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Abstract:

We examine the relationship between monetary policy and household income in Zambia in the 1990s and 2000s. Specifically, we examine the possibility that monetary policy has gender differentiated effects on income. This is one of the first direct micro-econometric analysis of the relationship between gender, monetary policy and household welfare in Zambia. In the absence of panel data, we take advantage of the availability of repeated cross sectional data from five rounds of household budget surveys to apply pseudo-panel econometric techniques to these cross sections. We identify the sector of main employment for the household head and proceed to introduce a monetary policy variable to the household survey data for 1996, 1998, 2004, 2006 and 2010. The econometric results provide evidence of a negative relationship between monetary policy and household welfare in general and that this effect is not is differentiated by gender. Therefore, the study concludes that monetary policy in Zambia is gender neutral.

JEL classification: E52
Key words: Price; exchange rate; impulse response

[1] Corresponding author. E-mail address: fchansa@boz.zm. The study also benefitted from comments received from the editors of the BoZ Working Paper Series and the Technical Committee discussions held with Bank of Zambia staff. The findings and opinions expressed in this paper are entirely those of the author and do not in any represent the views or position of the Bank of Zambia.

Contents

1. Introduction and Background

The gender dimension of macroeconomic policies has gained prominence over the past two to three decades[2]. Traditionally, macroeconomic policies such as monetary policy were thought of as being gender-neutral by many economists. The rationale was that since these policies typically deal with economic aggregates, there is no need for any gender orientation in the design and conduct of these broad based policies. But recently, this rationale has been challenged by the emergence of a strand of literature that argues that economic policy choices affect women and men differently, both in terms of market and non-market activities (Abell 1991; Braunstein and Heintz 2006; Tachtamanova and Sierminska 2009; Seguino and Heintz 2010)[3]. These studies contend that macro-level policies might not reach their goals if their gender effects are ignored and thus they advocate for considerable focus on identifying the impact of macroeconomic policies on the gender division of unpaid and paid labor (Elson 1995)[4].

For most central banks, the primary objective of monetary policy is to achieve price stability. This objective overarches other objectives such as employment creation and growth. The primary instrument in the central bank's toolkit is the nominal interest rate that acts on the demand side of the economy through changes in consumption and investment. The cost of controlling inflation via this method is an increase in unemployment. Haltom (2012) argues that the effects of the central bank's actions to control inflation may not be evenly spread on the economy. For example, the reduction of the policy interest rate or the infusion of cash by the central bank causes financial institutions to bid down lending rates, which pushes down other market lending rates in the economy and thereby stimulates the economy as a whole. He argues that interest-sensitive sectors, like manufacturing and real estate, tend to respond first, with the rest of the economy in tow. But that some sectors, regions, and demographic groups might experience a bigger boost than others from the central bank's easing or, conversely, higher costs when it tightens. Additionally, the important effects on the economy of the easing might also affect households differently depending on whether they hold inflation-protected assets, have big debts that might be eroded by inflation, or have labor market skills that insulate them from a down business cycle.

Evidently, the structure of the labour market and its dynamics are at the core of this debate. Seguino (2003) argues that gender differences in labor demand and

[2]Significant work was done by the International Working Group on Gender and Macroeconomics aimed at "engendering" macroeconomics and trade theory. In 1995 and 2000 they released special journal issues on this topic.

[3]UN Women (2015) argue that macroeconomic policies matter for gender equality because they shape the overall economic environment for realizing women's rights by affecting opportunities for paid employment, resources for policies aimed at reducing inequalities, and the demand for women's unpaid labour. Macroeconomic decisions may also bring about economic crises, with women and men bearing different costs of negative shocks.

[4]This strand of literature derives from a broader literature that argues generally that macroeconomic policies cannot be expected to have identical effects on different constituents of the economy such as industries, ethnic groups and age cohorts.

supply can cause changes in macroeconomic structure and policy to have differential effects on men's and women's work and ultimately their incomes. On the supply side, gender-based differences in education, skill and experience are often cited as a reason for this. But Braunstein and Heintz (2006) argue that these factors themselves tend to be rooted in workers' productive roles outside of the workplace and the institutional, social and material contexts in which they live. Thus, social norms, ownership of assets and rules that shape individual choice become important considerations on the supply side.

Social norms especially in developing countries are particularly strong and tend to propagate the gender division of labour whereby women are primarily associated with the care and reproduction of the family, and much of their work time is spent outside of the market (Fontana 2004). Men's work on the other hand is typically viewed as more directly productive and more fully incorporated into the market domain. These divisions not only have implications for whether women look for market work at all, but what types of jobs are considered feasible or even suitable[5]. Thus sector segregation by gender tends to be wide spread in most countries (Elson 1995). Also, systematic differences by gender in ownership or control over assets may partly determines how much wage employment women seek as well as the extent to which women and their decisions are influenced by other household members (Chen et al. 2005).

On the demand side, discrimination in hiring practices has also fuelled gender segregation in industries as well as occupations. For example, in East Asia in the highly competitive export oriented sectors, it has been observed that employers tend to have a preference for hiring women over men, the chief reason being that women's wages tend to be lower than men's and women turn out to be more productive in these types of jobs (Elson and Pearson 1981). Additionally, the presumption that men should and do bear the primary financial responsibility of providing for the family (male breadwinner ideal) has also been linked to gender differences in unemployment. In some countries, this attitude has led to women being laid off first as employers feel that it is more important for men to fulfil their traditional breadwinning responsibilities (Lim 1990).

Thorbecke (2001) argues that in episodes of high inflation where the central bank has to pursue contractionary monetary policy to bring inflation down, the burden of this disinflation in terms of unemployment, fall in output and incomes tends to be borne disproportionately by the poor, minority, and young, who tend to be relatively less productive workers with fewer skills, and therefore are laid off first. Also, the fact that there is widespread sector segregation with women concentrated in more precarious forms of employment puts them at a disadvantage because usually when demand falls its temporary, part-time or contingent forms of jobs are usually the first to be eliminated. Braunstein and Heintz (2008) also demonstrate that contractionary monetary policy aimed at

[5] Lim (1990) did a study on Asia on the relationship between divorce and women's participation in the labour market. He finds that norms about divorce and remarriage also underpin household-level structures that shape women's labor. For example, in East Asia, where divorce rates are extremely low, wage work for married women is less important as insurance against the economic stress of divorce. Conversely, in parts of Southeast Asia, divorce and remarriage rates are high.

inflation reduction has a disproportionately negative impact on women's employment in developing countries.

On the contrary, Takhtamanova and Siermiska (2009) find that monetary policy does not have gender differentiated effects on employment and the economy in general. Thus, a controversy exists and ultimately the relationship between monetary policy and gender is an empirical issue.

It is worth noting here that much of the existing literature on this topic is predominantly from industrialized or semi-industrialized economies and almost all of these studies are cross-country in nature. To date, there has been no study done on Sub-Saharan Africa in general or Zambia in particular. Thus, there is need for a country specific study on Zambia to ascertain the relationship between gender and monetary policy. Indeed, with the Bank of Zambia's ever increasing commitment to aligning monetary policy with inflation reduction and price stability, it is imperative to establish if monetary policy in Zambia has gender differentiated effects or not. The main reason for the lack of research on this topic in Zambia has been the limited availability of data. There is generally a lack of adequate time series data on employment in Zambia. The existing series is too short and not disaggregated by gender. This presents a challenge if one wants to analyse the relationship between gender, monetary policy and employment in Zambia as it will not be possible to apply the Vector Autoregression (VAR) models or Error Correction Models (ECM) which are the usual workhorse of macroeconomists.

The aim of the study is to ascertain the relationship between monetary policy and gender. Given the problem of limited data, the study makes use of repeated cross sectional data such as the Living Conditions Monitoring Survey (LCMS) to determine this relationship. However, in this study we use income/welfare indicator as the dependent variable. We do this for two reasons. Firstly, there is generally a lack of gender disaggregated employment numbers as the LCMS is essentially a household welfare survey and not an employment survey[6]. This notwithstanding, it is expected that the income/welfare variable will capture the effects of monetary policy just as well as an employment variable would. Secondly, there is currently no study in literature that has used welfare as a dependent variable in studying the effects of monetary policy. Thus, it is hoped that using income/welfare instead of employment provides a broader approach to the analysis and is a good value addition to the literature.

Interestingly, literature espouses a bi-directional causality between gender and macroeconomic outcomes. On the one hand, gender relations (for instance in household, labor, and credit markets) affect economic development and growth while on the other hand, macroeconomic policies have differential impacts on men and women. For purposes of this study, we focus on the latter. Therefore, we conduct an empirical investigation of the relationship between gender, monetary policy and welfare using a multivariate econometric analysis that incorporates key monetary policy variables such as the Bank of Zambia policy rate.

