The macroeconomic determinants of Multidimensional poverty in East Africa : Evidence from panel Data

A research presented on the 16th International conference on Ethiopian Economy

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Abstract

This paper investigated the macroeconomic determinants of multidimensional poverty in east Africa using a panel data from 1990 to 2016 and fixed effect model was employed. A parallel set of models has been developed to measure the response of household consumption expenditure and human poverty index to changes in economic growth and human capabilities indicators. All models are estimated using fixed effects estimators. Inconsistent with the development literature, household expenditure appears to be insignificantly and positively related to changes in gross domestic product (GDP) per capita. However, when the HPI is regressed on GDP per capita, statistically significant relationship is observed, calling into policy intervention on the relationship between economic growth and well-being in much of east Africa. This finding suggests that development policies that focus primarily on economic growth as a means to addressing multidimensional deprivation may be used well.

Key words: Macro drivers, multidimensional poverty, East Africa

1. Introduction

In the international development field's history, poverty has been expressed and measured in monetary terms, such as gross domestic product (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. 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 (Prince, H., 2014).

Over the last ten years or so, interest in multidimensional poverty measurement has been growing steadily. Multidimensional poverty analysis has also ventured forth from purely academic discussion and into the broader policy debate, both within a number of countries and internationally (Francisco H., Maria A.,2012). The driving force behind this rising popularity is the broad acknowledgment that poverty is about more than just low incomes. Low consumption and inadequate living standards lie at the heart of what most people understand by the word “poverty”, to be sure. But the associations conjured up by that term also include aspects of poor health, a shortened lifespan, limited access to education, knowledge and information, and powerlessness in various domains. Poor people themselves will often allude to non-income dimensions as crucial to their perception of their own hardships.

Both human development and human poverty[1] are defined in terms of the ability of the population to acquire and use capabilities. The Human Development Index measures deprivation in terms of the absence/prevalence of the capabilities to acquire and use three essential elements of human life: longevity, knowledge and a decent standard of

[1] The HPI is a broad, aggregate measure of how well the poorest of the poor are faring in a given country. Whilst it can be argued that the selection of indicators that comprise the HPI (or any similar multidimensional index) is arbitrary (Alkire & Santos 2009; Basarir 2011; Berenger & Verdier-Chouchane 2007; Ravallion 1992), 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 characterise extreme poverty.

living(UNDP, 2008). Furthermore, this study intends to know for poverty reduction or increase in Eastern Africa, as measured by the United Nation Development Program's (UNDP) former metric for aggregate and , national-level deprivation, the Human Poverty Index (HPI). 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, multidimensional measure of the prevalence of human poverty. The HDI measures human development and examines the progress of a society whereas the HPI measures deprivation and the percentage of people left out of this progress.

Dollar et al. (2003) argued that growth-enhancing policies and institutions 'tend to benefit the poor and everyone else in society equi proportionately', and that 'pro-poor' policy interventions, such as those related to primary school attainment, public expenditure on health and education and labour productivity in agriculture, have little to no effect in terms of raising the share of income for the poorest. They claimed on the 1:1 ratio in Dollar and Kraay's examination of income poverty of the poorest quintile.

From the outset, the intent of this study has been to determine whether those factors that drive change in an income-based metric of poverty are the same as or different from those that drive change in a multidimensional metric. This is important because, presumably, policy and investment decisions are made based on the evidence of what does and does not work. It 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 unidimensional and income-based metrics of poverty, I will use fixed effects panel models that regress the HPI on various factors reported to reduce income poverty and compare these findings to similar models that regress final household consumption expenditure per capita on those same factors.

This study is intended to answer the following primary research questions:

- What are the effects of economic growth-based policies on the levels of deprivation in East Africa, as measured by the HPI?
- Do human capabilities-based policies affect the HPI in East Africa?
- How do factors that drive change in household final consumption expenditure per capita differ from those that drive change in the HPI?

