On poverty and the persistence of poverty in Benin

1. Introduction

Over the past decades, the reduction of poverty, particularly in its extreme form, has been at the center of national policies in most countries[1] and high on international development agendas (United Nations, 2014). This is evidenced in the importance given to poverty reduction in the Millennium Development Goals (MDGs) and in the ongoing discussions on the Sustainable Development Goals (SDGs). The MDGs have served as a unified framework for concerted efforts by governments, development partners and international organizations to reduce poverty. Within this framework an increasing number of policies and programs were designed with the aims of reducing significantly poverty in the least developed countries. However, the evidence of success is mixed, particularly in Sub-Saharan African (SSA) countries

Despite moderate economic growth in the recent years, poverty levels in SSA have barely dropped and are still very high (Barret et al., 2005).[2] In most countries on the continent, little progress has been made toward the complete reduction of poverty. Between 1970 and 2000, the poverty rate in SSA has soared from 48% to 59% (Artadi and Sala-i-Martin, 2003; World Bank, 2000). A recent assessment by the United Nations concluded that, while globally the world have halved poverty between 1990 and 2010 from 36% to 18%, in SSA the poverty rate in 2010 was still at 48%; almost the same level some forty years ago (United Nations 2014). The continent as a group and most countries individually, are not expected to reach the MDG target on poverty by the end of 2015.

Benin is not an exception. In the 1970s and 1980s, Benin pursued a socialist ideology as development pathway and progressively slipped into a deep political, social and economic crisis

with dramatic consequence on poverty[3]. In the late 1980s, poverty in the country was widespread, unemployment was skyrocketing and social unrests plagued the country. The crisis culminated in a National Conference in February 1990s with a fundamental ideological shift toward democratization and market liberalization. At that time, the expectations for economic recovery, economic take-off, and human development peaked. While, there have been moderate economic growth[4], like other sub-Saharan African countries, poverty in this small country of West Africa, has remained stubbornly high over the last two decades.

Several studies have been conducted in Benin to better understand poverty in all its dimensions. The most authoritative studies are conducted by the Institute National de la Statistical et de l'Analyse Economique (INSAE), the national statistics institute which collect household data on living standards and estimate poverty indicators. In 1995, the institute conducted a survey on rural areas in order to quantify rural poverty. A similar study was lunched a year later but with a focus on urban household. The two datasets, combined with various other light surveys on particular areas or topics, helped generate the first indicators of the extent of poverty in the democratic era. The global poverty was estimated at 33% in 1996. Since, then little progress in poverty reduction has been recorded. First the poverty rate decreased to 30% in 1999-2000 (Moustapha and Vodounou, 2002); then rose again to 37.3% in 2006 (INSAE, 2007; World Development Indicators 2015). Later, the poverty rate has fallen to 35.2% in 2009 but then increased to 36.2% in 2011. With this erratic trend in poverty rate, the total number of poor continues to increase, suggesting that poverty has been persistent.

These observations beg the question of why some households are poor. In particular, what are the factors that drive household into poverty or prevent them from exiting from this situation, and what are the immediate and deep roots of the persistence of poverty. The aim of

this study is to provide some answers to these questions and contribute to our understanding of poverty and poverty persistence in the particular context of Benin. It is motivated by the quasi-stagnation in poverty across Africa; and in Benin in particular, which is puzzling and requires further analysis on what explain this social and economic condition. Without proper information on poverty and the poor, public policies and services would not be effective because the poor often get locked out of the opportunity wheel. Understanding the determinants of poverty and its persistence contributes to better designed public policies that target effectively the most vulnerable. It helps to pinpoint the key forces on which policies should focus in order to effectively accelerate the reduction of poverty, especially among the groups that are at a higher risk of being poor or remaining persistently poor.

The analysis starts by testing for the evidence of persistence of poverty, then it characterizes this persistence and analyze its determinants from the household perspective focusing on the role of various socio-demographic, economic and institutional factors in explaining the risk of being poor and remaining persistently poor. It also analyses the determinants of the dynamic of poverty to understand the time-varying and individual-specific determinants of households' poverty transitions. The study uses longitudinal panel data collected from 2006 to 2011 on a relatively large sample of households in Benin by INSAE, the national statistics institute. Early studies on poverty use cross-sectional data or repeated cross-sectional (Baulch and Hoddinott, 2000. These types of data provide a specific snapshot of the poverty situation in a single period of time and illustrate the trend in poverty over time. However, they do not shed light on the extent of mobility into and out of poverty. As more data become available in developing countries, later studies on poverty increasingly use panel data to capture the dynamic of poverty by tracking the same households over a long period of time (Oxley et al.

2000; Addison et al. 2009). However, such studies in the particular context of Benin are limited.

