DOES MONETARY POLICY REALLY AFFECT POVERTY?

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ABSTRACT

Inequality and poverty are a concern for most economies, thus central banks are increasingly asked by public stakeholders to evaluate the distributive impacts of monetary policy. This paper investigates monetary policy's influence on inequality and poverty by using Panel System GMM estimation for household data on income and consumption of the United States and the countries of the Economic and monetary Community of Central Africa (EMCCA[1]) from 1986 to 2011. The resulting estimates indicate that interest rate and poverty are positively correlated in the United States, implying that rising interest rate increases poverty rate. Thus monetary policy aimed at reducing inflation, have a positive impact on poverty reduction. Unlike in the EMCCA countries, conventional monetary policy does not affect income distribution and poverty. Monetary policy affects poverty through the quantitative easing channel.

Key words: *Inequality, Inflation, Monetary Policy, Poverty.*

JEL Classification : C15, C33, D58, E52, E58, O23.

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[1] The Economic and Monetary Community of Central Africa (EMCCA) was created in 1996 to replace the customs union of Central African States and consists of six countries namely : Cameroon, The Central African Republic, Congo, Gabon, Equatorial Guinea and Chad. This is a currency union whose Central Bank is the Bank of Central African States (BEAC).

1. INTRODUCTION

Inequality and poverty are a concern for most economies, at the same time monetary policy is one of the modern age's most potent tools for managing the economy. Thus central banks are increasingly asked by public stakeholders to evaluate the distributive impacts of monetary policy.

The literature on poverty and worldwide experience has also confirmed that income inequality matters, i.e., growth associated with progressive distributional changes will have a greater impact on poverty. However, this line of reasoning requires further explanation as to how the income distribution can be improved while simultaneously making the economy grow faster. The bottom line is that growth, stability, income inequality, and poverty are all endogenous and interrelated.

Because monetary policy is transmitted through many channels, direct and indirect (interest rates both current and expected, credit extension, asset prices) and because households differ in many respects (with regard to socio-demographic factors, such as age and education, as well as economic variables, such as income, wealth, employment status and housing status) monetary policy does not affect all households in the same way. Many channels through which monetary policy affects individuals in different ways may be at work, and it is a daunting task to disentangle and quantify these channels empirically.

Studies on the distributive effects of monetary policy have so far focused almost exclusively on OECD countries and their findings may not be applicable to developing countries, where countries are characterized by different tax and benefit systems, different institutions, and where households do not access financial markets in the same way. Thus in this paper we will explore these issues with respect to United States and one particular area the Economic and monetary community of Central Africa. Indeed the currency of this monetary union, the CFA Franc issued by the Central Bank of Central African States (BEAC), has long been pegged to the French Franc (and since 1999 to the Euro) at a fixed rate. Besides, the commitment to the fixed peg by a transnational central bank makes a low long-run rate of monetary expansion a time-consistent policy and a low and stable rate of inflation.

Unfortunately, until now, economic research has difficulties in providing satisfactory answers to the following questions despite several studies: what is the impact of monetary policy on the distribution of income and poverty and what are the main channels through which the monetary policy affects the distribution of income and wealth?

In order to answer these questions, this paper investigates monetary policy's influence on inequality and poverty by using Panel System GMM estimation for household data on income and consumption of the United States and the countries of the Economic and monetary Community of Central Africa (EMCCA) from 1986 to 2011.

The rest of the paper is organized as follows, section two presents a literature review, the third section describes the data used in empirical analysis. The fourth section presents the methodology used, while the fifth analyze the results and draws lessons, and finally the sixth concludes.

2. LITERATURE REWIEW

The literature examining the effects of monetary policy on poverty and inequality is relatively small unlike many studies about trends and causes of poverty and inequality. However, the literature survey revealed both theoretical and empirical debate on the impact of monetary policy on income distribution.

On the theoretical level, in classical economics there were two opposing schools. The « currency school » (Ricardo and others) that stressed the importance of base money for predicting long-run inflation. In contrast, the « banking school » (John Law, Adam Smith and others) argued that money is created by the intermediary sector and hence issuing money for real bills in times of crisis is not necessarily inflationary but can foster investment and reduce poverty.

Afterward, Keynes' writings stress frictions and distortions in financial markets. For Keynesians like Samuelson, Solow and Tobin the key stable relationship is that current income determines consumption. This is behind the stable IS relation and ensures that fiscal policy leads to a large multiplier. The Phillips curve is the other stable relationship. It implies that aggregate demand policy can control output. Given the assumption that the

demand for money is not very stable, they are wary of targeting monetary aggregates since it can lead to volatility of interest rates and output. Finally, Keynesians view monetary policy as ineffective, in times when the economy is stuck in a liquidity trap.

