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Income Diversification in Zimbabwe:

Welfare Implications from Urban and Rural Areas

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Abstract

The paper examines, taking into account the urban-rural divides, the changes and welfare implications of income diversification in Zimbabwe following macroeconomic policy changes and droughts of the early 1990s. Data from two comparable national income, consumption and expenditure surveys in 1990/91 and 1995/96, which straddled a period of economic volatility and natural disasters, show that the percentage of households earning income from private and informal sources grew considerably while that from government and formal sources declined in the aftermath of the drought and policy changes. We find that, in general, rural households tend to have a more diversified portfolio of income compared to their urban counterparts and the degree of diversification decreases with the level of urbanization. However, there are important differences in the level of diversification within the rural and urban areas depending on wealth: While the relatively better-off households have a more diversified income base in rural areas, it is the poor who pursue multiple income sources in urban areas. A decomposition of changes in welfare indicates that the total contribution of income diversification is large and increased between 1990/91 and 1995/96 in both urban and rural areas. On the other hand, there were significant declines in returns to human and physical capital assets during the same period. The findings suggest that households with a more diversified income base are better able to withstand the unfavorable impacts of the policy and weather shocks. The fact that relatively better-off households have a more diversified income base following the shocks implies that the poor are more vulnerable to economic changes unaccompanied by well-designed safety nets.

1. Introduction

Natural and policy-induced risks such as ill health, weather shocks and economic policy changes are common facts of life for many households all over the developing world. The likely impacts of these risks are exacerbated by notoriously weak, often times nonexistent, insurance and credit markets. A number of studies that have explored risk management strategies in such settings attest that households and communities, anticipating or facing conditions of adversity, engage in various own and informal risk management strategies—some mainly risk-reducing and others simply coping devices to protect consumption once a shock has taken place (Deaton 1991; Paxson 1992; Udry 1990, 1994 and 1995; Zimmerman and Carter 1996). Such strategies typically involve maintaining a diversified portfolio of livelihood activities and social support capabilities to shelter oneself from or cope with shocks. Income diversification is one of the most common components of such strategy undertaken to manage risk and sustain a livelihood (Ellis, 1998; Reardon et al. 1992).

Zimbabwe presents a distinctive example of households experiencing conditions of risk and uncertainty and coping with adverse shocks. In the early 1990s, Zimbabwe suffered two sets of shocks. First there were the droughts of the early 1990s. The 1991/2 drought was one of the most severe in recent memory, and affected all of southern Africa (Scoones et. al. 1996). The drought of 1994/5 was less severe per se, but its effects were magnified by the earlier drought. On top of this natural shock, a policy shock was imposed. In 1991 the country began an attempt to implement an Economic and Structural Adjustment Program (ESAP). Indicators of well-being, income and non-income, fell dramatically in the 1990s (Alwang et al. 1999, 2001). The impact of these changes on the livelihood strategies of rural and urban households is largely unknown.

The objective of this paper is to examine income and activity diversification in urban and rural Zimbabwe in response to the adverse effects of the above shocks. It looks at the degree of income and activity diversification and factors influencing it ex ante and ex post the shocks, and analyzes the role of diversification on consumption patterns. We use, along with time-series rainfall data, two nationally representative household survey datasets straddling the shocks. The household data come from Zimbabwe national income, expenditure and consumption surveys in 1990/91 and 1995/96, which were conducted using similar methodologies and near-identical questionnaires.

The paper is organized as follows. Section 2 provides a brief review of the nature and impact of Zimbabwe's economic policy reform program and the droughts of early 1990s on its urban and rural households. Section 3 overviews the literature on income diversification and its role in mitigating shocks. Section 4 introduces indices for measuring income diversification that are suitable for urban-rural comparison. Data and descriptive statistics are in section 5. Section 6 presents the empirical model. Section 7 discusses the results of multivariate analysis of the determinants of income diversification and its impact on welfare ex ante and ex post shocks. Finally section 8 concludes the paper.

2. The Economic Reform Program and the Droughts in Zimbabwe

Following independence, Zimbabwe allocated a high proportion of its public expenditures to social sectors. Spending on public sectors (such as health, education, transport) as a share of total government expenditures rose from 25.7 percent in 1980/1 to 34.9 percent in 1990/91 (CSO, 1997). The expenditures on public service delivery have resulted in substantial improvement in health and education coverage. However, the increased spending program has led to a growing imbalance between central government expenditures and revenues, which compromised the sustainability of the program. In order to stave off the impending inflationary and overcrowding effects of the fiscal deficits, Zimbabwe began implementing Economic Structural Adjustment Program (ESAP) in 1991.

The ESAP in Zimbabwe, like in other countries, involved a series of planned macroeconomic actions, including reductions in public spending, deregulation of the domestic economy, and less restrictive trade policies aimed at promoting sustainable economic growth. The program included cost recovery measures in education and health, as these sectors formed the core of the government's increased spending program. ESAP also involved removal of subsidies on food items and reform of trade and exchange rate policies. Concerns have been raised over the social costs of ESAP particularly for vulnerable groups, such as the poor (Renfew 1992; Gibbon 1995). The poor were disproportionately hurt by the short-run financial volatility and economic downturns that arise due to fiscal austerity and openness to global market forces, particularly in countries such as Zimbabwe whose social and market institutions are weak to begin with.[1]

For Zimbabwe, the implementation of ESAP was complicated by the droughts of the early 1990s. All provinces of Zimbabwe experienced below-average rainfall during the 1991/2 agricultural year, especially during the critical months of October and November when soil moisture is needed for seed germination. High dependency on rainfall made the agricultural sector and the entire economy highly vulnerable to the drought.[2] The drought of 1991/2 affected the entire economy, and real GDP per capita shrank by almost 12 percent in that year (CSO 1998a). It reduced domestic food production and lowered real incomes throughout the country. For instance, maize yield on all farms fell to about 1/3 of its normal levels, and agriculture's share of total production fell from about 14 percent to below 7 percent (CSO 1998a). The country was again hit with a less severe drought in 1994/5, which was more localized in the eastern part of the country and had a major impact on agricultural yields, particularly for rainfall-

[1] While the implementation of some of structural policy prescriptions such as removal of governmental inefficiencies could be beneficial in the medium to long run, policy reversals and failure to implement policy changes may have been harmful and actually worsened the conditions for the poor. This is particularly true in present Zimbabwe. For instance, the high level inflation and devaluation in 1997 stemmed from failure to control the deficit and to sell off parastatals. The poor may be hurt by the downturn and volatility but it is debatable that ESAP is to blame for such government policy failures.

[2] Although the contribution of agriculture to Zimbabwe's GNP is relatively lower compared to other sub-Saharan countries, this sector provides employment and livelihood for approximately 70 percent of the population and provides raw materials for the majority of the country's manufactured goods and exports. Even in urban areas, many households rely on food from nearby gardens and goods remitted from rural households; these informal contributions of agriculture go largely unaccounted in national accounts. (See CSO (Central Statistical Office) 1997, 1998a, 1998b; Alwang et al. 1999, 2000)

dependent crops such as maize.[3] The droughts lowered the asset base as many households sold their asset holdings in order to survive. The impact of the weather shocks, along with that associated with ESAP, was felt throughout the country.

Many of the ESAP reforms were not implemented as planned due to the droughts, which necessitated increased public spending. The economy failed to exhibit growth in the early 1990s, and the separate effects of droughts and ESAP are difficult to disentangle. The ESAP had negative effects on the poor in that prices rose due to removal of subsidies, and unemployment rose as public-sector employment fell due to retrenchments (Marquette 1997). It had a direct and immediate impact on the urban poor households, as their livelihood mainly depends on wage income and market purchase of consumption goods. Countrywide studies by Alwang et al. (2001) and others show that poverty has increased in Zimbabwe between 1990 and 1996. The prevalence, depth and severity of poverty have increased substantially. The data indicate that between the 1990 and 1995 survey periods mean real per adult equivalent consumption expenditures declined by about 29 percent and the median fell by 24 percent (table 6). Households in urban areas were hardest hit by these declines. The impact of these changes on the livelihood strategies of the poor is largely unknown.

3. Income Diversification as a Risk Management Strategy

Few households in developing countries derive the bulk of their income from a single source. The literature on livelihood sustainability under conditions of economic uncertainty concludes that most households avoid an extended period of dependence on only one or two sources of income (Reardon 1997; Bryceson 1999; Ellis 2000; Toulmin et al. 2000). Evidence abound which suggests that income diversification is a key way of ex ante risk management or ex post coping with shocks (Rosenzweig and Binswanger 1993; Reardon et al. 1992; Bryceson 1996 & 1999; Delgado and Siamwalla 1999; Barrett et al. 2001a). There are, in fact, several factors responsible for observed income diversification at the household level. These include: (a) self-insurance against risk in the context of missing insurance and credit markets (e.g. Kinsey et al. 1998), (b) an ex-post coping strategy (e.g. Reardon et al. 1992), with extra individuals and extra jobs taken on to stem the decline in income, (c) an inability to specialize due to incomplete input markets, (d) a way of diversifying consumption in areas with incomplete output markets, (e) to exploit strategic complementarities and positive interactions between activities, and (f) simple aggregation effects where the returns to assets vary by individual or across time and space (Barrett et al. 2001b).

