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Effective monetary policy, banks' pricing behaviour and human development in Africa

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Abstract: This paper empirically examines the effect of monetary policy effectiveness on human development in Africa. We employ both micro-bank level and macro-country level data. Bank level data are taken from the bank scope database maintained by Fitch/IBCA/Bureau Van Dijk. Series are yearly, covering a sample of 320 banks across 29 African countries. Panel fixed effects, random effects and IV regressions were estimated for the period 2002 to 2013. For our IV estimation, the paper explores an instrumental variable based on the fact that effective monetary policy is conditional on the independence of the central bank. The regression results that ensued suggest that; first, effective monetary policy translates to high banks' loan and deposit prices. Building on these results and employing various specifications of banks' pricing strategy, the second test suggests that, high banks' pricing induced by effective monetary policy tends to increase human development. Results of the net effects eventually suggest that effective monetary policy, overall, does not improve human development.

Keywords: effective monetary policy; human development; banks' pricing behaviour; central bank independence; CBI; Africa.

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1 Introduction

The act of expanding and contracting monetary policy has remain a major practice of central banks to regulate key macroeconomic indicators including but not limited to interest rate, money supply, inflation and GDP growth for better societal welfare (human development). Human development is the process of enlarging people's choices which allow them to lead a long and healthy life, to be educated and to enjoy a decent standard of living, inter alia. Monetary policy, whether expansionary or contractionary, should ideally reflect in human development regardless of its effectiveness. Incidentally, effectiveness of monetary policy has gained attention across the world today with advocacy for central bank independence (CBI) which has the potential of ensuring it. This makes the link between the policy effectiveness and human development of perennial interest to policy makers and academics.

Yet, compelling empirical evidence on the effects of the effectiveness of monetary policy on human development remains weak. This is because empirical studies that

explicitly evaluate this subject matter are scarce, conducted in developed countries, and use proxies (money supply (M2 and M3), interest rate, inflation, the yield curve among others) that fail to measure how effective monetary policy may be (see for example, Romer and Romer, 1998; Fielding, 2004; Uhlig, 2005; Galbraith et al., 2007; Nwoko et al., 2016). There is, therefore, a knowledge gap with regard to developing countries and the effectiveness aspect of the policy on human development. Literature pertaining to monetary policy and welfare nexus also measure welfare using earnings inequalities, relative price of components of the retail price index, poverty rate and the GDPs. While poverty incidence is a comprehensive measure of a country's well-being, it is not readily available. However, compared to the measures of well-being in extant works, an alternative comprehensive measure of welfare (the human development index, HDI) will be employed in this study. Effective monetary policy entails the control and stabilisation of general prices of goods and services, which directly have an influence on societal well-being. This is supported by Romer and Romer (1998), Fischer and Easterly (2000) who demonstrated empirically that, on average, low inflation enhances welfare. Hypothetically, when prices of goods and services are stable, welfare improves, in the sense that people are able to consume today and plan for the future with a defined income.

Effective monetary policy may not improve human development even though its main goals such as economic stability may be well accomplished. If the effectiveness of the policy tends to reduce money in the hands of the (poor) people, welfare may worsen. On the other hand, as noted by Romer and Romer (1998), a monetary policy that aims at stable aggregate demand is most likely to improve conditions for the poor permanently. Arguably, effective monetary policy influences human development through bank pricing behaviour. Chiu et al. (2012) noted that, there is a little doubt that a country's monetary policy not only can but does largely determine the evolution of its general pricing behaviour of banks. Other authors including and in particular Amidu (2006) and Ciccarelli et al. (2015) maintained that a change in the lending behaviours of banks (bank's interest rate) is greatly influenced by monetary policy of the central banks. Ideally, when monetary policy is effective, bank pricing is expected to be moderate and stable. However, most people smoothen their personal and business consumption using bank loans. This is likely to improve the welfare of such consumers of bank loans at a reduced cost of bank loans (Chiu et al., 2012).

Following the importance of monetary policy effectiveness for policy formulations, this study proceeds to empirically examine whether effective monetary policy through banks' pricing behaviour influence human development in Africa. We argue that the pricing behaviour of banks are the transmission mechanism through which effective monetary policy affect human development. In particular, the paper addresses the following research hypothesis:

The study, first, investigate the influence of effective monetary policy on banks' pricing behaviour.

H_0 Effective monetary policy does not influence the pricing behaviour of banks in Africa.

H_1 Effective monetary policy influences the pricing behaviour of banks in Africa.

Secondly, it investigates the influence banks' pricing behaviour has on human development.

H_0 High banks' pricing behaviour does not influence human development in Africa.

H_1 High banks' pricing behaviour influences human development in Africa.

Finally, and most importantly, it assesses the influence of effective monetary policy on human development in the light of banks' pricing behaviour.

H_0 Effective monetary policy does not influence human development in the light of banks' pricing behaviour.

H_1 Effective monetary policy influences human development in the light of banks' pricing behaviour.

Employing micro-bank-specific and macro-country-level data from 29 African countries, this paper contributes to the literature by analysing human development in Africa focusing on the role of monetary policy effectiveness and pricing behaviour of banks. First, we assess how effective monetary policy influences the pricing behaviour of banks in Africa. From an economic policy perspective, it is important to identify monetary policy determinants of pricing strategy of banks so that action can be taken to reduce the economic shocks associated with the pricing distortion of banks. Second, we examine the effect of loan price, deposit price and fee price (as used to proxy pricing behaviour of banks) on human development, which is rarely examine empirically in the literature. Human development is represented by the UNDP's HDI and arguably determined partly by bank's pricing behaviour. Finally, we examine the effect of monetary policy effectiveness on human development in the light of pricing behaviour of banks.