In contrast, monetarists armed with the permanent income hypothesis questioned the stable link between consumption and income and criticized the simple multiplier mechanism. Instead, monetarists viewed money demand as relatively stable. While Keynesians looked at financial frictions and institutions on the money demand side, monetarists worried about their supply side effects. In particular, they studied how intermediation affects broader measures of money through the money multiplier. Money supply shocks in most monetarist models are treated as exogenous. This suggests a causal influence of monetary policy mistakes on real output and income distribution in the short run (typically due to wage stickiness). Most prominently, Friedman and Schwartz (1963) carefully document that a change in money supply is followed by a change in aggregate output during the Great Depression in the US. Importantly, money aggregates have to include bank deposits. Simply looking at high-powered base money is misleading since during the Great Depression many households withdrew their demand deposits from banks and hoarded cash. As a consequence (despite the fact that base money expanded) broader measures of money, like M1 or M2, fell dramatically. In other words, the money multiplier collapsed during the Great Depression as banks went out of business. Brunner and Meltzer (1964) modeled the important additional feedback effects from aggregate output to money through the banking system.

An accommodative interest rate policy after an adverse shock partially offsets the negative wealth shocks suffered by financial intermediaries who hold interestsensitive bonds. This can be referred to as a « stealth recapitalization » as it is a sneaky way to redistribute wealth towards financial intermediaries (Open market operations in which the central bank long-term bonds in exchange for short-term money have the same redistributional effects.). This monetary transmission channel working through capital gains in asset prices is related to earlier work by Tobin (1969) and Brunner and Meltzer (1972). Of course, this wealth redistribution through monetary policy is not a zero-sum game as it promotes real growth in the economy.

Ferreira et *al*. (1999) explain that a macroeconomic shock can affect poverty through the different sources of household income such as self-employment income, wages, returns on physical assets and the receipt of public transfer. And they categorized those

effects into several channels. They explain that macroeconomic shocks can affect the poor households through the changes in relative prices, labor demand, the rate of return on assets, public transfers, and the community environment. They propose the counter measures to minimize such negative impacts on the poor.

On the empirical level, since the work of Kuznets (1955), many studies focused their analyses on the causes and consequences of wealth inequality and poverty.

Hume (1970) emphasizes the idea of an "inflation tax". He explains that when any quantity of money is imported into a nation, it is not at first dispersed into many hands but is confined to the coffers of a few persons, who immediately seek to employ it to advantage. This situation reveals that anticipated changes and unanticipated changes in inf1ation and money supply have very different effects. Fully anticipated inflation would have no real effects, but unanticipated inflation can lead to an array of consequences from stimulating production to inducing depression.

Nordhaus (1973) came closest to a statistical argument closely connecting inflation and wealth inequality. He also identified the same problem but his models did not take into consideration the dissemination of information or distribution of monetary units over time, which would expose actors to the redistributive effects of money supply differently.

The Austrian monetary inflation theory of Mises (1996) and Rothbard (1994) elaborate on Hume's theory on disproportionate monetary distribution, claiming that changes in the money supply are disproportionately distributed throughout an economy. For them, the increase in money supply is tantamount to a tax that penalizes those who see the new money last. This view of monetary redistribution is a comerstone of Austrian inflation theory. Balac (2008) tests a model illustrating this connection by examining monetary inflation's effect on wealth inequality. He finds that not only is monetary inflation a significant variable, but its effect on wealth inequality is more pronounced at the extremities of the distribution. Williamson (2009) and Ledoit (2009) build on this work.

Crowe (2006), using national panel data, concludes that there is a positive correlation between expansionary monetary policy and income inequality. Similarly Albanesi (2007)

analyzes the hypothesis that the cross-country correlation between inflation generated by expansionary monetary policy and income inequality results from distributional conflict. The model used in this analysis presents that inflation and income inequality are positively correlated for the relative vulnerability to inflation of the poor. That is, the poor are likely to hold more currency as a portion of their entire purchases and suffer greater loss from inflation than the rich do.

Galbraith (1998) has underlined the importance of monetary policy's effects on economic inequality. He also suggested that labor earnings are the primary source of income for most households and these earnings may respond differently for high-income and low-income households to monetary policy shocks. This could occur, for example, if unemployment disproportionately falls upon low income groups, as documented in Carpenter and Rogers (2004).

Romer and Romer (1999) make empirical attempts to analyze the effects of monetary policy on poverty and inequality. They analyze short-term influence of monetary policy on poverty and inequality using the U.S. time series data. They find that the short-run and long-run re1ationships go in opposite directions. A cyclical boom created by expansionary monetary po1icy is associated with improved conditions for the poor in the short run. Low inflation and stable aggregate demand growth are associated with improved well-being of the poor in the long run. But this study seems to contain several limitations. First, the effects of income growth, interest rate changes and inflation on poverty and inequality are analyzed in the short and long-term separately. Second, they use different data sets for each term. Fowler and Wilgus (2008) such as Romer and Romer (1999) find that expansionary monetary policy improves the well being of the poor.

Easterly and Fischer (2001) analyze the relationship between inflation and poverty by using household data of 38 countries. They conclude that inflation makes the poor worse off and that the poor suffer more from inflation than the rich do. Also their research findings suggest that inflation aggravates income imbalance.

Bulir (2001) using the Kuznets's framework finds that lower inflation rates can improve income equality but the effects of price stabilization on income distribution are nonlinear.