The third research question is included to do with the comparison between how economic growth and human capabilities development strategies related to a metric of multidimensional poverty and how they relate to a monetary-based metric of poverty. It is measured by household final consumption expenditure per capita. If one assumes 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 me to develop a third research question. The next section explain the conceptual framework of multidimensional poverty measurements.

2. Conceptual Framework of Multidimensional Poverty Measurement

There is consensus among scholars that poverty is a multidimensional concept. Even traditional monetary measures of poverty are considered as being multidimensional. Ravallion (2011) argued that besides the measures of rice consumption in countries such as Vietnam before the 1990s there have been no other attempts for uni-dimensional measures. Despite this confusion, monetary measures are often perceived as uni-dimensional when in reality, several different goods and services are used in their construction.

Furthermore, rather than viewing poverty as a result of a lack or lowness of single resource variable or trait, the multidimensional approach weighs in a more comprehensive set of information. Whereas economic well-being, capability, and social inclusion are treated as poverty indicating proxy concepts, this approach incorporates all

three as separate dimensions of poverty. Although these dimensions are highly interrelated, a lack of perfect predictability indicates the urgency for using all three. The measurement outcomes from this approach would more comprehensive and accurate than those from any unidimensional approach (Udaya R., 2007). Furthermore, the 2010 HDR introduced the MPI, which identifies multiple overlapping deprivations suffered by households in 3 dimensions: education, health and living standards.

Bourguignon (2006) advocated the "income paradigm of poverty", that has been traditionally dominant in the literature. Poverty is conceptualized following the maximizing utility behavior subject to a budgetary restriction. The individual choices over a set of goods and services are conceived as an expression of the revealed preferences of the individuals, rational and autonomous with access to a full set of information. In this case tradition, poverty is defined as a standard of living below a poverty line fixed using monetary resources (income, consumption, expenditure). However, since the late 1970s different authors have identified the limitations not only in the concept of poverty but also of the indicators used.

Townsend (1979) was arguing that poverty was not a lack of income to purchase goods in the market but the lack of resources to participate in society. He also introduced different indicators, mainly focusing on the access to goods and services, to account for his concept of poverty.

In 1971(Rawls) presented his "justice as fairness" conceptual framework under the social contract tradition. It conveys the idea that the principles of justice are agreed to in an initial situation that is fair" (Rawls, 1971, p. 11). He describes his approach as based on principles of justice, using the concept of the original position of equity. For Rawls, the space of equality is the set of `primary goods' in which he positions: rights and liberties, powers and opportunities, income and wealth, and health and vigor.

The "basic needs' approach" is another area of conceptual framework in the study of poverty. Its emphasis is on the services and commodities that individuals can obtain.

According to Streeten (1998, p. 26) the measurement of poverty is a process of disclosing six veils, where each veil shows a different aspect of it. In the fourth veil he refers to what is now known as the basic needs approach: Beyond the fourth veil are direct measures of physical inputs to meet basic needs, such as, calories consumed, yards of cloth bought, cubic feet at house room occupied, hospital beds available, school enrollment, letters posted, etc". He thinks that despite the fact that this veil is full of means, as in the monetary approach, those are means that move beyond the income paradigm and refer to goods and services favoring the human needs.

Also at the end of the 1970s Sen proposed the "capability approach" as a framework to understand development and specifies that poverty is a `capability deprivation'. He argues that income is not a satisfactory space to evaluate the well-being of individuals. For him, the monetary tradition is a very limited framework to understand development. Income is just one particular means among many others but not an end in itself: Aristotle had pointed out, at the very beginning of his Nicomachean Ethics, that income and wealth are only instrumentally1 valued, and we have to go deeper to understand what makes human life rich and human freedoms effective" (Sen, 2006, p. 35). The argument of Sen (1999, p. 90) is that poverty can be perceived as a capability deprivation when the focus is shifted from means (e.g. income) to ends (objectives that people want to pursue) as for instance health and education with their instrumental (indirect effects on productivity) and intrinsic (direct effect, like living a healthy life or being educated) value.