[6] The LCMS is preferred in this study to the Labour Force survey as it has more survey years and thus allows us to construct a data set with a longer time dimension.

In the absence of time series or panel data, we take advantage of the availability of repeated cross-sectional data from five rounds of household budget surveys to apply pseudo-panel econometric techniques to these cross sections. Pseudo panel modelling is a technique of creating an artificial or synthetic panel data from repeated cross-sectional data. The idea is to track cohorts of individuals through time rather than individuals as is the case in genuine panels (Deaton 1985; Verbeek and Vella 2005). Hence, in this study, we create a pseudo panel data set that incorporates a monetary policy variable and thereafter apply the usual panel data analysis techniques so as to understand the relationship between gender, monetary policy and welfare. To illuminate this link, we examine the impact of monetary policy on overall household income in general as well as its impact on male headed and female headed households in Zambia. The implications of the findings will not only shed light on the micro-level impacts of monetary policy in the country but will go further to demonstrate these differences by gender. This will provide invaluable information to policy makers as they strive to implement efficient and equitable monetary policies.

1.1. Evolution of Monetary Policy in Zambia

Between 1964 and 1991, Zambia's monetary framework was not clearly defined. Monetary policy in the country during the period lacked clear objectives and targets and relied heavily on the use of direct instruments such as core liquid assets, statutory reserve requirements and credit allocations (Kalyalya, 2001). The period post 1991 marked a turning point in the nation's political administration and subsequently the conduct of monetary policy. In 1991, Zambia ushered in a new government under the Movement for Multiparty Democracy (MMD) party and along with it came major economic and financial reforms (BoZ, 2012).

The overarching economic reform that was implemented was economic liberalization. In line with this campaign, the principal act of the BoZ was amended in order to better focus its objectives to price and financial stability. One of the major financial reforms as pertaining to monetary policy was the shift from using direct instruments to indirect instruments of policy. These indirect market instruments included primary Treasury bills, Government bond auctions and auctions of short-term credits and term deposits to and from BoZ (Kalyalya, 2001). This move towards indirect instruments was motivated by the need to enhance the effectiveness of monetary policy in stabilizing the growth of money supply and consequently inflation both in the short and long run.

After 1992, Zambia followed a monetary targeting monetary policy framework. However, in 2008, BoZ indicated intentions to transition towards inflation targeting as its main framework for guiding monetary policy. This shift was mainly driven by the need to align monetary policy with the goal of achieving low and stable inflation rates (Cheelo and Banda, 2017). In an effort to materialize these intentions, the Bank of Zambia initiated a reform of the monetary policy framework by introducing the monetary policy rate also called the BoZ policy rate in April 2012 as a key policy instrument. The objective of the policy rate as an instrument was to better anchor inflation expectations and influence the decisions

of commercial banks on pricing credit products. The policy rate has been adjusted over the past years and as at the second quarter of 2018, the BoZ policy rate has been maintained at 9.75% with inflation remaining within the 6-8% target range (BOZ, 2018).

2. Literature Review

We discuss the links between monetary policy tools and household income and outline the reasons for expecting differential household income responses for male and female headed households in Zambia.

One of the transmission mechanisms through which monetary policy impacts household income is through its influence on unemployment. Generally, monetary policy tools such as short-term interest rates influence employment through their effect on aggregate demand. In the short run, expansionary monetary policy in the form of lower interest rates is associated with reduced borrowing costs and savings which could increase aggregate demand through increased consumption and investment expenditure. This could further translate into employment expansion and a subsequent rise in household incomes. Conversely, contractionary monetary policy characterized by an increase in the interest rates could result in reduced consumption and investments expenditure leading to job losses and reduced household income via the same mechanism (Alexius, 2007; Takhtamanova and Sierminska, 2009).

The distribution of the effect of monetary policy on employment and household income may however be uneven for women and men (Abell, 1991). For instance, contractionary monetary policy can have a much greater negative impact on women if they experience a disproportionate share of the job losses arising from the policy. Further, if women have weaker power and status in society, they will be unable to compete fairly for jobs with their male counterparts in a resulting economic downturn (Seguino and Heintz, 2012). As such, more women would likely be unemployed or would find occupations in the informal sector resulting in lower incomes for women compared to their male colleagues. Moreover, female headed households would also likely experience a more adverse effect of contractionary monetary policy than male headed households. The reasons for the differences in household income by gender can be summarized in the labor demand and supply factors that underpin women's earning capacity and their relative presence in low income occupations and volatile industries.

On the labor demand front, gender discrimination by industry and occupation means that females and males experience cyclical volatility at work to different extents. In emerging economies, women are often employed in labor intensive, export oriented industries that tend to be more cyclically volatile than male dominated industries (Epstein and Yeldan, 2008; Braunstein, 2014). In the Zambian context, about 87% of employed women had agricultural and sales and services occupations in contrast to the 67% of males in the same occupations in 2014 (CSO, 2014). There is also an overwhelming majority of males employed in more stable institutional sectors such as Government, International Organisations and parastatals (CSO, 2014).

This greater concentration of women in low-skill, low-wage occupations that have been shown to be relatively more volatile compared to other occupations and industries implies that macroeconomic policies can have a much greater impact on the income of female headed households than male headed households. But this remains to be empirically tested.

On the labour supply side, there are considerable systematic differences in human capital attainment by gender. Coupled with the pervasive social, cultural and institutional contexts in which women and men work, these disparities in experiences translate into significant differences in opportunities for women relative to men (Epstein and Yeldan, 2008). For instance, women are viewed as the primary providers of care in a household with much of their work being unpaid and performed outside the market. On the other hand, men's work is considered productive and fully incorporated into the market. Therefore, women are not only less likely to participate in labour force activities especially if they are married and have children, they are also more likely to seek informal employment compared to their male counterparts (Verick, 2014). This is evident even in the Zambian data. Of the total women surveyed in the 2014 Gender Report, only 48% were employed compared to the 72.9% of men that reported being employed. Also, women had lower levels of education completion compared to males.

Seguino and Heintz (2010) investigated the distributional effects of contractionary monetary policy by race and gender in the United States. The study used state level panel data encompassing the period 1979 - 2008 and employed a two-level threshold fixed effects model. The main objective of the study was to determine the impact of monetary policy (proxied by the Federal Funds Rate) on the unemployment levels of blacks and women relative to white men. Their study found that monetary policy was neither race nor gender neutral. Specifically, blacks and white women were made worse off by contractionary monetary policy when compared to white men. The study highlights the significance of gender in monetary policy considerations, as a disproportionate negative impact of such policies could have long term implications on poverty and inequality comparisons between ethnicities and genders.

Takhtamanova and Sierminska (2009), focusing on nine OECD countries, sought to determine the impact of inflation reducing monetary policy on the unemployment levels of males and females. Using quarterly data from 1980 – 2004 and both a single equation regression and vector auto-regression analysis, the study found a weak link between the chosen monetary policy instrument (short term interest rates) and employment rates. Further, the study revealed that this link did not vary by gender. These findings are in contrast with those of Seguino and Heintz (2010) who find a significant relationship between monetary policy and employment in the United States. These two findings imply that given the transmission mechanism from monetary policy to employment, gender differentiated effects of monetary policy on employment may be negligible in other industrialized countries.

Using data from 17 low and middle income countries, Braunstein and Heintz (2008) examined the short-run impact of contractionary monetary policy on the level of formal employment for males and females. The study used data for 51

'inflation reduction' episodes for different countries spanning the period 1974 – 2004. Changes in employment across inflation reduction episodes were calculated as the annualized value of the overall rate of change in employment across the entire peak-to-trough period. The values for the long-run employment trends were computed using the Hodrick–Prescott filter on the actual employment time series (men, women, and total) for each country. The study concluded that in the case where employment contraction occurs in an inflation reduction episode, women bore the greater part of job losses in percentage terms compared to males.

While the three studies looked at the differences in employment outcomes by gender, they did not highlight the implications of these differences in terms of income. Household income can be taken to be a wider indicator of welfare compared to employment levels. Therefore, the disparity in gender differentiated household incomes may provide a better understanding of welfare differences arising from changes in monetary policy.

3. Methodology

The estimation techniques for the topic at hand presents some interesting methodological challenges. Firstly, in order to investigate the effects of monetary policy on household income or welfare, one ideally needs to track individuals or households through time[7]. Thus, such a task requires a rich panel dataset. But most of the existing data sets are essentially cross sectional. This is especially true for developing countries such as Zambia where the cost of collecting questionnaire-based panel datasets is most often a limiting factor. Secondly, while cross sectional datasets tend to be rich in terms of the variables included, they invariably suffer from the problem of unobserved individual heterogeneity. Economic literature is inundated with studies which warn that the issue of unmeasured differences between individuals is a problem which should not be taken lightly or ignored.