To answer the key questions of interest, the study develops a model of the probability of being poor in a given year conditional to the poverty status in previous years and a set of control variables. The model is used to test the hypothesis of the persistence of poverty over the period 2006-2011. The positive and significant coefficient of the lag poverty variable in the model is interpreted as evidence of persistence of poverty; households that are poor in a year t are more likely to remain poor in subsequent years $t + n$. The analysis proceeds further to examine the determinants of the persistence of poverty. It defines a household as persistently poor if that household remains poor over the entire period of the observation in the data. This definition characterizes households that are chronically poor. We find that only 4% of households are chronically poor over the period 2006-2011. Next, we define a variable that measures the dynamic of poverty capturing households' mobility across poverty status; households entering into and exiting out poverty. Using this variable, we estimate a multinomial model to explore the determinants of these transitions in and out of poverty. The analysis shows that high education levels and employment skills, not only reduce the risk of being poor in any period, but also, are the key forces that lift households out poverty and prevent them from falling back into poverty.

The contribution of the analysis in this paper is the characterization of the profile of the poor and the persistently poor households in Benin. The analysis updates and complements several previous studies on the determinants of poverty in Benin, such as Ahoyo (2000), Adegbidi and Gandonou (2003), Attanasio (2005) among others. Unlike these previous studies, it uses the most recent household data available and includes an analysis on the persistence and the dynamics of poverty. The remainder of the paper is organized as follows. The second section describes the methodology. Section 3 presents the data. The results are discussed in section 4 and

section 5 summarizes and draws conclusions.

2. Methodology

2.1. Modeling the determinants of poverty and testing for persistence of poverty

Poverty is a complex phenomenon that often entails monetary, material as well as non-monetary dimensions. The monetary approach to poverty is more popular because it is easy to implement but there is a growing literature on non-monetary poverty (Bourguignon and Chakravarty, 2003). However, Rouband and Razafindrakoto (2003) argue that the traditional approach of monetary approach to poverty is justified as it is strongly correlated with the other subjective measures, although it does not capture all the dimensions of poverty. This study follows the monetary approach and uses household expenditures per equivalent adult as a proxy for living standards (Deaton and Grosh, 2000). This choice emanates from the argument that consumption is often more consistent than income and more accurately reported (Attanazio, 2005). A household is considered as poor if their expenditure per capita is less than the poverty line, which is the acceptable minimum expenditure that can be used to obtain 2400 calories intake per person and per day. The poverty line is specific to each year and region in order to capture the heterogeneity in consumption and regional disparities in prices.

The analysis starts by considering the following binary variable that describes the poverty status of a household h in a giving year t:

$$y_{ht} = \begin{cases} 1 & \text{If household } h \text{ is poor in year } t \\ 0 & \text{Otherwise} \end{cases} \quad (1)$$

The literature on poverty has identified several variables commonly associated with probability of being poor in various geographical areas and contexts. Anyanwu (2014) provides

an excellent and up-to-date overview of these factors which include the household's assets, the past and current decisions made by the household, and a range of community and institutional factors such as infrastructures, schools, financial institutions, as well as social, political and economic shocks experienced by the household. If we denote by X_{ht} the vector of factors correlated with poverty, the probability of being poor can be written as:

$$p = \Pr[y_{ht} = 1|X_{ht}] = F(X'_{ht}\beta) \quad (2)$$

β denotes the vector of the parameters of the model, and F is a (known) cumulative density function (cdf) to be later specified. The model can be estimated using a linear probability model or by postulating a distribution F, usually the logistic distribution or the standard normal distribution (Cameron and Trivedi, 2010; Greene, 2012). In the second case, the model is estimated by maximizing the log-likelihood function of the data defined as follow:

$$lnL = \sum_{h\in H} lnF(x_{ht}\beta) + \sum_{h\notin H} \ln\{1 - F(x_{ht}\beta)\} \quad (3)$$

2.2. Testing and Modeling the persistence of poverty

In order to test for the evidence of persistence of poverty, we augment the model in equation (2) with the poverty status in the previous period as an additional explanatory variable. If the estimated coefficient of this variable is positive and statistically significant, we interpret this as evidence of persistence of poverty. Intuitively, this would suggest that households that are poor in a year $t - k$ $(k \geq 1)$ are more likely to remain trapped in poverty in the years after.

We characterize this persistence to explain its determinants. For this purpose, we defined a household to be persistently poor if the household remains poor over the entire period of observation 2006-2011. Then, we construct a variable of being persistently poor as follows.

$$ppersiently\ poor_h = \begin{cases} 1 & \text{If household } h \text{ is poor all year from } 2006-2011 \\ 0 & \text{Oherwise} \end{cases} \quad (5)$$

The same modeling framework described above to analyze the determinant of poverty can also be applied to examine the determinant of the persistence of poverty.

The analysis is further extended to investigate the heterogeneity in the likelihood of the persistence of poverty. We analyze the relationship between the probability of being persistently poor and the expenditure per equivalent adult using Kernel-weighted local polynomial smoothing. An interesting appeal of this nonparametric approach is that it makes no assumptions about the functional form of the relationship between the propensity to remain persistently poor and household's initial per equivalent adult expenditure (Fan and Gijbels, 1996). The kernel regression considers the set scatter plot of the expenditure per capita e and the propensity p of being persistently poor $\{(e_1, p_1), \dots, (e_H, p_H)\}$ and the model:

$$p_h = m(e_h) + \sigma(e_h)\varepsilon_h \quad (6)$$

$m(.)$ is an unknown mean with no assumption about its functional form, and $\sigma(.)$ is an unknown variance, and ε_h are symmetric errors with $E(\varepsilon_h) = 0$ and $Var(\varepsilon_h) = 1$. The Kernel-weighted local polynomial regression proceeds by estimating for each smoothing point e_0 $m(p_0) = E[P|E = e_0]$ as the intercept of regressions weighted by a kernel function of the propensity P of being persistently poor on the variables $(E - e_0)$, $(E - e_0)^2, \cdots, (E - e_0)^r$. The choice of the kernel function or weighting scheme is the popularly-used Epanechnikov kernel function; a rule-of-thumb bandwidth estimator as defined in Fan and Gijbels (1996) is used.