The proliferation of conceptual frameworks since the late 1970s has shifted the focus of understanding and measuring poverty from income to other dimensions of development. At the same time research on its measurement is booming. It is a complex subject to navigate and although several innovations have been proposed, the `income paradigm' is still the main framework used to understand and measure poverty. Life is richer and more complex than buying and selling goods and services, but unfortunately, this creates the need for alternative measures which are not so readily available and are likely to generate more controversy and more difficulties in measurement" (Fleurbaey, 2015, p. 201).

Poverty has different shapes and magnitudes. Poverty can be defined in terms of income, capabilities, basic needs, social exclusion, vulnerability to risk shocks. It can be considered permanent or transitory. It can be defined in relative or absolute terms. It can be understood in objective or subjective terms.

Jenkins and Mickelwright (2007), argued that these developments respect the view that poverty is not only about having enough money, and that inequality is not just about differences in money income". The rest of this section presents a summary of the data variables and methodology used. These calls the researcher to use both growth based and capabilities based variables to draw the relationship among variables.

2.1 Measurements of Human poverty Index

As UNDP's (1997) Human Development Report stated, the Human poverty Index remained essentially true to its original formulation until 2010. Later on The Human Poverty Index was replaced by the Multidimensional Poverty Index in 2010.

The Human Poverty Index (HPI) was an indication of the standard of living in a country, developed by the United Nations (UN) to complement the Human Development Index (HDI) and was first reported as part of the Human Development Report in 1997. It was considered to better reflect the extent of deprivation in developed countries compared to the HDI. In 2010 it was supplanted by the UN's Multidimensional Poverty Index.

The HPI concentrates on the deprivation in the three essential elements of human life already reflected in the HDI: longevity, knowledge and a decent standard of living. The HPI is derived separately for developing countries (HPI-1) and a group of select high-income OECD countries (HPI-2) to better reflect socio-economic differences and also the widely different measures of deprivation in the two groups.

For developing countries (HPI-1)

The Human Development Reports summarizes this as "A composite index measuring deprivations in the three basic dimensions captured in the human development index — a long and healthy life, knowledge and a decent standard of living." The formula for calculating it is:

$$HPI\text{-}1 = (1/3(p_1^{\alpha} + p_2^{\alpha} + p_3^{\alpha}))^{1/\alpha} \quad \text{.....Equation(1)}$$

p1: Probability at birth of not surviving to age 60.

p2:Adult illiteracy rate

p2: Unweighted average of population without sustainable access to an improved water source and children under weight for age α:3

For selected high-income OECD countries (HPI-2)

The Human Development Reports summarizes this as "A composite index measuring deprivations in the four basic dimensions captured in the human development index — a long and healthy life, knowledge and a decent standard of living — and also capturing social exclusion." The formula for calculating it is:

$$HPI\text{-}2 = (1/3(p_1^{\alpha} + p_2^{\alpha} + p_3^{\alpha} + p4^{\alpha}))^{1/\alpha} \quad \text{.....Equation(2)}$$

p1: Probability at birth of not surviving to age 60 (times 100)

p2: Adults lacking functional literacy skills

p4: Population below income poverty line (50% of median adjusted household disposable income)

p4: Rate of long-term unemployment (lasting 12 months or more) α:3

In sum up, the HPI measures deprivation in the three basic dimensions of human development:

- A long and healthy life-vulnerability to death at a relatively early age as measured by the probability at birth of not surviving to age 40;
- Knowledge-exclusion from the world of reading and communication, as measured by the adult illiteracy rate
- A decent standard of living-a lack of access to overall economic provisioning as measured by the unweighted average of two indicators, the percentage of the population not using an improved water source and the percentage of children under weight for age.

