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Vulnerability to Poverty in Fiji

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Abstract

In the extant literature either income or consumption expenditures as measured over short periods of time have been regarded as proxies for the material well-being of households. However, economists have long recognized that a household's sense of well-being depends not just on its average income or expenditures, but also on the risks it faces. Hence vulnerability is a more satisfactory measure of welfare. In this paper we measure the extent of vulnerability as expected poverty, and examine the importance of its determinants, on the basis of a household survey for Fiji. We find that in Fiji, vulnerability (and poverty) is largely a rural phenomenon. Moreover, the distribution of vulnerability across different segments of the population can differ significantly from the distribution of poverty. In addition, there is a sizable fraction of the population Fiji observed to be non-poor but estimated to be vulnerable to poverty. Thus, poverty reduction strategies in Fiji need to incorporate not just alleviation efforts but also prevention.

Keywords: Poverty, Vulnerability, Cross-section data, Fiji

JEL codes: C21, C23, I32

I.   Introduction

In the extant literature either income or consumption expenditures, as measured over short periods of time (say a year), have been regarded as proxies for the material well-being of households. However, economists have long recognized that a household's sense of well-being depends not just on its average income or expenditures, but also on the risks. Hence vulnerability is a more satisfactory measure of welfare. The concept of vulnerability used extends the notion of poverty to include idiosyncratic as well as system-wide risks. If policy makers design poverty alleviation policies in the current year on the basis of a poverty threshold of income in the previous year, "the poor" who receive income support may have already escaped from poverty and "the non- poor" who do not receive income may have slipped into poverty due to various unanticipated shocks (e.g. changes in relative crop prices or an illness incapacitating the main bread winner).

Chaudhuri (2003) listed four reasons why we should be concerned about vulnerability:

- A temporal or static approach to well-being, like poverty assessment, is of limited use in thinking about policy interventions to improve well-being that can only occur in the future.
- Vulnerability assessment highlights the distinction between ex-ante poverty prevention interventions and ex-post poverty alleviation interventions.
- Analysing vulnerability helps to investigate sources and forms of risks households face. This helps to design appropriate safety net programs to reduce or mitigate risk, hence vulnerability.
- Vulnerability is an intrinsic aspect of well-being with the assumption that individuals are risk averse.

According to Holzmann and Jørgensen (2001), poverty and vulnerability are closely related concepts due to two established facts: (i) the poor ar typically most exposed to diverse risks, and (ii) the poor have the fewest instruments to deal with these risks. Thus, Chaudhuri et al. (2002) state that:

"Poverty and vulnerability (to poverty) are two sides of the same coin.... So if we are able to generate predicted probabilities of poverty for households with different sets of characteristics (which some but not all poverty assessments attempt), we will have, in effect, estimates of the vulnerability of these households." (p. 3)

The purpose of this paper is to analyse poverty and vulnerability in Fiji. The paper begins in Section II by discussing the concept of social risk management and vulnerability. Section III lays out strategies to measure vulnerability for cross-section data. Section IV briefly introduces the economic and poverty situation in Fiji. Section V estimates determinants of vulnerability to poverty in Fiji. Section VI conducts a profile of vulnerability for Fiji. To the best of our knowledge, this is the first analysis of vulnerability for Fiji. Section VII concludes the paper.

II.   Social risk management and vulnerability

Globalization leads to improvements in welfare all over but also increase in income variability. Thus, according to Holzmann and Jørgensen (1999), social risk management (SRM) is concerned about four main issues:

- *Vulnerability*: can be defined as the risk of an individual or a household to fall below the poverty line or, for those already below the poverty line, to remain in or to fall further into poverty. Anti-vulnerability policies are designed to prevent this risk. Meanwhile, traditionally, anti-poverty policy is only concerned with bringing the poor up to the poverty line. Enhancing the static anti-poverty concept with the dynamic vulnerability concept through risk management measures should prove to be welfare enhancing.
- *Consumption smoothing*: Individuals are presumed to prefer spreading the expected income over a long period (i.e., they are risk-averse). This requires appropriate risk management instruments, such as saving and dis-saving possibilities, in order to smooth consumption path.
- *Improved equity*: Improved equality eases constraints in the ability of the poor to smooth their consumption, resulting in a better risk management (Holzmann and Jørgensen, 2001)
- *Economic development*: Undoubtedly, economic development is an important factor in reducing poverty.