Furthermore, Agénor (2004) comprehensively analyzes the linkage between macroeconomic adjustment process and poverty. Based on cross- country data, the

author analyzes effects of macroeconomics policies on wage, employment, and poverty. In brief, it shows that poverty is lowered by high levels of per capita income, the fall of real exchange rate, good health care and great openness in industry lower poverty. On the other hand, poverty is heightened by inflation, greater income inequality, and macroeconomic volatility.

For Doepke and Schneider (2006), an unexpected increase in interest rates or decrease in inflation will benefit savers and hurt borrowers, thereby generating an increase in consumption inequality (to the extent that savers are generally wealthier than borrowers).

Heathcote, Perri and Violante (2010), document that the labor earnings at the bottom of the distribution are most affected by business cycle fluctuations. In addition, the income composition channel could potentially push toward reduced (rather than increased, as suggested by Austrian economists) inequality after expansionary monetary policy.

Atkinson, Piketty and Saez (2011) studying top income share in the long run find that top income can explain an important part of inequality. However the limitation of their study is that the tax data, on which the study reviewed are based, are subject to serious limitations.

For Brunnermeier and Sannikov (2012), asset holdings are not symmetric, and hence monetary policy affects different economic agents differently. As a consequence, monetary policy redistributes wealth. This redistributive effect can mitigate distortions, such as debt overhang problems that arise from amplification mechanisms. These mitigating effects can spur growth and lead to an overall higher wealth level in the economy. For specific scenarios, monetary policy can even lead to Pareto improvements, making all agents in the economy better off. We therefore refer to these effects as relative wealth redistributions to stress that redistribution in our setting is not a zero sum game. For them, Conventional monetary policy can influence wealth distribution in two ways. First, by lowering the short term interest rate and reducing banks' funding costs. And second by affecting asset prices. They also find redistributive monetary policy has important implications across regions in a currency area.

Coibion et al (2012) studying the effects of monetary policy shocks to consumption and income inequality find that contractionary monetary policy actions systematically increase inequality in labor earnings, total income, consumption and total expenditures. But this

study focused exclusively on the United States economy and it would be useful to see if these results can be applied to other parts of the world.

More recently Kang, Chung and Sohn (2013) using provincial data for South Korea find that real interest rate and poverty are positively correlated while real interest rates do not have significant effects on income distribution. They also find that inflation reduces poverty while inflation improves income distribution in the short-term but has no significant effects on income distribution in the long-term.

Given these previous literatures as mentioned above, a conclusion is reached: monetary policy affects poverty and income inequality through income growth, interest rate and inflation. But this literature survey reveals different results, thus further studies are needed.

3. DATA

In order to measure the impact of monetary policy on poverty and inequality, BEAC, IMF, WORLD BANK and CEX data are used.

The Consumer Expenditure Survey (CEX), which is provided by the Bureau of Labor Statistics (BLS) in the United States, consists of two separate surveys, the Interview Survey and the Diary Survey. In this study we only use data from the Interview Survey since the Diary Survey covers only expenditures on small items that are frequently purchased, mostly related to food. The Interview Survey provides information on up to 95% of the typical household's consumption expenditures. The CEX is the most comprehensive data source on household consumption in the U.S. and is used for the construction of CPI weights. To reduce measurement error, we therefore aggregate the household's monthly expenditures to quarterly expenditures as Coibion *et al* (2012) did. Hence, "household time" is quarterly, but since the CEX is a monthly rotating panel, the overall sampling frequency of the expenditure data is monthly. To further improve the quality of the data, we drop the following observations: interviews with more or less than three monthly observations; households reporting zero food or total expenditures; and observations with negative expenditures where there should not be any. These data are available on a higher frequency (quarterly) than other sources such as IRS data, with a high frequency being a necessary ingredient for analyzing the effects of

monetary policy shocks but for the sake of consistency with data from the EMCCA area.

For the EMCCA six countries data come from the Bank of central African States household survey, this is an annual survey which covers expenditures on all items that are frequently purchased. This survey provides information on up to 95% of the typical household's consumption expenditures and is the most comprehensive data source on household consumption in the EMCCA area. We also use monthly data for price series in the BEAC data base, "*Indices harmonisés des prix à la consommation des Etats de la Communauté Economique et monétaire de l'Afrique Centrale* " (IHPC). These series are marked by the effect of the 1994 devaluation and the 2008 food crisis as shown in *Figure 1* below.