In rural areas of developing countries, diversification into non-farm income sources is growing over time and now accounts for a considerable share of household income. In an extensive analysis of household surveys from 1970s through the 1990s, Readon et al. (1998) find an average non-farm income share of 42% in Africa, followed by 40% in Latin America and 32% in Asia. Many studies in rural Africa find positive association between non-farm diversification and household welfare. On the basis of these findings, recommendations such as the promotion of off-farm employment in rural areas as a policy tool have gained widespread support by

[3] But, coming on the heels of the earlier drought, it may have increased hardship, especially among the vulnerable groups in drought-prone areas.

development agencies including the World Bank and non-governmental organizations (NGOs) (Delgado and Siamwalla 1999).

On income diversification, the most relevant studies for Zimbabwe are those by Piesse et al. (1998) and by Kinsey et al. (1998). Piesse et al. (1998) find that in remote areas, non-farm income sources increase income inequality but in areas better connected to the large urban market of Harare, that it decreases income inequality. They suggest that in rural areas less well connected to urban centers, the agrarian power structures allow those with higher farm incomes to better exploit non-farm income sources. With better access to urban markets, they suggest that opportunities for non-farm employment are less dependent on these power structures and are therefore more equalizing of income. Kinsey et al. (1998) examine 400 resettled households in rural Zimbabwe over a 13 year period and find that income diversification is a coping strategy used during times of drought, but that the income sources that can be tapped are likely to be low-return activities such as day jobs or agricultural piecework.

The existing empirical studies on income diversification have several limitations. There is little focus on the role of income diversification under urban settings, despite the fact that urban households face some of the same risks as their rural counterparts such as varying returns to labor, market failures and the risks of structural adjustment. Most current empirical work on rural income diversification uses the non-farm income share in the total income as a measure of diversification. This approach has some shortcoming, including the fact that it does not account for heterogeneity in the non-farm income sources. Finally, there is little or no work comparing income diversification patterns before and after economic shocks. This study attempts to extend the empirics on income diversification to fill these gaps.

4. Measuring Income Diversification

Attempts to quantify income diversification, so far mostly available for rural areas, have focused mainly on estimation of non-farm income share in the total household income (e.g. Block and Webb 2001; Barrett and Webb 2001; Lanjouw et al. 2001). The assumption in these studies is that higher share of non-farm income amounts to higher income diversification and less vulnerability to weather related shocks, a major risk factor in rural areas where agriculture is the mainstay of livelihood. Some important difficulties are associated with the use of non-farm income share as a measure of diversification. For instance, non-farm income share as a proxy indicator for income diversification gives equal risk-mitigation weight to households deriving a given percent of non-farm income, for instance, from 1 versus 3 sources or 1 versus 3 income generating household members. We argue that different sources of income exhibit varying degree of liquidity and vulnerability to risk; the same amount non-farm income from a single source and multiple sources will have different implications for household risk management. Non-farm income share also has less relevance in urban areas where most income sources tend to be non-farm.

This paper proposes a richer measure of income diversity based on a more disaggregated classification of income sources beyond the simple farm and non-farm categorization. Our diversification index incorporates the number of different income sources (N) and income

generating members (M) available to a given household. The rationale to incorporate N is based on the idea that households' desire to pursue more than one source of income (N>1) may arise from concerns to risk emanating, for instance, from macroeconomic policies that may result in job losses due shrinkage of the public sector employment. Likewise households may prefer to depend on more than one income earners (M>1) to manage idiosyncratic risks such as sickness of a gainfully employed family member. The number of income sources and income earners combinations (denoted G) in a given household is the total number of non-empty cells as illustrated in Table 1.[4] A household in Table 1, for instance, has N = 4 , M = 3 and G = 5. A diversification measure based on G, which accounts for different income sources and income earners, addresses some of the shortcoming inherent in non-farm income share. It also allows studying of income diversification behavior in urban areas, thus facilitating urban-rural comparison. In the following, we develop a diversification measure based on relative contributions to the total household income of the G income source-earner combinations.

Various measures of concentration and diversity are available particularly in the industry literature.[5] The most commonly used diversity indices are some special cases of the following form (Hannah and Kay 1977):

$$D = \left[\sum_{i-1}^{G} S_g^{\alpha} \right]^{1/(1-\alpha)} \qquad (1)$$

Where D is the diversity index, S_g is the share of the g^{th} income source (i.e., $S_g = \frac{Y_g}{Y}$, $g = 1, 2, 3 \ldots G$), Y_g is total income from source g, $Y = \sum_g Y_g$ is total household income from all sources. α is the diversity parameter, such that $\alpha \geq 0$ and $\alpha \neq 1$. For $\alpha = 2$, the index becomes $1/\sum S_g^2$ or the inverse of the Herfindahl-Index that is commonly used to measure industry concentration (Hanson and Simons 1995). As α approaches 1, the index becomes the Entropy-Index, which is calculated as $-\sum S_i \log S_i$, where *log* is the natural logarithm (Tauer 1992).

The general index measures both the number of income sources and the evenness of income shares across different income source-earner combinations, with the parameter α determining the weight of number of source-earner combinations versus evenness in the distribution of income shares. The higher the α value, the greater the emphasis on the distribution, while a parameter value of $\alpha = 0$ simply counts the number of income source-earner combinations. The upper limit value of the index for any α value is the number of income source-earner combinations, and the

[4] The incorporation of the number of earners (M) in the income diversity index may be criticized on the basis of the argument that a household with more economically active adults will, all things being equal, be more likely to have more income sources. This may reflect household labor supply decisions as much as a desire for diversification. We address this concern by including the number of household members in different age, sex and education categories as explanatory variables in our empirical estimation.

[5] See Patil and Taillie (1982) for detailed discussions on various diversity measures and their properties.

lowest limit is 1. The lower value occurs when a given household has only one source of income ($S_g = 1$ and $S_j = 0$ for all $j \neq g$), and the upper value occurs only if the shares are equal, i.e., the distribution is even across all income source-earner combinations ($S_g = S_j$ for all g and j). In this study, the inverse of Herfindahl-Index is used to measure income diversification by taking $\alpha = 2$. However, the results were also tested with alternative α values.

5. Data and Descriptive Statistics

We use two comparable household level data from the national Income, Consumption, and Expenditure Surveys (ICES) in 1990/91 and 1995/96[6], and a time series rainfall data (1951-1996) from 113 representative weather stations located throughout Zimbabwe. The Central Statistical Office of Zimbabwe administered the surveys. The ICES were based on representative samples comprising both urban and rural sectors of the country (table 1). They contain data on socio-demographic characteristics, incomes from various sources, consumption and other expenditures on a weekly basis, and for some durable and semi-durable items, on a monthly or yearly basis. Each selected household was monitored for a complete month, during which household consumption expenditures were recorded in a daily record book. From the 1990/91 round, about 14,168 observations were obtained following data cleaning. For 1995/96, we have 17,527 observations from a total of 395 enumeration areas. Table 1 presents the composition and geographic distribution of sampled households for both years.

The consumption portions of the questionnaires for the two surveys are virtually identical and permit construction of a consistent measure of consumption expenditures. Our welfare measure, the consumption expenditures, includes the value of all goods and services that are consumed in the previous month. We use a poverty-specific price deflator to adjust the per capita consumption expenditures. Raw prices from regional markets, used to create the national CPI, were obtained from CSO. The prices of the 23 items used to create the Zimbabwean food poverty line (see CSO, 1998b) were weighted using the food poverty line weights. The resulting index was used as an implicit deflator, with June 1990 Zimbabwean dollars in Harare as the base. This index reflects changes in costs of obtaining goods and services faced by the poorest consumers, and varies by survey month and province.

A time-series rainfall information comes from 113 representative weather stations throughout Zimbabwe from 1951 through 1996. The data were obtained from the Meteorological Office of Zimbabwe. Season- and region-specific rainfall variables were created using these data. Three basic rainfall variables representing different cropping seasons to account for seasonal variations in observed rainfall were used: Planting season rainfall variable measures the average rain during September and October months; weeding season variable accounts for rain during November-January and runs through weeding and growing season; and harvest season rainfall variable

[6] The 1995/6 ICES has a slightly expanded set of questions on a few items and a slightly less disaggregated questions on a few others. For our purposes, these differences create very little complication. We have accounted for those differences by establishing a similar set of variables in order to maintain the comparability between the results of 1990/91 and 1995/6. Although the sampling designs of both surveys were quite similar and representative of the different segments of the population, it was not possible to construct a panel structure.

measures average rainfall during February-April and covers the harvest.[7] Transitory rainfall variables are measured as standard deviations of actual rainfall in region j at time t from its regional mean.[8]

Descriptive Statistics

We divide household income sources into four categories: formal wage employment income, informal wage employment income[9], self-employment income, and non-labour income (table 2). Household members could be self-employed in agriculture or own business enterprises. For the Zimbabwe data, property and transfer and remittance incomes constitute the non-labour income category. Tables 3-5 present the percent distributions of households according to the number of income sources (N), number of income earners (M) and total number of income source-earner combinations (G). Not all households derive income from each of the four sources listed in table 2, although most households have at least 2 income sources (table 2). A few of the changes in these contributions between 1990/91 and 1995/96 are worth noting. First, there is a greater reliance on informal sources of income in both urban and rural areas. Reliance on government and parastatal incomes declined. In urban areas, private (formal and informal) income sources increased in importance, while public (government and parastatal) income sources declined. This probably reflects the retrenchment component of economic adjustment. Agriculture declines in importance in rural areas, reflecting the drought and the reduced food demand from urban areas. The importance of non-farm income sources such as informal wage employment increased in rural areas. Meanwhile, in urban areas, the contribution of incomes from urban agriculture (mainly from fruit and vegetable production) increased.