2.3. Analysis of the dynamic of poverty

To further understand the persistence of poverty, we consider a less restrictive definition.

Following Baulch et al. (2000) and Lopez-Calva and Ortiz-Juarez (2011) we compute the matrix of transition into or out of poverty showing a cross-classification of poverty status in the initial and the final period of observation in the data. We distinguish households that have never been poor between 2006 and 2011; households that have always been poor; and households exiting out of poverty in 2011 after being poor in 2006 and households entering into poverty in 2011 after being non poor in 2006.

Next, we estimate a multinomial model to investigate the determinants of these transitions into and out of poverty. We assume that there is a latent variable which take the value y_{jh}^{*} for the alternative j and the household h. We also assume the existence of a linear relationship $y_{jh}^{*} = x_h\alpha_j + \xi_{jh}$ for $j = 1,2,3,4$ and $h = 1, \ldots, H$ where ξ_{jh} are identically and independently distributed errors (Cameron and Trivedi, 2005, Green, 2012). A household h falls into a category k if $y_{kh}^{*} > y_{jh}^{*} \ \forall \ j \neq k$. The model can be estimated by maximizing the log-likelihood of the sample under of the assumption of independence from irrelevant alternatives (IIA) assumption which implies that the relative probabilities for any two categories depend only on the attributes of those two alternatives (Green, 2012). The IIA assumption can be tested using a Hausman test.

It is important to mention that the methods described above does not account for potential endogeneity issues that might bias the estimations of the determinants of poverty, the persistence of poverty and the dynamic of poverty. A particularly important source of endogeneity is omitted variable bias. In fact, there are several important factors that explain poverty and the persistence of poverty that we fail to include in the model either because these factors are difficult to measure or that we do not have a variable measuring them collected in the data we use. Example of such variables include household's experience of various economics, social, and political

shocks, household's copping strategies to survive, and remittances or other form assistance that household might have received. Given the objective of the study that is to identify the correlates of poverty and the persistence of poverty, the biases affect the results only in the sense that they should be taken with cautious and not interpreted from a causality perspective.

3. Data and descriptive Statistics

The dataset used in this analysis is a longitudinal household survey data collected by the National Institute of Statistics and Economics Analysis (INSAE) of Benin between 2006 and 2011. The survey collects data on household's expenditures and various socio- demographic and economic characteristics. There are currently four waves of this survey, but we have access to only the first three waves (2006, 2009 and 2011) that are publicly available on the institute website[5]. The fourth wave collected in 2011, is not yet publicly available. The sample size is 16,196 in 2006; 16,538 in 2009 and 20,159 in 2011. For the purpose of our analysis, and in order to have a balanced panel, we keep only households that have observations in all three years[6]. This reduces our sample size to 12,372 households in each year. The table 1 below presents the summary statistics on the variables included in the models.

In the final sample, the poverty rate is 29.4% in 2006, 21% in 2009 and 29% in 2011. The rates are different from the official poverty rates[7] mainly because we use region-specific poverty lines since in many regions, especially rural regions of the northern parts of the country, the cost of living is much lower than the national average. However, the estimations of the poverty rates using the national poverty line are similar to the official values reported by the national institute of statistics.

Table 1: Descriptive Statistics on the main variables[8]

Variables	2011	Poor in 2011	
	All	Yes	Not
		29%	71%
Female headed	22%	17%	24%
Male headed	78%	83%	76%
Rural	63%	68%	61%
Urban	37%	32%	39%
Household age	46	45	46
Household size	5	7	4
Is not alphabetized	66%	71%	63%
Alphabetized	34%	29%	37%
Is divorced or widow	14%	8%	17%
Is single or not married	7%	2%	9%
Is married to one wife	61%	66%	59%
Married with several wives	18%	24%	15%
Has no education	88%	93%	87%
Has primary education	9%	6%	10%
Has secondary education	2%	1%	2%
Has above secondary education	1%	0%	1%
Has no employment skills	91%	95%	89%
Has low employment skill	7%	4%	8%
Has high employment skill	3%	1%	3%
Agricultural sector	55%	67%	50%
Industry sector	9%	7%	9%
Services sector	36%	25%	41%

Most households are male-headed but still about one quarter is female headed. The average age of household's head is about 46 years and is similar among poor and non-poor. The average household size is 5 members and is relatively higher among poor households than the non-poor. Most households lives in rural area where is also concentrated the higher percentage of poor. In general, the education levels are lower among poor households who also have no or low employment skills and work mostly in agricultural and service sectors. Similar differences in the variables used are observed between the persistently poor households and those who are not.