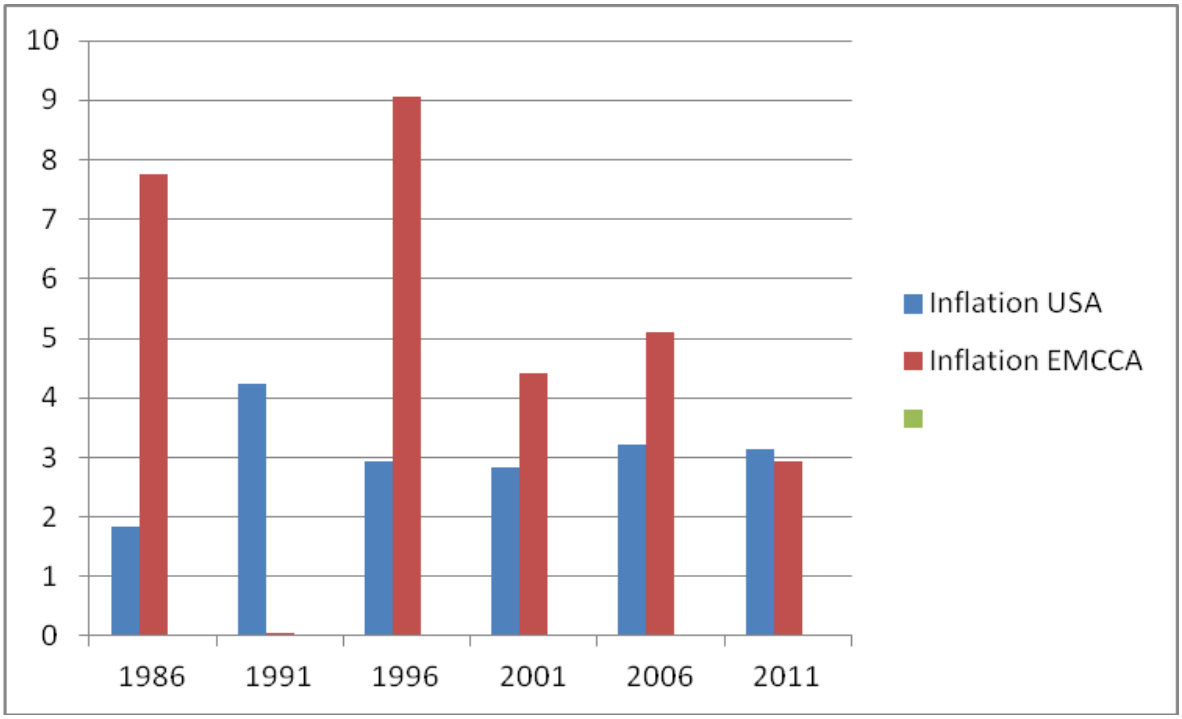

Figure 1: Trend of inflation in the EMCCA area and in the US from 1986 to 2011.
Source: Author's calculation based on IMF financial statistics.

IMF *International Financial Statistics* provide us data on interest rate, money stock, money supply and other financial asset for both US and EMCCA area. The Gini index data as well as other macro variables used in this study as explanatory

variables are based on data from the World Bank. The above variables were chosen as explanatory variables because, as mentioned in precedent studies, macroeconomic policies can have impact on poverty and inequality, through changes in income growth, interest rate, and inflation. Unemployment rate and per capita GDP are set as variables that reflect income growth.

In this study poverty is measure by share of the population below the poverty line which is drawn with the minimum cost of living issued by the UNDP. All variables related to income and consumption are converted to real variables by using the consumer price index. To come up with poverty related index such as country poverty gap and poverty severity index, this study use FGT index suggested by Foster *et al*. (1984). *Figure 2* shows the average of poverty gap index and poverty while *Figure 3* shows the trend of Gini index.

Inequality is measure by the Gini coefficients of levels which has long been used to measure inequality. It summarizes via a single number between 0 and 1 the extent to which a variable is equally allocated across different components of the distribution. The Gini coefficient is a good measure of inequality because it takes into account those households reporting no wage income, this is important given the context of developing countries.

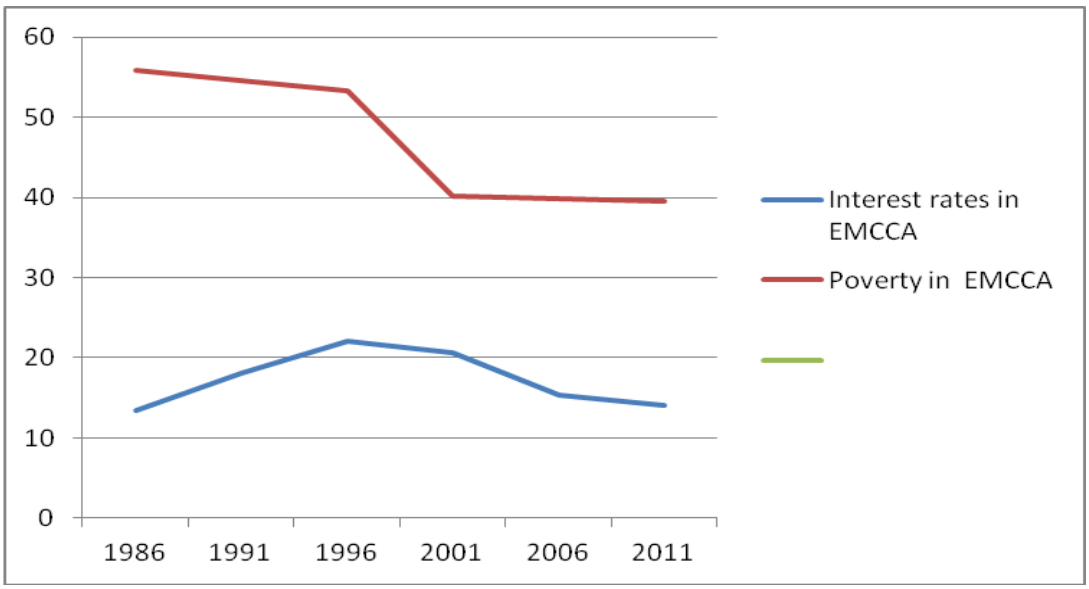

Figure 2: Trend of poverty severity index and interest rates in the EMCCA area.

