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Effect of Open Market Operations on Income Inequality

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ABSTRACT: Inequality is particularly relevant for public debates on the disaggregate implications of economic policies since they might have distinct effects across different segments of the population. Impact of monetary easing on inequality have recently attracted increasing attention especially in developing countries. This article examined the effect of open market operations on income inequality in Kenya. A quantitative research design method was adopted. The study utilized a quantitative cross-sectional data from the Kenya Continuous Household Survey Programme (KCHSP) for the years 2020 and 2021. Stepwise regression, forward selection model was executed with a threshold of 0.2. Further, the study was supported by Permanent Income Hypothesis, Kuznets Hypothesis and the modernization theory. Income inequality, measured by the Gini coefficient, was the dependent variable. Open market operations (repo, and reverse repo) was the independent variable in the model. The male headed households had a Gini coefficient of 0.58 while a Gini coefficient of 0.59 was attributed to female headed households, across the 47 counties. The results showed that open market operations (reverse repo) had a coefficient of 0.022, p=0.026< 0.05 which was positive and statistically significant at 5% level. The findings indicate that in order to effectively manage income inequality in the country, policymakers should adopt an interdisciplinary and multifaceted approach. This approach should take into account the differential impacts of various policy instruments on income distribution, with a particular focus on demographic segmentation. Additionally, policymakers should combine careful adjustments to monetary policy with targeted social and fiscal measures. These measures should be continuously informed by rigorous data analysis, with the aim of fostering a more inclusive and equitable economy.

KEY WORDS: Income inequality, Monetary policy, Open market operations, Repo, reverse Repo

I. INTRODUCTION

Effects of economic policies on inequality have recently spurred interest locally, regionally, and globally on its effect among different population. This has been due to uneven distribution of consumption expenditure, wealth and income, (Piketty, 2014; White House, 2017). Economist and policy makers have questioned whether the existing monetary policies have worsened off income and consumption gap across different households. Of concern, unconventional monetary measures adopted to cushion against global macroeconomic shocks are diversely debated. The rising income inequality among developing economies is linked to monetary policy shocks (Tolulope, 2021).

Kenya faces extreme income inequality between top richest and bottom poorest. Less than 0.1% of Kenyans control more wealth than the bottom 99.9%, highlighting a significant concentration of wealth among a small elite. Despite impressive economic growth since 2005, poverty remained pervasive, affecting millions. The income among top 10% richest Kenyans is approximately twenty-three times what the 10% poorest Kenyans incur. The number of millionaires in the country is expected to increase dramatically over the next decade. This disparity underscores the need for effective policies to mitigate the gap in incomes and promote equity among citizens.

The detrimental effects of such disparity have exacerbated to access to education, life expectancy duration, security, economic growth and emotional well-being including happiness. Policies aimed at reducing this inequality are crucial for sustainable development. The Kenyan government has implemented several measures, such as cash transfers to the aged and vulnerable groups, free access to primary education, social protection programs and pension, and universal health care, to mitigate these disparities. However, significant gaps remain, necessitating further investigation into factors contributing to income disparity, and how monetary policies have contributed to the effect.

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Given the potential exacerbation of income inequality with technological advancements and emergence of industrial revolution, understanding key determinants of income inequality in Kenya is critical. Past research has examined the effects of income inequality on economic growth and poverty reduction. Nevertheless, there is a lack of comprehensive analysis on the impact of monetary policies. This article aimed to enhance the existing body of knowledge on monetary policies and income inequality by addressing a significant gap in the literature. This article examined the impact of open market operations, a monetary policy tool, on income inequality in Kenya.

A. Hypotheses of the study

The following hypotheses were tested against the survey data;

Ho_1: Reverse repo changes has no significant effect on income inequality in Kenya

Ho_2: Repo changes has no significance effect on income inequality in Kenya

B. Contribution of this study

This study therefore made a methodological contribution to extant literature mainly in the regulatory mandate of the Central Bank of Kenya on monetary policy instruments in view of their effect on income disparity in Kenya. The findings provided valuable insights and recommendations to inform policies that promote equitable income distribution and economic growth, ultimately aiming to reduce poverty and improve living standards. By using a cross-sectional data, ordinary least squares techniques with the Stepwise regression, forward selection model to examine monthly household income reports over the period, this study aimed to reduce endogeneity issues, allowing the researchers to control the unobservable individual time-invariant heterogeneity, that is, systematic differences across cross-sectional units, e.g. households, and gender. Additionally, the use of the Stepwise regression, forward selection model was critical due to its ease of implementation and automation. This reduced the complexity and dimensionality of the model by improving the prediction accuracy, optimized classifier performance and eliminated the irrelevant or redundant variables that may cause multicollinearity, overfitting, or noise.