The following key results were found: First, the results show that, monetary policy effectiveness affects banks' pricing behaviour in Africa. For example, our results suggest that banks' loan and deposit prices are high if monetary policy is effective. This finding is consistent with the argument that a country's monetary policy not only can but does largely determine the evolution of its general pricing behaviour of banks. Second, on the effects of banks' pricing behaviour on human development, the results show that high banks' prices decrease human development. This means that an increase in loan and fee prices will deter people from taking loans to improve their well-being and hence develop themselves, whereas high deposit price is seen negligible to attract deposits. Finally, the results also show that high banks' pricing induced by effective monetary policy tends to improve human development in Africa. Results of the net effects eventually suggest that effective monetary policy, overall, does not improve human development.

The rest of the paper is organised as follows: Section 2 reviews the existing empirical literature while section 3 presents specifications of human development, monetary policy effectiveness, pricing behaviour of banks and other explanatory variables used. It also contains the estimation strategy employed to achieve our stated objectives. Section 4 contains the results and analysis. Finally, in Section 5 we conclude.

2 Empirical literature

Monetary policy and welfare nexus have attracted quite a lot of empirical works across the world. In this section, we present extant literature on this subject. In advance countries, Romer and Romer (1998) in the US use average inflation and average income of the poor to measure monetary policy and welfare respectively and find that

expansionary monetary policy in the short run is associated with improve welfare for the poor, whiles low inflation and stable aggregate demand growth are associated with improved welfare of the poor in the long run. Starr (2005) used the Granger causality test to investigate the relationships between monetary-policy variables and both output and prices in the post-stabilisation period, in four core CIS countries (Russia, Ukraine, Kazakhstan and Belarus) using quarterly data from 1995 to 2003. Results of the study provide little evidence of real effects of monetary policy in the four core CIS countries with the notable exception that interest rates have a significant impact on output in Russia. The findings complement the study of Uhlig (2005) whose findings show that contractionary monetary policy shocks have no clear effect on real GDP in the USA. Also, in the USA, Galbraith et al. (2007) find monetary policy to have significant causal impact on pay inequality. They did so by using the yield curve to proxy monetary policy.

Still in advance world, using money supply as a measure of monetary policy, Nouri and Samimi (2011) examined the impact of monetary policy on economic growth in Iran adopting ordinary least squares (OLS) technique and data covering the period 1974–2008. A positive and significance relationship between money supply and economic was established in the study. In Korea, Kang et al. (2013) examined this subject using household and province-level data. They proxy welfare with the poverty gap index, poverty severity index and Gini coefficient and monetary policy with interest rate. Their finding was that, real interest rate and poverty are positively correlated whiles inflation reduces poverty. But for the Gini coefficient, the coefficient was not significant. A study by Srithilat et al. (2017) in Lao PDR examined the effect of monetary policy and economic development. Using time series data from 1989 to 2016 and employing unit root, Johansen co-integration and error correction models. They find an inverse relationship between money supply, interest rate and inflation rate (as used to measure monetary policy) and GDP per capita. However, real exchange rate was positively related to the growth indicator (GDP per capita).

In Africa, Khabo and Harmse (2005) evaluated the impact of monetary policy on a small and open economy in the case of the South Africa for the period 1960–1997. He used M3 to measure monetary policy. The OLS method was employed, as well as the Augmented Dickey Fuller test to check for stationarity. Results of the study indicate that economic growth is significantly influenced by money supply. Fielding (2004) find among the West African Economic and Monetary Union (WAEMU) countries that change in monetary policy instruments such as interest rate puts a greater burden on the poor households than their rich counterparts. Balogun (2007) employed the generalised least squares (GLS) method in his study of monetary policy and economic performance of West African Monetary Zone Countries (Gambia, Ghana, Guinea, Nigeria and Sierra Leone) from 1991–2004. Using the variables money supply (M2), minimum rediscount Rate, banking system credit to private sector, banking system credit to central Government and exchange rate of the national currency to the US dollar, findings of the study indicate that monetary policy was a source of stagnation as it hurt real domestic output of these countries. In Nigeria, Akujobi (2012) investigated the impact of monetary policy instrument on economic development using multiple regression technique and found that Treasury bill, minimum rediscount rate and liquidity rate have significant impact on economic development of Nigeria. Okoro (2013) examined the impact monetary policy on Nigeria economic growth by testing the influence of interest rate, inflation, exchange rate, money supply and credit on GDP. The results show the existence

of long-run equilibrium relationship between monetary policy instruments and economic growth.

Again, Michael and Ebibai (2014) examined the impact of monetary policy on selected macroeconomic variables such as gross domestic product, inflation and balance of payment in Nigeria using OLS regression analysis. The result shows that the provision of investment friendly environment in Nigeria will increase the growth rate of GDP. Nwoko et al. (2016), using data covering the period of 1990–2011, examined the influence of money supply, average price, interest rate and labour force were tested on gross domestic product using the multiple regression models as the main statistical tool of analysis. Their findings indicate that average price and labour force have significant influence on gross domestic product while money supply was not significant. In Sudan, Mustafa (2020) examined the role banking finance and monetary policy plays in enhancing HDI using time series data over the period 1999–2018. He used inflation rate as a measure of monetary policy efficiency and employed the OLS. The results found a positive relationship between HDI and changes in provision of banking finance and inflation during the period under consideration. Moreover, it is found that, monetary policy in term if inflation indirectly contributed to enhance HDI through money supply increase. Ufoeze et al. (2018) studied the impact of monetary policy on economic growth using measures such as GDP, monetary policy rate, money supply, exchange rate, lending rate and investment and a time series data from 1986 to 2016. Employing the OLS among other time series techniques, they found at the end that monetary policy explains 98% of the changes in economic growth in Nigeria.

