THE IMPACT OF HEALTH SHOCKS ON POVERTY LEVEL IN NIGERIA

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ABSTRACT

Good health and no poverty are two critical goals of Sustainable Development Goals that any nation would want to achieve. However, health shock is an unpredictable shock, it implies a welfare loss due to illness or injury while poverty is multidimensional. The poor are more vulnerable to health shock and more households are pushed into poverty due to high out of pocket expenditure on health. Hence, this study examined the influence of health shock on the poverty level in Nigeria for thirty-seven years (1981-2017). Impulse Response and Variance decomposition of the Vector Error Correction Model (VECM) were employed to examine the impact of health shock on the poverty level in Nigeria. The data source for our analysis was from World Development Indicator (WDI) and Central Bank of Nigeria Statistical Bulletin database. Our findings revealed that an increase in out of pocket expenditure and death rate provide an appreciable explanation for shocks to the poverty level. This implies that an increase in out of pocket expenditure and death of household member could make the household more vulnerable to poverty due to reduction in income, savings, investment and productive activities. Our study, therefore, recommends that essential needs of the poor should be addressed to mitigate the adverse effect of health shock to households.

Keywords: Health Shocks, Out- of- Pocket Expenditure, Poverty, VECM

JEL Classification Code: I300, Q180

1. INTRODUCTION

Health is an important asset and poor health generates poverty. To achieve sustainable development, improved health and poverty reduction are important and necessary. Little wonder that these are part of the Sustainable Development Goals (SDGs). Developing countries are prone to either covariant shock (such as financial crises, social unrest, change in commodity prices among others), Idiosyncratic shock (such as death, severe illness, job loss among others) or both (Shehu and Sidique, 2005; Onisanwa and Olaniyan, 2018). Covariant shocks affect group of communities, households, regions or even the country as a whole while idiosyncratic shocks only affect individuals or households. Health shock is one of the unpredictable shocks which doesn't only affect the patient but rather the entire household. It is idiosyncratic, usually associated with severe economic consequences and impose a significant risk on households (Bonfrer and Gustafsson-Wright, 2017). It is also an unexpected negative health event or a reoccurring illness which increase health expenditures,

out-of-pocket expenditures and this reduces the income of the household. It also implies a welfare loss for the household due to illness or injury which usually involve direct and indirect cost (Mitra, Palmer, Mont and Groce, 2015). It incurs loss of income and economic costs to household and can easily reverse the progress of the poor and makes household more vulnerable than other types of shock because it is least predictable (Duflo, 2005; (Dhanaraj, 2015). It affects household income and consumption and this could easily push them into extreme poverty (Duflo, 2005; Mitra, Palmer, Mont and Groce, 2015).

The poor are more vulnerable to health shocks because it could affect the economic welfare of their children and thereby reduce their income and their investment in the human capital of their children (Capatina, Keane and Maruyama, 2018). Household tends to trade the future welfare for the present welfare to cope with health shocks and thereby adopt several coping strategies (such as formal and informal) to cope with health shocks. Some of these coping strategies are sales of assets, borrowing from families and friends, loan, reduction in expenses on education, reduction in consumption among others (Dhanaraj, 2014). People go bankrupt due to medical problems associated with loss or reduction in income and out-of-pocket payments (Islam and Parasnis, 2017). The impact of health shocks on poverty level in Nigeria is underexplored in the literature. Understanding how health shocks impact on the poverty level of Nigerians is very crucial. This is because health shock is less predictable compare to other types of shock and also it negatively affects growth and productivity. It could easily make the rich poor and the poor poorer. Studies such as Dercon and Hoddinott, (2003); Dhanaraj, (2014); Khan, Bedi and Sparrow, (2014); Onisanwa and Olaniyan, (2018) have examined the effects of health shocks on household income and their coping strategies. Also, little is known in the literature on the channels through which health shocks affect the poverty level. There are only a few studies on health shock in Nigeria while most of the few studies focused on the effect health shock has on income and they also identified some coping strategies. Our study is to fill this gap by empirically investigating the effect of health shock on the poverty level in Nigeria. Nigeria is considered as a case study because; it is one of the low-income countries, not all citizens have access to health insurance scheme and formal risk institutions are scarce to reduce the negative effect of health shock on the household. Therefore, the objective of this study is to examine the impact of health shock on household poverty level in Nigeria.