3. Data and Methodology

This study used a panel data set of HPI scores for a set of 7 east African countries, between 1990 and 2016. HPI is calculated using the formula above with current data for each country, 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 the World Bank's World Development Indicators.

This article analyses the effects of economic growth and human capabilities-based policies on deprivation. In this case deprivation is measured by the HPI. To examine this question, a panel regression model is applied to measure changes in the HPI between 1990 and 2016 for selected east African countries.

Two dependent variables are used in this study. These are: Human Poverty Index and Household final consumption expenditure per capita. Human Poverty Index was created to provide an accounting of human deprivation than those based simply on measure of income. It was computed based on the HPI formula given above on equation().

Independent variables are classified in to two broad categories. The first is growth-based variable considered as a potential driver of the HPI is GDP[2] per capita and as a

[2] Dasgupta (1993) neatly summarizes the two primary 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)

covariates foreign direct investment, a measure of exports as a percentage of GDP, imports as a percentage of GDP, the official exchange rate and inflation.

The second is Capabilities-based[3] variables. The key indicator of interest is public health expenditure per capita. The model includes as a covariate the female secondary school enrolment rate, the percentage of women in a given country's parliament, the labour force participation rate, household consumption expenditure, livestock production index, and food production index.

Following Prince (2014) conceptual model may be presented as an equation:

$HPI_{it} = f(zg, zc, t) + Ci$+Eit.....Equation (3)

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*. The model includes a set of indicators C_i 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'. Seven countries are selected to represent eastern African countries. These are Ethiopia, Tanzania, Madagascar, Zimbabwe, Zambia, Burundi, and Kenya.

Use fixed-effects (FE) whenever you are only interested in analyzing the impact of variables that vary over time. Fixed-effects explore the relationship between predictor and outcome variables within an entity (country, person, company, etc.). Each entity has its own individual characteristics that may or may not influence the predictor variables. When using fixed-effects we assume that something within the individual may impact or bias the predictor or outcome variables and we need to control for this. This is the rationale behind the assumption of the correlation between entity's error term and

[3] Subramanian (McGillivray 2007) notes 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 functioning's by routes different from those centered exclusively on income growth and the percolation of that growth to the poor'. Therefore, incorporating these variables may lead to true proxies.

predictor variables. Fixed-effects[4] remove the effect of those time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable. Another important assumption of the fixed-effects model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Each entity is different therefore the entity's error term and the constant (which captures individual characteristics) should not be correlated with the others. If the error terms are not correlated, then fixed-effects is suitable since inferences may be correct.

The equation for the fixed effects model becomes:

$$Y_{it} = \beta 1 X_{it} + \alpha i + U_{it} \quad \text{.....Equation(4)}$$

αi (i=1,2,3,....n) is the unknown intercept for each entity (n entity-specific intercepts).

Y_{it} is the dependent variable (DV) where i= entity and t= time.

X_{it} represents one independent variable (IV),

β_1 is the coefficient for that IV,

u_{it} is the error term. The log values of all variables are used in this study.

4.1 Descriptive statistics Results

This section describes lists the 7 countries included in the analysis and provides means, standard errors, minimum, maximum, number of overall, within, and between observation for all variables.

Table 1 below presents the mean HPI, GDP per capita, household consumption expenditure, inflation, import, export, FDI and human poverty index by country over the course of this study.

[4] 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 (2006) notes that fixed effects models are the more appropriate models when using panel data to determine policy effects over time.