There are marked differences in livelihood strategy in urban and rural areas. The rural areas have a more diversified income base, with less than 17% depending on a single income source at either time period (table 2) while about 38% of urban households depend on a single income source. Using the income classification on table 2, in 1990/91 (1995/96) 73% (58%) of rural households had 3 or more income sources. In urban areas, 1990/91 (1995/96) saw 31% (27%) of households with at least 3 income sources. While all areas saw less diversified portfolio following the shocks, the rural areas got hit harder in terms of reduction in number of income sources.

The descriptive statistics on table 6 do not indicate significant changes in demographic and educational variables before and after the shocks, although educational attainments are generally higher in urban areas. Household size showed slight downward growth. The percentage of households receiving non-labor income such as remittances and transfers decreased in both urban and rural areas. This is perhaps indicative of the fact that even the traditional sources of

[7] The cropping seasons are approximate; planting can take place as late as November and harvesting can come late in May. The information on seasons was obtained from crop calendars of Food and Agriculture Organization (FAO).

[8] The regional mean is computed over all years except the current year, to eliminate biases in the measure of the deviation from the mean for those regions with shorter time-series.

[9] It is difficult to make a clear distinction between formal and informal activities in developing countries. For the purpose of this paper, formal refers to economic activities that are registered and licensed by the government while informal ones do not possess one or both of these characteristics.

remittances were affected by the shocks, suggesting their widespread impact. During the same time period, the fraction of households depending on informal income sources increased. Overall, household monthly consumption expenditures took strong downward hit and the reduction was highest among the urban households.

6. Empirical Approach

Income diversification affects consumption stability and the overall welfare of households. The level and the type of income diversification depend on the accessibility and availability of different income sources and the type risk households are responding to, which may in turn depend on household's geographic location, access to factor and labor markets, human and social capital, and recurring policy changes. Empirical studies show that educational attainment and infrastructure access are strong determinants of diversification (Barrett, et al., 2001a, 2001b; Block and Webb, 2001). In this section, we empirically investigate the impact of income diversification on household welfare. At the same time, we also examine the determinants of income diversification taking into account several household characteristics variables.

Let D_{jt} be a measure of income diversification for a household in region j (rural, urban) and at time period t (1990/91, 1995/96). A model that contemporaneously determines income diversification and per capita consumption (C_{jt}) as a function of explanatory variables X_{jt}, and Z_{jt} can be given as:

$$C_{jt} = D_{jt}\pi_t + X_{jt}\theta_t + v_{jt} \qquad (3)$$

$$D_{jt} = X_{jt}\alpha_t + Z_{jt}\beta_t + u_{jt} \qquad (4)$$

where X_{jt} is a vector of explanatory variables common to both (3) and (4); Z_{jt} contains those variables that affect income diversification but affect per capita consumption only indirectly through their effect on income diversification (e.g. transitory income factors). The vector X_{jt} includes household demographic variables in age, sex and education classes as well as asset holding. We include regional dummy variables in estimating (3) and (4) in order to account for regional differences in income generation that may affect income diversification as well as the level of consumption expenditures. The explanatory variables are either directly obtained from the Zimbabwe Income, Consumption, and Expenditure Surveys (ICES) of 1990/91 and 1995/96 or derived from it with the exception of the rainfall variables. In order to facilitate comparison of the estimates obtained, the construction of the dependent variables is identical and similar sets of explanatory variables are used for both 1990/91 and after 1995/96 households.

Since the above system of equations is endogenous, we estimate the parameters by using instrumental variables approach. A two-stage least squares (2SLS) instrumental variables regression can be used to produce consistent estimates if the system is properly identified (Davidson and Mackinnon, 1993). Two seasonal (planting and harvesting) rainfall variables with a lag are used as identifying instruments for income diversification. These variables are standard deviations of seasonal rainfall by a year on the grounds that more variable rainfall would lead to

a more variable income for both rural and urban households.[10] We assume that seasonal rainfall variation produces shocks to income through its effect on income diversification and transitory income variability, but has no direct effect on current per capita consumption.[11]

7. Results

Before discussing the results, we address the econometric specification issues. Since income diversification could be a choice variable, we test if it suffers from endogeneity problems when estimating household welfare. As suspected, the test result reported in table 12 strongly rejects that hypothesis that S is exogenous in the structural equation (4). A common econometric fix for endogeneity concerns is to use instrumental variables estimation such as a two-stage least squares regression (2SLS). 2SLS presupposes that appropriate instruments exist, i.e., the instruments are relevant in the sense that they are correlated with suspected endogenous variable and uncorrelated with error term in the structural equation.

Table 12 presents several specification tests for the instrumental variables approach. The relevance test (Bound et al., 1995), which tests the hypothesis that the coefficients on these instruments in the first stage regressions are jointly zero are soundly rejected (the F statistic meets the rule of thumb threshold of 10 established in Bound et al. (1995)). The instruments also satisfy the over-identification test proposed by Davidson and MacKinnon (1993) on the joint hypothesis that the instruments are uncorrelated with the error term and that the second stage regression is correctly specified. The standard Durban-Hausman-Wu test also shows that OLS estimates are inconsistent in all cases, justifying the use of an instrumental variables approach.

Tables 7a & b present instrumental variables (IV) estimates of per capita consumption expenditures for rural areas. We also report the accompanying OLS estimates of income diversification. Tables 9a & b contain the corresponding results for urban areas. Table 8 presents the estimates of obtained by using non-farm income share (NF) as a measure of diversification for rural areas. The results of tables 7a & b and 8 are used to compare the estimates obtained by using our measures of income diversification against those obtained by using NF.

Determinants of Income Diversification

[10] Extension of rainfall variables as instruments to urban areas assumes strong urban-rural linkages in developing countries such as Zimbabwe through food markets and other factors (see, for instance, Ravallion and Datt, 1996 on India). In order to make the rainfall variables better instruments we use national average rainfall information for major urban areas instead of regional rainfall figures. Our empirical results (not reported, but available upon request) indicate that rainfall variability indeed significantly affects welfare in urban Zimbabwe, both before and after economic changes.

[11] This is in line with permanent income hypothesis. See Paxson (1992) who, in studying the savings behavior of Thai farm households, makes a similar assumption and uses time-series information on regional rainfall in conjunction with cross-sectional data on farm household income to obtain estimates of components of household income attributed to rainfall shocks. Alderman (1996) applies a similar technique to Pakistani households. We test the validity of our instruments (see table 10).

Before exploring the role of income diversification on welfare, this section assesses the determinants of income diversification in urban and rural areas. The level and the type of income diversification strategy may depend on the access to and availability of different income generating activities, which may in turn depend on a household's geographic location, access to factor markets, human and social capital, and recurring policy changes. The first columns on Tables 7 through 9 present the regression results of the different income diversification indices as functions of (1) household demographic variables such as headship, head education and age, and other household members in age/sex/education groups; (2) household asset ownership variable to capture the wealth effect; (3) regional variables such provincial indicators for the rural sub-sample; (4) a measure of rainfall variability to capture household response to income risk originating from weather shocks.[12] We expect that rainfall variability to have a positive association with income diversification.

Column (1) on tables 7a and 7b indicates the number of income sources is positively associated with household asset ownership in rural areas, while in urban areas it is either negatively associated or insignificant. This finding suggests that it easier for the asset rich to diversify in rural areas while the poorer pursue multiple income sources in urban areas. The urban rich tend to have a more stable jobs or businesses compared to the poor. On the other hand, the rich in the rural areas have greater access to a diversified portfolio, while the rural poor might face entry barriers or lack the necessary resources or credits to pursue multiple income sources. It is interesting to note that following the structural and weather shocks, the urban rich had a higher rate of diversification than they did before.

The number of income sources are directly associated with household head sex and the number of adult household members in rural areas. On the other hand, income diversification is negatively associated with household head sex. Unlike in rural areas, female-headed households tend to have more income sources in urban areas. Higher rainfall diversification leads to pursuit of multiple income sources as would be expected since diversification may be pursued in response to risk such as income variance. Positive association between rainfall variability and income diversification may imply that the latter may have been used as a risk management strategy. Finally, access to credit appears to improve conditions for diversification in rural areas, but not so in urban areas. The rural finding underscores the possibility that credit constraints prevent households from engaging in lucrative diversification options in rural areas. However, in urban areas following the shocks access to credit had negative effect on diversification, suggesting access to credit market could be a substitute for diversification. Recall that income diversification serves as mainly risk coping strategy in urban areas.

Welfare and Income Diversification in Rural Areas

The results using S (table 7a) and D (table 7b) are quite similar, lending support for use of the number of income sources as a measure of diversification. D is the most appropriate measure of diversification as it incorporates information in the number of income sources as well as the relative shares of each income source. However, it requires complete accounting of all income

[12] In Africa, where most of the poor reside in rural areas and rely, at least partially, on agricultural activities for their livelihoods, climatic conditions can have a major impact on economic well-being and production decisions.

sources, similar to non-farm income share in rural areas. The advantage of D and S over NF is that they allow urban-rural comparisons. S has added advantage in that it is easier to measure. The number of income sources is based on much smaller set of information. Since the results using S is comparable to those obtained by using D and NF, our discussions are mainly based on S for the remainder of the section.