II. LITERATURE REVIEW

A. The Income inequality and open market operations.

Income inequality derives uneven distribution of wealth, wealth inequality (Moll, Rachel & Restrepo, 2021). The income disparity can be examined through various methods that allow for the analysis of varying income distributions. Demographic segmentation forms the foundation for studying income inequality and disparity (Tammaru, Czak, Aunap, van Ham & Janssen, 2020). These segmentations may include distributions based on gender, geographic location, age and historical income (McLafferty & Preston, 2019).

Income inequality denotes difference between income distribution among individuals, social classes, groups, populations or countries. Engler & Weisstanner, (2021) captured income inequality as a major dimension of social stratification and social class which is regulated by social status, power relations and wealth disparity. Level of income for an individual determines their lifestyle which directs their welfare. The relationship varies among sex, age and ethnicity.

Globally, the 21st century reported extreme inequalities that the 1% wealthiest individuals register an income approximately to 56% of bottom poorest (Solt, 2020). This defines welfare levels within the nations ranging from basic needs to market regulation to asset ownership and production levels (Bilan et al., 2020)

Monetary policy adjustments occur when a central bank changes, its pattern of money supply control. Monetary policy adjustments can be computed, as contained in changes of a measure of market expectation of the money market rates. The adjustments propose either increasing or decreasing money supply into the economy by the government through open-market operations and domestic borrowing by the state. Repo is a short-term borrowing, which involves purchases of sold security by virtue of an agreement within a defined short-term period at higher price. This is common among traditional non-depository banks. Practically, commercial banks sell or lends treasury bills, the CBK decreases their cash reserves thus increasing money supply. Moreover, commercial banks buy or borrows from central bank, thus decreasing their cash reserves balances. However, the model is difficult to apply as correlation between bond prices is different from money, thus have adopted inflation as a target for growth and employment.

Selling or buying of securities by Central bank colloquially affects the money supply, either to loosen or tighten the policies. When the bank sells or lends to commercial banks, then monetary policy tightens and the interest rates increases. The opposite is true, when Central bank buys or borrows money from commercial banks, the policies weaken and interest rates fall, which arise from soaking up of reserves among commercial banks

B. Theoretical Literature

The theoretical foundation is guided by Permanent Income Hypothesis (PIH), Kuznets Hypothesis, and Modernization theory. In regards to open market operations, the PIH examines effect of these adjustments on income inequality. The PIH posit effect of open market operations is short-lived on income inequality. This is because open market operations can lead to changes in aggregate demand, subsequently leading to changes in employment and wages. However, the PIH suggests that these changes will be temporary, as people will eventually adjust their consumption and saving behavior to reflect the new economic conditions. The PIH suggests that these adjustments may have varied effect on different groups of people. This is because different groups of people have different levels of income and different levels of wealth. As a result, such adjustments register a greater effect on income of some groups of people than others.

In modern economics, Kuznets (1955) idea focuses on long-term change in income inequality rather short-time. Kuznets posits that income inequality tend to emerge during early stages of industrialization within a country, characterized by high availability of capital which accumulate over time preceded over continuous growth. As investments in capitalism rise, the gap between the working class and investors widens due to different income per capita. Such income avenues forges way for more income among households, which narrow the gap between income disparity. The relationship is inverted U curve over time. Thus, growth and inequality directly and positively influence each other. The relationship is more pronounced at early stages which is outlived to negative during later stages.

C. Empirical Literature

In the USA, Davtyan, (2016) studied effect of contractionary monetary policy. It was found that contractionary monetary adjustment declined income inequality. Herradi and Leroy, (2019) found a negative relationship between expansionary monetary policies and increased income disparity. The results became more pronounced and significant when the adjustments were skewed on the expansionary side.

Open market operations alone had less of an impact on the dynamics of inequality than the financial system. Ahiadorme (2021) evaluated the transmission of monetary policy and economic inequality in sub-Saharan Africa in a different study. The relationship between monetary policy measures, especially the unexpected monetary easing and income inequality was examined through the lens of econometric modeling. The analysis considered, at the various ways, that open market operations could impact income inequality. According to the authors' research, changes in open market operations in sub-Saharan Africa had a procyclical impact on income inequality.

Even with the aforementioned research and other studies on income inequality, there still existed a significant knowledge gap that had to be closed, particularly with regard to the impact of open market operations, which had been shown to both impede economic growth and contribute to an even more uneven distribution of income. As a result, it was essential to comprehend the primary factors that contributed to income inequality, investigate how they impacted Kenya's income inequality, and offer suggestions for reducing their effects. This information was crucial, especially regarding the implications for open market operations, as the results might have an impact on economic decisions that alter how income is distributed in Kenya. Policies that advocated for equal distribution of income led to economic growth (World bank, 2017). The choice of the monetary tool was a major monetary policy design issue. The ability of a Central Bank to influence income equality and make a success of monetary policy depended on the tool applied and how they quickly altered monetary conditions.