Among the above issues, vulnerability is the central concept of SRM (Holzmann et al., 2003). Holzmann et al. (2003) review *three* definitions of vulnerability:

1. Vulnerability is the risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty or fall deeper into poverty. Thus, vulnerability is synonymous with a high probability of becoming poor or poorer in the future. This definition is referred as *outcome approach* to vulnerability in Scaramozzino (2006).

2. Vulnerability is the households' ability to smooth (insure) consumption when faced income shocks while preserving a minimum level of assets. Under this approach, vulnerability is tantamount to consumption volatility. More precisely, household vulnerability is the conditional covariance between changes in household consumption and changes in income, subject to an asset constraint.

3. Vulnerability is the utility lost due to risks, as the difference between the expected household consumption and the certainty-equivalent consumption. This definition is referred as *utility-based approach* to vulnerability in Scaramozzino (2006). Especially, the utility function can be decomposed into two distinct components measuring vulnerability: poverty and risk (aggregate and idiosyncratic risk) (Ligon and Schechterd, 2003).

III.   Empirical strategy to measuring vulnerability

This section discusses econometric methods for vulnerability assessments corresponding to the first definition of vulnerability – outcome apporach. Ideally, according to Holzmann et al. (2003), the implementation of a vulnerability assessment requires panel data, and information on (i) the shocks that affect the households, and (ii) the household ability to withstand those shocks. Such data are typically not available, especially in developing countries. However, cross-sectional data have been advised to estimate vulnerability, namely *vulnerability as expected poverty* (VEP), as a second-best solution (Chaudhuri, 2003; Chaudhuri et al., 2002).

With VEP, the vulnerability level of household (or individual) i at time t is defined by

$$VEP_t^i = \Pr(c_{t+1}^i \leq z)$$

where c_{t+1}^i is the per capita consumption (or income) of household i at time $t+1$ and z is the per capital expenditure requirement defined as the poverty line. If we can estimate the ex ante probability distribution f of the consumption c, the vulnerability of household i can be identified as

$$VEP_t^i = \int_0^z f(c_{t+1}^i)\mathrm{d}c_{t+1}^i$$

Here, we assume a stationary environment where the probability of possible future consumption outcomes remain the same across time (Ligon and Schechter, 2004).

The major challenge in measuring vulnerability is to estimate the probability distribution f (Christiaensen and Boisvert, 2002). Given a limited panel data set for two years, in the case of Tajikistan, we assume that consumption is log-normally distributed as in Chaudhuri et al. (2002).[*] Thus, the vulnerability is estimated by

$$VEP_t^i = \Phi\left(\frac{\ln z - \ln c_{t+1}^i}{\sigma_i}\right)$$

with Φ is the cumulative log-normal distribution function.

Thus, to estimate a household's vulnerability we need to estimate its expected consumption and the variance of its consumption. To predict the consumption of household i at time $t+1$ and the variance of consumption σ_i^2 we specify the following heteroscedasticity regressions:

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[*] With a panel data of sufficient length we can directly estimate the probability distribution of the household's consumption without the need for auxiliary assumptions.

$$\ln c^i = X_i\beta + \varepsilon_i \quad (1)$$

$$\sigma^2_{\varepsilon i} = X_i\theta + e_i \quad (2)$$

where X_i presents a bundle of observed house household characteristics, such as the number of household members or the proportion of children.