Table 7a column (2) indicates that income diversification has a significant positive impact on per capita consumption both before and after the shocks. Following the shocks, its role on consumption has increased in magnitude (see table 7a columns (2) and (5) and Chow test in table 10). The OLS estimate significantly underestimates the role of income diversification on per capita consumption, although the coefficient on S remained significant both before and after the shocks (see table 7a columns (2) and (5)). Other variables have expected signs and significance on per capita consumption. Household head education, asset ownership and the proportion of educated adults in the household are directly correlated with per capita consumption. However, returns on these variables and other assets appear reduced following the shocks.

Table 8 is presented to examine the commonality of the results obtained by using number of income sources versus the commonly used non-farm income share for rural areas. We do this by comparing their impact on per capita consumption and their responsiveness, as measures of risk management and coping strategies, to factors such as income variability. The two results are comparable in terms of explanatory power and their positive effect on consumption. Similar to S, the effect on welfare of NF increases following the shocks. Rainfall variability leads to higher diversification in terms of non-farm income share as was observed for S. Therefore, to the extent that rural households use income diversification to manage income risk or cope with it, it appears S is at least as good a measure of diversification as NF.

Welfare and Income Diversification in Urban Areas

Tables 9a & b present the results obtained using S and D, respectively. Similar to the rural areas, the results based on number of income sources (S) and income diversification index (D) in equation (2) are quite comparable.[13]

The role of income diversification in urban areas is markedly different from that in rural, especially before the economic shocks. Unlike rural areas, consumption expenditures per capita is negatively associated with the number of income sources in urban areas, implying multiple income sources are primarily practiced among the poor. The urban poor commonly engage in temporary, seasonal and informal sector jobs. Their income sources are unstable, making them more vulnerability to risky factors such as rainfall variability and policy changes. Thus it is not surprising to find that the poor and female-headed households in urban areas depend more on multiple income sources.

In sum, our findings are comparable to those by Piesse et al. (1998) in that it is easier for better off households to diversify in rural areas and that the poorer households diversify more in urban areas. However, our results for 1995/96 show that even the urban rich are not immune to shocks. While the poor commonly pursue multiple income sources in urban areas, it is interesting to note that the urban rich also engage in the pursuit of multiple income sources when faced with shocks. Note that the policy changes have led to significant shrinkage in formal wage

[13] Unlike for the rural sample, the coefficients on income diversification when using S and D are somewhat different in urban areas. But the general trends and directions of effect are quite the same.

employment, which was and remains to be the single most important source of livelihood in urban Zimbabwe.

Parameter Stability Tests

This section investigates if changes in parameter space following the shocks that we observed on tables 7 through 9 are indeed statistically significant and their implications for policy. The Chow test is the most common one used for testing structural changes. But the assumption of equal variance for error terms in both periods is crucial for its validity. Such an assumption fails for the Zimbabwe ICES and thus variance correction steps are needed before implementing the Chow test.[14]

Table 10 presents the results of parameter stability test using the Chow test. Structural parameter stability test indicates significant shift in coefficients following the economic shocks. Specifically we observe significant declines in returns to human capital and physical assets in rural areas. On the other hand, returns to income diversification were significantly higher following the shocks. The role of boys and girls in welfare generation increased following the shocks, particularly in rural areas. This may suggest that more children are involved in income generating activities during economic crisis. In addition to highlighting the importance of income diversification as a risk coping strategy, this finding also has implications, among other things, on the empirical validity of poverty targeting and mappings techniques that combine survey and census data collected at different points in time (see, for instance, Hentschel, et al., 2000).

Decomposition of Household Welfare Changes

The rural and urban results discussed above show that income diversification had significant impact in weathering away some of the negative effects of the economic shocks that hit Zimbabwe in the early 1990s. Given that there were changes in other structural variables and the Chow test on Table 10 also showed significant changes in the parameter estimates, it would be useful to decompose the impacts of explanatory variables on the changes in household welfare.

Denote the means of the dependent variable (log of real per capita consumption) and the explanatory variables for time t as $\bar{y}_t$ and $\bar{x}_t$, respectively. Denoting b_t as a corresponding vector of parameter estimates, one can obtain:

$$\bar{y}_{1990} = b_{1990}' . \bar{x}_{1990} \quad (5)$$

$$\bar{y}_{1995} = b_{1995}' . \bar{x}_{1995} \quad (6)$$

$$\bar{y}_{1995} - \bar{y}_{1990} = b_{1995}' \bar{x}_{1995} - b_{1990}' \bar{x}_{1990} \Leftrightarrow$$

$$\bar{y}_{1995} - \bar{y}_{1990} = (\bar{x}_{1995} - \bar{x}_{1990})' . b_{1995} + (b_{1995} - b_{1990}) . \bar{x}_{1990}' \quad (7)$$

[Total change] [Due changes in level] [Due changes in return]

[14] A simple variance adjustment procedure was used before implementing the Chow test. The procedure is not reported to save space and is available upon request.

Equation (7) shows that the mean changes in per capita consumption from 1990/91 to 1995/96 equals the changes in the level of explanatory variables multiplied by their return in 1995/96 plus changes in returns to these variables multiplied by their level in 1990/91.

Table 11 reports the results of this decomposition. In both urban and rural areas, the decomposition exercise clearly shows that changes in welfare due both the changes in level of and return to income diversification are positive. However, the total contribution of income diversification to changes in household welfare is larger for urban areas (0.92) than for rural areas (0.44). The effects of S on consumption levels are larger from the change in returns to 1990/91 levels than from changes in levels from 1990/91 to 1995/96. On the other hand, total contributions to changes in welfare of changes in return to other variables (such as head sex and education, household size, and physical asset holding) are negative.

8. Summary and Conclusion

In the early 1990s, Zimbabwe suffered two sets of shocks. The first was a policy shock associated with the economic structural adjustment program (ESAP). The second involved the droughts of the early 1990s. Indicators of well-being for both rural and urban households dramatically fell as a result. This study looked at the role of income diversification in household's ability to weather some of the adverse effects of these shocks. It analyzed changes in income diversification behavior before and after the droughts and economic adjustment policies of the early 1990s. We used two national surveys, the Income Consumption and Expenditure Surveys of 1990/91 and 1995/96 that straddle the shocks.

Before the shocks, per capita consumption expenditures varied positively (negatively) with the degree of income diversification for rural (urban) households, implying that multiple income sources are mainly pursued by the poor in urban areas and by the rich in rural areas. This suggests the rich have better access to pursue multiple income sources in rural areas. The urban poor commonly engage in temporary, seasonal and informal sector jobs, and they are thus subject to more vulnerability due to risk factors such as rainfall and policy changes. In general, the results suggest different motives for diversification in urban and rural areas. While in urban areas diversification is driven more by survival than wealth accumulation motives, in rural areas diversification serves as a means of both wealth accumulation as well as shock protection.

Following the shocks, there were marked differences with regard to the role of income diversification on welfare as well as the factors affecting diversification, especially in the urban setting. Income diversification is positively and significantly associated with per capita consumption expenditures in both urban and rural areas. In fact, the role of income diversification on consumption has significantly increased in both urban and rural areas. While in general the poor are more associated with multiple income sources than the rich in urban areas, the urban rich also engage in income diversification as a coping strategy when faced with shocks.

These results have important policy implications. The decomposition of changes in welfare shows that the total contributions of income diversification are large and positive in both urban and rural areas. The structural stability tests indicate a significant shift in parameters after the economic shocks: a significant increase in returns to income diversification and a decrease in returns to most other asset variables. The findings suggest that households with a more diversified income base are better equipped to withstand the unfavorable welfare impacts of financial and weather shocks. The fact that better-off households in both urban and rural areas

have a more diversified income base following the shocks implies that the poor are more vulnerable to economic shocks. These findings thus strengthen the need for the public provision of well-designed safety nets before implementing significant policy changes.

References

Alderman, H. 1996. "Saving and economic shocks in rural Pakistan", *Journal of Development Economics*, 51:343-65.

Alwang, J., B. Mills and N. Taruvinga. 1999. "Changes in well-being in Zimbabwe: Non-parameteric evidence", Poverty Reduction and Social Development Africa Region, The World Bank, processed.

Alwang, J. 2000. "Structural adjustment, drought and poverty in Zimbabwe: Changes in the 1990s", Poverty Reduction and Social Development Africa Region, The World Bank, mimeo.

Alwang, J., L. Ersado, and N. Taruvinga. 2001. "Changes in poverty in Zimbabwe between 1990 and 1996: Worsening outcomes under adverse conditions", *Development South Africa*, 18(5):553-79.

Barrett, C.B., T. Reardon and P. Webb. 2001a. "Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications", *Food Policy* 26(4):315-32.

Barrett, C.B., M. Bezunh and A. Aboud. 2001b. "Income Diversification, Poverty Traps and Policy Shocks in Cote d'Ivoire and Kenya", *Food Policy* 26(4):367-84

Block, S. and P. Webb. 2001. "The dynamics of livelihood diversification in post-famine Ethiopia", *Food Policy* 26(4):333-50.

Binswanger, H. and J. McIntire. 1987. "Behavioral and material determinants of production relations in land-abundant tropical agriculture", *Economic Development and Culture Change*, 36(1):73-99.

Bound, J., D. A. Jaeger, and R. M. Baker. 1995. "Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak", *Journal of the American Statistical Association*, 90(430):443-50.

Bromley, D.W., and J. P. Chavas.1989. "On risk, transactions and economic development in the semiarid tropics", *Economic Development and Cultural Change*, 37(4):719-36.