4. Results

4.1. Poverty and persistence of poverty

The models are estimated for three years 2006, 2009 and 2011 and the results are presented in

the table 2[9]. All models fit reasonably well and the independent variables are not all jointly non-significant. The pseudo R squared ranges between 0.11 for 2006 and 0.31 for 2009, and can be considered as relatively high compared to those usually encountered in binary choice models. The Hosmer–Lemeshow goodness-of-fit test confirms that we cannot reject the validity of the models for all three years. The models also predict correctly more than 70% of the values. The columns (1), (3), and (5) of table 2 present the coefficients estimated for 2009 and 2011 respectively. The average marginal effects are presented in columns (2), (4) and (6). In both cases, households that are poor in a year are more likely to remain poor in the subsequent years. The marginal effects suggest that a household that was poor in 2006 is 12% more likely to be poor in 2009 and 3.3% more likely to remain poor in 2011. These results provide a simple empirical evidence of persistence of poverty among households in Benin.

Table 2: Logit regression of being poor in 2006, 2009 and 2011

	Logit 2006		Logit 2009		Logit 2011	
	(1)	(2)	(3)	(4)	(5)	(6)
	Coeff	Marg Eff	Coeff	Marg Eff	Coeff	Marg Eff
Poor in 2006			1.12***	0.12***	0.17***	0.03***
			(0.06)	(0.01)	(0.05)	(0.01)
Poor in 2009					0.20***	0.03***
					(0.06)	(0.01)
Female Headed	0.22***	0.04***	0.30***	0.03***	0.31***	0.05***
	(0.06)	(0.01)	(0.09)	(0.01)	(0.08)	(0.01)
Rural	-0.10**	-0.02**	0.25***	0.03***	-0.09*	-0.01*
	(0.05)	(0.01)	(0.07)	(0.01)	(0.05)	(0.01)
Household Age	-0.02**	0.00**	-0.02	-0.01	-0.06***	-0.01***
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)
Household Age squared/100	0.02**	0.00**	0.012	0.001	0.05***	0.01***
	(0.01)	(0.00)	(0.01)	(0.00)	(0.01)	(0.00)
Household size	0.52***	0.10**	0.87***	0.10***	0.74***	0.12***
	(0.03)	(0.01)	(0.05)	(0.01)	(0.03)	(0.00)
Household size squared/100	-1.85***	-0.36***	-2.47***	-0.27***	-2.83***	-0.46***
	(0.20)	(0.04)	(0.29)	(0.03)	(0.17)	(0.03)
Single or Not married	-0.04	-0.01	0.03	0.01	-0.20	-0.03
	(0.11)	(0.02)	(0.18)	(0.02)	(0.16)	(0.02)
Married to one wife	-0.09	-0.02	-0.07	-0.01	0.19*	0.03**
	(0.07)	(0.01)	(0.11)	(0.01)	(0.10)	(0.02)
Married to several wives	-0.43***	-0.08***	-0.23*	-0.03*	-0.10	-0.016
	(0.09)	(0.02)	(0.12)	(0.01)	(0.11)	(0.02)
Is not Alphabetized	0.30***	0.06***	0.30***	0.03***	0.24***	0.04***
	(0.06)	(0.01)	(0.11)	(0.01)	(0.06)	(0.01)
Has primary education	-0.06	-0.01	0.03	0.01	-0.49***	-0.08***
	(0.06)	(0.01)	(0.11)	(0.01)	(0.09)	(0.01)
Has secondary education	-0.44***	-0.08***	-0.27*	-0.03*	-0.357*	-0.06*
	(0.08)	(0.01)	(0.15)	(0.02)	(0.20)	(0.03)
Has above secondary education	-1.31***	-0.19	-0.87***	-0.08***	-0.87**	-0.126***
	(0.24)	(0.02)	(0.25)	(0.02)	(0.38)	(0.05)
Low Skill employee	-0.15	-0.03	-0.23	-0.02	-0.29***	-0.046***
	(0.10)	(0.02)	(0.15)	(0.01)	(0.11)	(0.02)
High Skill employee	-0.46**	-0.08**	-0.36	-0.04	-1.14***	-0.156***
	(0.19)	(0.03)	(0.24)	(0.02)	(0.20)	(0.02)
Industry sector	-0.14*	-0.03*	-0.57***	-0.06***	-0.39***	-0.065***
	(0.09)	(0.02)	(0.12)	(0.01)	(0.09)	(0.01)
Services sector	-0.31***	-0.06***	-0.44***	-0.05***	-0.47***	-0.077***
	(0.06)	(0.01)	(0.08)	(0.01)	(0.06)	(0.01)
Constant	-2.52***		-6.22***		-3.25***	
	(0.24)		(0.37)		(0.29)	
Observations			11,975		11,975	
Pseudo R2	0.11		0.31		0.16	
LR chi2 (21)	1557***		2324***		2227***	
Correctly classified	71.72%		84.02%		73.62%	

In each column, the dependent variable is a binary variable of the poverty status in the corresponding year. Coeff: Coefficient; Marg Eff: marginal effect LR: Log likelihood ratio test. Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1. All regressions include regional dummies