According to Chaudhuri et al. (2002), there are two vulnerability thresholds. The first is the observed current poverty rate in the population. The alternative thresholds is 0.5. This threshold indicates that a household whose vulnerability level exceeds 50 percent is more likely than not to end up being poor and can thus be considered to be vulnerable. In this paper, we chose the later threshold so a household i would be included among the vulnerable if $VEP^i > 0.5$.

IV. Economic and poverty situation in Fiji

Fiji is the richest among the Pacific island countries with high GDP per capita, compared with the other countries in the region. Fiji's real GDP growth is around the average growth rate of the Pacific island nations. Inflation is comparatively low in Fiji, with consumer price rising annually by only 3% on average from 1997 to 2006. (Table 1 and Figures 1 to 3)

[Table 1 here].

[Figures 1 to 3 here]

The services sector accounted two thirds of GDP in Fiji partly because of the importance of tourism in this country. However, tourism in Fiji is beset with problems of poor infrastructure, especially regular transport services and accommodation. These prevent tourism from reaching its potential (ESCAP, 2003).

We estimate the poverty rate in 2002 to be 33.8%, increasing from 25% in 1991 (UNDP, 1998). The experience of many Asian countries has shown that high growth rates have led to sharp fall in poverty. However, growth rates in Fiji have not been high so far. Furthermore, the fact that sugarcane leases held by Indo-Fijians are non-renewable has resulted in the eviction of several farmers (UNDP, 2007). At the

same time, the labour market has not provided any significant alternative opportunities to displaced families (UNDP, 2007). But, tourism, which had suffered in the wake of the terrorist attacks in the United States, has recovered modestly. (ESCAP, 2004). In addition, Fiji has witnessed a brain drain of people leaving in search of better opportunities as a result of the political instability and lack of business confidence engendered by several coups.

Although the poverty rate increased in Fiji, some social indicators of this country have been improving. For instance, life expectancy improved from 67.5 years in 2000 to 68.6 years in 2006. Infant mortality rates had declined to just 15.65 deaths per 1,000 live births in 2006, compared with 16.2 in 2000. Amazingly, the Gini index is low only at 30.3 which is better than that for many developed countries (UNDP, 2007).

V. Data

The household data we use to assess vulnerability in Fiji come from the 2002-03 Household Income and Expenditure Survey (HIES) which was conducted by the Household Survey Unit of Fiji Islands Bureau of Statistics. It provides income, expenditure, and other data at the household level, which are useful in the analysis of poverty.

A two-stage sampling strategy was used. In the first stage 860 representative samples of Urban and Rural Enumeration Areas (EA) were selected. Within each EA a fixed number of households were selected by systematic random sampling. The household weights for all the households in each selected EA are given. The number of households each selected EA (observation) presents for is then calculated as:

Household weight * No of household in EA

A poverty line is defined as a household income of 8062.6 Fiji dollars per year for a 4-members household (Strategic Development Plan 2007-2011), equivalent to a poverty line of 2015.7 Fiji dollars per year per capita. Fiji is divided into 4 divisions, all covered by the survey: Central, Eastern, Northern, and Western. Basic characteristics of the sample are given in Table 2.

[Table 2 here.]

VI.   Determinants of vulnerability in Fiji

Based on the specification described in Section III, we estimated the coefficients on the different determinants of the ex ante mean and variance of future consumption as specified by (1) and (2). The estimated results, i.e. the relative importance of different factors to vulnerability, are presented in Table 3.

[Table 3 here]

Urban households tend to have higher expectation of future income and consumption (per capita) compared with rural households. In the Pacific island countries, rural areas are less developed in terms of transport and social infrastructure, leading to a reduction in opportunities of earning income available to those living in rural areas. Further, the construction of roads would provide access to markets, health and education (ESCAP, 2003).

However, there is significant evidence that households in urban areas have larger variances of income and consumption.