Source: Author's calculation based on BEAC database.

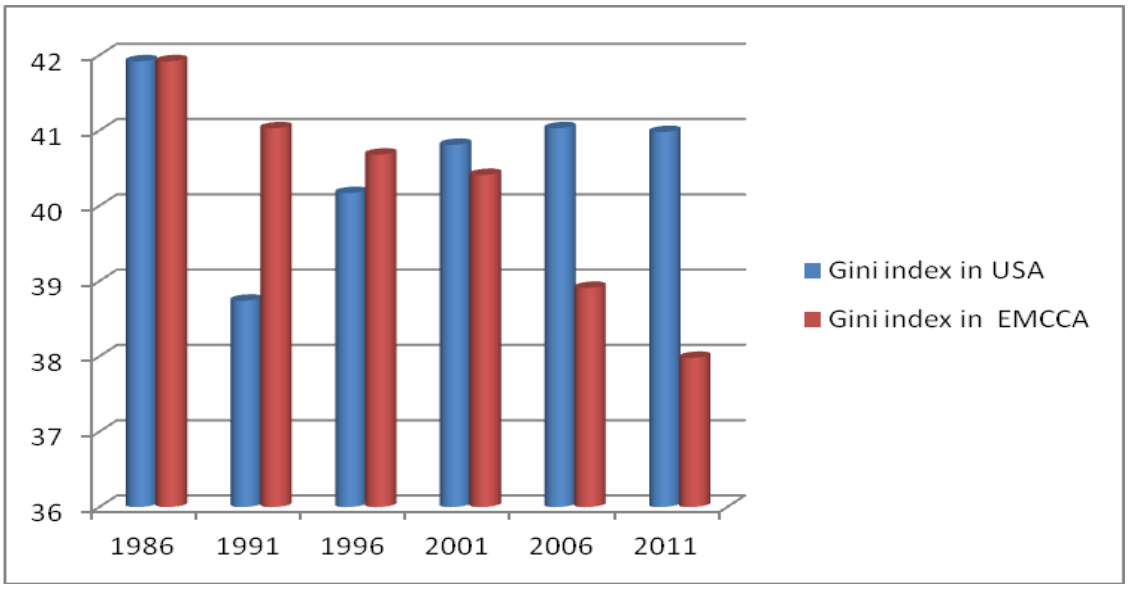

Figure 3: Trend of Gini index in the US and in the EMCCA.

Source: Author's calculation based on World Bank database.

4. METHODOLOGY

4.1. Presentation of the model

In order to analyze the impact of monetary policy on inequality, we use the econometrics of panels and more precisely a dynamic panel which we will apply the generalized method of moments (GMM) because it can control the individual and time specific unobserved effects but also bearing the simultaneity bias of reverse causality and

omitted variables. Using instruments based on lagged explanatory variables allows us to control the potential endogeneity of the explanatory variables.

The explanatory variables are assumed weakly exogenous, which means they can be influenced by past and present achievements of the variable to explain but are not correlated with future realizations of the error term. In other words, future shocks (unanticipated) do not affect our targets variables.

As did Kang et al (2013), we assume that income (y) is determined by individual abilities (a) and other factors (p) like economic policy and that consumption (c) is determined by income (y) and time preference (γ).

We assume that income and consumption maximize utility; equation (1) and equation (2) are formed. In equations (1) and (2), i is individual household, j is a country or the state and t is time.

$$y_{ijt} = Y(a_{ijt}, p_{jt}) \qquad (1)$$

$$c_{ijt} = C(y_{ijt}, \gamma) \qquad (2)$$

Based on poverty and inequality index defined in the previous section, FGT poverty index and Gini coefficient are shown in equations (3) and (4) respectively:

$$\theta_{a,jt} = \theta(c_{jt}, p_{jt}) \qquad (3)$$

$$G_{jt} = G(c_{jt}, p_{jt}) \qquad (4)$$

Where, θ is the poverty index and $\boldsymbol{G}$ the Gini index.

Real interest rate brings heterogeneous effects on individual economic agents. Individuals determine current and future spending depending on real interest rate, and return of real asset changes due to fluctuating real interest rate. And it is considered to be correlated with monetary policy.

Inflation affects individual real income or spending when individual wages and income do not fluctuate to the same extent as inflation. Also, in empirical analysis, inflation is included as other factor (p) that controls the gap between real and nominal interest rates. Per capita GDP is considered because a change in aggregate demand affects individual income and consumption. Aggregate demand will be affected by monetary policy.