Fortunately, a remedy for this problem was provided by the Nobel laureate Angus Deaton in his 1985 ground-breaking proposition on this methodological conundrum. Deaton (1985) proposes to track cohorts and estimating relationships based on cohort means. He argues that since it is impossible to track individual households over time, the best alternative is to track cohorts through time. Generally, a cohort is defined as a group with fixed membership, so that an individual is a member of exactly one cohort which is the same for all periods. Examples of cohorts include age cohorts or cohorts based on sex or a combination of these variables. Successive surveys will generate successive random samples of individuals from these cohorts. Summary statistics from these time series can then be used to infer behavioural relationships for the cohort as if it were a panel (Hammer, 2007). Panels constructed this way are called synthetic panels or pseudo panels and can be used to control for unobserved fixed effects just as effectively as a genuine panel.

To demonstrate the novelty of this approach, consider the following panel regression equations as is postulated in the traditional sense:

[7] While accounting for other confounding factors

$$y_{it} = x'_{it}\beta + z'_i\alpha + \varepsilon_{it}, \qquad t = 1, \ldots\ldots\ldots\ldots\ldots\ldots\ldots, T \tag{1}$$

where i denotes individuals and t time periods. $z'_i\alpha$ is the heterogeneity or individual effect where z_i contains a constant term and a set of individual or group specific variables, which may be observed (i.e. race, gender and location) or unobserved (i.e. family specific characteristics, skill or preferences), all of which are taken to be constant over time t (Green, 2002).

According to Deaton (1985), the basic panel regression equation above can be modified by introducing or defining a set of cohorts C such that every individual i is a member of one and only one cohort for each time t. Then by taking averages over all the cohort members we obtain the following:

$$\overline{y_{ct}} = \overline{x_{ct}}\beta + \overline{z_{ct}}\alpha + \varepsilon_{ct}, \qquad c = 1, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots, C \tag{2}$$

where $\overline{y_{ct}}$ denotes the average of y_{it} for all members of cohort c at time t. $\overline{z_{ct}}$ is the cohort fixed effect and it will tend to vary with t since they are made up of different individuals in each cohort c at time t. Estimation can be done by either fixed effects or random effects.

Leyaro (2010) argues that the pseudo panel may in fact have an advantage over a genuine panel in the sense that it does not suffer from the problem of attrition which is common with genuine panel data sets. This is because cohort data is selected from a fresh sample each time. Therefore, with a genuine panel there is always a risk that the data will become increasingly unrepresentative as attrition takes its toll especially in the early years. This is not the case with a cohort panel. Additionally, the cohort panel is less susceptible to measurement errors given the fact that the quantity being tracked is essentially an average[8]. However, Ackah (2009) argues that one major disadvantage of using a cohort panel is that in some instances, problems may arise if they are significant changes in the sampling design or if probabilities of selection into the sample depend on characteristics such as age.

Generally, cohorts can be constructed using any characteristic[9]. But for purposes of this study, we construct the cohorts by grouping households together based on three common characteristics, namely; age of household head, gender of

[8] This is why Deaton (1985) argues that in essence cohort methods can be regarded as instrumental variables methods where the instruments are grouping variables whose application averages away the measurement error.

[9] Inevitably, there is an apparent tradeoff between cohort size and cohort number. Typically, if the cohort size is large or if it contains a large number of households, then the number of cohort groups will be small which implies a small cross sectional dimension for the panel. Conversely, if the number of cohort groups is large, then the cohort will contain small number of households implying a large cross-sectional dimension for the panel with the risk that the cohort may not be representative of the household type (Ackah, 2009).

household head and the province in which the household head resides[10]. The household data that we use comes from the LCMS of which we use five of the existing rounds of surveys to construct the pseudo panel. The surveys were carried out for the following years: 1996, 1998, 2004, 2006 and 2010.

A key feature of the approach is that we are interested in households with heads who are in the working age group, but we account for the fact that the surveys are two, six, two and four years apart. Thus, we add the years apart with the previous survey. This implies that for the first cross section (1996) the sample only includes households whose heads are aged between 18 and 62, the second cross section (1998) includes only households whose heads are aged between 20 and 64 (adding two years), the third cross section (2004) includes households with heads aged between 26 and 70 (adding six years), the fourth cross section (2006) includes households with heads aged between 28 and 72 (adding two years) and finally the fifth cross section (2010) includes only households with heads aged between 30 and 76 (adding two years). We define generational cohorts using five-year bands resulting in nine birth cohorts. This implies that the first cohort studied was aged between 18 and 22 in 1996, 20 and 24 in 1998, 26 and 30 in 2004, 28 and 32 in 2006 and 32 and 36 in 2010[11].

A key issue that arises in studies such as this concerns the choice of appropriate measure of welfare. A number of studies adopt per adult equivalent consumption expenditure as a measure of welfare because of its ability to capture differences in need by age and economies of scale in consumption (Deaton 1985; Leyaro 2010; Ackah 2009). Thus, in the same spirit, we model per adult equivalent consumption expenditure for a household, which is adjusted for variations in prices between localities and overtime (i.e. real per adult equivalent consumption expenditure) as a proxy for household welfare. The approach is to model the natural logarithm of welfare (see Deaton 1985). Therefore, the estimation equation is formulated as follows:

$$\ln w_{it} = \alpha + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 hsize_{it} + \beta_4 educ_{it} + \beta_5 urban_i + \beta_6 ecoz_i + \delta_1 policyrate_{jt} + \mu_{it} \quad (3)$$

where subscripts i and t denote households and survey years respectively, age denotes age of household head at the time of the survey, age^2 is squared age, $hsize$ is the size of the household, $educ$ is education of the household head, $urban$ is a 0/1 location dummy (1 for urban household and 0 for rural households), $ecoz$ is agro-climatic zones, $policyrate$ is the BoZ policy interest rate in year t and μ is the error term. We use age^2 to capture the life cycle effects.

This model is both linear and static in specification. But as discussed above, all survey data suffers from the problem of unmeasured or unobservable individual heterogeneity and therefore estimations based on such specification may be flawed. Ackah (2009) argues that a pooled analysis of the raw household data

[10] It is worth noting here that of the three characteristics, gender and province (9 provinces) are essentially fixed while the span of age is more amenable to manipulation

[11] Thus, we end up with 162 representative households in the pseudo panel.

based on equation (3) may be flawed or inconsistent because not only does it fail to account for unobservable differences between households but also because it assumes that repeated observations on each household are independent. To address this problem, we reformulate equation (3) by organizing into cohorts and thereby allowing us to account for household's sector and time heterogeneity. Thus, we obtain the following equation:

$$\ln w_{it} = \alpha + \beta_1 age_{it} + \beta_2 age_{it}^2 + \beta_3 hsize_{it} + \beta_4 educ_{it} + \beta_5 urban_i + \beta_6 ecoz_i + \delta_1 policyrate_{jt} + f_c + \lambda_j + \gamma_t + \varepsilon_{it} \quad (4)$$

where f_c is the cohort (c) fixed effect, λ_j is the fixed effect for the household's sector (j) affiliation, γ_t is the year (t) fixed effect and ε is the error term. Year fixed effects are included to absorb economy-wide shocks (such as technological change) that may affect welfare while sector dummies control for sector-specific effects and cohort fixed effect captures unobserved heterogeneity. Following Deaton (1985) and recent pseudo panel data literature, we take cohort averages of all variables and estimate (4) based on the cohort means as follows:

$$ln\overline{w}_{ct} = \alpha + \beta_1 \overline{age}_{ct} + \beta_2 \overline{age}_{ct}^2 + \beta_3 \overline{hsize}_{ct} + \beta_4 \overline{educ}_{ct} + \beta_5 \overline{urban}_{ct} + \beta_6 \overline{ecoz}_{ct} + \delta_1 \overline{policyrate}_{ct} + \bar{f}_{ct} + \bar{\lambda}_{ct} + \bar{\gamma}_{ct} + \bar{\varepsilon}_{ct} \quad (5)$$

With regards to the estimation strategy, equation (5) can be estimated by using either random effects or fixed-effects estimators. The choice between random effects or fixed effects estimator is informed by an appropriate test statistic such as the Hausman test. In principle, the random-effects (RE) estimator generates consistent parameter estimates if the individual effects are uncorrelated with the other explanatory variables. The fixed-effects (FE) estimator is also consistent under this assumption, but is less efficient. However, if the individual effects are correlated with other explanatory variables, only the fixed effects estimator is consistent (Green, 2002). Therefore, for purposes of this study, we used both methods to estimate (5) and report diagnostics to evaluate the estimators.

