UNDP, 2008b)

Notably absent from this list of factors are any that directly measure income or other monetary-based measures of well-being. This was intentional and done so that a clearer picture of poverty, exclusive of income, could be determined. By focusing solely on the deprived, the HPI is relatively free of the distribution-related shortcomings of the other highly-aggregated income-based measurements of well-being.

[ii] Household consumption, rather than income, was selected as the dependent variable for comparison purposes due primarily to the availability of annual consumption data.

[iii] For example, in 2010 the World Bank categorized countries for which annual GNI per capita was above $12,276 as "high income," between $3,976 and 12,275 as "upper middle income," between $1,006 and $3,975 as "lower middle income," and below $1,005 as "low income." (World Development Indicators database, World Bank, 1 July 2011)

[iv] In her article on policymaking at the World Bank, Robin Broad documents how the Bank's lending policy has been unduly influenced by David Dollar's research, and research subsequent to Dollar and Kraay's that supports a neoliberal "paradigm maintenance" to the exclusion of alternative perspectives on poverty reduction.

[v] However, to this point Sen notes: "It is easy to see why decomposability has such a strong appeal. It is "nice" to be able to "break down" the overall poverty of a total population into poverty in different subgroups of people that make up the total population. It gives, I suppose, some forensic satisfaction in solving a "whodunit" (and by how much respectively)… but, if decomposability is taken to be a necessary virtue of measures of inequality and poverty, the class of permissible normative indicators would be severely restricted. The much used Gini coefficient, in particular, as a measure of inequality must be abandoned. Similarly, distribution-sensitive poverty measures that make use of the Gini method of taking account of inequality among the poor, such as the "S (Sen) measure" (or its variations), must also be rejected. It is, therefore, important to ask whether decomposability is indeed a necessary— or at least a desirable— characteristic of the indicators to be chosen to reflect poverty or inequality in the income space…" (Sen in Kanbur and Grusky, 200x)

[vi] Multidimensional Poverty Index (MPI) identifies deprivations across the same three dimensions as the HDI (a long and healthy life, access to education, and a decent standard of living) and shows the number of people who are poor (suffering a given number of deprivations) and the number of deprivations with which poor households typically contend.

[viii] Data for the four indicators used to calculate the HPI are drawn from the following sources:

- Probability of not surviving to age 40
  - Source: UN Population Division World Population Prospects: The 2008 Revision.
- Adult illiteracy rate
  - Source: UNESCO Institute for Statistics www.uis.unesco.org
- Population not using an improved water source
  - Source: UNICEF and WHO
    either via   http://www.childinfo.org/statistical_tables.html
- Children under weight for age
  - Source: UNICEF www.childmortality.org

[ix] OLS estimation of pooled panel data was not pursued, given the high probability that this would introduce bias from country-specific effects that do not vary over time, as well as invite autocorrelation if errors are correlated across years.

[x] In addition to conducting a Hausman test to determine whether fixed or random effects estimators should be used, I also conducted a Wald test, which determines if year dummies are equal to zero. The test rejected the null hypothesis, indicating year fixed effects are required.

[xi] Per Baum (2000), I confirmed the presence of heteroskedasticity using xttest3 in Stata 12, and so have used cluster robust standard errors in the models. In post-estimation tests, I use the Schwartz Bayesian Information Criterion to confirm that the cluster robust standard errors models have more explanatory power than either a model using simply robust standard errors or a simple model that does not account for heteroskedasticity.