2. LITERATURE REVIEW

Poverty is multidimensional and cannot be captured with just a variable. For example, an increase in income of the poor doesn't guarantee an improvement in their health status (World bank. 2000). Likewise, health is an important asset that aid learning, productivity, growth and consumption. Good health promotes productivity and economic development while effective health insurance scheme is also important to promote the welfare of the citizens especially the poor and also to prevent households from extreme economic outcomes. Poverty and poor health are closely related and the most vulnerable to poverty and health shock are children, pregnant women, elderly, refugees, travelling communities and homeless communities. Poverty also reduces life expectancy and increases the risk of mental illness and chronic disease (Shahid, 2018).

Demand for health model was developed by Grossman (1972). In this model, health is demanded by consumers as consumption and investment commodity. As an investment commodity, education increases the demand for health because of individual efficiency increases. The model assumed health as a durable capital stock which produces an output of healthy time. An initial stock of health is inherited by individuals and this depreciates with age and increases with investment. Expenditure on health and medical care increases for the elders because the stock of health decreases as human grow older. Grossman model is accepted generally as a standard by health economists but Eze, (2018) criticized the model that curative health care is better explained by the standard consumer model rather than explaining it through the human capital model. Eze, (2018) also argued that health decreases not only due to ageing as assumed by Grossman (1972) but also as a result of illness.

Household is at the risk of being vulnerable to poverty when the standard of living is below the poverty line. The poor households are also susceptible to shock because they lack some important mechanisms that are needed to protect themselves against shock and this expose households to the risk and limited access to resources (Bonfrer and Gustafsson-Wright, 2017). They are also faced with the risk of Increased in out of pocket spending on health (Morudu and Kollamparambil, 2020).

Health shock is the main source of vulnerability to the household. It is the most unpredictable shock and it is common to the poor (Duflo, 2005; Wagstaff and Lindelow, 2010). It could have both short- and long-term effect on the household. It is regarded as a short-term effect if household substitute production and consumption spending to get health care it is regarded as a long-term effect when investment and productive activity reduces (Atake, 2018). Good health improves productivity and education (WHO, 1999) likewise healthy workers are more energetic and productive.

Dhanraj, (2014) examined the health shocks and coping strategies in India. The objectives of the study were to examine those due to health shocks are vulnerable to welfare loss; how household react to an economic burden that was due to health shocks and whether the state health insurance schemes reduce economic vulnerability. They used longitudinal data and logistic regression analysis. Based on their findings, health shock vulnerability increases with the age of household heads and households headed by female have a higher probability of facing welfare loss than the ones headed by a male. Households with members that are elderly, ill, and disabled are more prone to a welfare loss. The study identified that households can react to economic burden from health shocks through their current income or past savings. They could also borrow from friends, neighbours or relatives. They can equally reduce their expenditures, consumption or sell their assets. Some households allow other members of the family to work to cope with a decrease in wage income and an increase in medical bills.

Dhanaraj, (2015) evaluate the effect parental health shocks have on investment in children human capital. Their measure of investment captured various aspect using longitudinal dataset such as expenditure on education, school participation, time spent in learning, cognitive and non-cognitive skills of children, current enrolment status, a transition from

primary school to secondary school. Their study found evidence that poor households smoothen their consumption against health shocks by reducing investments in children human capital. This is because of imperfect insurance and credit markets which has significant implications on intergenerational transmission of inequality and poverty. Dhanaraj, (2016) examined the economic vulnerability to health shocks and coping strategies in India. In their findings, a higher number of households with elderly and disabled are vulnerable to welfare loss from health shocks; higher welfare loss among the socially vulnerable such as Muslim households.

Parro and Pohl, (2018) explore the link between human capital, health shocks and labour market outcomes. They found out that health shocks reduce household earnings and human capital and this has a negative effect on the labour market. Focusing on the impacts of shocks on child and adult health, Dercon and Hoddinott, (2003) identified health status as a valid indicator of welfare. Results from their findings suggest a significant fluctuation in growth retardation and body weight in response to shocks. Lenhart, (2018) also examined the link between labour market outcomes and health shocks. Evidence from their findings shows that health shocks pose negative effects on individual earnings and labour market outcomes. Evidence from the literature also shows that consumption could be affected by health shock (Gertler and Gruber, 2002) and it may not (Kochar, 1995). It could increase consumption because household may have a preference for a particular food that aid their recovery from illness (Needham, Bowman and Foster, 2003). Household's ability to smoothen consumption spending on food and non-food items during health shock is mixed (Bales, 2014; Khan, 2014; Dhanaraj, 2015).