Given our current specification in (5), an issue that naturally arises is whether dynamics are important and if so, how should they be modelled in this framework? The model that we have specified so far assumes that preferences are time separable[12]. However, in the 1990's there emerged a group of researchers who pioneered a class of time-separable preferences (Deaton, 1997; Fuhrer, 2000). The key element of such non-separable preferences is that they exhibit habit formation or persistence where current utility depends not only on current consumption, but also on a habit stock formed from past consumption. Hence, dynamics become important[13]. Ackah (2009) contends that a dynamic specification can be justified on the grounds that households might incur short

[12] Time-separability of utility means that past work and consumption do not influence current and future tastes. Barro and King (1982) contend that this form of preferences does not restrict the size of intertemporal-substitution effects as we can still have a strong response of labor supply to temporary changes in wages but that there are important constraints on the relative responses of leisure and consumption to changes in relative-price and in permanent income.

[13] If dynamics matter in this manner, then it follows that equation (5) is dynamically misspecified.

term costs resulting from policy changes due to rigidities. It may also take time to adjust to any policy shocks such as switching jobs from industries whose wages are declining to ones where wages are rising. Thus, we reformulate equation (5) to incorporate dynamics by introducing a lagged dependent variable (w_{ct-1}) as an additional regressor[14].

$$ln\overline{w}_{ct} = \alpha + \beta_1\overline{age}_{ct} + \beta_2\overline{age}^2_{ct} + \beta_3\overline{hsize}_{ct} + \beta_4\overline{educ}_{ct} + \beta_5\overline{urban}_{ct} + \beta_6\overline{ecoz}_{ct} + \delta_1\overline{policyrate}_{ct} + \beta_7\overline{w}_{ct-1} + \bar{f}_{ct} + \bar{\lambda}_{ct} + \bar{\gamma}_{ct} + \bar{\varepsilon}_{ct} \quad (6)$$

where *educ* denotes four mutually exclusive educational dummies[15] (no education, basic, secondary and tertiary) for the education qualification category of the household head. Basic is where the household head has attained some primary or junior high school education, secondary is household heads with high school or post-secondary education and tertiary is household heads with graduate level education. Here, no education is the omitted category.

4. Data Description and Summary Statistics

In this section we describe the data and the main features of the variables that are relevant for the subsequent econometric analysis. The main data set used in this study is the LCMS which was carried out by the Central Statistics Office (CSO) in 1996, 1998, 2004, 2006 and 2010[16]. These data sets attempt to capture some of the salient features of the Zambian population based on some of the sub-groups of the population[17]. They cover a spectrum of topics pertinent to the Zambian population (both at household and individual level) such as education, health, economic activities, employment, child nutrition, death in the households, income generation, food production, household consumption expenditure, access to clean water, sanitation, housing, transport, banks, credit facilities and markets. The second data set used in this study is the BoZ interest rate data for years

[14] Ideally we would want to directly model the dynamics but unfortunately this is very difficult without panel data as discussed in the section earlier.

[15] After taking cohort means, the education dummy variables essentially become proportional variables where every value for each of these variables is interpreted as the proportion in the cohort with that level of education (see Russell and Fraas, 2005). This makes sense because any given cohort will usually contain both individuals with the characteristics and individuals without the characteristics.

[16] Although the 2015 LCMS is available, it is not utilised in this study due to compatibility challenges. This notwithstanding, revised versions of this study may utilise the 2015 survey if the compatibility issue is resolved.

[17] The LCMS uses a standard methodology, which involves a sample of households differentiated by Census Supervisory Areas (provinces) and Standard Enumeration Areas (districts). The sampled households are further classified according to strata based on property values of their neighborhoods (for urban areas) and type of agriculture activity that the household is involved in (for rural areas). This results in seven strata, namely; rural small-scale agricultural households, rural medium-scale agricultural households, rural large-scale agricultural households, rural non-agricultural households, urban low-cost housing residential areas, urban medium-cost housing residential areas and urban high-cost housing residential areas (CSO, 2010).

corresponding to the survey years. We construct a database of annual interest rate data for the year 1996, 1998, 2004, 2006 and 2010. In this study, we refer to this interest rate data set as the BoZ policy rate[18]. Additionally, we also obtain gender disaggregated descriptive statistics from the 2012 Labour Force Survey (LFS).

The sample of households is selected conditional on the household head working so as to allow for the effects of monetary policy conditional on being in the labor force to be examined[19]. Thus, nonworking households are excluded. The selected households are then mapped to their respective sectors using the sector of main employment for the household head. The key household variables used include a set of demographic variables, variables pertaining to educational attainment, household size, agro-climatic zones as well as linear and quadratic terms in the age of the household head to help capture possible life cycle effects. We also include dummy variables for agro-climatic zones, location, sectors and survey-year. The agro-climatic dummies are included to control for the effects of agro-ecological zone characteristics on household welfare while the survey-year dummies allow us to establish if there were any significant changes in household welfare between the periods under study. In addition, the sector dummies allow us to ascertain if there are important differences in household welfare due to sector heterogeneity. Using the information on highest qualification attained, we define four education indicators, namely; No education, Basic education, Secondary education and Tertiary education.

Summary Statistics from the Living Conditions Monitoring Survey

Table 1 presents summary statistics for the key variables that are used in the econometric estimations. The variables included are log welfare (proxied by real per adult equivalent consumption expenditure), age of head, age of head squared and household size. We also include skill classification based on four levels of education attainment defined above.

[18] Technically, the BoZ Policy Rate was introduced in 2012 (see previous section). In the years prior to 2012, the interest rate on the 91-Day Treasury bill serves as the proxy for the Policy Rate. (need justification)

[19] It was highlighted in the previous section that the structure of the labour market and its dynamics is at the core of this debate.

Table 1: Summary Statistics

	1996		1998		2004		2006		2010	
Variable	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*	*Mean*	*Std. Dev*
Log Welfare	10.2	1	10.4	1.1	11.5	1.1	11.6	1	12.1	1
Age of Head	40.6	13.2	40.8	13.1	41	13.1	41.2	12.9	40.7	12.4
HH Size	5.2	3	5.8	4.1	5.3	2.9	5.5	2.9	5.3	2.7
No Education	0.3	0.4	0.2	0.4	0.3	0.4	0.2	0.4	0.2	0.4
Basic Education	0.5	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.4	0.5
Secondary Education	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4
Tertiary Education	0	0.1	0.1	0.3	0.1	0.3	0.1	0.3	0.2	0.4

Source: Author's calculation from Living Conditions Monetary Survey for 1996, 1998, 2004, 2006 and 2010.
Note: The reported figures are weighted using survey weights

The table shows that the average age of the household head is 40 across the survey years while the average household size is 5. The category no education and basic education accounts for approximately 60 percent of all household heads in the respective survey. Interestingly, there has been a marked improvement in the share of heads attaining tertiary education, rising by 19 percent over the years. This is explained by the fact that Zambia has experienced significant increase of both private and public higher learning institutions. However, the share of heads with secondary education has remained stable around 17 percent.

Table 2 provides more insight into the evolution of welfare over the period under review by decomposing welfare by gender. The results show that except for 1996, women have consistently reported a higher figure than men for all of the survey years. The table shows that between the period 1996 to 2010, women's welfare increased by 710 percent in nominal terms compared to 641 percent for men.

Table 2: Decomposition of Welfare by Gender

	Welfare			
	All Households	*Men*	*Women*	*Women/Men*
1996	43,380	43,863	41,720	0.95
1998	61,125	60,331	63,860	1.06
2004	178,320	177,778	198,658	1.12
2006	186,073	185,054	215,503	1.16
2010	327,305	325,108	338,312	1.04

Source: Author's calculation from Living Conditions Monetary Survey for 1996, 1998, 2004, 2006 and 2010

Table 3 shows the policy rate trend proxied by the 91-day Treasury bill rate. The table shows that the interest rates were very high in the earlier part of the study period averaging about 52% in 1996. The rates subsequently declined to about 6.6% in 2010. The trend of the interest rates over the period is perhaps not surprising given that the 1990's was generally characterised by high inflation

episodes and thus the central bank instituted tight monetary condition to rein in inflation.

Table 3: Policy rate trend

	Policy Rate (%)
1996	52.6
1998	33.1
2004	13.1
2006	11.5
2010	6.6

Source: Author's calculation from Bank of Zambia data base.