Considering the above discussions, one can say that the relationship between monetary policy and welfare is firm in the literature. However, literature on the effectiveness of monetary policy on human development nexus is limited. This is the gap that this paper addresses. Again, several measures including GDP per capita and poverty incidence has been used in the literature to assess countries' progress towards improved welfare. Per capita GDP only measures the economic aspect of welfare. This leaves a gap in the literature since some authors including Gohou and Soumaré (2012) attest to the fact that development is a multidimensional phenomenon, and welfare depends not only on economic factors but on health care, education, and other factors as well. On the other hand, poverty incidence is a comprehensive measure of a country's well-being, it encompasses all aspects of individuals' living conditions (health, education, access to basic services, nutrition, etc.) to the threshold needed for a decent standard of living (Gohou and Soumaré, 2012). However, it is not recorded annually and is too country-specific to be aggregated across countries (Gohou and Soumaré, 2012), therefore, its use in empirical analysis is limited. The HDI is used as the population welfare measure, despite the fact that it limits the definition of poverty to three basic aspects of human development. HDI is the most universally accepted measure of a country's human development.

3 Evaluating methodology

3.1 Data sources

This study employs both micro-bank level and macro-country level data. Bank level data is taken from the Bank scope database maintained by Fitch/IBCA/Bureau Van Dijk.

Series are yearly, covering a sample of 320 banks across 29 African countries. In order to reduce the possibility of introducing data aggregation bias in the empirical analysis, unconsolidated financial statements of the banks are used. The sample includes all commercial banks, cooperative banks, development banks, savings banks, real estate and mortgage banks for which annual data is available. To ensure that banks that are important players in the deposit and/or loan markets are not omitted, medium and long-term credit banks and specialised government institutions are included in the sample. Observations with outliers such as zero and/or negative capitalisation are dropped. Also, observations for capitalisation above the 99th percentile are dropped. In addition, loan growth rate observations above 99th percentile of the distribution were equally dropped. This is to correct for mergers, acquisitions and start-ups during the study period. Macroeconomic data are sourced from the World Bank Economic Development Indicators, Freedom house, Garriga (2016) and UNDP human development database. The micro-level bank data is available from 2002 to 2013 while the CBI which will be used as instrument is available up to 2012. These may potentially limit the study; however, it does not mean that the results from this study would be of less use for policymaking and implementation.

3.2 Variable measurements

We proxy human development by the UNDP's HDI. HDI as defined by the UNDP (2010), is a summary composite index that measures a country's average achievements in three basic aspects of human development, namely health, knowledge, and standard of living. Health is measured by life expectancy at birth. Knowledge is measured by a combination of the adult literacy rate and the combined primary, secondary, and tertiary gross enrolment ratio. Standard of living is defined by GNI per capita (purchasing power parity US$).

Following Brewer et al. (2006), we use *loan price*, *deposit price* and price of providing non-interest related services (*fee price*) as measures of pricing behaviour of banks in Africa. Lending rate is measured as total interest income as a percentage of total earning assets; the deposit rate is calculated as total interest cost divided by total interest-bearing liabilities, the fee price is the cost of providing non-interest income services such as fee on commission, trading and others.

The *effective monetary policy* variable is measured by the respective countries' monetary freedom indices from the heritage foundation and has been used by other authors including that of Ravnik and Žilić (2011) and Amidu and Wolfe (2013). Monetary freedom is a weighted average of price stability and price controls. It is measured from 0 to 100, 100 being the most effective monetary policy framework.

We also control for variables that may affect human development, monetary policy and pricing behaviour of banks. These controls include bank-specific characteristics and the characteristics of macroeconomic, political and monetary environments. For bank-level controls; bank Age is the year of establishment till date, Loan is the ratio of loan to total assets used to control for loan size, the individual bank's loan to total market loan is used to proxy bank's market share, efficiency is proxied by cost to gross income ratio, Funding source is the total liability to total assets. Macro level variables are; Inflation is the rate of inflation based on the consumer price index, GDP growth measures business cycle fluctuation and political right rating (PRR) measures freedom for political

activism. African countries are generally characterised by low level of institutional efficiency which adversely impact human development.

3.3 Model and estimation strategy

In addressing the issue of human development, monetary policy effectiveness and pricing behaviour of banks, the study investigates the influence of monetary policy effectiveness on human development in the light of pricing behaviour of banks. We follow the work of Valverde and Fernandez (2007) and Amidu and Wolfe (2013) and consequently estimate the following empirical model;

$$HDI_{t,c} = \alpha_1 + \alpha_2 MP_{t,c} + \alpha_3 PBB_{it,c} + \alpha_4 \left(MP_{t,c} * PBB_{it,c} \right) + \sum_{j=5}^{k} \alpha_j X_{ij} + \mu_i + v_i + \varepsilon_{it} \quad (1)$$

where $HDI_{t,c}$ is human development of country c at period t, $MP_{t,c}$ is the monetary freedom of country c in period t, $PBB_{it,c}$ is the pricing behaviour of bank i in country c in period t, ($MP_{t,c}$ * $PBB_{it,c}$) is the interaction between monetary freedom and the pricing behaviour of bank i in country c at period t, the variable $X_{i,j}$ are a set of $\{k\}$ variables controlling for bank-specific characteristics, respective countries' macroeconomic and political environments variables, α's are the parameter vectors. μ_i represents country fixed effects which control for time-invariant unobserved country characteristics. v_i are year fixed effects which control for macroeconomic changes and ε_{it} is the random error term of the equation.