Onisanwa and Olaniyan, (2018) assessed the effects of health shocks on household consumption and the strategies embraced by the household to address health shock in Nigeria. Severe illness and demise of household members were used to measure health shock and their result shows that health shocks and earnings are negatively related while severe illness and households' consumption are positively related. The study concluded that institutions should be developed to cater for the health needs of people during health shocks and formal credit market should be developed and accessible to low-income households.

Evidence also shows that health shock significantly and negatively affects welfare, savings and labour supply (Islam and Parasnis, 2017). Health shock is caused by lack of health insurance and poverty (Atake 2018). 5% of the population are registered under the Nigerian health insurance scheme (NHIS) and these are people who reside in the urban areas and employed by the federal and state government (NHIS, 2009). The poor and those that belong to the informal sector couldn't afford quality health care which made them vulnerable to health shock due to their financial status.

The study of Kabir and Maitrot, (2018) explored how health shocks affect anti-poverty interventions in Bangladesh. Exploratory qualitative research design and thematic analysis approach were adopted in the study. Most of the participants considered in the study have a chronic disease that requires continuous medical care which results in a prolonged absence from work. In their findings, access to health and health outcomes in Bangladesh vary with

income, age and gender of the household while greater households are pushed into poverty due to high cost of out of pocket health expenditures. Also, the cost of health care expenses is higher for extremely poor households, most of them could not respond to follow-up medical visit and full medical treatment because of high out of the pocket expenditure. It was also discovered that sickness lasts longer and worsen among the participants because of lack of medical information, so households ignorantly seek medical care from informal health care providers which are detrimental to their health. Bloom, Canning, Kotschy, Prettner and Schunemann, (2019) assess health and economic growth by reconciling micro-based and macro-based approach in 116 countries. Their findings showed that health is one of the important factors that explain the variations in the level of income per worker.

Socio-economic impact of covid-19 on global poverty in Asia, Africa, South America and Europe was analyzed by Buheji, Cunha, Beka, Mavric, Souza, Silva, Hanafi and Yein, (2020). Their objectives were to evaluate the socio-economic effects of covid-19 preventive measures on the poor. In their review, it is generally hard for the poor in these four continents, especially in Asia and Africa to acquire necessary personal products for protection against Covid-19 and also difficult to for them adhere to strictly to the restrictive measures of lockdown because most of them depend on daily wage for survival. They also identified that Covid-19 outbreak has posed a serious threat to the Sustainable development goals (SDGs) of ending poverty by 2030 because many households have been pushed into poverty by the pandemic. Other reasons include its effects on trades, industries, tourism, education among others and also reduction in agricultural activities. The pandemic has also given countries with poor health system an opportunity to build a more robust health system as a preventive measure against future occurrences of health shock.

Most empirical studies focused only on direct cost (such as an increase in medical expenditures) as a major factor that imposes financial catastrophe on households neglecting the indirect cost (such as loss of income and time for productive activities). Also, how households finance medical expenditures and the effect of the death of a member of the family on household welfare were not critically examined in the previous studies. This study bridges the above gap by examining the effect of death and out of pocket expenditure on household welfare. We also used secondary data in analyzing and explaining our objectives unlike most of the studies that used survey data.

3. METHODOLOGY

Secondary data within the period of 1981 to 2017 were employed for the study. Poverty Index (POVI) data was sourced from Central Bank of Nigeria Statistical Bulletin while Out of Pocket Expenditure (OOPE), Gross Fixed Capital Formation (GCF), Inflation (INFL) and Death Rate (DRT) data were sourced from World Development Indicator (WDI) database. The theoretical framework for this study is the health production function model by Grossman, (1972). Health is a source of utility and it is necessary for human capital because it determines wealth and income levels. Grossman, (1972) argued that there is a difference between health capital and other types of human capital in that health capital determines the time invested in producing money earnings and commodities while market and non-market productivity affects person's stock of knowledge. When there is an increase in the health

capital, the amount of time lost from the market and non-market activities reduces. The demand for other health inputs and medical care is derived from the demand for health. Our model is specified as;

$$Y_t = f(X_t); t = 1,2,3 \dots \dots \dots n \quad (1)$$

Y_t represents the poverty index while X_t represents the health shock measured by out-of-pocket expenditure (OOPE), gross capital formation (GCF) and inflation (INFL) and death rate (DRT). Equation one becomes;

$$POVI_t = \propto_1 OOPE_t + \propto_2 GCF_t + \propto_3 INFL_t + \propto_4 DRT_t + \mathcal{E}_t \quad (2)$$