During the period under review, wage employment declined significantly from 38.7 percent in 1996 to 30.2 percent in 2004 before rising to 35.6 percent in 2010 (see Table 4). This trend in wage employment is consistent with the retrenchments which were experienced in Zambia with the advent of economic reforms such as Structural Adjustment Programs (SAP) and privatisation of state-owned enterprises in the 1990's.20 After 2004 the economic reforms began yielding some positive results leading to strong recovery in wage employment by 2010. The trend in GDP growth seems to be in support of this, with growth falling from 6.9 percent in 1996 to 3.5 percent in 2000 and then recovering to 7.6 percent in 2010. We also observe that agriculture production rose sharply from 36.9 percent in 1996 to 46.8 percent in 2004 before declining to 35.8 percent in 2010. The trend in agriculture production mirrors that of wage employment; when wage employment was declining between the period 1996 to 2004, agriculture production was rising, and when wage employment was rising between the period 2004 to 2010, agriculture production was declining. This evidence seems to suggest that when wage employment fell due to retrenchments, those that could not find wage employment were absorbed into agriculture production and later when wage employment recovered it pulled people out of agriculture production. Self-employment in the non-agriculture sector has also grown steadily from 15.4 percent in 1996 to 18.3 percent in 2010.

Table 4: Economic Activity (% of Households)

Activity	**1996**	**1998**	**2004**	**2006**	**2010**
Wage employment	38.7	33.5	30.2	30.4	35.6
Self-employment (Non-Agric)	15.4	15.8	15.2	17.0	18.3
Agriculture Production	36.9	39.6	46.8	42.7	35.8
Unemployed	4.4	4.9	4.3	5.7	6.6
Full-time student	0.3	0.2	0.2	0.4	0.0
Homemaker	1.4	2.2	0.7	0.6	1.0
Inactive	2.9	3.0	2.7	3.2	2.7
All	100	100	100	100	100

[20] SAPs include downsizing of the civil service, adding to loss of formal employment

Source: Author's calculation from Living Conditions Monetary Survey for 1996, 1998, 2004, 2006 and 2010.
Note: The reported figures are weighted using survey weights

More tellingly, sector shares of employment show that employment in the agriculture related sectors is much larger than employment in the manufacturing sectors (see Table 5). Food crop agriculture accounts for the largest share of employment averaging 30 percent over the period followed by mixed farming agriculture with an average share of 13.1 percent. Manufacture of food and beverages accounts for about 2 percent of employment while other manufacturing and wood and paper processing accounts for 2 and 0.8 percent of employment, respectively.

Table 5: Sector Share of Employment (% of Households)

		Survey year				
No.	**Sector**	**1996**	**1998**	**2004**	**2006**	**2010**
1	*Food Crops*	33.5	36.7	31.8	29.0	26.7
2	*Livestock*	0.2	0.3	0.4	0.3	0.7
3	*Mixed Farming*	8.1	8.2	18.3	18.0	12.7
4	*Fishing*	1.7	3.2	2.5	2.4	1.7
5	*Mineral Products*	0.2	0.2	0.6	2.1	0.3
6	*Manufactured Food and Beverages*	2.4	2.0	1.6	2.0	1.6
7	*Textile*	1.1	0.9	0.7	0.8	0.5
8	*Chemicals, Rubber and Plastics*	0.7	0.5	0.5	0.4	0.3
9	*Wood and Paper*	1.3	1.1	1.0	1.0	0.7
10	*Other Manufacturing*	2.3	1.9	1.3	1.7	2.3
11	*All other sectors (non-traded)*	48.5	45.0	41.3	42.3	52.4
Total		100	100	100	100	100

Source: Author's calculation from Living Conditions Monetary Survey for 1996, 1998, 2004, 2006 and 2010.
Note: The reported figures are weighted using survey weights

Tables 6 and 7 show the level of education by economic activity of the household head for 1996 and 2010. The Tables show that the majority of households engaged in agriculture have attained utmost basic education (96 and 90 percent in 1996 and 2010, respectively). This is also true for those engaged in self-employment in the non-agriculture sectors (83 and 65 percent in 1996 and 2010, respectively). There has been a marked increase in heads with tertiary education between 1996 and 2010 (41 percent for wage employment) consistent with the observation that there has been a marked expansion in tertiary education in Zambia.

Table 6: Level of Education by Household Economic Activity, 1996

	Education Attained				
Activity	***None***	***Basic***	***Secondary***	***Tertiary***	***All***
Wage employment	0.1	0.5	0.4	0.0	1.0
Self-employment (Non-Agriculture)	0.2	0.6	0.2	0.0	1.0
Agriculture Production	0.5	0.5	0.0	0.0	1.0
Unemployed	0.2	0.6	0.2	0.0	1.0
Full-time student	0.3	0.0	0.7	0.0	1.0
Homemaker	0.4	0.6	0.0	0.0	1.0
Inactive	0.4	0.4	0.2	0.0	1.0

Source: Author's calculation from Living Conditions Monetary Survey for 1996.
Note: The reported figures are weighted using survey weights

Table 7: Level of Education by Household Economic Activity, 2010

	Education Attained				
Activity	***None***	***Basic***	***Secondary***	***Tertiary***	***All***
Wage employment	0.1	0.3	0.3	0.4	1.0
Self-employment (Non-Agriculture)	0.1	0.5	0.2	0.1	1.0
Agriculture Production	0.3	0.6	0.1	0.0	1.0
Unemployed	0.1	0.5	0.3	0.1	1.0
Full-time student	0.2	0.2	0.6	0.0	1.0
Homemaker	0.4	0.4	0.2	0.1	1.0
Inactive	0.3	0.3	0.1	0.3	1.0

Source: Author's calculation from Living Conditions Monetary Survey for 2010.
Note: The reported figures are weighted using survey weights

This evidence is corroborated by Tables 8 and 9 (see Appendix Table A1 –A3 for 1998, 2004 and 2006 surveys) which show the level of education by sector for 1996 and 2010. As expected, manufacturing sector has a larger share of heads with secondary education compared to agriculture sectors. The chemical, rubber and plastics sector has the largest share of heads with secondary education followed by mineral products sector.

Table 8: Level of Education by Sector, 1996

		Education Level				
No.	*Sector*	*No Educ*	*Basic*	*Secondary*	*Tertiary*	*Total*
1	*Food Crops*	50.7	45.6	3.6	0.2	100
2	*Livestock*	28.6	52.4	14.3	4.8	100
3	*Mixed Farming*	47.7	45.5	6.2	0.6	100
4	*Fishing*	42.0	52.2	5.1	0.6	100
5	*Mineral Products*	17.4	52.2	30.4	0.0	100
6	*Manufactured Food and Beverages*	23.6	56.2	19.3	0.9	100
7	*Textile*	9.7	61.2	29.1	0.0	100
8	*Chemicals, Rubber and Plastics*	4.3	42.9	51.4	1.4	100
9	*Wood and Paper*	15.5	55.3	29.3	0.0	100
10	*Other Manufacturing*	12.2	60.2	27.0	0.0	100
11	*All other sectors (non-traded)*	11.7	48.7	38.4	1.2	100

Source: Author's calculation from Living Conditions Monetary Survey for 1996.
Note: The reported figures are weighted using survey weights

Table 9: Level of Education by Sector, 2010

		Education Level				
No.	*Sector*	*No Educ*	*Basic*	*Secondary*	*Tertiary*	*Total*
1	*Food Crops*	29.9	58.3	8.5	3.4	100
2	*Livestock*	10.7	46.3	27.3	15.7	100
3	*Mixed Farming*	32.0	56.4	6.8	4.8	100
4	*Fishing*	31.9	63.9	3.2	1.0	100
5	*Mineral Products*	5.1	28.8	28.8	37.3	100
6	*Manufactured Food and Beverages*	10.8	49.1	24.0	16.0	100
7	*Textile*	8.5	63.8	18.1	9.6	100
8	*Chemicals, Rubber and Plastics*	0.0	11.7	31.7	56.7	100
9	*Wood and Paper*	8.1	65.9	20.3	5.7	100
10	*Other Manufacturing*	8.9	43.5	30.3	17.3	100
11	*All other sectors (non-traded)*	7.9	37.5	22.9	31.8	100

Source: Author's calculation from Living Conditions Monetary Survey for 2010.
Note: The reported figures are weighted using survey weights

Summary Statistics from the 2012 Labour Force Survey

The LFS which is also conducted by the CSO provides some very useful gender disaggregated information on the labour market such as labour force participation rates, unemployment/employment and earnings. Table 10 shows the labour force participation rates by sex and rural / urban decomposition for the year, 2012[21]. It

[21] Labour force is the total number of persons aged 15 years and older who are employed, and who are unemployed but available for work during the specified period of time. Labour force

shows that the national labour force participation rate was 75.9 percent and that the participation rate for females was higher at 76.3 percent than that for males at 75.5 percent. In terms of decomposition by rural/urban, the labour participation rate in rural areas was higher for women (81.4 %) than for men (77.2%) while in the urban areas it was lower for females (69.8%) than for males (73.3%).