Considering these independent variables for equations (3) and (4), short and long-term model specifications are assumed by equation (5).

$$w_{jt} = \alpha + \delta w_{jt-1} + \beta_1 r_t + \beta_2 GDP_{jt} + \beta_3 \pi_t + u_j + \varepsilon_{jt} \quad (5)$$

Where, w_{jt} represents the poverty severity index, and the Gini index for the country j at the time t. α is a constant term, w_{jt-1} is the auto-correlation term which is a lagged dependent variable in order to measure long-term effects, r and π denote interest rate and inflation rate, GDP is the annual rate of Gross domestic product, u is an unobserved country-specific effect, ε is the error term, and the subscripts j and t represent country (or the state in the US case) and time period, respectively.

The use of instruments is again required to deal with two issues: first, the likely endogeneity of the explanatory variables; and, second, the new error term, $\varepsilon_{j,t} - \varepsilon_{j,t-1}$ is correlated with the differenced lagged dependent variable, $w_{j,t-1} - w_{j,t-2}$. This second issue arises by construction when we difference equation (5).

We would like to relax the assumption that all the explanatory variables are strictly exogenous

(That is, that they are uncorrelated with the error term at all leads and lags). Relaxing this assumption allows for the possibility of simultaneity and reverse causality. We adopt the assumption of weak exogeneity of the explanatory variables, in the sense that they are assumed to be uncorrelated with future realizations of the error term. This weaker assumption means that current explanatory variables may be affected by past and current growth rates but not by future ones. In practice we assume that all variables are weakly exogenous. Under the assumptions that (a) the error term, ε is not serially correlated, and

(b) the explanatory variables are weakly exogenous, the following moment conditions apply to the lagged dependent variable and the set of explanatory variables:

$$E\left[w_{j,t-s} .(\varepsilon_{j,t} - \varepsilon_{j,t-1}) \right] = 0 \quad \text{for } s \geq 2; \quad t = 3, ..., T \qquad (6)$$

$$E\left[X_{j,t-s} .(\varepsilon_{j,t} - \varepsilon_{j,t-1}) \right] = 0 \quad \text{for } s \geq 2; \quad t = 3, ..., T \qquad (7)$$

Where, ***X*** is the set of explanatory variables.

Even if the moment conditions in equations (6) and (7) are met, estimator is not consistent under fixed and random effects models. It is because of specific errors included in the auto-correlation term. Therefore, for a consistent estimator and an efficient estimate, the panel system GMM (Blundell and Bond, 1998) is used. $\delta>0$ indicates that current dependant variable is related with that of the next period. Several tests need to be done to make sure that the equation (5) is consistency estimated by the panel system GMM with proper instrumental variables. Auto-correlation (AR) test is the first one. The panel system GMM is considered proper when an order 1 AR test rejects the null hypothesis and order 2 AR test accepts the hypothesis. The second, is the Sargan over-identification test of instrumental variables. The Panel System GMM is considered appropriate when the test accepts the null hypothesis.

From equation (5), β_1, β_2 and β_3 respectively captures the marginal effect of current real interest rate, income growth and inflation on current poverty and inequality, which is the short-term effect. While the long-term effect is given by $(1-\delta)$.

4.2. Estimation Results

Tables (1) to (4) show the results of Panel System GMM estimation on short and long-term effects of monetary policy when the poverty severity index and the Gini coefficient are dependent variables, respectively for both US case and EMCCA area case.

Table 1: Long-term Effects of Monetary Policy on Poverty Severity (EMCCA area)

Dependent Variable: Poverty Severity Index (PSI) Method: GMM Observations : 156			
VARIABLES	Coefficient	Std Error	Prob
PSI (-1)	0.7994***	2.63442	0.023223
Interest rate	-0.0036*	0.95249	0.090955
Unemployment rate	0.0101**	1.79746	0.441806
GDP	-0.0341**	1.84325	0.239621
Inflation	0.02554***	2.10 623	0.052342
Constant Variable	0.07224 3**	2.63442	0.023223
AR Test (Order 1)	-2.757***		0.006
AR Test (Order 2)	0.717**		0.476
Sargan Statistics	59.307		0.257
R-squared	**0.870**385	**F-statistic**	9.233373
Adjusted R-squared	**0.776**120		
Observations	156	**Prob (F-statistic)**	

*** p<0.01, ** p<0.05, * p<0.

Source: Author's estimation.

Table 2: Long-term Effects of Monetary Policy on Poverty Severity (US)

Dependent Variable: Method: GMM Observations : 1300	**Poverty Severity Index (PSI)**		
VARIABLES	Coefficient	Std Error	Prob
PSI (-1)	0.7182***	1.93442	0.023893
Interest rate	0.4236***	2.0 5249	0.068955
Unemployment rate	0.1951**	1.957 46	0.141802
GDP	-0.0463**	1.64325	0.239621
Inflation	0.02554***	2.21 325	0.052342
Constant Variable	0.052243**	2.03442	0.023223
AR Test (Order 1)	-2.241***		0.006
AR Test (Order 2)	0.617**		0.476
Sargan Statistics	60.214		0.257
R-squared	**0.8703**85	**F-statistic**	8.324473
Adjusted R-squared	**0.7761**20		
Observations	1300		

*** p<0.01, ** p<0.05, * p<0.

Source: Author's estimation.