We also find that households in Central areas have significantly higher expectation and larger variance of future income and consumption. Furthermore, households in Northern areas have significantly lower expectation of future income and consumption and lower variance of consumption. Thus we can say that households in Northern areas are more vulnerable to poverty than households in the other divisions. Although, variance of income and consumption for households in Eastern areas are significantly lower than that of households in the other division, we do not find significant evidence of lower expectation of future income and consumption for these households.

Controlling for all other determinants, an EA with large average household size tends to have small expectation of income and consumption, thereby increasing household vulnerability. It is well-known that families with many children are on average poorer. However, this negative effect weakens with the household size because the coefficient on (average) household size squared is positive and

significant. However, we don't find significant evidence that larger family size is associated with a decrease in the variance of consumption.

When controlling for all other characteristics, female headed households are associated with significantly lower means of future income and consumption. The reason is in the Pacific island countries women are prominent in traditional agriculture which is characterised by low value-added (ESCAP, 2003). Moreover, most women in the Pacific are disadvantaged because of their under-representation at all levels of society, especially in the decision-making process (ESCAP, 2003).

In general, we find that the larger the dependency ratio, the larger is a household's vulnerability, as manifested by a significantly lower expectation of future consumption. The dependency ratio is measured by the proportion of household that consists of children under fifteen. We also find that EAs with more employees, relative to the population, tend to have higher expectations of future income and consumption.

We also find effect of ethnicity on the vulnerability of households in an EA. Fijians have low expectations of future income and consumption. Indians have even lower expectations of future income and consumption.

VII.   Profiles of vulnerability in Fiji

a.   Distribution of vulnerability at the aggregate level

Based on the estimation results for determinants of vulnerability above we conduct a vulnerability profile for Fiji. Using the crucial assumption that income is lognormally distributed we can calculate the probability that an EA (so households and people in this EA) has a per capita income falling below the poverty line in the future. A household (or a person) is then considered as vulnerable to poverty if this probability exceeds some threshold.

To investigate the distribution of the vulnerability we chose a threshold of 0.5 using the argument that a household whose vulnerability level exceeds 0.5 is more likely than not to end up poor (Chaudhuri, 2003; Chaudhuri et al., 2002).

Error! Reference source not found.4 describes the distribution of vulnerability at the aggregate level in Fiji. It can be seen that, in this case, the poverty rate overestimates the fraction of the population vulnerable to poverty. While 33.8% of the population is observed to be poor, we estimate only 24.5% of the population to be vulnerable to poverty.

Table 4 here.

Table 4 also shows that a sizable fraction of non-poor is vulnerable to poverty. Indeed, of the 86.2% of the population observed to be non-poor, 13.8% are estimated to be vulnerable to poverty. Thus poverty reduction strategies need to incorporate not just alleviation efforts but also prevention. Offcourse, programs that aim to reduce the vulnerability in the population need to be targeted differently from those aimed at poverty alleviation. This can be seen in the next subsection, where we analyse the distribution of vulnerability to poverty over segments of the population.

To check for other vulnerability threshold, 0 depicts the estimated incidence of vulnerability to poverty for the population, the poor and the non-poor for given vulnerability thresholds - ranging from 0 to 1 – measured along the horizontal axis. The horizontal line illustrates the (observed) poverty rate of the population. The figure shows that for any threshold less than 0.4 the vulnerability rate of the population is higher than the poverty rate. The figure also suggests that almost for any thresholds, the incidence of vulnerability to poverty of the population, the poor and the non-poor are significantly different and there is a given fraction of the non-poor are vulnerable to poverty. The vulnerable fraction of the non-poor is much closer to the vulnerable fraction of the population than the vulnerable fraction of the poor. This implies that the incidence of vulnerability of the poor is much higher than that of the overall population. Thus, Chaudhuri et al. (2002) argue that "poverty and vulnerability are closely related concepts".

b.		*Distribution of vulnerability over selected segments*

Now we analyse the distribution of vulnerability (along with poverty) over locations and selected household characteristics (see Table 5).