Table 10: Labour Force Participation Rates by Sex and Rural/Urban, 2012

Sex	*Total*	*Rural*	*Urban*
Both Sexes	75.9	79.3	71.5
Female	76.3	81.4	69.8
Male	75.5	77.2	73.3

Source: Labour Force Survey for 2012.

Table 11 shows the distribution of employed persons by industry and gender. It indicates that agriculture, forestry and fishing industry had the highest percentage of employed persons at 52.2 percent followed by the activities of household as employers at 13.1 percent. The table highlights the sector disaggregation by gender that exists in the economy with males being more concentrated in the manufacturing, transport and construction sectors while females are concentrated in sectors such as activities of households as employers, education, human health and social work as well as other services.

participation rate (Activity Rate) is the proportion of the economically active population in relation to the total working age population.

Table 11: Distribution of Employed Persons by Sector and Gender, 2012

Industry	*Total*		*Male*		*Female*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Zambia Total	5,499,673.0	100.0	2,702,410.0	100.0	2,797,263.0	100.0
Agriculture, forestry & fishing	2,872,331.0	52.2	1,377,628.0	51.0	1,494,703.0	53.4
Mining and quarrying	88,251.0	1.6	75,807.0	2.8	12,444.0	0.4
Manufacturing	216,660.0	3.9	150,406.0	5.6	66,254.0	2.4
Electricity, gas, steam and air conditioning supply	12,211.0	0.2	9,628.0	0.4	2,583.0	0.1
Water Supply Sewerage, waste management and	14,790.0	0.3	7,644.0	0.3	7,147.0	0.3
Construction	187,906.0	3.4	180,403.0	6.7	7,504.0	0.3
Trade, Wholesale & retail distribution	645,571.0	11.7	297,637.0	11.0	347,934.0	12.4
Transport and Storage	137,301.0	2.5	126,702.0	4.7	10,599.0	0.4
Accommodation and food service activities	62,671.0	1.1	29,105.0	1.1	33,565.0	1.2
Information and communication	42,104.0	0.8	24,162.0	0.9	17,942.0	0.6
Financial and Insurance Activities	14,941.0	0.3	7,899.0	0.3	7,042.0	0.3
Real estate Activities	7,257.0	0.1	3,558.0	0.1	3,699.0	0.1
Professional, Scientific and technical activities	19,378.0	0.4	12,656.0	0.5	6,722.0	0.2
Administration and support services	57,801.0	1.1	49,856.0	1.8	7,945.0	0.3
Public Administration and Defence, Compulsory social	60,750.0	1.1	47,403.0	1.8	13,347.0	0.5
Education	150,215.0	2.7	77,511.0	2.9	72,704.0	2.6
Human Health and Social work	62,180.0	1.1	26,050.0	1.0	36,130.0	1.3
Arts, Entertainment and Recreation	10,267.0	0.2	7,496.0	0.3	2,772.0	0.1
Other service activities	110,550.0	2.0	46,476.0	1.7	64,074.0	2.3
Activities of household as Employers	722,524.0	13.1	141,545.0	5.2	580,979.0	20.8
Activities of extraterritorial organization and bodies	4,016.0	0.1	2,840.0	0.1	1,177.0	0.0

Source: Labour Force Survey for 2012.

Table 12 provides a decomposition of average monthly earning by formal/informal employment and by gender. It shows that workers in formal employment earned a monthly average salary of K2,630.12 while those in informal employment earned a monthly average salary of K1,513.51. In terms of disaggregation by gender, it shows that females in formal employment had higher average monthly earnings of K3,102.67 compared to their male counterparts who had a monthly average earning of K2,444.70. On the other hand, males who were in informal employment had higher average monthly earnings of K1,861.48 compared to their female colleagues whose average earnings were K905.13.

Table 12: Average Monthly Earnings (ZMW) by Formal/informal Employment by Gender, 2012

	Total	***Formal***	***Informal***
Number of Paid Employees	2,864,498	625,305	2,239,193
Monthly Average Earnings (ZMW)	1,724.11	2,630.12	1,513.51
Men	1,981.66	2,444.70	1,861.48
Female	1,245.16	3,102.69	905.13

Source: Labour Force Survey for 2012.

5. Econometric Results

In the results section, we present results for the effects of monetary policy on the welfare of all household as well as the results for the welfare of women and men separately.

Effect of Monetary Policy on Household Welfare

Table 12 presents estimates for both Pooled OLS (POLS) based on equation (3) and cohort panel using Random Effects (RE) based on equation (4). RE is chosen on the basis of Hausman test. We present three alternative specifications for both POLS and RE.

Table 12: Linear Static Regression

	Pooled OLS	*Pooled OLS*	*Pooled OLS*	*RE*	*RE*	*RE*
	1	*2*	*3*	*4*	*5*	*6*
AgeHead	-0.08***	-0.08***	-0.08***	-0.07***	-0.07***	-0.07***
	(-6.11)	(-4.96)	(-5.47)	(-4.78)	(-4.4)	(-4.59)
AgeHead^2	0.00***	0.00***	0.00***	0.00***	0.00***	0.00**
	(-6.01)	(-4.75)	(5.19)	-4.93	-4.46	-4.67
Hhsize	0.08**	0.09	0.09**	0.05*	0.06**	0.05*
	(-3.22)	(-3.52)	(3.40)	-1.73	-2.24	-1.9
Urban	-0.06	-0.15	-0.08	0.01	-0.04	0.01
	(-0.51)	(-1.07)	(-0.6)	-0.04	(-0.31)	-0.09
Basic	0.19	0.44	0.48	0.1	-0.31	-0.3
	(0.70)	(1.29)	(1.50)	(0.35)	(-0.85)	(-0.89)
Secondary	0.01	-0.29	-0.12	-0.1	-0.36	-0.14
	-0.03	(-0.71)	(-0.31)	(-0.23)	(-0.78)	(-0.31)
Tertiary	2.23***	2.15**	2.01***	1.95***	1.9***	1.89***
	(-5.04)	(-4.32)	(4.10)	-4.31	-3.67	-3.87
Policy Rate	-0.03***	-0.03**	-0.03**	-0.02***	-0.02*	-0.02**
	(-5.24)	(-3.09)	(-3.12)	(-4.2)	(-1.94)	(-2.05)
AGR			-0.38***			-0.28***
			(-15.53)			(-10.41)
Moderate Rainfall	0.01	0.06	0.02	-0.05	0.00	-0.05
	(-0.26)	(-1.15)	(0.50)	(-0.95)	-0.06	(-0.82)
High Rainfall	0.07	0.08*	0.07	0.01	0.04	0.00
	-1.56	-1.78	1.58	-0.16	-0.63	-0.08
Constant	12.34***	12.65***	12.64	12.13***	12.23***	12.20***
	-45.21	-32.87	33.39	-42.11	-29.87	-30.48
Year Dummies	All	All	All	All	All	All
Sector Dummies	None	All	Non-Agric	None	All	Non-Agric
F-Test	0	0	0			
R^2	0.40	0.48	0.45			

Columns 1 and 4 present results without controlling for sector specific effects. The argument is that monetary policy may have asymmetric effects on sectors (Gaiotti and Generale, 2001). The coefficient on policy rate is negative and statistically significant for both POLS and RE. In Columns 2 and 5, we present results using an alternative specification that includes sector dummies for all the ten traded sectors to examine if unobserved sector heterogeneity is important. The coefficient on policy rate remains negative and is still statistically significant. This suggests that there is no unobserved sector heterogeneity effect on welfare in the previous estimates. Lastly, Column 3 and 6 presents results after controlling for general sector differences by introducing a dummy AGR = 1 if the head of the household is in agriculture and zero otherwise. Given that agriculture in general accounts for the largest share of employment (see Tables 4 and 10), it might be the case that the coefficient on policy rate is simply just capturing an agriculture effect. Thus, to control for this possibility, it seems reasonable to introduce the agriculture dummy. Hence, under this alternative specification, the coefficient on policy rate just captures manufacturing while the coefficient on the AGR =1

dummy captures the agriculture effect. The coefficient on policy rate remains negative and statistically significant while the coefficient on AGR = 1 is also negative and statistically significant.

Notably, the alternative specifications leave most other coefficients largely unaffected. The negative and statistically significant coefficient on policy rate suggests that lower policy rate is associated with higher income. In other words, welfare is higher for households when monetary policy is expansionary regardless of the sectors in which they are employed. The converse is true that increasing the policy rate lowers welfare among households regardless of the sectors in which they are employed. Notwithstanding the results in Table 12, we can be sceptical about the static nature of the estimates. Thus, we re-estimate by introducing dynamics (lagged dependent variable) based on equation (6) and examine for further evidence of the impact of monetary policy on welfare. Table 13 presents the results for the dynamic estimations.