Table 3: Long-term Effects of Monetary Policy on Gini Coefficient (EMCCA area)

Dependent Variable: Gini coefficient Method: GMM Observations : 156			
VARIABLES	Coefficient	Std Error	Prob
Gini (-1)	0.8681***	2.63442	0.023223
Interest rate	0.0247*	1.0 5249	0.090955
Unemployment rate	0.0513**	1.88546	0.441806
GDP	-0.0624**	1.74325	0.239621
Inflation	0.0282***	2.10 623	0.052342
Constant Variable	0.0578**	2.63442	0.023223
AR Test (Order 1)	-2.135***		0.006
AR Test (Order 2)	0.601**		0.476
Sargan Statistics	60.028		0.257
R-squared	**0.820385**	**F-statistic**	9.123673
Adjusted R-squared	**0.771620**		
Observations	156		

*** p<0.01, ** p<0.05, * p<0.

Source: Author's estimation.

Table 4: Long-term Effects of Monetary Policy on Gini Coefficient (US)

Dependent Variable: Gini coefficient Method: GMM Observations : 1300			
VARIABLES	Coefficient	Std Error	Prob
Gini (-1)	0.8581***	2.63442	0.023223
Interest rate	0.0421***	2.0 5249	0.090955
Unemployment rate	0.0862**	1.79746	0.441806
GDP	-0.0291**	1.24325	0.239621
Inflation	-0.03147***	2.10 623	0.052342
Constant Variable	0.06371**	2.63442	0.023223
AR Test (Order 1)	-2.235***		0.006
AR Test (Order 2)	0.812**		0.476
Sargan Statistics	58.956		0.257
R-squared	**0.820385**	**F-statistic**	9.413373
Adjusted R-squared	**0.796120**		
Observations	1300		

*** p<0.01, ** p<0.05, * p<0.

Source: Author's estimation.

4.3. Robustness of our estimates

To verify the robustness of these results, we consider a wide set of robustness checks. First, we consider the sensitivity of our results to longer lag lengths. The estimated effects on Gini coefficient are qualitatively unchanged, while those for inequality are strengthened: for the latter, the effects are much larger and are now statistically significant at longer horizons. A second check is to assess whether these results are driven by the Volcker disinflation (in the US case): this period includes particularly contractionary monetary shocks and increases in most measures of inequality. At the

same time, Coibion (2010) documents that the estimated effects of monetary policy shocks on macroeconomic variables can be quite sensitive to the treatment of this time period. Again, the results are qualitatively unchanged indicating that the Volcker disinflation is not driving the empirical results in the US case.

One alternative approach to estimating the response of a variable to shocks is to directly estimate the moving average representation of that variable in terms of the shock. Another robustness check we consider is to control for other macroeconomic shocks in the estimation of equation (5). This can potentially increase the precision of the estimates in short samples. We consider three specific shocks as controls: technology shocks (T) as in Gali (1999), oil supply shocks (O) from Kilian (2009) and tax shocks (F) from Romer and Romer (2010).

Finally, we want to ensure that our results are robust to household characteristics. Our baseline measures of economic inequality across households do not control for a number of household characteristics such as number of people in the household, age of household members, education, etc… Because work on inequality sometimes normalizes household income and consumption by the number of individuals in the household, we also consider measures of income and consumption inequality across households measured using an OECD equivalence scale. We consider measures of inequality after controlling for factors which would contribute to differential income and consumption levels across households. For example, we control for age of the head of household (quartic polynomial), the number of adults and the number of children in the household, race, the education level of the head of household, and a number of other characteristics by first regressing logged household income, earnings, consumption and expenditures on these observables. We then define inequality as the cross-sectional standard deviation of the residuals across households (since Gini coefficients cannot be constructed using residuals).

5. RESULTS ANALYSIS

Tables (1) and (2) show the effects of monetary policy on the poverty in the EMCCA area and in the US. While tables (3) and show the effects of monetary policy on inequality. Auto-correlation terms are included as an independent variable. For every

empirical model that includes auto-correlation term, both AR and Sargan tests exhibit whether instrumental variables used in the estimation are appropriate.

Table (1) indicates the estimation results of the monetary policy effects' on poverty in the EMCCA area. An auto-correlation term which is important in measuring long-term effects has significantly positive effects on current poverty. This means that poverty persists and that present independent variables influence current period's dependent variables until next period. Inflation is significant and positively correlated with poverty while interest rate has a negative but not significant effect on poverty. Considering the results of this table, it can be said that increase in inflation rate leads to increase of poverty this result seems to be in line with the theory and previous researches (Romer and Romer, 1999 for example). It also appear that interest rate do not affect poverty in the EMCCA area. This second finding goes against the theory and previous researches, but there are two reasons behind this. First, the low financial development observed in the EMCCA countries as in many developing countries and the low access to banking services for the households. Indeed only 17% of the household of the EMCCA area have access to banking services (2012 BEAC survey). Thus is this area the households are not sensitive to interest rate. The second reason seems to be the excess liquidity of the banking system of the EMCCA area. This makes banks insensitive to variations in bank interest rates decided by the central Bank. Because of those characteristics, interest rate do not affect poverty in the EMCCA countries.