[Table 5 here]

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In Fiji, vulnerability (and poverty) is largely a rural phenomenon because poverty and vulnerability rates are much higher in rural areas. Relative to their share in the population, rural households are over-represented among the poor and the vulnerable. While 43.9% of the population live in rural areas, 68.1% of the poor and 88.3% of the vulnerable are rural. Of the population living in rural areas 52.4% are observed to be poor and 51% are predicted to remain poor in the future. Further, only 19.2% of urban population is observed to be poor and 5.3% of them are vulnerable to poverty. Vulnerability levels for alternative thresholds are sketched in Figure 4.

[Figure 4 here]

Strikingly, inequality in urban areas is more severe than that in rural areas, reflecting the poverty and vulnerability in rural areas are due to inequality between urban and rural areas, but within rural areas. Per capita income in urban areas is nearly twice as high that in rural areas. (Figure 5)

[Figure 5 here]

The imbalances in the contribution of rural and urban areas to overall poverty and vulnerability are analysed at the regional level. We report the distribution of vulnerability across different regions of Fiji. The observed poverty rates underestimated the vulnerability to poverty only in the Northern area and overestimated the vulnerability in the other divisions. We also find that in Fiji inter-regional differences in vulnerability rates are more obvious than the regional disparities in poverty rates. Indeed, the fraction of population poor ranges from a low of 23% in the Central to a high of 73% in the Eastern. However, the fraction of population vulnerable to poverty ranges from a low of 7.2% in the Central areas to a high of 71.5% in the Northern area.

The reason for the imbalance in the contribution of the divisions in Fiji to overall poverty and vulnerability is their small size, remoteness and geographical fragmentation. Because of this, the divisions suffer disproportionately from external shocks, such as natural disasters, and are vulnerable to poverty differently.

Clearly, poverty and vulnerability increase with household size. Especially, none of EAs with average household size less than 3 members is observed to be poor or predicted to be poor in the future. However, roughly 40% of EAs with average household size of 5 or more are poor and vulnerable to poverty.

VIII. Conclusions

We found that in Fiji, vulnerability (and poverty) is largely a rural phenomenon. Policies of the government will be required to reduce inequality between urban and rural areas. An important part of these policies is to improve transport and social infrastructure to make opportunities available to those living in rural areas, where the construction of roads would provide access to markets, health, education and other services.

We also found that the fraction of the population that faces a risk of poverty is considerably different from the fraction that is observed to be poor. Thus, poverty reduction strategies in Fiji need to incorporate not just alleviation efforts but also prevention. There is a sizable fraction of the population in Fiji who were observed to be non-poor but are estimated to be vulnerable to poverty. Moreover, the distribution of vulnerability across different segments of the population can differ significantly from the distribution of poverty. Therefore, programs that aim to reduce the vulnerability in the population need to be targeted differently from those aimed at poverty alleviation.

Table 1: Selected economic and social indicators for Fiji, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
Inflation, consumer prices (annual %)	1.1	4.3	0.8	4.2	2.8	2.4	2.5
GDP growth (annual %)	-1.7	2.0	3.2	1.0	5.3	0.7	3.6
GDP per capita (constant 2000 US$)	2,103	2,130	2,184	2,192	2,294	2,296	2,363
Agriculture, value added (% of GDP)	17	15	15	15	15	14	15
Industry, value added (% of GDP)	22	24	23	22	23	22	26
Services, etc., value added (% of GDP)	61	62	62	63	62	64	59
Poverty rate (% of population)			33.8[*]				
Gini index			30.3[*]				
Life expectancy at birth, total (years)	67.5	…	67.9	…	…	68.4	68.6
Infant mortality rate (per 1,000 live births)	16.2	…	…	…	..	15.7	15.65
Population growth (annual %)	0.7	0.7	0.7	0.6	0.6	0.6	0.6

Source: World Development Indicators, WB. [*] Our estimate.