Table 1: Descriptive statistics for growth based model

Variable		Mean	Std. Dev.	Min	Max	Observations
lngdpp~a	overall	2.743252	.2750842	2.213845	3.211461	N = 189
	between		.2802522	2.390494	3.059327	n = 7
	within		.0893985	2.514627	3.052489	T = 27
lnexch~e	overall	1.74498	1.60449	-2.610034	9.827566	N = 181
	between		1.384812	-.3461945	3.104128	n = 7
	within		1.017144	-.5188597	11.91874	T = 25.8571
lnfdi	overall	7.81809	1.315915	3.766356	9.600859	N = 123
	between		1.236943	4.894883	8.316478	n = 7
	within		.9250603	3.53669	9.190476	T-bar = 17.5714
lninf	overall	.9795052	.4444298	-.6847529	2.218887	N = 177
	between		.252157	.5004589	1.325487	n = 7
	within		.3877714	-.5505056	2.350024	T-bar = 25.2857
lnimp	overall	9.401594	.5496249	8.110594	10.30704	N = 150
	between		.5062929	8.549883	10.18058	n = 7
	within		.317423	8.896954	9.998884	T-bar = 21.4286
lnhpi	overall	-1.797526	.5415059	-3.878325	-1.073272	N = 189
	between		.342267	-2.25392	-1.343705	n = 7
	within		.4385009	-3.853989	-.7641272	T = 27
lnhce	overall	9.792678	.4761109	8.833504	10.75048	N = 148
	between		.4714432	9.046682	10.56081	n = 7
	within		.2465505	9.186724	10.3772	T-bar = 21.1429
lnexp	overall	9.186815	.6268607	7.587446	10.05513	N = 164
	between		.5899076	8.007542	9.771962	n = 7
	within		.2951658	8.514134	9.801832	T-bar = 23.4286

.

Source: Own Computation, 2018

Mean values range from, at the lower end, HPI, with a mean HPI of -1.79 , to import 9.4, over the 26-year period of this study. The observation occurred within the group were 27 observations where as between the group we have 7 observations, and overall we have 160.

Table 2 presents the mean public health expenditure per capita, secondary school enrolment rate, the percentage of women in a given country's parliament, the labour force participation rate, household consumption expenditure, livestock production index, and food production index.

Table 2: Descriptive statistics for capabilities based model

Variable		Mean	Std. Dev.	Min	Max	Observations
lnhpi	overall	-1.797526	.5415059	-3.878325	-1.073272	N = 189
	between		.342267	-2.25392	-1.343705	n = 7
	within		.4385009	-3.853989	-.7641272	T = 27
lnhce	overall	9.792678	.4761109	8.833504	10.75048	N = 148
	between		.4714432	9.046682	10.56081	n = 7
	within		.2465505	9.186724	10.3772	T-bar = 21.1429
lnhep	overall	1.282659	.3269101	.6042091	1.943658	N = 135
	between		.2551145	.9429181	1.621378	n = 7
	within		.2253726	.8327018	1.765402	T = 19.2857
lnsfe	overall	1.338666	.3108113	.6626322	1.75869	N = 71
	between		.2702001	.9157533	1.65557	n = 7
	within		.1900894	1.079302	1.924401	T = 10.1429
lnwip	overall	1.138037	.3121475	.0413927	1.588832	N = 138
	between		.2084375	.8414317	1.434555	n = 7
	within		.2463653	.317786	1.605588	T-bar = 19.7143
lnlpr	overall	.	.	.	.	N = 0
	between		.	.	.	n = 0
	within		.	.	.	T = .
lnlpi	overall	1.980914	.1084382	1.727785	2.3366	N = 172
	between		.042381	1.926716	2.028602	n = 7
	within		.1010735	1.771258	2.288912	T = 24.5714
lnfpi	overall	1.976172	.1113138	1.711301	2.268461	N = 172
	between		.026583	1.942751	2.013555	n = 7
	within		.1085244	1.730955	2.276541	T = 24.5714

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Source: Own Computation, 2018

Mean values range from, at the lower end, HPI, with a mean HPI of -1.79 , to household consumption expenditure 9.79, over the 26-year period of this study. The observation occurred within the group were 27 observations where as between the group we have 7 observations, and overall we have 160.