We estimate equation (1) by fixed effects and also random effects. Fixed effects and random effects models eliminate omitted variable bias by measuring change within a group across time. The fixed effects technique assumes that the individual specific effects are correlated with the regressors and therefore, removes the effect of time-invariant characteristics in order to assess the net effect of the independent variables on human development. On the other hand, the random effects work under the assumption that the individual specific effects are uncorrelated with the regressors. Furthermore, the use of fixed effects does not allow for inference outside the data set. However, since the random effects assume that the data set is normally distributed; inferences can be extended to a larger population. Also, in the random effects model, time-invariant characteristics can be included in the model; nonetheless, in the case of the fixed effect models, time-invariant variables are absorbed into the intercept. We also improve the estimates by estimating a 2SLS-IV regression. This is because we acknowledged that monetary policy effectiveness is not random. We rely on the fact that effective monetary policy is conditional on the independence of the central bank. The study also adopted the panel corrected standard errors (PCSE) model of fixed and random effects and the 2SLS-IV estimations which is robust to heteroscedasticity and autocorrelation.

The data analysis is led by performing tests to determine suitability and goodness-of-fit of the model. A Hausman specification test was performed to establish the choice between a fixed effects model and a random effects model. The results of the Hausman test showed significant P-values which depicts the absence of the problem of endogeneity bias and hence the preferred estimation technique should be the random effects model which provides consistent estimates in this instance. However, the

2SLS-IV estimation will be of interest to the study where it is used because it accounts for potential endogeneity.

4 Empirical results

4.1 Summary and descriptive statistics

Table 1 presents summary statistics for the key country level variables used in this study. All variables are averaged by country during the period 2002–2013. The variables are grouped into macroeconomic, monetary policy and human development. Under the human development is the HDI from UNDP database. Mauritius records the highest average of human development of about 0.73 units whiles the lowest average of about 0.337 units is recorded by Sierra Leone. Similarly, the monetary freedom is used to proxy monetary policy effectiveness. The results show that Morocco is the country with more effective monetary policy (highest monetary freedom of about 81.99 units) and the least was about 6.88 units for Zimbabwe. Regarding the macroeconomic variables; Angola toped in terms of macroeconomic growth with about 0.13% growth rate whiles Zimbabwe records a negative average growth rate of about –0.68% and at the same time, the highest average price instability (inflation). Prices were more stable in Morocco as an average inflation of about 1.8% was recorded. In terms of political rights rating, Namibia on average enjoyed more political freedom over the period (about 6.92 average rating) with Nigeria recording the lowest of 1. Finally, on CBI, the central banks of Benin, Burkina Faso, Cote d'Ivoire, Mali and Senegal are equally rated as more independent whiles that of Mozambique was less independent.

Table 2 shows summary statistics for the bank level variables used in this study. Bank-specific variables are also averaged by country during the same period as above and are grouped into banks' pricing and other bank level controls. Banks' pricing variables considered are; loan price, fee price and deposit price. Figures from the banks' pricing variables show that banks in Zimbabwe on average charge high prices of about 0.36%, 0.10% and 0.22% loan, fee and deposit prices respectively. This can be attributed to the high price instability in Zimbabwe over that period, which is evident by the least effective monetary policy recorded. The various low prices are about 0.03% loan price, 0.0098% fee price and 0.015% deposit price for Botswana, Morocco and Mali respectively, which is also evident from their monetary freedom status. For the other bank level control variables, older banks are found in Morocco than the other countries in the sample as it records an average bank age of about 63 years, whiles the opposite is true for Angola which records an average bank age of about 12 years. Tunisian banks on average give more loans with banks in Angola being the least in the sample. In terms of efficiency, the figures indicate that, banks in Rwanda are more efficient in the sample with banks in Egypt being the least efficient. Cameroonian and Namibian banks have the highest and lowest funding sources respectively. Finally, a market share of about 26% is recorded for banks in Sierra Leone, whiles banks in Egypt hold the least market share of about 0.04% in our sample.

Table 3 presents the pair-wise correlation coefficients as a preliminary analysis of the relationship between the human development indicator, monetary policy effectiveness and banks' pricing behaviour. The correlation coefficient between human development variable and loan price is negative and statistically significant indicating, that for banks

operating in Africa, human development improves when loan price decrease, however, it was insignificant with fee and deposit prices. On the correlation between monetary freedom and banks' pricing behaviour, we noticed that the coefficients were negative and significantly correlated with all the banks' pricing variables. This suggests that effective monetary policy reduces various banks' pricing. Next is the pair-wise correlation between the indicators of effective monetary policy and human development. The results show that effective monetary policy has negative and significant correlation with the human development indicator. Thus, more effective monetary policy inversely affects human development in Africa. This possible if the policy effectiveness results in low cash flow in the hands of people. We shall explore this in a regression setting which allow us to add other covariates.