Table 2: Basic Characteristics of Fiji Sample 2002-03

Variable	Obs.	Mean	Std. Dev.	Min	Max
EA annual income per capita per year (F$)	860	3,504.8	2,762.69	525.7	41,065.7
EA annual total expenditure per capita (F$)	860	2,781.3	2,172.62	584.7	37,604.9
EA household number	860	6	2.8	1	25
EA population	860	30	15.6	1	126
EA Fijian population	860	16	16.9	0	110
EA Indian population	860	13	12.6	0	104
EA other-ethnic population	860	1	4.3	0	79
EA males	860	15	8.3	0	65
EA females	860	15	7.9	0	61
EA employees	860	8	4.3	0	35
EA number of hh with male head	860	5	2.6	0	21
EA children under 15	860	4	3.3	0	18
EA old upper 55	860	5	3.9	0	22

Table 3: Determinants of vulnerability in Fiji

	log EA income per capita		log EA consumption per capita	
	expectation	variance	expectation	variance
Whether EA is urban	0.264***	0.039**	0.244***	0.061***
Whether EA is in Central	0.161***	0.045**	0.247***	0.054**
Whether EA is in Eastern	-0.049	-0.095***	-0.016	-0.054**
Whether EA is in Northern	-0.187***	0.035	-0.125***	0.054*
Average household size	-0.725***	-0.091	-0.775***	-0.103
Average household size squared	0.052***	0.005	0.058***	0.009
Prop. of hh with male head	0.244***	0.115*	0.182**	0.091
Prop. of child (<=14)	-0.381*	0.255	-0.493**	0.272
Prop. of employees	1.261***	-0.007	0.782***	0.265*
Prop. of Fijian	-0.346***	-0.117	-0.364***	-0.159
Prop. of Indian	-0.523***	-0.125	-0.523***	-0.175
Constant	9.810***	0.412**	9.880***	0.342*
Number of obs.	860	860	860	860
R-squared	0.4786	0.04755	0.4562	0.06365

Notes: * indicates the coef. is sign. at 10%, ** at 5%, *** at 1% level.

Table 4: Cross-distribution between poverty and vulnerability in Fiji

	Non-vulnerable to poverty	Vulnerable to poverty	
Overall	**74.6**	**25.4**	**100**
Non-poor	86.2	13.8	**66.2**
Poor	52.0	48.0	**33.8**

Table 5: Distributions of poverty and vulnerability in Fiji

	Share of population	Share of poor	Share of vulnerable	Poverty rate	Vulnerability rate
Overall	**100**	**100**	**100**	**33.8**	**25.4**
By areas					
Rural	43.9	68.1	88.3	52.4	51.0
Urban	56.1	31.9	11.8	19.2	5.3
By divisions					
Central	47.7	32.6	13.6	23.0	7.2
Eastern	0.6	1.3	1.3	73.0	56.1
Northern	15.2	30.5	42.9	67.6	71.5
Western	36.5	35.7	42.2	33.0	29.4
By household size					
[1,2)	0.0	0.0	0.0	0.0	0.0
[2,3)	0.8	0.0	0.0	0.0	0.0
[3,4)	8.5	3.0	0.6	11.8	1.8
[4,5)	38.8	35.8	26.0	31.2	17.0
[5,6)	35.2	41.9	47.1	40.1	33.9
6 or more	16.8	19.3	26.3	38.9	39.9