4.2 Panel regression results

Economic growth-based variables and household consumption expenditure

Household final consumption per capita was used as the dependent variable against which I will compare findings from the HPI models. Therefore, economic growth based variables are regressed on household final consumption per capita.

Table 2: Economic growth models and household consumption expenditure results

```
Fixed-effects (within) regression               Number of obs      =       101
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.9258                                         min =         3
     between = 0.8880                                         avg =      16.8
     overall = 0.9385                                         max =        27

                                                F(6,89)            =    185.18
corr(u_i, Xb)  = -0.4462                        Prob > F           =    0.0000
```

lnhce	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lngdppercapita	.3366245	.2297084	1.47	0.146	-.1198012	.7930502
lnexchangerate	-.0365456	.0669168	-0.55	0.586	-.1695078	.0964166
lnfdi	.0126601	.0138179	0.92	0.362	-.0147958	.040116
lninf	-.0749433	.0310587	-2.41	0.018	-.1366563	-.0132303
lnexp	.058523	.1238108	0.47	0.638	-.1874864	.3045324
lnimp	.760675	.0850578	8.94	0.000	.5916669	.9296831
_cons	1.26909	.4390102	2.89	0.005	.3967858	2.141394
sigma_u	.18484886					
sigma_e	.07951914					
rho	.84383997	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(5, 89) = 6.58                     Prob > F = 0.0000
```

Source: Own Computation, 2018

As the model result is shown on table 2 above, With a $1 increase in import is associated with an approximately $0.76 increase ($p < 0.01$) in household consumption expenditure whereas a 1% increase in inflation result in $7.4 reduction of household consumption expenditure($p < 0.05$). None of the other indicators is statistically significant.

Economic growth-based variables and the Human Poverty Index

In this section, human poverty index is used as dependent variables and growth variables are considered as independent variables.

Table 3: Economic growth models and Human Poverty Index results

```
Fixed-effects (within) regression               Number of obs      =       103
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.2087                                         min =         5
     between = 0.1221                                         avg =      17.2
     overall = 0.0023                                         max =        27

                                                F(6,91)            =      4.00
corr(u_i, Xb)  = -0.9529                        Prob > F           =    0.0013
```

lnhpi	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lngdppercapita	-4.846078	1.169665	-4.14	0.000	-7.169474	-2.522682
lnexchangerate	-1.410121	.3439518	-4.10	0.000	-2.093339	-.7269033
lnfdi	.1156973	.0714404	1.62	0.109	-.0262104	.2576049
lninf	-.152556	.1594605	-0.96	0.341	-.4693047	.1641927
lnexp	.9595445	.63812	1.50	0.136	-.3080024	2.227091
lnimp	.2668818	.4412865	0.60	0.547	-.6096796	1.143443
_cons	2.72665	2.239603	1.22	0.227	-1.722047	7.175347
sigma_u	1.4896073					
sigma_e	.41297436					
rho	.92862548	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(5, 91) = 7.17                     Prob > F = 0.0000
```

Source: Own Computation, 2018

Table 3 presents the results of a panel regression model that regresses the HPI on the same economic growth indicators. Amongst these indicators, only GDP per capita and exchange rate are statistically significant. A $1 increase in GDP per capita resulting in a 4.84 ($p < 0.01$) decrease in the HPI. Also, exchange rate affect HPI negatively .i.e. 1% increment in the value of dollar results in decrement of HPI by 1.4. None of the other indicators is statistically significant.