Table 1 Averages for the country-level variables

	Macroeconomic variables				*Monetary policy variable*	*Human development index*
	GDP growth	*Inflation*	*PRR*	*CBI*	*Monetary freedom*	*HDI*
Algeria	0.03925	3.989149	---	0.3825	79.47622	0.683083
Egypt	0.052965	8.990811	6	0.502421	71.10271	0.6565
Morocco	0.048018	1.829395	2.08333	0.438939	81.9879	0.577667
Sudan	0.066118	12.79251	2.41667	0.216375	64.5	0.43575
Tunisia	0.046245	3.815263	4.83333	0.529261	80.9962	0.693917
Benin	0.04	3.174899	6	0.840625	79.4125	0.441
Burkina Faso	0.051667	3.199441	6.08333	0.840625	78.52857	0.347667
Cameroon	0.032076	2.43566	---	0.60825	76.20833	0.470083
Cote d'Ivoire	0.010678	2.828464	5.33333	0.840625	79.60833	0.422
Ethiopia	0.08327	14.58635	1.25	0.3375	69.33333	0.368083
Ghana	0.058935	14.29811	3.66667	0.585208	64.53622	0.532
Kenya	0.039952	10.59747	3.5	0.477227	75.02468	0.4975
Mali	0.0487	2.663761	2.66667	0.840625	80.85938	0.368667
Mauritania	0.041629	6.825447	5.66667	0.526909	76.58824	0.462333
Nigeria	0.066873	11.85653	1	0.557261	71.12414	0.4815
Rwanda	0.074875	8.137947	---	0.739886	73.93438	0.417833
Senegal	0.039721	2.137373	3.41667	0.840625	80.98333	0.45825

Notes: Table 1 presents the mean value of country-level variables involving macroeconomic indicators, effective monetary policy variable and human development variable. Effective monetary policy is measured by monetary freedom. Human development variable is measured by the UNDP's human development index. The macroeconomic variables are; GDP growth is the annual growth rate of gross domestic product, inflation is the annual consumer price inflation, political rights rating measures the political freedom of a country and CBI from Garriga (2016).
The data comprises of 330 banks across 29 countries over the period 2002–2013.
---Information is not available.

Source: Authors' calculation using STATA

Table 1 Averages for the country-level variables (continued)

	Macroeconomic variables				*Monetary policy variable*	*Human development index*
	GDP growth	*Inflation*	*PRR*	*CBI*	*Monetary freedom*	*HDI*
Sierra Leone	0.092374	12.89041	2	0.709955	79.25313	0.337167
Uganda	0.079374	8.370174	4.16667	0.52825	79.9	0.44375
Angola	0.133823	40.67299	6.08333	---	51.325	0.464667
Botswana	0.038526	8.52434	2.33333	0.522125	74.33409	0.6325
Malawi	0.05625	12.81765	3.33333	0.38075	67.19167	0.38275
Mauritius	0.038917	5.653335	1.66667	0.579208	73.03529	0.731917
Mozambique	0.075442	8.486622	7	0.189167	72.61667	0.349333
Namibia	0.049842	6.01191	6.91667	0.41375	74.54167	0.589833
South Africa	0.036893	5.926116	3.66667	0.439327	76.99521	0.630833
Swaziland	0.024524	7.245928	---	---	74.50357	0.513917
Tanzania	0.07074	8.189333	5.16667	0.604852	74.55417	0.436583
Zimbabwe	-0.06845	2899.289	---	0.436125	6.856786	0.442167

Notes: Table 1 presents the mean value of country-level variables involving macroeconomic indicators, effective monetary policy variable and human development variable. Effective monetary policy is measured by monetary freedom. Human development variable is measured by the UNDP's human development index. The macroeconomic variables are; GDP growth is the annual growth rate of gross domestic product, inflation is the annual consumer price inflation, political rights rating measures the political freedom of a country and CBI from Garriga (2016).
The data comprises of 330 banks across 29 countries over the period 2002–2013.
---Information is not available.

Source: Authors' calculation using STATA

4.2 Effects of monetary policy on bank pricing behaviour

This sub-section analyses the empirical results with the aim of examining effective monetary policy influence on the pricing behaviour of banks in Africa. Table 4 presents the results of the regressions that use bank-specific variables, accounting for the respective countries' monetary freedom, level of development and macroeconomic stability. The first three columns (columns 1, 2 and 3) are estimated using the fixed effect estimator while the last three (columns 4, 5 and 6) are estimated using the random effect estimator. All regressions are corrected for robust standard errors, controlled for country effects as well as year effects. To improve on our estimates and account for any potential endogeneity, we also use the 2SLS-IV regression. This is because we acknowledged that monetary policy effectiveness is not random. We rely on the fact that effective monetary policy is conditional on the independence of the central bank. From the first-stage

regressions, the F statistics which test for weak identification of the endogenous regressor, 'monetary freedom' is reported as 18.97, 18.99 and 18.97 for loan price, fee price and deposit price respectively. According to Staiger and Stock (1997), an F statistic of at least ten indicates that the endogenous regressor, in this case, 'monetary freedom' is strongly identified.