Bryceson, D.1996. "Deagrarianization and rural development in Sub-saharan Africa: A sectoral perspective", *World Development*, 24(1):97-111.

Bryceson, D.1999. "African rural labor, income diversification and livelihood approaches: a long-term development perspective", *Review of African Political Economy* 26(80):171-89.

CSA (Central Statistical Office). 1997. *National Accounts 1985-1996.* Harare: Government Printing Office.

CSA (Central Statistical Office). 1998a. *Report on the ICES*. Harare: Government Printing Office.

CSA (Central Statistical Office). 1998b. *Poverty in Zimbabwe*. Harare: Government Printing Office.

Coate, S. and M. Ravallion.1993. "Reciprocity without commitment: characterization and performance informal insurance arrangements", *Journal of Development Economics*, (40):1-24.

Davidson, R. and D. MacKinnon.1993. *Estimation and Inference in Econometrics*. New York: Oxford University Press.
Deaton, A. 1991. "Saving and liquidity constraints", *Econometrica*, 59(5):1221-48.
Delgado, C. and L. Siamwalla. 1999. "Rural economy and farm diversification developing countries" In: Peters, G.H., J. von Braun (eds.), Food Security, Diversification and Resource management, Refocusing the Role of Agriculture, International Associations of Agricultural Economists, Ashgate, P. 126-43.
Ellis, F. 1998. "Household strategies and rural livelihood diversification", *Journal of Development Studies*, 35(1):1-38.
Ellis, F. 2000. *Rural livelihood and diversity in developing countries*, Oxford University Press.
Ersado, L., H. Alderman and J. Alwang. 2003. "Changes in consumption and savings behavior before and after economic shocks: Evidence from Zimbabwe", *Economic Development and Culture Change*, forthcoming.
Fafchamps, M., C. Udry and K. Czukas. 1998. " Drought and saving in West Africa: are livestock a buffer stock?", *Journal of Development Economics* 55 (2):273-305.
Hentschel, J., J. O. Lanjouw, P. Lanjouw, and J. Poggi. 2000. " Combining census and survey data to trace the spatial dimensions of poverty: A case study of Ecuador", *The World Bank Economic Review*, 4(1):147–65.
Gibbon, P. 1995. *Structural adjustment and the working poor in Zimbabwe*. Nordiska Afrikainstitutet, Uppsala, Sweden.
Kinsey, B., K. Burger and J.W. Gunning. 1998. "Coping with Drought in Zimbabwe. Survey Evidence on Responses of Rural Households to Risk", *World Development*, 26(1): 89-110.
Lanjouw, P., J. Quizon and R. Sparrow. 2001. "Non-agricultural earnings in peri-urban areas of Tanzania: evidence from household survey data", *Food Policy* 26(4):385-403.
Lensik, R. 1996. *Structural Adjustment in Sub-Saharan Africa*. Longman, London.
Lund, S. 1996. "Informed credit and risk-sharing networks: empirical evidence from the Philippines", Manuscript, Stanford University.
Marquette, C. M. 1997. "Current poverty, structural adjustment and drought in Zimbabwe", *World Development*. 25(7):1141-50.
Mosley, P., T. Subasat and J. Weeks. 1996. "Assessing adjustment in Africa", *World Development*, 23(9):1459-73.
Paxson, C.H. 1992. "Using weather variability to estimate the response of savings to transitory income in Thailand", *The American Economic Review*, 82(1):15-33.
Piesse, J., J. Simister and C. Thirtle. 1998. "Modernization, multiple income sources and equity: A gini decomposition for the communal lands in Zimbabwe", Clore Management Centre, Birkbeck College, University of London.
Ravallion, M., and G. Datt. 1996. "How Important to India's Poor Is the Sectoral Composition of Economic Growth?" *The World Bank Economic Review*, 10(1):1-25.
Reardon, T., C. Delgado, and P. Malton. 1992. "Determinants and effects of income diversification amongst farm households in Burkina Faso", *Journal of Development Studies*, 28(1):264-96.
Reardon, T. 1997. "Using evidence of household income diversification to inform study of the rural non-farm labor market in Africa", *World Development* 25(5):735-48.
Reardon, T., K. Stamoulis, A. Balisacan, M.E. Cruz, J. Berdeue, and B. Banks. 1998. "Rural nonfarm income in developing countries", Special chapter in The State of Food and Agriculture 1998, Food and Agriculture Organization of the United Nations, Rome.

Renfew, A. 1992. *ESAP and Health*. Mambo Press: Harare.
Rosenzweig, M. and K. Wolpin. 1993. "Credit market constraints, consumption smoothing, and the accumulation of durable production assets in low-income countries: investments in bullocks in India", *Journal of Political Economy*, 101:223-45.
Rosenzweig, M and H. Binswanger. 1993. "Wealth, weather risk and the composition and profitability of agricultural investment", *Economic Journal*, 103:56-78.
Scoones, I., C. Chibudu, S. Chikura et al. 1996. *Hazards and Opportunities. Farming Livelihoods in Dryland Africa. Lessons From Zimbabwe.* London: Zed Books
Toulmin, C., R. Leonard, K. Brock, N. Coulibaly, G. Carswell, and D. Dea. 2000. "Diversification of livelihoods, evidence from Mali and Ethiopia", Research Report 47, Institute of Development Studies, Brighton, UK.
Townsend, R.M. 1995. "Consumption insurance: an evaluation of risk-bearing systems in low-income economies", *Journal of Economic Perspectives*, 9(3):85-102.
Udry, C. 1990. " Credit markets in Northern Nigeria: Credit as insurance in a rural economy", *World Bank Economic Review*, 49(30):251-69.
Udry, C. 1994. " Risk and insurance in a rural credit market: An empirical investigation in Northern Nigeria." *Review of Economic Studies*, 61(3):495-526.
Udry, C. 1995. " Risk and saving in Northern Nigeria", *American Economic Review*, 85(5):1287-300.
Zimmerman F. and M. R. Carter. 1996. "Dynamic portfolio management under risk and subsistence constraints in developing countries", Agricultural and Applied Economics, Staff Paper Series, University of Wisconsin-Madison.

Table 1. Illustration of Income Source-Earner Combinations

	Number of Income Earners				Non-labor income
Number of Income Sources		1	2	3	
	1	X		X	
	2		X		
	3			X	
	4				X

Source: Zimbabwe ICES 1990/91 and 1995/96.

Table 2: Percent contribution of different income sources to overall income of the sample

Income Sources	**Rural**		**Urban**	
	1990/91 (N=9432)	1995/96 (N=10136)	1990/91 (N=4744)	1995/96 (N=7391)
Formal wage employment	27.2	26.5	66.1	57.9
Informal wage employment	4.3	7.4	13.2	16.8
Self-employment	45.5	46.3	8.1	10.8
Non-labor income	22.9	19.7	12.8	14.4
Total	**100**	**100**	**100**	**100**

Source: Zimbabwe ICES 1990/91 and 1995/96.

Table 3: Percent distribution of households by number of income sources (N)

Number of income	**Rural**		**Urban**	
sources	1990/91	1995/96	1990/91	1995/96
1	20.8	35.6	38.0	41.8
2	62.1	52.0	40.4	40.7
3	16.3	12.0	20.0	15.8
4	0.8	0.4	1.5	1.7
Total	***100***	***100***	***100***	***100***

Source: Zimbabwe ICES 1990/91 and 1995/96

Table 4: Percent distribution of households by number of income earners (M)

Number of Income Earners	**Rural**		**Urban**	
	1990 (%)	1995 (%)	1990 (%)	1995 (%)
1	1.1	1.6	4.0	9.6
2	33.0	30.7	36.0	33.5
3	39.1	38.8	43.8	42.3
4	15.7	15.8	12.3	10.1
5	6.4	7.4	3.1	2.9
6	2.7	3.3	0.7	1.0
>6	1.1	1.5	0.2	0.3
Total	100	100	100	100

Source: Zimbabwe ICES 1990/91 and 1995/96

Table 5: Percent distribution of households by number of income source-earner combination (G)

Number of income sources	**Rural**		**Urban**	
	1990/91	1995/96	1990/91	1995/96
1	9.8	16.7	34.9	38.1
2	17.1	25.8	34.1	35.1
3	20.4	25.4	20.4	18.2
4	21.6	18.9	7.2	6.1
5	17.8	9.1	2.5	2.0
6	9.4	3.3	0.7	0.5
>6	4.1	0.8	0.2	0.1
Total	***100***	***100***	***100***	***100***