One of the most popular monetary policy tools used by the central banks was open market operations. However, little was known about how these operations might have contributed to uneven impact on households with varying income and wealth levels and portfolio compositions. Some of the research conducted evaluated the transmission of monetary policy and the implications for various families across the wealth and income spectrum.

An assessment of the effectiveness of open market operations in Nigeria (Godwin, Pius, & Okon J. Umoh, 2018)" stated that open market operations were the critical tool of monetary control and were becoming more significant to developing nations and transitioning economies. Open market operations encouraged a business-like, impersonal connection with participants in the market and gave central banks significant freedom in the timing and amount of monetary operations at their own initiative, and offered a way of avoiding inefficiencies of direct controls. Creating indirect controls was a crucial step in the course of economic growth because, in a more globalized economy, markets inevitably found a way around direct controls as their size increases and they become less effective. Many policymakers and central bankers were debating how to fully reap the benefits of open market operations as more nations looked to deregulate and unleash the power of market forces.

In the Philippines, where reverse repos were utilized to absorb liquidity, maturities were longest, often ranging from one week to one month and up to a year. In several of these nations, outright purchases and sales of Treasury securities were also conducted on the secondary market. They were employed in Brazil to provide or absorb reserves on a longer-term basis. They

were carried out on a regular basis and were seen as crucial tools of monetary control. However, outright transactions carried a significant danger of controlling the market and preventing future development while secondary markets were still relatively small, particularly in longer-term industries. Thus, it was possible to argue that open market activities influenced the bank's reserves and deposits in addition to influencing its capacity to extend credit.

With the assistance of commercial banks, a central bank would sell securities and government bonds in order to decrease the amount of money available to the general population. This action limited banks' ability to provide loans to individuals and decreased the amount of money in the economy. It affected the credit's supply as well as demand. Similar to this, when the circumstances for liquidity were tight, the central bank would buy back the securities. This allowed the public and commercial banks to easily obtain credit facilities, which served to stabilize the market and add liquidity to the system.

Other monetary tools, clearly needed to be given less weight if open market operations were to take center stage as the principal tool for monetary policy. Additional modifications may also be required, dependent in part on the specific approach chosen for carrying out daily open market activities. In order for open market operations to be successful, banks' ability to borrow from the central bank during the discount window has to be restricted. According to Godwin, Pius, and Okon J. Umoh (2018), open market operations could not be utilized as the primary monetary tool for managing bank reserves and general financial conditions in the absence of such restrictions.

A number of factors, such as how open market operations affected interest rates, market liquidity, and market expectations, must be taken into account when assessing how effective they are, in controlling inflation and influencing income distribution. Although central banks possessed a potent instrument in open market operations, their efficacy was contingent upon the specific circumstances and the central bank's capacity to proficiently convey and execute its policies.

Open market operations, however, provided more flexibility and precision in modifying the money supply, than other alternative tools, which is why it was a preferred choice for many central banks

III. DATA AND METHODOLOGY

A. Data

The target population included sampled households' data in Kenya in the 47 Counties. As per the data collected from the Kenya National Bureau of Statistics (KNBS) dated May 2023, the total number of households was estimated at 12,143,913 households. In carrying out this study, the secondary data was used covering the period 2020 and 2021 on monthly basis. This period of study was determined by the availability of data. The open market operation data was collected from the Central Bank of Kenya (CBK) repository, for the years stated, while the data on households income was collected from the Kenya National Bureau of Statistics (KNBS) and Kenya Continuous Household Survey Programme reports. Thereafter, the data was redefined to Stata 15 for analysis.

B. Model and method

In the estimation, standard errors were clustered at the county level. The model estimated is given

$$y_i^g = \beta_0 + \beta_1 OMO_{\bar{\imath}} + \alpha X_{\bar{\imath}} + \gamma A_{ih} + \varepsilon_i$$

Where h refers to a household, income inequality in county i, g assumes 1 for a female headed household, and 0 for a male headed household. $\bar{\imath}$ refers to a national-level estimate since the Open market operations (OMO), refers to repo and reverse repo, which cut across the country. Age of the household head is given by A whereas X captured other variables that were incorporated in the model. Estimation of regression coefficients α, β, and γ relied on minimizing the sum of squared residuals arising from the error term, ε. Gini coefficient was computed for each household.

The method used was stepwise regression with forward selection. With an inclusion criterion set at a p-value of 0.2, the first model regressed the Gini coefficient against the open market operations as a variable.