After conducting cointegration test for the variables in equation (2), the result shows that there is cointegration among the variables and hence, long-run relationship exists among the variables. We, therefore, specify our vector error correction model (VECM) as;

$$POVI_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta POVI_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta OOPE_{t-j} + \sum_{m=1}^{k-1} \psi_m \Delta GCF_{t-m} + \sum_{l=1}^{k-1} \theta_l \Delta INFL_{t-l} + \sum_{\rho=1}^{k-1} \beta\delta_\rho \Delta DRT_{t-\rho} + \lambda ECT_{t-1} + \mu_t \quad (3)$$

We adopted Vector error correction model VECM because the result of our cointegration test shows that there is a long-run relationship among our variables. If the cointegration result doesn't indicate a long-run relationship among the variables, then vector autoregressive model (VAR) is to be used for the analysis but if otherwise, VECM is suitable. Vector error correction model (VECM) allows the long-run behaviour of the endogenous variables to converge to cointegration, that is, long-run equilibrium relationships while allowing a wide range of short-run dynamics. The results of the VECM is presented through impulse response and variance decomposition in Appendix C, D and E.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1 Unit Root Test

Appendix A presents the unit root test for our variables using Augmented Dickey-Fuller [ADF] and Phillip Perron [PP]. ADF and PP unit root tests, test the null hypothesis of the existence of unit root (non-stationary) against the alternative hypothesis of the non-existence of unit root (stationary). Our result shows that the variables GCF, INFL, OOPE and POVI are stationary at the first difference at 1% level of significance. DRT is also stationary at first difference but 10% level of significance.

4.2 Cointegration Test

Cointegration implies when economic variables share the same stochastic trend. The variables may deviate from each other in the short run but they tend to come back to the trend in the long run. Cointegration test is necessary when all the variables are integrated of the same order or contain a deterministic trend (Engle and Granger, 1987). The cointegration result in Appendix B shows that there are at least four cointegrating equations among the variables. We, therefore, reject the null hypothesis of no cointegration among the variable at 5 per cent level and accept the alternative hypothesis that there is cointegration among the variables. This implies a long-run relationship among the variables.

4.3 Response of POVI to Shock

Appendix C presents the Table of the impulse response of POVI to shock while Appendix D presents the graph of the impulse response function. Impulse response measures the time profile of the effect of a shock on the expected value of a variable. It also traces the temporal and directional response of an endogenous variable to a change in one of the structural innovations. The impulse response of POVI alone is shown in appendix C because it is the dependent variable. A shock in POVI results in an increase in LINFL in all the periods except in period 3 and 4 where a shock in POVI result in a decrease in LINFL. The response of POVI to itself is positive all through the periods but negative in period 4, 8, 9 and 10. POVI also respond positively to shocks in LGCF and LDRT through the ten periods. This implies that when there is a shock in LGCF and LDRT, poverty increases. This is in support with the study of Lenhart, (2018); Onisawa and Olaniyan, (2018) that health shock reduces income and household consumption which makes household more vulnerable to poverty. Also, on the average, increase in LOOPE negatively affects POVI. This is in support with the findings of Kabir and Maitrot, (2018) that most of the poor could not respond to follow up medical visit and full treatment because of high out of pocket expenditures. High out of pocket expenditure also pushes some household to sort medical care from informal health care provider which is detrimental to their health. High out of pocket expenditure also reduces household savings and investment (Dhanaraj, 2015; Demenet, 2016; Islam and Parasnis, 2017). Most households in developing countries meet up with out of pocket expenditures by selling their assets, borrowing, dissaving, reducing investment in schooling (Alam and Mahal, 2014; Mistra, Palmer, Mont and Groce, 2015; Kabir and Maitrot, 2018).