Source: Zimbabwe ICES 1990/91 and 1995/96

Table 6: Descriptive Statistics

Variables	Rural				Urban			
	199/01		1995/96		1990/91		1995/96	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Head Sex (male)	0.62	0.48	0.64	0.48	0.82	0.38	0.80	0.40
Head Education, none (yes)	0.25	0.43	0.21	0.41	0.05	0.22	0.04	0.20
Head Education, primary (yes)	0.62	0.48	0.60	0.49	0.48	0.50	0.42	0.49
Head Education, secondary or higher (yes)	0.13	0.34	0.19	0.40	0.47	0.50	0.54	0.50
Head age (years)	45.31	15.30	44.91	15.78	39.81	12.10	39.54	12.65
Household size (#)	5.28	3.07	4.88	2.83	4.23	2.73	4.09	2.54
# Children [a]	0.99	1.07	0.89	0.99	0.67	0.87	0.61	0.79
# Boys	0.88	1.07	0.79	1.01	0.50	0.84	0.48	0.82
# Girls	0.87	1.07	0.79	1.01	0.53	0.86	0.52	0.85
# Male adult with no education	0.11	0.32	0.08	0.27	0.03	0.19	0.02	0.13
# Male adults with primary education	0.51	0.67	0.49	0.65	0.43	0.58	0.34	0.54
# Male adult with secondary or higher education	0.38	0.68	0.38	0.65	0.82	0.91	0.86	0.87
# Female adults with no education	0.25	0.49	0.19	0.42	0.06	0.26	0.04	0.19
# Female adult with primary education	0.69	0.72	0.66	0.70	0.45	0.60	0.39	0.57
# Female adult with secondary or higher education	0.29	0.61	0.32	0.60	0.64	0.82	0.72	0.84
# Elderly	0.30	0.57	0.29	0.56	0.09	0.33	0.10	0.35
Access to credit (yes) [b]	0.20	0.22	0.30	0.19	0.48	0.15	0.37	0.16
Non-farm income share	0.56	0.38	0.55	0.41	0.97	0.12	0.96	0.16
# of income sources	3.88	1.67	2.96	1.41	2.32	1.15	2.20	1.12
# of income sources per capita	0.96	0.73	0.87	0.72	0.77	0.66	0.72	0.62
# of income earners	2.11	1.21	2.18	1.29	1.78	0.92	1.69	1.02
# of income earners per capita	0.50	0.28	0.54	0.29	0.55	0.31	0.50	0.31
% with formal wage income	0.31	0.46	0.30	0.46	0.72	0.45	0.64	0.48
% with informal wage income	0.11	0.31	0.16	0.37	0.19	0.40	0.28	0.45
% with farming income	0.86	0.35	0.84	0.37	0.40	0.49	0.42	0.49
% with non-labor income	0.69	0.46	0.46	0.50	0.47	0.50	0.36	0.48
Formal wage income share	0.27	0.42	0.26	0.41	0.66	0.43	0.58	0.46
Informal wage income share	0.04	0.16	0.07	0.21	0.13	0.31	0.17	0.33
Agricultural income share	0.42	0.38	0.44	0.40	0.02	0.11	0.03	0.14
Non-labor income share	0.23	0.30	0.20	0.31	0.13	0.28	0.14	0.30
Per capita real consumption [c]	78.5	111.8	59.64	97.18	243.5	438.2	146.9	278.4
Per capita asset holding	0.66	0.70	0.56	0.61	0.82	1.29	0.80	0.99
Home ownership (yes)	0.71	0.45	0.67	0.47	0.34	0.47	0.35	0.48

Source:
Zimbabwe ICES 1990/91 and 1995/96

[a] Children are those with age <=5 years; boys and girls are those between 6 and 15 years; adults are those between 16 and 59 years of age, and are further sub-divided by education level; and finally elderly are those over 59 years of age. [b] Credit access, an indicator of whether a household had access to a bank or other credit source, is measured at the community level. [c] Normalized to real terms by July 1990 Zimbabwe dollar using consumer price index that takes into account variations in survey month and regions.

Table 7a: Estimation of income diversification (S) and household welfare, rural areas

Dependent Variables:	1990/91			1995/96		
Income Diversification (S) and log of per capita consumption (Cons)	1st stage (1) S	IV (2) Cons	OLS (3) Cons	1st stage (4) S	IV (5) Cons	OLS (6) Cons
S		0.98	0.49		1.42	0.55
		(13.4)***	(9.8)***		(14.9)***	(8.9)***
Head sex (Male)	0.07	-0.02	0.09	0.06	0.01	0.14
	(12.1)***	(0.9)	(6.0)***	(11.6)***	-0.6	(9.7)***
Head age	-0.02	0.08	0.05	-0.02	0.10	0.06
	(2.2)**	(2.6)***	(1.8)*	(1.9)*	(3.5)***	(2.6)***
Age Squared	0.00	-0.01	-0.01	0.00	-0.01	-0.01
	-0.5	(2.4)**	(2.6)***	(0.3)	(3.1)***	(3.3)***
Head education primary	-0.02	0.12	0.09	0.00	0.04	0.03
	(2.9)***	(5.7)***	(4.8)***	(0.3)	(1.9)*	(2.0)**
Head education secondary or higher	0.08	0.31	0.45	0.06	0.11	0.22
	(8.0)***	(9.2)***	(15.8)***	(6.1)***	(3.7)***	(8.8)***
Household size	-0.03	-0.10	-0.14	-0.03	-0.13	-0.18
	(13.1)***	(14.2)***	(25.3)***	(12.7)***	(18.6)***	(33.9)***
# Boys	0.01	0.02	0.03	0.00	0.05	0.06
	(1.6)	(2.1)**	(3.3)***	(1.1)	(4.9)***	(7.0)***
# Girls	0.01	0.01	0.02	0.01	0.06	0.08
	(2.4)**	(0.7)	(2.2)**	(2.3)**	(5.7)***	(9.0)***
# Male adult with primary education	0.02	0.03	0.06	0.01	0.05	0.07
	(3.6)***	(2.1)**	(4.7)***	(2.8)***	(3.1)***	(5.9)***
# Male adult with sec./ higher education	0.01	0.12	0.13	0.00	0.13	0.13
	(1.7)*	(8.7)***	(11.0)***	(0.6)	(9.2)***	(12.0)***
# Female adult with primary education	0.00	0.07	0.07	-0.01	0.07	0.06
	(0.6)	(4.7)***	(5.9)***	(1.2)	(4.9)***	(5.2)***
# Female adult with sec./ higher education	0.02	0.18	0.20	0.01	0.15	0.17
	(3.3)***	(11.8)***	(15.6)***	(2.2)**	(9.7)***	(13.7)***
Per capita asset holding	-0.05	0.41	0.33	-0.06	0.32	0.22
	(12.9)***	(30.5)***	(29.9)***	(15.8)***	(26.8)***	(24.0)***
Access to credit (yes)	0.25	0.10	0.48	0.01	0.35	0.39
	(20.9)***	(2.2)**	(14.7)***	(0.4)	(7.8)***	(10.8)***
Manicaland (yes)	0.03	0.47	0.40	-0.19	0.10	0.11
	(2.7)***	(21.2)***	(21.6)***	(6.4)***	(4.4)***	(6.0)***
Masonaland East (yes)	0.14	-0.03	0.07	-0.04	0.09	0.20
	(12.6)***	(1.1)	(3.4)***	(2.6)***	(3.9)***	(11.2)***
Masonaland West (yes)	0.05	0.21	0.31	0.04	-0.19	-0.07
	(5.1)***	(8.0)***	(13.8)***	(4.3)***	(7.3)***	(3.5)***
Matabeleland North (yes)	0.17	-0.17	0.06	0.17	-0.15	0.02
	(14.9)***	(5.5)***	(2.5)**	(8.8)***	(5.6)***	(1.2)
Midlands (yes)	-0.08	0.24	0.21	0.18	-0.48	-0.21
	(8.2)***	(10.2)***	(10.6)***	(15.5)***	(15.5)***	(9.3)***
Rainfall standard Deviations (planting)	0.68			-0.13		
	(10.3)***			(1.4)		
Rainfall standard deviations (harvesting)	0.07			0.22		
	(4.9)***			(4.4)***		
Constant	0.51	2.46	3.62	0.81	2.13	3.66
	(15.3)***	(24.7)***	(53.7)***	(17.2)***	(21.3)***	(59.2)***
R Squared (adjusted)	0.25	--	0.47	0.18	--	0.44
Observations (N)	9342	9342	9342	9910	9910	9910

Absolute value of t statistics in parentheses. * significant at 10%; **significant at 5%; *** significant at 1%

Table 7b: Estimation of income diversification (D) and household welfare, rural areas