The main problem encountered when estimating dynamic specifications from repeated cross sections is that the true value of the lagged dependent variable (lagged welfare) is unobserved due to the fact that the same individuals are not tracked over time. For pseudo-panels, different approaches have been suggested as a way of getting around this hurdle (Moffit, 1993). However, in line with Leyaro (2010), the lagged dependent variable we use in this study is simply the welfare of the representative household cohort in the previous survey. This approach makes sense because we are tracking cohorts over time. Since we are using a pseudo-panel comprising of five rounds of survey (1996, 1998, 2004, 2006 and 2010), it follows that we have four rounds of survey for estimation.

Table 13: Linear Dynamic Regression

	RE 1	***RE 2***	***RE 3***	***RE 4***
Lag Welfare	0.187***	0.187***	0.186***	0.184***
	(13.390)	(13.280)	(13.220)	(13.12)
AgeHead	-0.083***	-0.085***	-0.078***	-0.057***
	(-4.130)	(-4.260)	(-3.800)	(-2.64)
$AgeHead^2$	0.001***	0.001***	0.001***	0.001***
	(4.500)	(4.580)	(4.030)	(2.87)
Hhsize	0.142***	0.154***	0.137***	0.113***
	(4.040)	(4.230)	3.81	(3.07)
Urban	0.873***	0.806***	0.841***	0.674***
	(5.090)	(4.330)	(4.98)	(3.79)
Policy Rate	-0.030**	-0.028*	-0.031**	-0.018***
	(-2.160)	(-1.940)	(-2.190)	(-2.27)
No Education	0.075			
	(0.200)			
Basic		-0.492		
		(-1.090)		
Secondary			-0.711	
			(-1.260)	
Tertiary				2.055***
				(3.05)
Moderate Rainfall	0.114	0.091	0.127*	0.091
	(1.530)	(1.190)	(1.690)	(1.23)
High Rainfall	0.176**	0.164**	0.176**	0.153**
	(2.550)	(2.340)	(2.570)	(2.25)
Constant	10.821***	11.01***	10.889***	9.988***
	(23.060)	(23.320)	(23.370)	(18.04)
Year Dummies	All	All	All	All
Sector Dummies	All	All	All	All
F-Test	0	0	0	0

The results in Table 13 show that the coefficient of the lagged welfare variable is positive and statistically significant, with an average magnitude of 0.186. This suggests that there is a tendency (albeit mildly) for increasing income inequality. Table 13 provides robust evidence regarding the effects of the policy rate on welfare and confirms the results of the static model. The coefficient on policy rate is negative and statistically significant implying that welfare responds negatively to policy rates, so that policy rate reductions would lead to an increase in welfare. In other words, welfare would be lower for households in episodes of monetary contraction. Thus, we again find a negative and statistically significant relationship between the policy rate and household welfare and this relationship is robust to different specifications. The estimated effect of monetary policy on welfare ranges from -0.018 to -0.030.

Not surprisingly, higher education is associated with higher incomes with the coefficient on tertiary education being positive and statistically significant. This implies that compared to those with no education, households with tertiary education tend to have a higher level of welfare. The results show that larger households tend to be associated with higher income with the impact ranging from 0.05 to 0.09 while living in urban areas is associated with higher income with the impact reaching as high as 0.87 for the dynamic estimations. Surprisingly, residing in one of the three ecological zones does not seem to be important except when we introduce dynamics (results are relative to low rainfall region). The coefficient on the high rainfall ecological zone is positive and statistically significant with a magnitude of about 0.153 to 0.176. This implies that being located in the high rainfall zone is associated with an increase in welfare of about 15.3 to 17.6 percent.

Gender Differentiated Effects of Monetary Policy on Household Welfare

As alluded to earlier, literature is awash with studies that contend that monetary policy may affect women disproportionately different from men (see Elson,1995; Braunstein and Heintz, 2006). Thus, in this section we estimate the effects of monetary policy on the welfare of women and men separately. This is to allow us to assess whether monetary policy affects women differently. Table 14 presents the static results while Table A4 in the appendix provides the dynamic results respectively.

Table 14 presents estimates for both pooled OLS (POLS) based on equation (3) and cohort panel using Random Effects (RE) based on equation (4). Again, RE is chosen on the basis of Hausman test. Here we present two alternative specifications for both POLS and RE. The alternative specifications rule out the possibility of unobserved sector heterogeneity effects suggesting that the effect of monetary policy on women is not dependent on the sector of employment. This is in conformity with the conclusion in the previous section. The coefficient on the policy rate is negative and statistically significant with a magnitude ranging between 0.047 to 0.064 and averaging 0.0555. This suggests that lowering the policy rate is associated with higher income for women. Thus, it is expected that when the central bank conducts expansionary monetary policy, the welfare of women will improve together with the rest of the economy. Conversely, when the central bank conducts contractionary monetary policy by increasing the policy rate, the welfare of women will reduce. Similarly, for men, the coefficient on the policy rate is negative and statistically significant.

The average size of the coefficient on the policy rate is bigger for women than what we obtained for men. This may not be so surprising given the fact that the descriptive statistics in the previous section show that the women's average earnings in the formal sector are higher than for their male counterparts. This result is similar to the findings from Takhtamanova and Sierminska (2009) who found that the impact of monetary policy did not differ across gender. The dynamic results presented in Appendix Table A4 render support to the static result as they also show that the welfare of women increases with a decline in the policy rate and vice versa.

Table 14: Linear Static Regressions by Gender

	Regressions for Women				*Regressions for Men*			
	Pooled OLS	***Pooled OLS***	***RE***	***RE***	***Pooled OLS***	***Pooled OLS***	***RE***	***RE***
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***
AgeHead	-0.011	-0.117***	-0.014	-0.096***	0.012**	0.046***	0.000	0.000
	(-0.680)	(-8.550)	(-0.740)	(-6.720)	(2.460)	(14.260)	(0.050)	(-0.100)
$AgeHead^2$	0.000	0.001***	0.000	0.001***	0.000***	-0.001***	0.000	0.000
	(0.350)	(9.370)	(0.570)	(7.470)	(-3.490)	(-19.810)	(-0.540)	(-1.030)
Hhsize	0.012	0.065**	0.019	0.046	0.089***	0.077***	0.048**	0.036**
	(0.430)	(2.520)	(0.630)	(1.630)	(5.250)	(5.140)	(2.470)	(2.060)
Urban	0.281	1.044***	0.201	0.639***	0.056	0.702***	0.058	0.094
	(1.880)	(9.480)	(1.320)	(4.950)	(0.570)	(12.060)	(0.520)	(1.300)
Basic	0.087	0.710**	0.008	0.483	0.611***	0.293**	0.420**	0.309
	(0.300)	(2.470)	(0.030)	(1.520)	(3.680)	(2.030)	(2.390)	(1.870)
Secondary	-0.238	1.176***	-0.102	1.079***	0.126	0.033	0.112	-0.011
	(-0.650)	(3.790)	(-0.260)	(3.380)	(0.570)	(0.160)	(0.460)	(-0.050)
Tertiary	2.393***	1.973***	1.461*	-1.046	1.389***	1.428***	0.261	0.156
	(4.900)	(3.980)	(1.800)	(-1.150)	(7.410)	(8.670)	(1.190)	(0.800)
Policy Rate	-0.061***	-0.064***	-0.050***	-0.047***	-0.080***	-0.070***	-0.015***	-0.011**
	(-6.000)	(-12.490)	(-4.760)	(-8.460)	(-14.430)	(-13.720)	(-2.620)	(-2.120)
AGR		-0.380		-0.78**		0.729***		0.339
		(-0.820)		(-2.520)		(2.890)		(1.510)
Moderate Rainfall	0.034	-0.006	-0.008	-0.098	-0.021	-0.030	-0.013	-0.023
	(0.710)	(-0.130)	(-0.130)	(-1.780)	(-1.050)	(-1.890)	(-0.380)	(-0.770)
High Rainfall	-0.040	0.010	-0.076	-0.069	-0.020	0.007	0.019	0.014
	(-0.890)	(0.240)	(-1.350)	(-1.290)	(-1.010)	(0.500)	(0.600)	(0.520)
Constant	13.128***	14.017***	12.869***	13.290***	12.879***	11.765***	11.688***	11.622***
	(33.900)	(54.610)	(32.840)	(47.200)	(94.110)	(137.530)	(78.160)	(116.210)
Year Dummies	All	All	All	All	All	All	All	All
Sector Dummies	All	Non-Agric	All	Non-Agric	All	Non-Agric	All	Non-Agric
F-Test	0	0			0	0		
R^2	0.45	0.45			0.48	0.45		

6. Conclusions

The objective of this study was to investigate the impact of monetary policy on household incomes and to examine the possibility that its effect on income varies across gender. This is one of the first direct micro-econometric analysis of the impact of monetary policy on household welfare in Zambia. In the absence of panel data, we take advantage of the availability of repeated cross sections from five rounds of household budget surveys to apply pseudo-panel econometric techniques to these cross sections. We identified the sector of main employment for the household head and proceed to introduce a monetary policy variable to the LCMS for 1996, 1998, 2004, 2006 and 2010.