From Table 4(a), the coefficient of effective monetary policy variable (monetary freedom) is negative and significant across all columns (except columns 2 and 5 where it is not significant). This suggests that when monetary policy is effective, commercial banks adopt low pricing behaviour, particularly with regard to their loan and deposit prices. On the contrary, in Table 4(b), where we account for endogenous monetary policy effectiveness, effective monetary policy tends to increase banks' pricing behaviour. We, therefore, rely on the results of Table 4(b) for a more robust analysis since it accounts for endogeneity. To be specific, the results show that, for each additional unit increase in monetary freedom, loan and deposit prices increase by 0.003 percentage points, all else equal. This is intuitive since the aim of effective monetary policy is to ensure that prices of goods and services are stable in the economy (low inflation), there should be low cash flow in the system, and this is always done by contracting monetary policy which tends to increase banks' pricing. In sum, our results support the hypothesis that effective monetary policy influences pricing behaviour of banks in Africa, and therefore, should be of interest to policy makers. This finding supports the argument that a country's monetary policy does largely determine the evolution of its general pricing behaviour of banks, and consistent with the findings of Amidu (2006) and Ciccarelli et al. (2015) who maintained that a change in lending behaviours of banks is greatly influenced by monetary policy of the central banks. In particular, Amidu (2006) also found a positive effect of monetary policy on lending behaviour of banks at 1% level and at higher magnitude compared to ours.

For the controls, the age of the bank is a significant factor that affects banks' loan pricing in column 1, the results show that, older banks tend to have higher loan price, which makes sense since older banks have alternative ways of making profit and not necessary from interest from loans. Another significant factor that affects banks' pricing is the loan to total asset, the results show in columns 1, 3, 4 and 6 that higher loan/total asset goes with higher loan and deposit prices. This is logical in the sense that the higher the loan and deposit prices the higher the amount of money banks give out as loans to reap more profit. Also, market share is negative and significant in columns 1, 3, 4 and 6, indicating that banks' market share increases when various banks' prices decrease, which is intuitive as banks may win more clients with low prices. Similarly, the coefficient of efficiency in columns 1, 3, 4 and 6 also indicate that more efficient banks tend to reduce their prices. Results of the bank funding sources suggest in columns 2, 5 and 6 that decrease in banks' funding sources tend to increase their fee and deposit prices. This is logical as they may want to mobilise more deposits for funding. Finally, the macroeconomic stability (inflation) variable was negative and significant in columns 1 and 4 suggesting that higher level of inflation is associated with low banks' loan prices, which is logical as low banks' loan prices may allow more money in the system to chase fewer goods. However, the economic growth (GDP growth) variable was not statistically significant across all regressions.

Table 2 Averages for the bank-level variables by country

	Bank pricing variables				*Other control variables*			
	Loan price	*Fee price*	*Deposit price*	*Bank age*	*Loan/total assets*	*Efficiency*	*Funding sources*	*Mkt. share*
Algeria	0.04017	0.022249	0.019455	22.55953	0.440736	0.319414	0.848434	0.084508
Egypt	0.065758	0.015652	0.055094	34.38334	0.478219	0.240519	0.891071	0.038027
Morocco	0.050658	0.009863	0.024206	62.86364	0.552603	0.341447	0.912198	0.104348
Sudan	0.046127	0.049864	0.05804	19.16667	0.351919	0.50077	0.864544	0.177419
Tunisia	0.052546	0.015254	0.042021	49.38726	0.760904	0.363356	0.861213	0.067073
Benin	0.056296	0.027444	0.025003	12.375	0.552656	0.490792	0.906864	0.244898
Burkina Faso	0.067622	0.038943	0.024481	28	0.600794	0.494454	0.918967	0.212766
Cameroon	0.056169	0.0324	0.023662	21.92857	0.523423	0.425458	0.928634	0.164384
Cote d'Ivoire	0.055063	0.042519	0.022802	29.34722	0.611757	0.551225	0.906209	0.181818
Ethiopia	0.046788	0.032674	0.022612	25.625	0.511628	0.268839	0.888373	0.127907
Ghana	0.123045	0.042696	0.075898	30.22222	0.450323	0.424849	0.879703	0.068024
Keyna	0.09155	0.033274	0.043818	35.02778	0.563299	0.432365	0.841996	0.042187
Mali	0.054804	0.033927	0.015545	17.51389	0.578961	0.532492	0.896227	0.206897
Mauritania	0.053593	0.041531	0.025202	28.5	0.564532	0.488026	0.782448	0.20339
Nigeria	0.096554	0.045141	0.05834	33.80953	0.38526	0.451825	0.834976	0.058201

Notes: Table 2 presents the mean value of bank-specific variables of the selected banks. Bank pricing variables are the measures of bank interest income (loan price), non-interest income (fees price), and interest cost (deposit price). The bank specific controls are; bank age is the year of establishment till date, loan is the ratio of loan to total assets used to control for loan size, Mkt. share is the individual bank loan to total market loan is use to proxy bank's market share, efficiency is a proxy to cost to gross income ratio, Funding source is the total liability to total assets. The mean values of the selected banks are in percentage terms except for bank age which is in years.
The data comprises of 330 banks across 29 countries over the period 2002–2013.

Source: Authors' calculation using STATA

Table 2 Averages for the bank-level variables by country (continued)

	Bank pricing variables			*Other control variables*				
	Loan price	*Fee price*	*Deposit price*	*Bank age*	*Loan/total assets*	*Efficiency*	*Funding sources*	*Mkt. share*
Rwanda	0.087468	0.038188	0.052689	17.55556	0.54723	0.568237	0.846952	0.222222
Senegal	0.060858	0.028696	0.022034	32.20238	0.618218	0.514865	0.907938	0.322
Sierra Leone	0.108884	0.079976	0.034262	28.38889	0.314371	0.548089	0.817128	0.26087
Uganda	0.11066	0.025986	0.034518	42.95454	0.446809	0.452914	0.852696	0.116678
Angola	0.061864	0.045289	0.030207	11.91667	0.310697	0.403912	0.870597	0.103448
Botswana	0.034132	0.024345	0.097455	23.08333	0.549747	0.282539	0.837013	0.15
Malawi	0.12974	0.073634	0.062926	26.55	0.411407	0.513189	0.857273	0.134831
Mauritius	0.056394	0.038375	0.048575	42.50758	0.576895	0.305189	0.804573	0.110092
Mozambique	0.112419	0.044445	0.042651	22.01042	0.485435	0.533189	0.859407	0.141176
Namibia	0.091608	0.028271	0.085022	58.01389	0.732214	0.340321	0.662757	0.188679
South Africa	0.107579	0.052537	0.117903	33.375	0.6516	0.334845	0.820412	0.083932
Swaziland	0.087107	0.044077	0.042339	31.7	0.691535	0.478065	0.848358	0.229167
Tanzania	0.077844	0.032307	0.032737	23.56018	0.47033	0.490193	0.878589	0.074182
Zimbabwe	0.355246	0.102527	0.224294	51.5	0.401217	0.388544	0.841196	0.238095