Figure 1: GDP per capita in selected Pacific island economies, 1997-2006 (*Source:* World Development Indicators, WB)
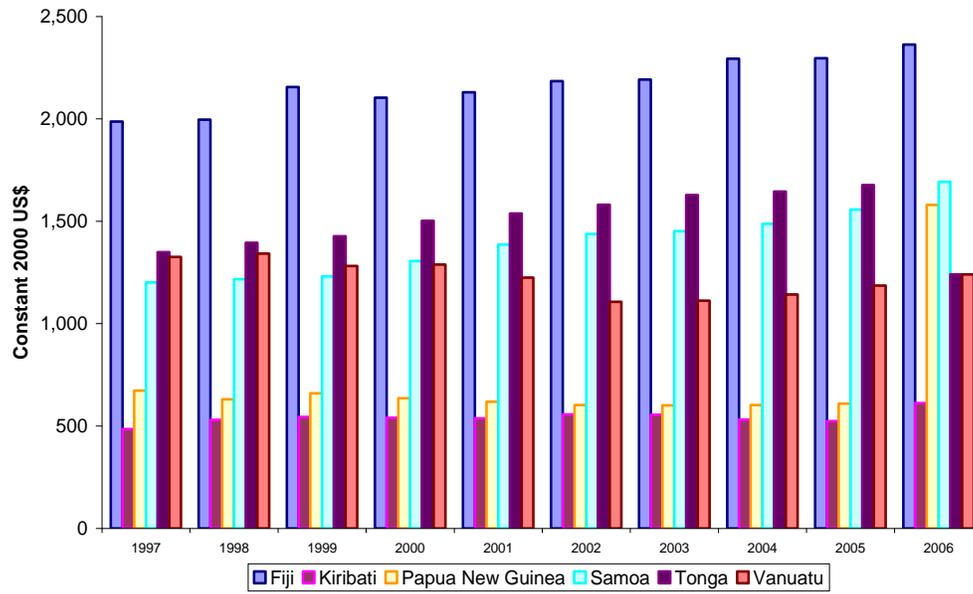
Figure 2: Rates of GDP growth in selected Pacific island economies, 1997-2006 (*Source:* World
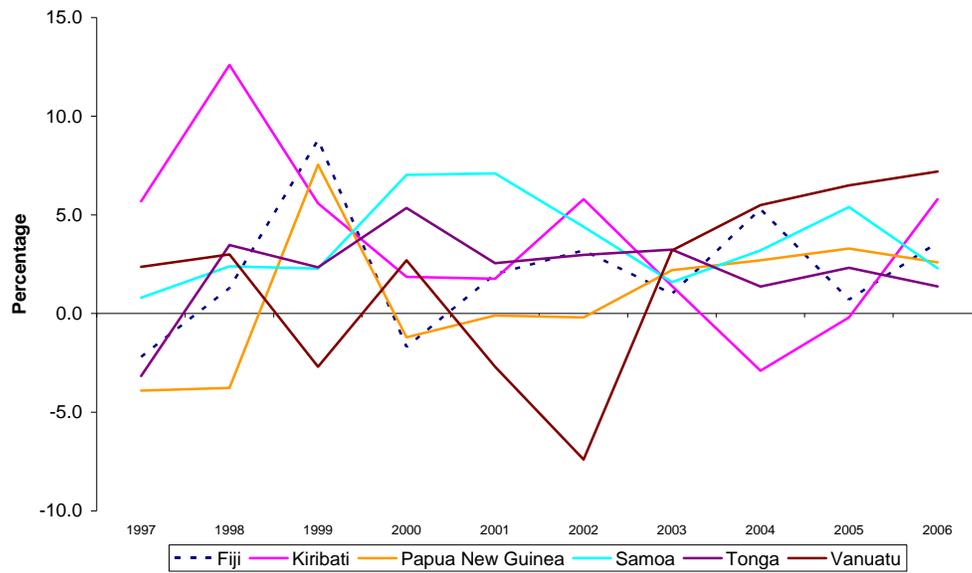
Development Indicators, WB)

Figure 3: Inflation rates in selected Pacific island economies, 1997-2006 (*Source:* World Development Indicators, WB)