Capabilities-based variables and household consumption expenditure

Table 4: Capabilities and household consumption expenditure

```
Fixed-effects (within) regression               Number of obs      =        34
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.9069                                         min =         2
     between = 0.0020                                         avg =       5.7
     overall = 0.0326                                         max =        11

                                                F(5,23)            =     44.81
corr(u_i, Xb)  = -0.3527                        Prob > F           =    0.0000
```

lnhce	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnhep	.755013	.1519635	4.97	0.000	.4406526	1.069373
lnsfe	.1541345	.1773666	0.87	0.394	-.2127763	.5210453
lnwip	.4653025	.1072914	4.34	0.000	.2433534	.6872516
lnlpi	.1780492	.4684592	0.38	0.707	-.7910324	1.147131
lnfpi	-.398693	.3379511	-1.18	0.250	-1.097798	.3004122
_cons	8.581293	.6284672	13.65	0.000	7.28121	9.881377
sigma_u	.43673523					
sigma_e	.06418753					
rho	.97885617	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(5, 23) = 134.20                     Prob > F = 0.0000
```

Source: Own Computation, 2018

Table 4 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 data set finds health expenditure per capita and women in parliament to be statistically significant. When health expenditure per capita increase by $1, then household consumption expenditure increase by $0.75 over the period of study. The percentage of women in parliament increment b y 1% percent results in $0.46 household consumption expenditure increase. None of the other indicators is statistically significant.

Capabilities-based variables and the Human Poverty Index

Table 5: Capabilities and Human Poverty Index results

```
Fixed-effects (within) regression               Number of obs      =        46
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.3358                                         min =         3
     between = 0.0000                                         avg =       7.7
     overall = 0.0189                                         max =        14

                                                F(5,35)            =      3.54
corr(u_i, Xb)  = -0.5391                        Prob > F           =    0.0108
```

lnhpi	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnhep	-.3774371	.3615954	-1.04	0.304	-1.111515	.3566406
lnsfe	-.0552951	.5309264	-0.10	0.918	-1.133133	1.022543
lnwip	.6200677	.2237246	2.77	0.009	.1658826	1.074253
lnlpi	.0273919	.9734653	0.03	0.978	-1.948848	2.003632
lnfpi	.6149736	1.008742	0.61	0.546	-1.432883	2.66283
_cons	-3.140772	1.464914	-2.14	0.039	-6.114706	-.1668381
sigma_u	.3747437					
sigma_e	.20261322					
rho	.77379879	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(5, 35) = 6.35                     Prob > F = 0.0003
```

Source: Own Computation, 2018

However, when the HPI is considered, several of the indicators are found to be insignificant. As shown in Table 5 above, a one percent increase in women participation parliament is associated with a 0.62% reduction in the HPI ($p < 0.05$); each percentage increase in percentage of parliamentary seats held by women is associated with a 0.13% reduction in the HPI ($p < 0.01$). Curiously, neither the labour force participation rate nor the secondary school enrolment rate amongst girls is statistically significant including food production and livestock production index.

5. Conclusion

The primary aim of this study has been to identify from amongst the range of potential macro-level drivers those that have an influence on multidimensional poverty in east Africa by using a panel data span from 1990 to 2016 with fixed effect model . 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. Continuing to conceptualise poverty as a function of income, whether national or individual, presents a misleading picture of the effect that development policy has had on the well-being of the poorest.

The result suggest that import and inflation affects the household consumption expenditure per capita when it is used as independent variable in growth based model positively and negatively correspondingly whereas GDP per capita and exchange rate resulted reduction of HPI. The other variables are insignificant.