Notes: Table 2 presents the mean value of bank-specific variables of the selected banks. Bank pricing variables are the measures of bank interest income (loan price), non-interest income (fees price), and interest cost (deposit price). The bank specific controls are; bank age is the year of establishment till date, loan is the ratio of loan to total assets used to control for loan size, Mkt. share is the individual bank loan to total market loan is use to proxy bank's market share, efficiency is a proxy to cost to gross income ratio, Funding source is the total liability to total assets. The mean values of the selected banks are in percentage terms except for bank age which is in years.
The data comprises of 330 banks across 29 countries over the period 2002–2013.

Source: Authors' calculation using STATA

Table 3 Pair-wise correlation coefficient between selected variables

	Loan price	*F. price*	*D. price*	*HDI*	*M. freedom*	*Bank age*	*Loan*	*Mkt. share*	*Efficiency*	*Fun. source*	*Inflation*	*GDP growth*	*PRR*	*CBI*
Loan price	1													
F. price	0.1644*	1												
D. price	0.5966*	0.1118*	1											
HDI	–0.0705*	0.0207	–0.0261	1										
M. freedom	–0.3950*	–0.1899*	–0.2405*	–0.0505*	1									
Bank age	0.0275	–0.1169*	–0.0196	–0.0031	–0.0036	1								
Loan	0.0149	–0.1714*	0.1096*	–0.2340*	0.2827*	0.1669*	1							
Mkt. share	0.0207	0.0387*	–0.0419*	–0.0574*	–0.01	0.1740*	0.1350*	1						
Efficiency	–0.0293	0.2822*	–0.2129*	–0.0954*	0.0154	–0.1059*	–0.0837*	0.0501*	1					
Fun. source	–0.1044*	–0.3055*	–0.2726*	–0.1015*	0.0132	0.0823*	–0.0773*	0.1739*	–0.0615*	1				
Inflation	0.1868*	0.0791*	0.1585*	–0.0195	–0.2776*	0.0265	–0.0569*	0.0572*	–0.0312	–0.0392*	1			
GDP growth	–0.2338*	–0.0422	–0.2017*	0.0859*	–0.0068	–0.0975*	–0.1928*	–0.0765*	0.0828*	0.0516*	–0.0731*	1		
PRR	–0.0028	–0.0921*	–0.0246	–0.4906*	–0.0896*	–0.0511*	0.0765*	–0.0029	–0.0103	0.0296	0.0491*	0.046*	1	
CBI	–0.0791*	–0.0206	–0.1074*	–0.1377*	0.1306*	–0.0447*	0.1164*	0.1958*	0.1848*	0.0998*	–0.0249	–0.039	0.034	1

Notes: Pair wise correlation coefficient estimated on sample of 320 banks across 29 African countries. *implies significant at 5% or more. Bank pricing variables are the measures of bank interest income (loan price), non-interest income (fees price), and interest cost (deposit price). Effective monetary policy is measured by monetary freedom. Human development is measured by UNDP's human development index. The bank specific controls are; bank age is the year of establishment till date, loan is the ratio of loan to total assets used to control for loan size, Mkt. share is the individual bank loan to total market loan is use to proxy bank's market share, efficiency is a proxy to cost to gross income ratio, Funding source is the total liability to total assets. The macroeconomic controls; GDP growth is the annual growth rate of gross domestic product and inflation is the annual consumer price inflation, Political rights rating measures the political freedom of a country and CBI from Garriga (2016).

Source: Authors' calculation using STATA

Table 4(a) Monetary policy effectiveness and bank pricing behaviour

Independent variables	*Fixed effects model*			*Random effects model*		
	Loan price	*Fees price*	*Deposit price*	*Loan price*	*Fees price*	*Deposit price*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Monetary freedom	*–0.001***	*0.000*	*–0.001***	*–0.001***	*0.000*	*–0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Bank age	0.001*	–0.000	0.001	–0.000	–0.000	–0.000
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Loan/total assets	0.050***	–0.003	0.036**	0.056***	–0.008	0.043***
	(0.014)	(0.006)	(0.016)	(0.012)	(0.007)	(0.015)
Mkt. share	–0.062**	–0.027	-0.081*	–0.043**	–0.022	–0.084**
	(0.031)	(0.018)	(0.044)	(0.019)	(0.016)	(0.036)
Efficiency	–0.073***	–0.014	–0.084***	–0.061***	–0.008	–0.085***
	(0.014)	(0.010)	(0.017)	(0.012)	(0.010)	(0.017)
Funding sources	–0.022	–0.060**	–0.057	–0.027	–0.069**	–0.109**
	(0.040)	(0.030)	(0.053)	(0.026)	(0.029)	(0.046)
Inflation	–0.000***	0.000	0.000	–0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	–0.012	–0.004	–0.043	–0.013	–0.004	–0.038
	(0.037)	(0.025)	(0.046)	(0.037)	(0.026)	(0.045)
Constant	0.183***	0.104***	0.211***	0.170***	0.081***	0.248***
	(0.040)	(0.028)	(0.058)	(0.035)	(0.026)	(0.057)
Country effect				Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes	Yes	Yes
observations	1,864	1,855	1,848	1,864	1,855	1,848
R-squared	0.125	0.048	0.087	0.121	0.046	0.084
Number of banks	299	299	297	299	299	297

Notes: Dependent variable: various bank pricing (loan price, fees price, deposit price). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. The coefficient of country and year dummies are not stated for brevity.