4.4 Variance Decomposition Result for POVI

Appendix E depicts the variance decomposition result for POVI. Variance decomposition measure and predict the proportion of error variance in one variable that is explained by shocks from other variable and itself. It also indicates the relative contribution of past periods of POVI to its current value and also the contributions made by other explanatory variables to its value. The variance decomposition of POVI alone is shown because it is the dependent variable. From Table 4, LOOPE, LINFL, LGCF and LDRT did not explain the variation in POVI in the first period. Also, LOOPE and LDRT account significantly for the variations in LPOVI in the ten periods. The shock from LOOPE increases from 2 per cent in period 3 to 1110 per cent in period 6. There was a reduction from shock in period 7 to 984 per cent after which it increased to 1262 per cent in period 10. The shock from LDRT increases from 52 per cent in period 2 to 5730 per cent in period 10. Though the shock from LINFL and LGCF increases through the ten periods, LOOPE and LDRT provide more appreciable explanation for shocks to POVI. This implies that out of pocket expenditure and death rate significantly affect the poverty level of the household. Our result is in support with the findings of Dercon and Hoddinott, 2003; Dhanaraj, 2015;2016 that death of household member increases the poverty rate and forces other members of the household that are below the age of labour force into labour force early. This affects human capital and labour productivity. It is also in support with the findings of Atake, (2018) that health shock reduces investment and

productive activities and pushes household to substitute spending on consumption and production to getting health care.

5. CONCLUSIONS AND RECOMMENDATIONS

Health shock has negative implications on poverty reduction and it contributes to poor households' inability to achieve sustainable economic empowerment. Health shock could make household poor or even poorer in future. In Nigeria, several factors such as lack of health insurance coverage, financial hardship, unemployment, poor health service delivery system, bad governance, illiteracy, lack of health care information contribute to health shock and increase in the poverty level. We have examined the effect of health shock on the poverty level in Nigeria for over 37 years. It was observed in the study that out of pocket expenditure and death rate significantly affects the poverty level. This implies that health shock could easily push vulnerable household to poverty through an increase in out of pocket health expenditure and death of a household member. Also, an increase in out of pocket expenditure expose a household to the risk of low savings, low investment and increase in inequality which could make household substitute future welfare for the present. The study recommends that effective protective measures to mitigate the adverse effect of health shock to the household should be provided. Essential needs of the poor and the provision of a well-equipped health care system should be addressed to reduce the negative effect of health shock. Also, health centres should be easily accessible to people especially to the vulnerable and health insurance scheme should be well implemented. These would reduce the adverse effect of health shock in households and on the economy at large.

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7. APPENDIX OF RESULTS, TABLES AND FIGURES.

Appendix A**:** Unit Root Test (Augmented Dickey-Fuller [ADF] and Phillip Perron [PP] Test with Intercept)

Variable	Augmented Dickey-Fuller [ADF]			Phillip Perron [PP]		
	Level	First Diff.	Remark	Level	First Diff.	Remark
DRT	-1.392592	-2.863319***	I(1)	2.567857	-1.025216***	I(1)
GCF	-0.535375	-4.092826*	I(1)	-0.943252	-4.353314*	I(1)
INFL	-2.861096	-5.507923*	I(1)	-2.732953	-9.381340*	I(1)
OOPE	-0.492787	-6.357488*	I(1)	-0.196963	-6.540312*	I(1)
POVI	-2.202524	-5.725148*	I(1)	-1.913185	-10.27188*	I(1)

Note: *, **, *** denote 1%, 5% and 10% level of significance respectively
Source: Authors' Computation

Appendix B: Cointegration Result with Poverty Index (POVI) as the dependent variable