The results in table 2 also show that households' characteristics are strongly correlated with their poverty status. This result has been largely found in the literature and is not specific to Benin (Hoynes et al., 2006). In the context of Benin, previous studies by Ahoyo (2000), Adegbidi and Gandonou (2003), Attanasio (2005) and various survey reports produced by INSAE have found strong correlations between households' socio-demographic and economics characteristics and the probability of being poor. A female headed household, living in rural area and not alphabetized is more like likely to be poor. This result, consistently found in the literature, have been the basis for a large strand of the literature on the poverty analysis of female-headed household and the increasing policy support for empowering women (Appleton, 1996; Attanasio, 2005). Female-headed households are a vulnerable group in the society (Barros et al., 1997), especially in a developing where there are important gender inequalities in access to education, employment, health, credit and land (PNUD, 1998).

Poverty is predominant in rural areas, but has also an urban face. Both in relative and in absolute terms, there are more poor households in rural areas than in urban areas. The econometric results show that living in rural zones increases the likelihood of being poor in 2009. Surprisingly the reverse is found for the model for the year 2011. This might seems counter-intuitive at first look. However a possible explanation can be found on the lasting effect of the recent food and energy crisis during the period 2007-2009. In fact, urban households were more severely hit as they are net consumers and the price of consumers goods have soared and energy products. On the contrary, many rural households are net producers and have benefited from the high price of food.

Education and employment skills are essential to high productivity and decent earning (Christiansen et al., 2002). In Benin, households with an educated head, even only a primary

education are at a lower risk of being poor. This result is consistent with the findings on education and wages in labor economics, and human capital and development in growth literature a macro-economic level. Not being able to read and write head also increases the probability of being trapped into poverty as the household cannot take advantage of important knowledge and opportunities. The importance of education is now well recognized that the Government of Benin has been making important effort to guarantee free and universal access to primary schools for all kids, especially for girls. Also various programs for alphabetization and evening training have been put in place for adults with lack of education and unable to write and read. But these efforts remain insufficient given the high demand and low geographical and population coverage of the programmes. The analysis also shows that accumulating high labor skill and working in nonagricultural sector decreases significantly the risk of being poor.

The other socio-demographic variables that explain poverty status include the age of the head of household and the size of the household. The relationship between the age of the head of household and the probability of being poor is U-shaped. Household whose head are young are likely single, unemployed and dependent on transfer while household whose head are very old are likely female, widowed. On the contrary adult household heads have a high probability to be active in the labor market. The relationship between household size and poverty is an inverse U-shaped. Household size affects positively the probability of being poor, but the effect is nonlinear and marginally decreasing. Large households have lower resources per member and are more likely to be poor (Lipton and Ravallion, 1994). However, very large households can reap some benefit from the abundance of family labor or the opportunity to diversify income source (Anyanwu, 2014). These two effects are translated into the quadratic effect of household size. Not only the age of the household head is correlated with poverty, but it is also known in the

literature that the age structure of the household affect the probability of being poor. In general, household with a high proportion of youngsters and few adults which are able to bring the bread at home tend to be poorer. Finally, the marital status of the head of household is another key determinant of poverty. Compared to households whose head is divorced and widowed, being single decreases the risk of being persistently poor.

4.2. Determinants of the persistence of poverty

Having shown that in the previous section that there is evidence that poverty in Benin has been persistent, we now turn to the characterization of this persistence. In the table 3 below, we present the results of a binary model of the determinants of the persistence of poverty. The dependent variable of the logit regression is a variable that takes the value 1 if the household has remained poor over the period 2006-2011. Qualitatively many variables that were significant in explaining household poverty status appear to be also significant in explaining their persistence in poverty. As before, we find that household size affects positively but nonlinearly the probability of being persistently poor. Everything else being equal, large households are more likely to be trapped into poverty but very large households can escape occasionally in periods where they can reap some benefit from the abundance of family labor or the opportunity to diversify income sources. Unlike in the model of poverty, the age of the household head is a not significant determinant of the persistence of poverty. This suggests poverty is persistent among household irrespective of the age of the head of household. Compared to divorced households and households with widowed head, being single decreases the risk of being persistently poor; but being married has not significant effect.

Human capital accumulation through schooling, training and employment skills also

appears to be particularly fundamental in explaining the persistence of poverty. This stresses again the importance of human capital in poverty reduction. Specifically, we find that not being able to read and write in any language increases the probability of being trapped into poverty. Households with a head of that has at least a secondary school education level are at a lower risk to be persistently poor compared to those without at least a secondary school education level. Also, accumulating high labor skill and working in nonagricultural sector also decrease substantially and significantly the risk of being persistently poor. This result can be explained by the fact that wages in non-agricultural sector are higher and worker in those sector are more productive since the non-food outputs typically have more value added.