Table (2) indicates the estimation results of the monetary policy effects' on poverty in the United States. The results indicate that, interest rate, income growth, unemployment and inflation are shown to be significant. Interest rate and poverty have significantly positive correlation. So it can be said that rising interest rate leads to greater poverty severity index. Two reasons seems to be behind this. First, most poor people are highly likely to be net debtors. To them, higher interest rate may be a burden, causing them to cut back their spending. Second, other than net debtors, any people in poverty can face worse situation due to substitution effects of interest rate. When interest rate climbs, opportunity cost of present consumption increases, reducing current spending and enlarging future consumption. Accordingly, poor people will cut back consumption, causing greater poverty severity.

Income growth has significantly negative effects on poverty. When income increases, poverty decreases, which is consistent with the result of Romer and Romer (1999). With other variables fixed, it is natural to see that rising income swells consumption. This will lessen poverty gap and raise possibility to get out of poverty. Unemployment rate is positively correlated to poverty, this means that an increase in unemployment rate leads to a rise in poverty.

Inflation and poverty have significantly positive correlation. In this way, rise in inflation rate leads to increase of poverty. This result suggest that monetary policy that aims at low inflation and stable aggregate demand is the most likely to result in genuinely improved conditions for the poor in the long run. The auto-correlation term which is important in measuring long-term effects has significantly positive effects on current poverty. This means that poverty persists and that present independent variables influence current period's dependent variables until next period.

Table (3) indicates the estimation results of the monetary policy effects' on inequality measured by the Gini coefficient in the EMCCA area. The results show on the one hand that GDP is significant and negatively correlated with inequality this result is consistent with Romer and Romer (1999) and means that output growth reduce inequality. And on the other hand that Inflation and Unemployment are significant and positively correlated with inequality. Thus monetary policy aiming to low inflation can reduce inequality. We also find that the interest rate's effect is negative but not significant. This result seems to be justified by the characteristics of the EMCCA banking system as mentioned above.

Finally, table (4) indicates the estimation results of the monetary policy effects' on inequality measured by the Gini coefficient in the US. The results show that GDP is significant and negatively correlated with inequality, this is consistent with Romer and Romer (1999) and means that output growth seems to reduce inequality. Unemployment is significant and positively correlated with inequality. This is consistent with the theory and means that rise of unemployment rate leads to increase of inequality. Another finding is that interest rate is significant and positively correlated to inequality, this result suggest that contractionary monetary policy shocks can reduce inequality as shown by Coibion

and al. (2012). The last result is that inflation is significant and negatively correlated with inequality, this finding is at odds with Romer and Romer (1999), Easterly and Fischer (2001), Albanesi (2007), among others but is consistent with Coibion and al. (2012) Kang and al. (2013). The apparent conflict between our results and some prior papers could reflect our focus on U.S. economic conditions since 1986 on one hand and EMCCA area economic conditions in the other hand rather than cross-country comparisons. Cross-country heterogeneity in labor market institutions, transfer systems, and skill distributions, among many other factors, would affect the relative strength of the different channels through which (dis)inflationary policies affect income and consumption distributions. Hence, one should be wary of drawing broad conclusions about whether higher inflation necessarily increases or decreases economic inequality across different countries or time periods, particularly in the presence of other significant institutional changes.

We can conclude that, interest rate and poverty are positively correlated in the United States, implying that rising interest rate increases poverty rate. Unlike in the EMCCA countries where conventional monetary policy does not affect income distribution and poverty, monetary policy affects poverty through the quantitative easing channel. This result is justified by the nature of the banking sector of developing countries.

6. CONCLUSION

Using data of United States and developing countries especially the EMCCA countries, this study conducts an empirical analysis on effects of monetary policy on poverty and inequality. With previous researches, it was examined that monetary policy can influence poverty and inequality through income distribution, interest rate changes, quantitative easing and inflation.

The results show that low inflation and macroeconomic stability are associated with higher income for the poor both in United States and in the EMCCA area. This finding is consistent with the results of Romer and Romer (1999). Thus monetary policy aimed at reducing inflation, have a positive impact on poverty reduction. Monetary policy affects poverty through its impact on income distribution and mean expenditure.

We also find that short term interest rate does not affect income distribution and poverty in the EMCCA countries. Two reasons seem to explain this result: firstly the low financial development observed in those countries and the low access to banking services for the household. Secondly, this is justified by the excess liquidity of the banking system of the EMCCA area. This makes banks insensitive to variations in bank interest rates decided by the central Bank. Monetary policy affects poverty through the quantitative easing channel. Thus conventional monetary policy does not affect income distribution and poverty in EMCCA countries unlike in the United States.

These results show that findings on monetary policy effects on poverty and inequality in developed countries may not be applicable to developing countries, where countries are characterized by different tax and benefit systems, different institutions, and where households do not access financial markets in the same way.

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