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Appendix

Robustness check

```
Fixed-effects (within) regression               Number of obs      =       101
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.9258                                         min =         3
     between = 0.8880                                         avg =      16.8
     overall = 0.9385                                         max =        27

                                                F(5,5)             =         .
corr(u_i, Xb)  = -0.4462                        Prob > F           =         .

                                    (Std. Err. adjusted for 6 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      lnhce |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lngdppercapita |   .3366245   .1740527     1.93   0.111    -.1107921    .7840411
lnexchangerate |  -.0365456   .0458809    -0.80   0.462    -.1544862     .081395
       lnfdi |   .0126601   .0187652     0.67   0.530    -.0355775    .0608977
       lninf |  -.0749433   .0256816    -2.92   0.033      -.14096   -.0089266
        lnexp |    .058523   .1370556     0.43   0.687    -.2937897    .4108358
        lnimp |    .760675   .2396188     3.17   0.025     .1447154    1.376635
        _cons |   1.26909   1.057795     1.20   0.284    -1.450059    3.988239
-------------+----------------------------------------------------------------
      sigma_u |  .18484886
      sigma_e |  .07951914
          rho |  .84383997   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
Fixed-effects (within) regression               Number of obs      =       103
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.2087                                         min =         5
     between = 0.1221                                         avg =      17.2
     overall = 0.0023                                         max =        27

                                                F(5,5)             =         .
corr(u_i, Xb)  = -0.9529                        Prob > F           =         .

                                    (Std. Err. adjusted for 6 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      lnhpi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
lngdppercapita |  -4.846078   1.614954    -3.00   0.030    -8.997448   -.6947069
lnexchangerate |  -1.410121   .4217076    -3.34   0.020    -2.494155   -.3260874
       lnfdi |   .1156973   .0544269     2.13   0.087    -.0242116    .2556061
       lninf |  -.152556   .1207033    -1.26   0.262    -.4628337    .1577217
        lnexp |   .9595445   .7328163     1.31   0.247    -.9242198    2.843309
        lnimp |   .2668818   .3099655     0.86   0.429    -.5299099    1.063673
        _cons |    2.72665   3.028765     0.90   0.409    -5.059037    10.51234
-------------+----------------------------------------------------------------
      sigma_u |  1.4896073
      sigma_e |  .41297436
          rho |  .92862548   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
Fixed-effects (within) regression               Number of obs      =        34
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.9069                                         min =         2
     between = 0.0020                                         avg =       5.7
     overall = 0.0326                                         max =        11

                                                F(5,5)             =    271.51
corr(u_i, Xb)  = -0.3527                        Prob > F           =    0.0000

                                    (Std. Err. adjusted for 6 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      lnhce |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnhep |    .755013   .2014566     3.75   0.013     .2371524    1.272874
      lnsfe |   .1541345   .2073702     0.74   0.491    -.3789277    .6871967
      lnwip |   .4653025   .0975814     4.77   0.005     .2144616    .7161434
      lnlpi |   .1780492   .1895838     0.94   0.391    -.3092915     .66539
      lnfpi |   -.398693   .3336242    -1.20   0.286    -1.256301    .4589154
      _cons |   8.581293   .2941195    29.18   0.000     7.825235    9.337352
------------------------------------------------------------------------------
    sigma_u |  .43673523
    sigma_e |  .06418753
        rho |  .97885617   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

```
Fixed-effects (within) regression               Number of obs      =        46
Group variable: country1                        Number of groups   =         6

R-sq:                                           Obs per group:
     within  = 0.3358                                         min =         3
     between = 0.0000                                         avg =       7.7
     overall = 0.0189                                         max =        14

                                                F(5,5)             =     8.56
corr(u_i, Xb)  = -0.5391                        Prob > F           =    0.0171

                                    (Std. Err. adjusted for 6 clusters in country1)
------------------------------------------------------------------------------
             |               Robust
      lnhpi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lnhep |  -.3774371   .2539648    -1.49   0.197    -1.030274    .2754003
      lnsfe |  -.0552951   .2559097    -0.22   0.837    -.7131318    .6025417
      lnwip |   .6200677   .2590755     2.39   0.062    -.0459071    1.286043
      lnlpi |   .0273919   .4560375     0.06   0.954     -1.14489    1.199674
      lnfpi |   .6149736   .7117626     0.86   0.427     -1.21467    2.444618
      _cons |  -3.140772   .8155383    -3.85   0.012     -5.23718   -1.044364
------------------------------------------------------------------------------
    sigma_u |  .3747437
    sigma_e |  .20261322
        rho |  .77379879   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```