In overall, there is some similarity between the factors that are correlated with poverty and those correlated with the persistence of poverty in Benin. However, there are also some notable differences. First, the age of the head of the household is significant in the regression of poverty status, but has no explanatory power on the persistence of poverty. An explanation for this difference is likely that a young head of household or senior household head can receives more support in forms of transfer from active adults in the family at large. But the time span of the panel and nature of our data did not allow us to verify this hypothesis. Another important result is that being in rural area decreases slightly the probability of being persistently poor. This result is surprising at first look but can arguably be defended. It is clear that rural households are more likely to be poor because of lack of opportunities and low human and physical capital. They also experience various income and consumption shocks as they mainly rely on substance agriculture. However, the risk of being trapped in poverty can be higher in urban areas, especially in recent years. There are some shocks like spike in food prices that hit more severely poor households in urban areas because they are net consumers of agricultural products.

Table 3: Logit regression of being persistently poor over the period 2006-2011[10]

Dependent Variable Persistently Poor 2006-2011	Coefficient	Marginal Effect
	(1)	(2)
Female Headed	0.443***	0.019***
	(0.15)	(0.01)
Rural	-0.314***	-0.014***
	(0.10)	(0.00)
Household Age	0.008	0.000
	(0.02)	(0.00)
Household Age squared/100	-0.020	-0.001
	(0.02)	(0.00)
Household size	0.695***	0.031***
	(0.05)	(0.00)
Household size squared/100	-2.144***	-0.094***
	(0.22)	(0.01)
Single or Not married	-0.970**	-0.027***
	(0.41)	(0.01)
Married to one wife	0.138	0.006
	(0.17)	(0.01)
Married with several wives	0.166	0.007
	(0.18)	(0.01)
Not Alphabetized	0.244**	0.011**
	(0.12)	(0.01)
Has primary education	-0.160	-0.007
	(0.12)	(0.01)
Has secondary education	-0.707***	-0.026***
	(0.20)	(0.01)
Has above secondary education	-0.442	-0.018
	(0.62)	(0.02)
Low Skill employee	-0.270	-0.011
	(0.25)	(0.01)
High Skill employee	-2.327**	-0.047***
	(1.03)	(0.01)
Industry sector	-0.836***	-0.032***
	(0.22)	(0.01)
Services sector	-0.679***	-0.028***
	(0.13)	(0.00)
Constant	-6.794***	
	(0.56)	
Observations	11,975	11,975
Pseudo R2	0.18	
LR chi2(21)	886***	
Goodness-of-fit (Prob> chi2)	1.0000	
Percent of correctly classified	94.82%	

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Notes: The dependent variable is a binary variable taking the value 1 of a household has been poor in 2006, 2009 and 2011 and 0 if he has not been poor at least for one year.

To shed additional light on the heterogeneity of the persistence of poverty among households, we estimate for each household the predicted probability of being persistently poor and then use non parametric regression to analyze the effect of initial and current income level on the risk of being persistently poor. The non-parametric regressions[11] are presented in graphical form on the figure 1 below. The results show that the likelihood to remain persistently poor over the period 2006-2011 is relatively high for households with low initial income per capita. This results is not surprising as these households a less likely to expect a fast and substantial rise in their income. An interesting feature of these graphs is the sharp decline in the propensity of being persistently poor for household with initial log of expenditure per capita greater than 11.75 (or 126, 753.56 FCFA ≈ 283 USD). This suggests that policies to fight poverty should identify those at the very bottom of the income distribution