The econometric results provided evidence that monetary expansions (contractions) are associated with higher (lower) incomes for households employed in various sectors. They further show that the effect of monetary policy on household incomes holds regardless of the gender of the household head. As such women, like their male counterparts, are expected to experience increasing welfare in the event of an expansionary monetary policy and declining incomes in the face of a contractionary monetary policy. With regards to the magnitude of the impact, it was found that the effect was larger for women than for men. One possible explanation for this is the fact that out of the five survey's used to build the pseudo panel, four showed that the average income for the women was higher than for the men. Interestingly, the 2012 LFS also showed that the average earnings of women in the formal sector was higher than for men. All in all, the study demonstrates that as far as household welfare is concerned, monetary policy in Zambia does not discriminate by gender.

Though the study is not able to infer causal effects of policy rate on household income, it is informative about the relationship between the cross-section pattern of monetary policy and household income. However, there are some limitations inherent in this analysis. For instance, there is a possibility that the sector of main employment of the household head that we identified may not accurately represent the sector of activity for the household as a whole. This is simply because the household, when taken together as a group of adults, maybe engaged in more than one activity. Consequently, the observed relationship between policy rate and incomes will vary between sectors given the many unobserved determinants of sector performance even though our econometric specifications account for this by using sector dummies. Hence, caution is required in interpreting the results.

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Appendix

Table A1: Level of Education by Sector, 1998

		Education Level				
No.	*Sector*	*No Educ*	*Basic*	*Secondary*	*Tertiary*	*Total*
1	*Food Crops*	26.4	47.5	15.2	11.0	100
2	*Livestock*	15.4	50.0	21.2	13.5	100
3	*Mixed Farming*	24.8	48.0	15.8	11.5	100
4	*Fishing*	23.4	48.7	17.4	10.5	100
5	*Mineral Products*	21.2	60.6	18.2	0.0	100
6	*Manufactured Food and Beverages*	21.1	48.7	17.5	12.8	100
7	*Textile*	24.7	45.3	16.7	13.3	100
8	*Chemicals, Rubber and Plastics*	30.5	50.0	9.8	9.8	100
9	*Wood and Paper*	25.0	44.2	18.1	12.8	100
10	*Other Manufacturing*	26.1	49.5	14.5	10.0	100
11	*All other sectors (non-traded)*	23.0	47.9	17.2	11.9	100

Source: Author's calculation from Living Conditions Monetary Survey for 1998.
Note: The reported figures are weighted using survey weights.

Table A2: Level of Education by Sector, 2004

		Education Level				
No.	*Sector*	*No Educ*	*Basic*	*Secondary*	*Tertiary*	*Total*
1	*Food Crops*	25.8	46.9	17.4	9.9	100
2	*Livestock*	15.4	50.8	26.2	7.7	100
3	*Mixed Farming*	24.7	47.4	17.9	10.1	100
4	*Fishing*	20.7	49.8	20.2	9.3	100
5	*Mineral Products*	17.1	50.5	21.0	11.4	100
6	*Manufactured Food and Beverages*	23.6	47.5	20.3	8.5	100
7	*Textile*	16.2	54.9	16.2	12.7	100
8	*Chemicals, Rubber and Plastics*	29.6	44.4	17.3	8.6	100
9	*Wood and Paper*	21.2	49.7	23.3	5.7	100
10	*Other Manufacturing*	27.4	51.0	13.5	8.2	100
11	*All other sectors (non-traded)*	22.2	46.8	19.6	11.4	100

Source: Author's calculation from Living Conditions Monetary Survey for 2004.
Note: The reported figures are weighted using survey weights.

Table A3: Level of Education by Sector, 2006

		Education Level				
No.	***Sector***	***No Educ***	***Basic***	***Secondary***	***Tertiary***	***Total***
1	*Food Crops*	33.5	52.6	9.0	4.9	100
2	*Livestock*	11.6	58.1	11.6	18.6	100
3	*Mixed Farming*	36.7	53.0	6.9	3.5	100
4	*Fishing*	30.0	58.4	8.8	2.8	100
5	*Mineral Products*	5.7	36.0	34.0	24.0	100
6	*Manufactured Food and Beverages*	14.2	45.3	20.1	20.4	100
7	*Textile*	11.6	52.1	23.1	13.2	100
8	*Chemicals, Rubber and Plastics*	10.0	32.9	27.1	30.0	100
9	*Wood and Paper*	19.4	39.4	25.6	15.6	100
10	*Other Manufacturing*	12.4	47.5	26.3	13.9	100
11	*All other sectors (non-traded)*	11.0	39.6	26.8	22.6	100

Source: Author's calculation from Living Conditions Monetary Survey for 2006.
Note: The reported figures are weighted using survey weights.

Table A4: Linear Dynamic Regressions by Gender

	Regressions for Women				*Regressions for Men*			
	RE 1	***RE 2***	***RE 3***	***RE 4***	***RE 1***	***RE 2***	***RE 3***	***RE 4***
Lag Welfare	0.121***	0.121***	0.122***	0.121***	0.070***	0.071***	0.071***	0.072***
	(8.410)	(8.400)	(8.490)	(8.440)	(12.000)	(12.000)	(12.000)	(-12.000)
AgeHead	-0.029	-0.030	-0.019	-0.025	-0.004	-0.005	-0.006	-0.003
	(-1.180)	(-1.250)	(-0.800)	(-1.050)	(-0.650)	(-0.690)	(-0.840)	(-0.390)
$AgeHead^2$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(1.150)	(1.150)	(0.720)	(1.040)	(0.210)	(0.170)	(0.360)	(-0.230)
Hhsize	0.051	0.057**	0.046	0.051	0.011	0.009	-0.005	0.011**
	(1.440)	(2.590)	(1.280)	(1.480)	(0.480)	(0.400)	(-0.230)	(2.480)
Urban	1.241***	1.224***	1.183***	1.240***	0.254**	0.218	0.257**	0.184
	(8.220)	(6.850)	(8.020)	(8.640)	(2.150)	(1.880)	(2.100)	(1.590)
Policy Rate	-0.076***	-0.074***	-0.077***	-0.072***	-0.015**	-0.017**	-0.017**	-0.016
	(-8.190)	(-8.240)	(-8.660)	(-8.150)	(-1.980)	(-2.260)	(-2.220)	(-2.140)
No Education	0.155				-0.238			
	(0.450)				-1.610			
Basic		-0.153				0.008		
		(-0.360)				(0.050)		
Secondary			1.148***				0.250	
			(2.460)				(1.090)	
Tertiary				1.353***				0.253**
				(2.060)				(2.200)
Moderate Rainfall	0.204***	0.196**	0.225***	0.190***	0.002	0.002	0.001	0.003
	(2.900)	(2.450)	(3.270)	(2.700)	0.040	(0.050)	(0.030)	(0.090)
High Rainfall	0.163**	0.164**	0.154**	0.171**	0.019	0.024**	0.023	0.020**
	(2.350)	(2.350)	(2.220)	(2.510)	(0.620)	(2.790)	(0.750)	(2.670)
Constant	12.795***	12.842***	12.840***	12.502***	11.484***	11.430***	11.399***	11.423***
	(33.190)	(33.320)	(33.690)	(30.480)	(79.400)	(69.440)	(77.170)	(79.010)
Year Dummies	All	All	All	All	All	All	All	All
Sector Dummies	All	All	All	All	All	All	All	All
F-Test	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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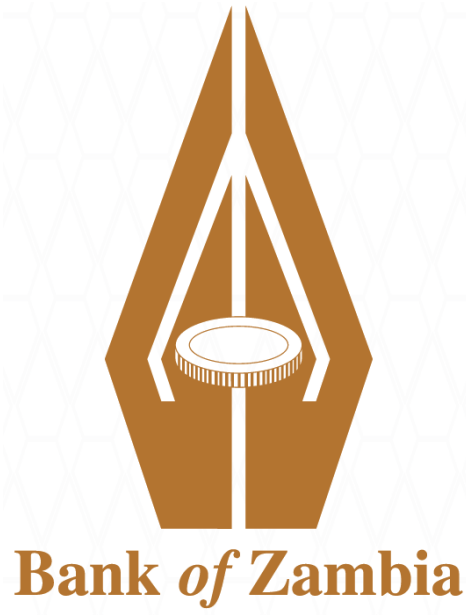

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