IV. RESULTS AND DISCUSSIONS

A. Stepwise Regression estimation

This study made use of datasets that included 11,090 families, of which 6,254 families were led by men while 4,836 families were led by women. The Gini coefficient for households headed by men was 0.58, while the Gini coefficient was 0.59 for households headed by women. According to descriptive statistics, the mean age of homes headed by men was 41.34 years, which was somewhat higher than the mean age of households headed by women, which was 41.23 years. Therefore, the average age of a household head was between 41 and 42 years old. The average income of families led by men was greater than that of households headed by women. Due presumably to disparities in maximum income levels, the average income for male headed families was KES. 15,724 and for female headed households was KES. 9,619. The stated values of the open market operations variables showed very little variation.

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We then interacted gender with each of the explanatory variables. The findings suggested that the reverse repo, had statistically significant effects on income inequality among male headed households but its effect on the female headed households was not significant. The repo had no significant effect on income inequality among both the male headed and female headed households

Table I. Summary results of the model estimation

Gini	Overall Coef.	Standard error.	p-value	[95% Conf	Interval]	Male-headed households	Female-headed households
Gender*REPO	-.003	.004	.532	-.011	.006	-	-
Gender*Reverse REPO	-.013	.007	.088	-.027	.002	-	-
REPO	.002	.003	.492	-.004	.009	0.00419	0.00286
Reverse REPO	.022**	.009	.026	.003	.04	0.0225**	0.0101
Gender	-.016	1.752	.993	-3.543	3.511	-	-
Constant	.105	1.194	.93	-2.299	2.508	-	-

B. Hypotheses Testing

The hypotheses were tested and the summary statistical results were as below;

i) Reverse REPO:

The overall observed test statistic, $P = 0.026 < 0.05$, relating to the coefficient of reverse REPO, was statistically significant at 5 percent level. The results indicated that reverse REPO had a positive and significant effects on income inequality among households. The null hypothesis was therefore rejected at the 5 percent level of significance and concluded that the alternative hypothesis holds.

Upon separation of the gender, the observed test statistic, on male headed households, $P = 0.037 < 0.05$, relating to the coefficient of reverse REPO, was statistically significant at 5 percent level. The results indicated that reverse REPO had a positive and significant effects on income inequality among the male headed households. For the female headed households, the observed test statistic, $P=0.400 > 0.05$, of the coefficient of reverse REPO was not statistically significant at 5 percent level, implying that reverse REPO did not have significant effects on the income inequality among the female headed households across the 47 counties in Kenya.

To ascertain the magnitude, the test statistics observed that a unit increase in reverse REPO, increases the income inequality by 0.022 among the male headed households, while a unit increase in reverse REPO, among the female headed households, increased the income inequality by 0.101, across the 47 counties.

ii) REPO:

The overall observed test statistic, $P = 0.492 > 0.05$, of the coefficient of REPO, among households, was not statistically significant at 5 percent level. Therefore, the null hypothesis was not rejected at the 5 percent level of significance, implying that REPO, did not have significant effects on income inequality among households across the 47 counties in Kenya.

Testing the specific gender separately, observed test statistic, $P = 0.481 > 0.05$, of the coefficient of repo, among the male headed households, was not statistically significant at 5 percent level. For the female headed households, the observed test statistic, $P=0.621 > 0.05$, of the coefficient of repo, was also not statistically significant at 5 percent level. A unit increase in repo, increased the income inequality by 0.004 among the male headed households, while same unit increase in repo, increased the income inequality by 0.003 among the female headed households, across the 47 counties

V. CONCLUSIONS, AND RECOMMENDATIONS

A. Conclusion

This study highlighted the effects of open market operations on income distribution, emphasizing the need for gender-specific considerations in policy design to effectively address income inequalities. Cognizant of the effects of reverse repo, having positive and statistically significant effects on income inequality, therefore, the use of the open market operations would held better results in addressing income inequality concerns.

Further conclusions drawn from this study was that contractionary (expansionary) open market operation, as a monetary policy tool, significantly increased (decreases) income inequality. Therefore, reverse repo would appear to be the most effective

instruments in addressing income inequality. Kenya could better use open market operations, as the monetary policy tool, to support fair growth and income distribution in addition to economic stability.

Nonetheless, a complimentary combination, mix of the two open market operations instruments and all other monetary tools could be the best course of action for the majority of emerging markets and transitional economies, which would be vulnerable to spikes in liquidity and abrupt capital flows and with markets at different stages of development.

B. Recommendations

The study gave useful insights for monetary policymakers to consider when assessing the economic consequences of their actions. Central banks, which have occasionally disregarded inequality concerns in their monetary policy actions, should address the distributional dimension of their programs, even if it is not their primary duty. We advocate that policymakers in emerging economies pursue policies to combat income inequality using a comprehensive strategy that takes into account the unequal consequences on male- and female-headed households, as well as gender-specific policy design, such as women's credit facilities. To build a more inclusive and equitable economy, policymakers should combine cautious open market operations and all other monetary policy adjustments with targeted social and fiscal policies that are constantly informed by comprehensive data analysis.

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