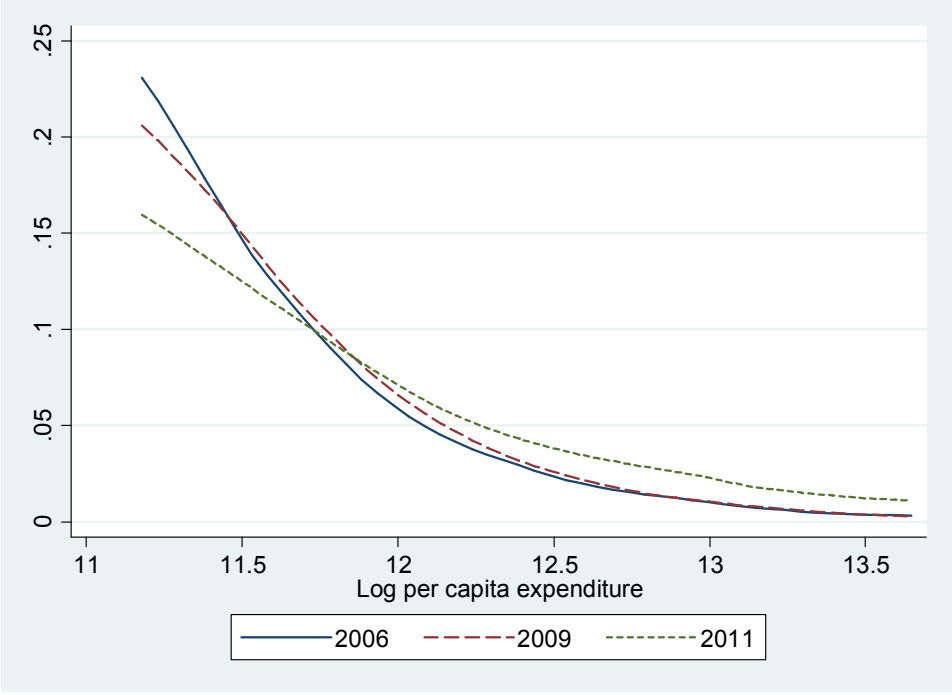

Figure 1: Kernel density of annul expenditure per capita 2006, 2009 and 2011

4.3. Determinants of Poverty Transition

With income mobility due to various shocks, households experience high mobility across poverty and non-poverty status from a year to another with a lot of heterogeneity among households. While some households might be pushed into poverty following a significant drop in income, other might exit out of poverty after a rise in their income. As noted by Baulch et al. (2000), traditional poverty regressions give the profile of the poor but provide little information on the dynamic processes leading households to fall into or escape from poverty. Understanding poverty transition and the factors explaining this dynamic contributes to the filling of knowledge gap in the poverty literature and can provide insights to policy makers on the designing effective policies and programmes. Following Baulch et al. (2000) and Lopez-Calva and Ortiz-Juarez (2011), we classify households into four groups depending on their initial poverty status and their final poverty status.

Table 4: Poverty transition matrix over the period 2006-2011

		Final Period 2009		
Initial Period 2006		Non-poor	Poor	Total
	Non-poor	87.47%	12.53%	100%
	Poor	60.24%	39.76%	100%
		Final Period 2011		
Initial Period 2009		Non-poor	Poor	Total
	Non-poor	75.42%	24.58%	100%
	Poor	55.42%	44.58%	100%
		Final Period 2011		
Initial		Non-poor	Poor	Total

Period 2006	Non-poor	74.65%	25.35%	100%
	Poor	63.30%	36.70%	100%

As shown in table 4, there is a large and rapid turnover in poverty over time period of the study with many households exiting and falling back into poverty. This suggests that, in addition to poverty and chronic poverty, transitory poverty is also an important issue in Benin. Among households that were poor in 2006, almost 39.76% have remained poor in 2009 and 36.70% are still poor in 2011. Also, among the non-poor in 2006, some 12.53% have fallen back into poverty in 2009 and 25.35% become poor in 2011. However, there are still a large proportion of poor households in 2006 that escape from poverty both in the years 2009 and 2011. These results are in line with the findings by Baulch et al. (2000) in rural Pakistan and Lopez-Calva and Ortiz-Juarez (2011) in Chile, Mexico and Peru.

We proceed further to analyze the factors that explain this dynamic of poverty by estimating a multinomial logistic model. The results are presented in the table 5. All the results are interpreted in comparison to the reference group which is households that non-poor both in 2006 and have remained non-poor in 2011. The Hausman IIA test confirms that the multinomial logistic model is valid. The columns 1 and 2 present the coefficients estimated and the marginal effects for the category of households that fall back into poverty in 2011 while they started non-poor; columns 3 and 4 concern households that have exited poverty between 2006 and 2011 and columns 5 and 6 concerns households that have been trapped into poverty.

The results of the multinomial regression provide additional insights into the analysis of the dynamic of poverty in Benin. Most the variables that explain significantly household's poverty status and the persistence of poverty are also significant in explaining the dynamic of

poverty over the period 2006-2011. While for most variables the expected effect are consistent with the findings on the two previous models, some households characteristics have different effects depending on whether household are exiting or entering into poverty. For instance, we find that being a female-headed household reduce the likelihood of falling back into poverty if the household started initially as non-poor. However, if the household was initially poor, there is an almost equal likelihood, though low, that the household will remains poor or exit poverty. Similarly, for most of the variables, the marginal effects do not always have the same direction and magnitude across all the categories of movement into and out of poverty.

As in the previous analysis, the age of household head and the size of the household both play an important nonlinear role in households' movement into and out of poverty. Household's head marital status also plays an important role in explaining the transition in and out of poverty. On the one hand, single or not married head of households are a less likely to become poor or stay persistently in poverty. On the other hand, married head of households, to one or more wives, are more likely to become poor if they started non-poor or to remain persistently poor. As before, education and labor skill appear to be strong determinants of the transition in and out of poverty. Households that are well endowed with these human capital and skills are more likely to remain non-poor or to escape poverty if they were initially poor. They are also less likely to fall back into poverty if they were initially non-poor.

Table 5: Multinomial logistic regression of the determinant of transition in or out of poverty between 2006 and 2011