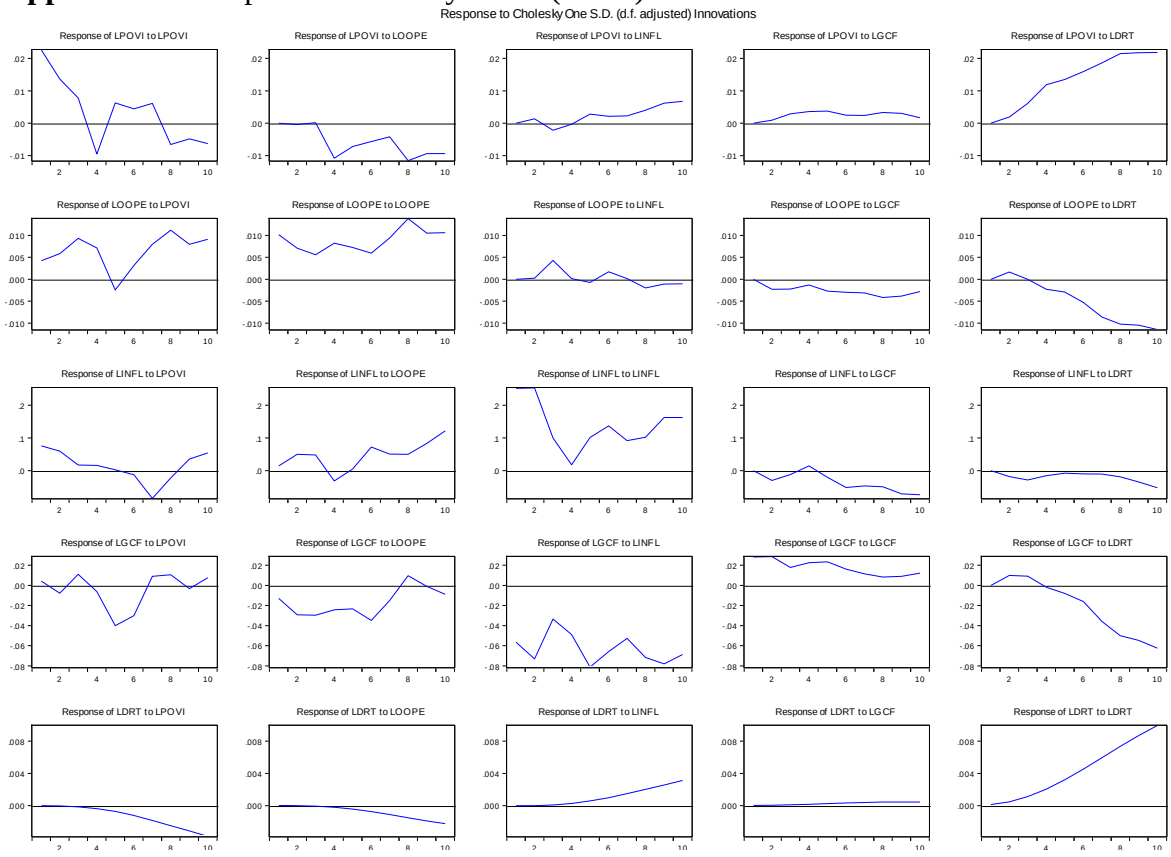
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.905445	164.6514	69.81889	0.0000
At most 1 *	0.730332	86.81862	47.85613	0.0000
At most 2 *	0.542290	43.57002	29.79707	0.0007
At most 3 *	0.401295	17.77986	15.49471	0.0222
At most 4	0.025468	0.851324	3.841466	0.3562

Trace Test indicates 4 cointegrating equation(s) at the 0.05 level
Source: Authors' Computation

Appendix C: Response of Poverty Index (POVI) to shock

Period	LPOVI	LOOPE	LINFL	LGCF	LDRT
1	0.022627	0.000000	0.000000	0.000000	0.000000
2	0.013625	-0.000392	0.001394	0.000959	0.001932
3	0.007845	0.000156	-0.002160	0.002875	0.006155
4	-0.009484	-0.010735	-0.000290	0.003610	0.011857
5	0.006248	-0.007208	0.002853	0.003717	0.013487
6	0.004454	-0.005644	0.002170	0.002481	0.015961
7	0.006155	-0.004166	0.002248	0.002394	0.018622
8	-0.006568	-0.011491	0.004061	0.003333	0.021471
9	-0.004770	-0.009337	0.006182	0.003025	0.021782
10	-0.006293	-0.009368	0.006763	0.001727	0.021816

Appendix D: Response of Poverty Index (POVI) to shock



Appendix E: Variance Decomposition Result for Poverty Index (POVI)

Period	S.E.	LPOVI	LOOPE	LINFL	LGCF	LDRT
1	0.022627	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.026540	99.04230	0.021833	0.275691	0.130443	0.529738
3	0.028579	92.94901	0.021818	0.809012	1.124833	5.095325
4	0.034288	72.22598	9.816993	0.569202	1.890220	15.49761
5	0.038347	60.39855	11.38139	1.008641	2.450641	24.76077
6	0.042283	50.78830	11.14281	1.092912	2.359928	34.61605
7	0.046911	42.98225	9.841100	1.117566	2.177739	43.88134
8	0.053520	34.52783	12.17059	1.434240	2.061015	49.80633
9	0.059129	28.93942	12.46498	2.268183	1.950278	54.37713
10	0.064406	25.34538	12.62139	3.014300	1.715655	57.30328