Dependent Variables:	1990/91			1995/96		
Income Diversification (D) and log of per capita consumption (Cons)	1st stage (1) D	IV (2) Cons	OLS (3) Cons	1st stage (4) D	IV (5) Cons	OLS (6) Cons
D		1.23	0.58		1.71	0.71
		(12.9)***	(20.8)***		(15.3)***	(28.4)***
Head sex (Male)	0.07	-0.04	0.07	0.09	-0.03	0.12
	(7.2)***	(1.7)*	(4.4)***	(9.5)***	-1.1	(8.6)***
Head age	-0.06	0.14	0.05	-0.01	0.05	0.05
	(3.3)***	(3.8)***	(2.0)**	(0.4)	(1.5)	(2.4)**
Age Squared	0.005	-0.015	-0.007	0.001	-0.008	-0.007
	(3.0)***	(4.1)***	(2.8)***	(0.7)	(2.3)**	(3.3)***
Head education primary	-0.08	0.26	0.14	-0.04	0.10	0.05
	(6.5)***	(9.6)***	(7.8)***	(3.1)***	(3.9)***	(3.0)***
Head education secondary or higher	-0.05	0.61	0.53	-0.04	0.29	0.25
	(2.8)***	(15.1)***	(18.7)***	(2.1)**	(7.7)***	(10.2)***
Household size	-0.12	0.06	-0.12	-0.15	0.11	-0.14
	(33.9)***	(4.2)***	(20.3)***	(38.4)***	(6.5)***	(24.6)***
# Boys	0.02	0.01	0.04	0.02	0.02	0.06
	(2.7)***	(1.0)	(4.1)***	(3.5)***	(1.3)	(6.6)***
# Girls	0.02	-0.01	0.02	0.03	0.02	0.07
	(3.1)***	(0.5)	(2.3)**	(4.6)***	(1.7)*	(8.2)***
# Male adult with primary education	0.05	-0.03	0.04	0.06	-0.04	0.05
	(5.6)***	(1.4)	(3.5)***	(6.6)***	(2.0)*	(4.5)***
# Male adult with sec./ higher education	0.03	0.07	0.12	0.04	0.05	0.12
	(3.9)***	(4.4)***	(10.1)***	(5.6)***	(2.7)***	(10.8)***
# Female adult with primary education	-0.01	0.09	0.08	0.00	0.06	0.06
	-0.6	(5.2)***	(6.6)***	(0.4)	(3.7)***	(5.3)***
# Female adult with sec./ higher education	0.03	0.16	0.21	0.02	0.14	0.17
	(3.9)***	(8.4)***	(15.9)***	(1.9)*	(7.1)***	(13.7)***
Per capita asset holding	0.11	0.12	0.29	0.06	0.08	0.18
	(15.2)***	(6.4)***	(26.0)***	(8.9)***	(5.8)***	(20.5)***
Access to credit (yes)	0.47	-0.16	0.54	0.27	-0.07	0.26
	(21.6)***	(2.4)**	(17.3)***	(10.5)***	(1.2)	(7.6)***
Manicaland (yes)	-0.02	0.40	0.29	0.03	0.24	0.20
	(1.4)	(12.5)***	(13.4)***	(2.4)**	(8.8)***	(11.6)***
Masonaland East (yes)	0.03	0.32	0.25	0.14	0.08	-0.05
	(1.2)	(10.4)***	(11.7)***	(5.7)***	(2.5)**	(2.3)**
Masonaland West (yes)	0.08	-0.10	-0.10	-0.72	-0.05	-0.19
	(1.9)*	(2.7)***	(3.6)***	(10.9)***	(1.5)	(8.7)***
Matabeleland North (yes)	0.07	0.02	0.00	-1.30	0.10	0.03
	(3.2)***	(0.7)	(0.1)	(10.5)***	(3.2)***	(1.5)
Midlands (yes)	0.06	0.15	0.12	-0.53	0.06	0.05
	(1.6)	(5.5)***	(6.3)***	(9.7)***	(2.0)**	(2.4)**
Rainfall standard Deviations (planting)	-0.21			2.18		
	(1.0)			(7.3)***		
Rainfall standard deviations (harvesting)	0.13			0.76		
	(4.2)***			(10.1)***		
Constant	1.18	1.76	3.55	-0.71	1.67	3.49
	(17.6)***	(11.2)***	(53.1)***	(4.1)***	(12.2)***	(60.1)***
R Squared (adjusted)	0.51	--	0.48	0.49	--.	0.47
Observations (N)	9342	9342	9342	9910	9910	9910

Absolute value of t statistics in parentheses; * significant at 10%; **significant at 5%; *** significant at 1%

Table 8: Estimation of non-farm income share (NF) and household welfare, rural areas

Dependent Variables:	1990/91			1995/96		
Non-farm income share (NF) and log of per capita consumption (Cons)	1st stage (1) NF	IV (2) Cons	OLS (3) Cons	1st stage (4) NF	IV (5) Cons	OLS (6) Cons
NF		0.96	0.21		0.91	0.37
		(22.5)***	(10.8)***		(29.7)***	(23.8)***
Head sex (Male)	0.02	0.09	0.11	0.11	0.05	0.11
	(2.6)***	(5.4)***	(6.9)***	(12.2)***	(3.4)***	(7.8)***
Head age	-0.05	0.09	0.06	-0.02	0.08	0.07
	(3.8)***	(3.2)***	(2.1)**	(1.7)*	(3.5)***	(3.1)***
Age Squared	0.00	-0.01	-0.01	0.00	-0.01	-0.01
	(1.7)*	(3.1)***	(2.8)***	(0.0)	(3.3)***	(3.5)***
Head education primary	-0.03	0.11	0.09	0.01	0.03	0.04
	(3.3)***	(5.7)***	(4.9)***	(0.9)	(1.8)*	(2.3)**
Head education secondary or higher	0.13	0.34	0.45	0.12	0.13	0.20
	(8.7)***	(10.8)***	(15.7)***	(7.7)***	(5.1)***	(8.2)***
Household size	-0.03	-0.12	-0.14	-0.06	-0.14	-0.17
	(10.4)***	(19.4)***	(25.5)***	(17.7)***	(23.2)***	(31.4)***
# Boys	0.00	0.03	0.03	0.02	0.05	0.06
	(0.1)	(3.3)***	(3.5)***	(3.5)***	(5.0)***	(6.5)***
# Girls	0.00	0.02	0.02	0.02	0.06	0.07
	(0.2)	(2.4)**	(2.4)**	(4.1)***	(6.8)***	(8.6)***
# Male adult with primary education	0.02	0.05	0.06	0.05	0.03	0.05
	(2.6)***	(3.4)***	(4.8)***	(6.3)***	(2.2)**	(4.4)***
# Male adult with sec./ higher education	-0.01	0.13	0.13	0.03	0.11	0.12
	(0.9)	(10.8)***	(11.2)***	(4.3)***	(9.3)***	(11.3)***
# Female adult with primary education	0.00	0.07	0.07	0.01	0.05	0.05
	(0.6)	(5.1)***	(5.9)***	(1.9)*	(3.9)***	(4.8)***
# Female adult with sec./ higher education	0.03	0.18	0.20	0.05	0.13	0.16
	(3.7)***	(12.9)***	(15.5)***	(6.9)***	(9.8)***	(12.8)***
Per capita asset holding	-0.09	0.40	0.33	-0.09	0.29	0.24
	(15.0)***	(32.3)***	(30.3)***	(15.5)***	(29.9)***	(27.3)***
Access to credit (yes)	0.46	0.11	0.45	0.28	0.18	0.33
	(26.6)***	(2.7)***	(13.5)***	(12.2)***	(5.0)***	(9.9)***
Manicaland (yes)	6.68	0.44	0.38	-1.51	0.12	0.12
	(14.3)***	(22.0)***	(20.8)***	(2.6)**	(6.4)***	(6.9)***
Masonaland East (yes)	7.32	0.05	0.06	-0.58	0.13	0.19
	(14.4)***	(2.0)**	(2.8)***	(2.0)**	(6.6)***	(10.3)***
Masonaland West (yes)	-5.48	0.21	0.28	-0.04	-0.03	-0.04
	(14.2)***	(8.6)***	(12.5)***	(0.8)	(1.2)	(1.9)*
Matabeleland North (yes)	-15.75	0.01	-0.02	-0.31	0.05	0.05
	(14.4)***	(0.5)	(0.7)	(2.1)**	(2.5)**	(2.6)***
Midlands (yes)	-12.94	0.24	0.19	0.14	-0.02	-0.05
	(14.4)***	(10.9)***	(9.7)***	(2.9)***	(1.2)	(2.9)***
Rainfall standard Deviations (planting)	98.90			1.81		
	(14.3)***			(3.6)***		
Rainfall standard deviations (harvesting)	10.22			2.18		
	(14.2)***			(2.8)***		
Constant	-26.84	3.03	3.66	-0.33	3.14	3.52
	(13.9)***	(38.8)***	(55.2)***	(1.1)	(49.0)***	(60.7)***
R Squared (adjusted)	0.26	--	0.47	0.21	--	0.46
Observations (N)	9342	9342	9342	9910	9910	9910

Absolute value of t statistics in parentheses. * significant at 10%; **significant at 5%; *** significant at 1%

Table 9a: Estimation of number of income sources and household welfare, urban areas