	Non Poor - Poor	Poor - Non Poor	Poor - Poor
	Coeff	Coeff	Coeff
	(1)	(2)	(3)
Female Headed	-0.075	0.172**	0.258**
	(0.08)	(0.08)	(0.10)
Rural	0.040	0.011	-0.286***
	(0.06)	(0.06)	(0.08)
Household Age	-0.054***	-0.035***	-0.038***
	(0.01)	(0.01)	(0.01)
Household Age squared/100	0.041***	0.033***	0.022
	(0.01)	(0.01)	(0.01)
Household size	0.279***	0.542***	0.720***
	(0.02)	(0.03)	(0.03)
Household size squared/100	-0.900***	-1.938***	-2.401***
	(0.12)	(0.14)	(0.18)
Single or Not married	-0.764***	0.005	-0.796***
	(0.18)	(0.12)	(0.25)
Married to one wife	0.534***	-0.128	0.409***
	(0.10)	(0.08)	(0.12)
Married to several wives	0.632***	-0.456***	0.180
	(0.11)	(0.10)	(0.14)
Is not Alphabetized	0.248***	0.353***	0.432***
	(0.07)	(0.07)	(0.09)
Has primary education	-0.000	0.006	-0.163*
	(0.07)	(0.07)	(0.09)
Has secondary education	-0.211**	-0.394***	-0.695***
	(0.10)	(0.10)	(0.13)
Has above secondary education	-1.181***	-1.468***	-1.478***
	(0.27)	(0.29)	(0.42)
Has low employment skill	-0.067	-0.151	-0.206
	(0.11)	(0.12)	(0.16)
Has high employment skill	-0.246	-0.340*	-1.035***
	(0.20)	(0.20)	(0.37)
Industry sector	-0.390***	-0.122	-0.534***
	(0.10)	(0.10)	(0.14)
Services sector	-0.508***	-0.285***	-0.800***
	(0.07)	(0.07)	(0.09)
Constant	-1.399***	-2.335***	-4.247***
	(0.27)	(0.28)	(0.38)
Observations	11,975	11,975	11,975

Dependent Variable is the transition in or out of poverty between 2006 and 2011. Base category: Non Poor in 2006 and Non Poor in 2011. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

Poverty in Benin, and other SSA countries, has remained persistently high, despite moderate

economic growth and large reduction in other part. This poses the questions of what drives household mobility across poverty status and what factors trap them in this condition. In this paper, we address these questions. The goal is to identify the profile of the poor and identify factors that are strongly correlated with poverty and its persistence and that are amenable to improvement by public policy and household effort. Understanding the key determinants of poverty and its persistence is essential to design effective policies for poverty reduction. We start the analysis by examining the extent and the determinants of the persistence of poverty and the correlates of poverty. Next, we use a strict definition of persistence of poverty which categorizes a household as persistently poor, if the household remains poor over the entire period of observation. This definition is then use to characterize chronic poverty and its determinants. Finally, we relax this definition by examining in detail the dynamic of poverty in term of entry and exit with a focus on the determinants of such dynamics.

We find that about a quarter of Beninese still live with insufficient means to satisfy their basic food, education clothing and health needs. The typical profile of a poor in Benin can be described as a household headed by a relatively old adult, who is female, and has a large family. Most importantly, the head of this household lacks adequate schooling and employment skills. He also works in low productivity sector such as agriculture. A large proportion of made headed households are also poor and are net consumer of food; urban households face a greater risk of being poor especially during the year of food price spikes.

We also find a strong evidence of persistence of poverty with households poor in a period more likely to remain poor in the subsequent years. We find that there is large and rapid turnover of household into and out of poverty. This suggests an extreme vulnerability of household to various types of shocks that push them back into poverty. There is a lot of heterogeneity in the

probability of being poor with respect the household expenditure, the general finding is that very poor households face a great risk of remaining poor. A multinomial logistic model developed showed that household's head gender, marital status, education level and employment skill and sector determine the dynamic of poverty.

In overall, the findings suggest that poverty and persistence of poverty are both important in Benin. Households are vulnerable and various shocks push many of them in poverty, although some of them also exit poverty. This suggests that policies should not only focus on the currently poor but also various groups such as the persistently poor and households currently not poor but who are at a great risk of falling back into poverty. The ultimate goal should be to increase exit from and reduce entries into poverty. The profile of poor and persistently poor households highlights the great importance of education, employment skill and the type of activity of the household head. Poverty reduction strategies policies should focus on these key elements both in urban and rural areas and among all types of households.

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[1] After the period of Structural Adjustment Program, most developing countries start developing Poverty Reduction Strategy Papers (PRSP) in which poverty reduction is the center. See http://www.imf.org/external/np/prsp/prsp.aspx for all PRSP

[2] Since the seminal work of Dollar and Kraay (2002), there is a large literature suggesting that growth is good for the poor. Although this thesis has been challenged, economic growth remain the many channel that countries actively pursued to achieve poverty reduction

[3] In 1974, a military coup overthrew a civilian regime and in 1977 the Marxist-Leninist ideology was proclaimed and the country changed its name from Dahomey to Benin republic and espoused the socialism. The socialism lasted until 1990 and was subsequently replaced by a democratic transition amidst a social, economic and political chaos.

[4] The average GDP per capita growth over the period 1990-2011 is 3.7% (data from the World Development Indicator 2015)

[5] The data are obtain from INSAE website at http://www.insae-bj.org/bases-donnees.html

[6] The results regressions on the full unbalanced data are qualitatively similar to the results presented in the paper using the balanced sample

[7] The official poverty rate reported by INSAE is 37.3% in 2006, 35.2% in 2009 and 36.2% in 2011

[8] Only the descriptive statistics for the year 2011 are reported.

[9] Only the results of the logistic regression are presented. The results are of the linear probability model and the probit regression (not reported) are qualitatively the same.

[10] Only the results of the logistic regression are presented. The results are of the linear probability model and the probit regression (not reported) are qualitatively the same.

[11] Before estimating the non-parametric regression, we first estimate an income equation with the same independent variables as in poverty models in order to eliminate any unobserved income shocks and capture the fundamental relation between income level and the persistence of poverty.