Figure 4: Estimated incidences of vulnerability to poverty for poor and non-poor in Fiji
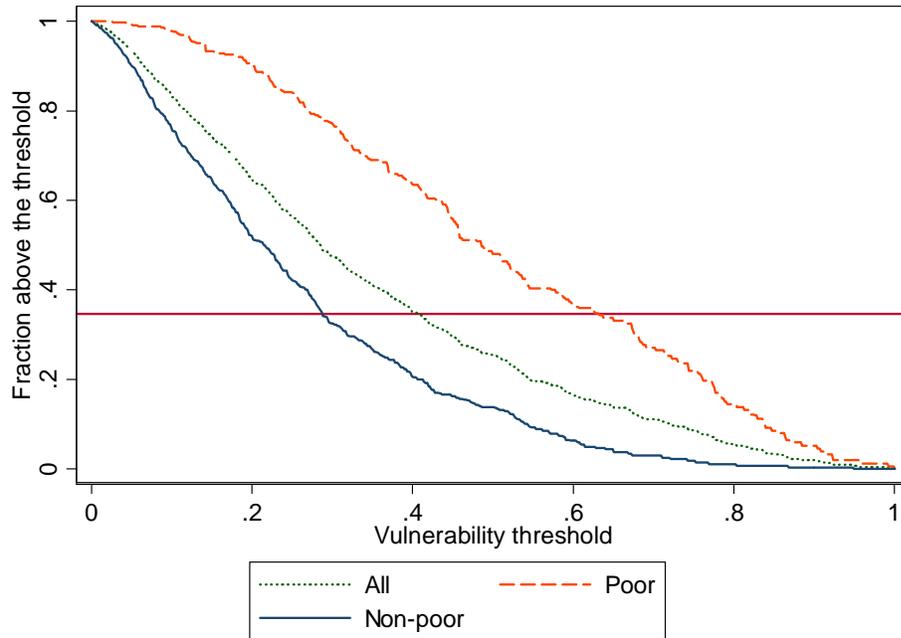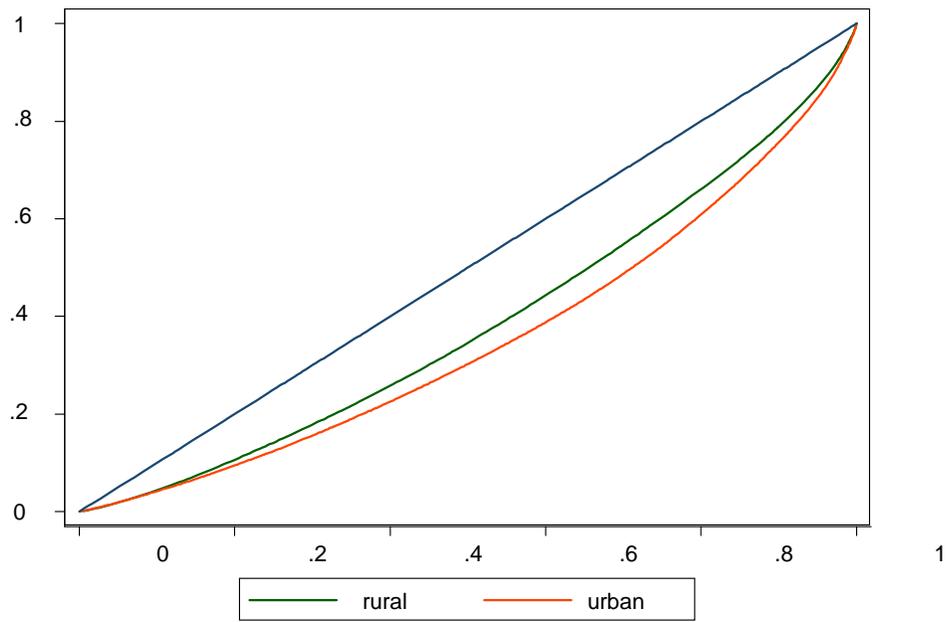
Figure 5:Lorenz income curves by area in Fiji

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