Dependent Variables: Income Diversification (S) and log of per capita consumption (Cons)	1990/91			1995/96		
	1st stage (1) S	IV (2) Cons	OLS (3) Cons	1st stage (4) S	IV (5) Cons	OLS (6) Cons
S		-0.79	-0.37		0.53	0.03
		(2.3)**	(3.9)***		(2.0)**	-1.3
Head sex (Male)	0.05	0.20	0.14	0.07	0.15	0.09
	(6.2)***	(4.8)***	(4.9)***	(8.9)***	(4.3)***	(4.6)***
Head age	-0.02	0.25	0.26	0.02	0.18	0.16
	(1.1)	(5.0)***	(5.6)***	(1.7)*	(5.6)***	(5.5)***
Age Squared	0.00	-0.03	-0.03	0.00	-0.02	-0.02
	(0.0)	(5.2)***	(5.5)***	(3.1)***	(5.3)***	(5.1)***
Head education primary	0.02	0.28	0.27	0.04	0.12	0.08
	(1.1)	(5.5)***	(5.5)***	(2.9)***	(2.8)***	(2.3)**
Head education secondary or higher	0.05	0.56	0.50	0.09	0.27	0.19
	(3.3)***	(9.5)***	(10.1)***	(6.2)***	(4.7)***	(4.8)***
Household size	0.00	-0.18	-0.17	-0.01	-0.21	-0.20
	(1.4)	(15.3)***	(16.1)***	(2.2)**	(22.8)***	(24.4)***
# Boys	0.00	0.07	0.07	-0.01	0.08	0.09
	(0.2)	(4.0)***	(4.1)***	(1.4)	(6.2)***	(7.2)***
# Girls	0.00	0.08	0.08	0.00	0.10	0.10
	(0.1)	(4.4)***	(4.5)***	-0.9	(7.5)***	(8.2)***
# Male adult with primary education	0.00	-0.02	-0.02	0.01	0.03	0.03
	(0.4)	(0.5)	(0.7)	(1.1)	(1.6)	(1.3)
# Male adult with sec./ higher education	-0.02	0.05	0.06	-0.03	0.10	0.12
	(3.8)***	(2.5)**	(4.2)***	(6.2)***	(5.9)***	(10.3)***
# Female adult with primary education	-0.02	0.02	0.04	-0.03	0.04	0.07
	(3.4)***	(0.7)	(1.9)*	(5.3)***	(1.5)	(3.8)***
# Female adult with sec./ higher education	-0.02	0.17	0.20	-0.02	0.18	0.20
	(4.1)***	(8.0)***	(11.0)***	(4.1)***	(10.8)***	(14.5)***
Per capita asset holding	0.00	0.29	0.28	0.00	0.33	0.33
	(1.3)	(32.6)***	(34.7)***	(0.2)	(41.6)***	(43.6)***
Access to credit (yes)	0.07	-0.01	-0.03	-0.04	0.38	0.42
	(2.7)***	(0.1)	(0.4)	(2.4)**	(7.6)***	(9.5)***
Secondary city (yes)	-0.04	-0.32	-0.31	0.01	-0.34	-0.35
	(3.7)***	(10.6)***	(11.0)***	(1.8)*	(19.7)***	(21.6)***
Bulawayo city (yes)	0.01	-0.24	-0.24	-0.02	-0.14	-0.14
	(0.6)	(7.0)***	(7.3)***	(1.9)*	(6.9)***	(7.6)***
Rainfall standard Deviations (planting)	-0.20			0.29		
	(2.9)***			(6.2)***		
Rainfall standard deviations (harvesting)	0.02			0.06		
	(1.4)			(2.8)***		
Constant	0.93	5.56	4.58	0.69	4.97	4.29
	(24.7)***	(11.2)***	(37.1)***	(19.8)***	(14.4)***	(53.7)***
R Squared (adjusted)	0.36	--	0.52	0.32	--	0.49
Observations (N)	4561	4561	4561	7177	7177	7177

Absolute value of t statistics in parentheses

* significant at 10%; **significant at 5%; *** significant at 1%

Table 9b: Estimation of income diversification (D) and household welfare, urban areas

Dependent Variables:	1990/91			1995/96		
Income Diversification (D) and log of per capita consumption (Cons)	1st stage (1) D	IV (2) Cons	OLS (3) Cons	1st stage (4) D	IV (5) Cons	OLS (6) Cons
D		-0.63	-0.46		0.76	0.27
		(1.2)	(7.8)***		(3.5)***	(13.5)***
Head sex (Male)	-0.04	0.08	0.14	-0.08	0.23	0.11
	(2.0)**	(1.3)	(4.9)***	(5.2)***	(4.7)***	(5.3)***
Head age	-0.02	0.24	0.27	0.02	0.14	0.16
	(0.5)	(3.3)***	(5.7)***	(0.7)	(3.1)***	(5.4)***
Age Squared	0.00	-0.02	-0.03	0.00	-0.02	-0.02
	(0.8)	(2.9)***	(5.6)***	(0.1)	(3.5)***	(5.2)***
Head education primary	-0.02	0.24	0.27	-0.10	0.26	0.10
	(0.6)	(3.2)***	(5.6)***	(3.5)***	(3.5)***	(2.8)***
Head education secondary or higher	-0.12	0.34	0.52	-0.20	0.54	0.22
	(3.2)***	(2.5)**	(10.4)***	(6.7)***	(4.8)***	(5.8)***
Household size	-0.17	-0.40	-0.14	-0.17	0.09	-0.17
	(21.7)***	(2.5)**	(13.0)***	(26.5)***	(1.1)	(19.8)***
# Boys	0.06	0.15	0.06	0.05	0.00	0.08
	(4.6)***	(2.5)**	(3.6)***	(5.3)***	(0.1)	(6.5)***
# Girls	0.05	0.14	0.07	0.05	0.02	0.09
	(4.0)***	(2.7)***	(4.1)***	(5.3)***	(0.5)	(7.5)***
# Male adult with primary education	0.01	0.00	-0.02	0.03	-0.02	0.02
	(0.7)	(0.0)	(0.8)	(1.9)*	(0.6)	(1.0)
# Male adult with sec./ higher education	0.03	0.11	0.06	0.06	0.02	0.11
	(3.0)***	(2.8)***	(4.0)***	(6.4)***	-0.7	(9.6)***
# Female adult with primary education	-0.01	0.04	0.05	0.01	0.05	0.07
	(0.5)	(1.0)	(2.1)**	(0.6)	(1.9)*	(3.8)***
# Female adult with sec./ higher education	0.00	0.20	0.20	0.01	0.18	0.20
	(0.1)	(7.6)***	(11.2)***	(1.2)	(8.2)***	(14.6)***
Per capita asset holding	0.01	0.30	0.28	0.04	0.26	0.32
	(2.0)**	(17.9)***	(34.6)***	(7.0)***	(11.8)***	(42.9)***
Access to credit (yes)	0.01	0.03	-0.04	0.14	0.19	0.39
	(0.1)	(0.3)	(0.6)	(4.1)***	(2.1)**	(9.1)***
Secondary city (yes)	0.08	-0.12	-0.32	0.12	-0.55	-0.37
	(3.0)***	(0.9)	(11.7)***	(9.6)***	(9.2)***	(23.1)***
Bulawayo city (yes)	-0.02	-0.13	-0.25	0.09	-0.25	-0.15
	(0.6)	(1.5)	(7.7)***	(5.8)***	(6.1)***	(8.3)***
Rainfall standard Deviations (planting)	0.47			-0.21		
	(2.9)***			(1.4)		
Rainfall standard deviations (harvesting)	0.14			0.17		
	(3.6)***			(2.2)**		
Constant	1.23	6.26	4.27	1.26	2.12	4.04
	(13.5)***	(5.0)***	(36.2)***	(17.0)***	(3.6)***	(52.3)***
R Squared (adjusted)	0.46	--	0.50	0.42	--	0.51
Observations (N)	4561	4561	4561	7177	7177	7177

Absolute value of t statistics in parentheses

* significant at 10%; **significant at 5%; *** significant at 1%

Table 10: Chow test of structural changes in parameter space, from 1990/91 to 1995/96

Explanatory Variables	Rural	Urban
	Change in coefficient (t-value)	Change in coefficient (t-value)
Year (1995)	-0.57	-0.78
	(4.6)***	(2.0)*
Income diversification (S)	0.44	0.92
	(3.6)***	(4.9)***
Head sex (male)	0.03	-0.05
	(1.50)	(1.7)*
Head education, secondary or higher	-0.20	-0.29
	(5.0)***	(4.7)***
Household size	-0.03	-0.03
	(4.9)***	(2.2)**
# Boys	0.03	0.01
	(2.8)***	(0.8)
# Girls	0.06	0.02
	(5.1)***	(1.1)
# Male adult with sec./ higher education	0.01	-0.04
	(1.0)	(3.1)***
# Female adult with sec./ higher education	-0.03	0.01
	(1.3)	(0.7)
Per capita asset holding	-0.09	-0.10
	(5.8)***	(3.7)***
Access to credit	0.23	0.38
	(9.0)***	(4.4)***
Observations	19252	11738

Absolute value of t statistics in parentheses
* significant at 10%; **significant at 5%; *** significant at 1%

Table 11: Decomposition of changes in log real per capita consumption, from 1990/91 to 1995/96

Explanatory Variables	Rural			Urban		
	Due changes in level	Due changes in return	Total	Due changes in level	Due changes in return	Total
S	-1.08	1.71	0.63	-0.06	2.14	2.08
Head sex (male)	0.00	0.02	0.02	0.00	-0.04	-0.04
Head education, secondary or higher	0.01	-0.03	-0.02	0.02	-0.14	-0.12
Household size	0.05	-0.18	-0.13	0.03	-0.14	-0.11
# Boys	0.00	0.03	0.02	0.00	0.01	0.00
# Girls	-0.01	0.05	0.04	0.00	0.01	0.01
# Male adult with secondary or higher	0.00	0.00	0.00	0.00	-0.04	-0.03
# Female adult with secondary or higher	0.00	-0.01	0.00	0.01	0.01	0.02
Per capita asset holding	-0.03	-0.06	-0.09	-0.01	-0.08	-0.09
Access to credit	0.04	0.05	0.09	-0.04	0.18	0.14

Table 12: Econometric tests for instrumental variables approach

Test/Equation	Rural				Urban	
	S		NF		S	
	1990/91	1995/96	1990/91	1995/96	1990/91	1995/96
Relevance test: F (2, N-23) statistic (p-value)	12.0 (0.00)	66.70 (0.00)	153.0 0.00)	219.0 (0.00)	17.3 (0.00)	23.2 (0.00)
Overidentification test: Chi2 (1) statistic (p-value)	1.7 (0.19)	0.04 (0.85)	1.9 (0.20)	2.01 (0.19)	1.48 (0.22)	1.2 (0.28)
Durban-Hausman-Wu test: Chi2 (21) statistic (p-value)	192.6 (0.00)	307.4 (0.00)	246.8 (0.00)	393.5 (0.00)	47.6 (0.00)	53.8 (0.00)
Observations (N)	9342	9910	9342	9910	4561	7177