Table 4(b) Monetary policy effectiveness and human development: the role of bank pricing behaviour

Fixed effect – instrumental variable (IV) (2SLS)						
Independent variables	*Loan price*		*Fees price*		*Deposit price*	
	Stage 2	*Stage 1*	*Stage 2*	*Stage 1*	*Stage 2*	*Stage 1*
Monetary freedom	*0.003***		*0.000*		*0.003**	
	(0.001)		(0.001)		(0.001)	
Bank age	0.001	–0.537***	–0.000	–0.548***	0.001	–0.532***
	(0.001)	(0.085)	(0.000)	(0.0863)	(0.001)	(0.084)
Loan/total assets	0.006	10.056***	–0.001	10.352***	–0.005	10.301***
	(0.018)	(1.621)	(0.010)	(1.631)	(0.027)	(1.618)
Mkt. share	–0.017	–9.374***	–0.024	–9.069***	–0.031	–9.438***
	(0.038)	(3.081)	(0.015)	(3.083)	(0.047)	(3.081)
Efficiency	–0.079***	1.395	–0.012	0.794	–0.089***	1.057
	(0.016)	(1.533)	(0.009)	(1.493)	(0.017)	(1.491)
Funding sources	–0.039	4.233	–0.062***	3.398	–0.071	4.916
	(0.039)	(3.579)	(0.022)	(3.721)	(0.053)	(3.569)
Inflation	–0.000	–0.00028	0.000	–0.00023*	0.000	–0.0002
	(0.000)	(0.00028)	(0.000)	(0.00014)	(0.000)	(0.0001)
GDP growth	0.160*	–45.401***	0.021	–43.234***	0.067	–43.596***
	(0.092)	(6.573)	(0.037)	(6.358)	(0.108)	(6.372)
CBI		–6.085***		–6.098***		–6.298***
		(1.397)		(1.399)		(1.446)
F stat.		18.97		18.99		18.97
Observations	1,751		1,744		1,735	
R-squared	–0.388		0.040		–0.168	
Number of banks	283		283		280	

Notes: Dependent variable: various bank pricing (loan price, fees price, deposit price). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

4.3 Effects of bank pricing behaviour on human development

Next is to analyse how banks' pricing behaviour affects human development in Africa. Table 5 presents the regression results that have HDI as the dependent variable. Again, the estimations are done using fixed and random effects with robust standard errors. We also control for differences across countries.

Table 5 Bank pricing behaviour and human development

Independent variables	*Fixed effects model*			*Random effects model*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Loan price	–0.006			–0.077*		
	(0.029)			(0.043)		
Fees price		–0.077***			–0.121***	
		(0.027)			(0.032)	
Deposit price			–0.012			–0.097***
			(0.018)			(0.019)
Bank age	0.009***	0.009***	0.009***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Loan/total assets	–0.013	–0.013*	–0.013	0.018*	0.012	0.017*
	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)	(0.010)
Mkt. share	0.001	0.001	0.001	–0.014	–0.011	–0.015
	(0.012)	(0.011)	(0.012)	(0.015)	(0.015)	(0.016)
Efficiency	0.005	0.006	0.003	–0.005	0.001	–0.011
	(0.008)	(0.007)	(0.008)	(0.010)	(0.011)	(0.011)
Funding sources	–0.004	–0.013	–0.007	-0.024	–0.032*	–0.039*
	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)	(0.021)
Inflation	–0.000**	–0.000**	–0.000**	–0.000*	-0.000*	–0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Political rights rating	–0.001	–0.001	–0.001	–0.000	–0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Constant	0.165***	0.171***	0.168***	0.471***	0.476***	0.484***
	(0.024)	(0.023)	(0.025)	(0.020)	(0.021)	(0.023)
Country effect				Yes	Yes	Yes
Observations	2,352	2,342	2,309	2,352	2,342	2,309
R-squared	0.734	0.738	0.734	0.109	0.114	0.109
Number of banks	273	273	269	273	273	269

Notes: Dependent variable: human development index (HDI). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. The coefficients of country dummies are not stated for brevity.

The results indicate that all the banks' prices are negative and significantly related to human development, at 10% level for loan price and 1% levels for both fee and deposit prices. Talking about loan and fee prices which affect the clients, logically if these prices are high, there will be less borrowing and hence less money to improve welfare. Thus, the

higher cost borne by borrowers will deter them from taking loans to improve their well-being and hence develop themselves. Deposit price on the other hand will be considered so negligible that welfare may not improve regardless of its increase. Another possible intuition is that, higher deposit prices reduce banks' net interest margins and consequently increase their loan pricing. In other words, high deposit price may not encourage human development. In a nutshell, human development is responsive to banks' pricing behaviour in Africa. Our result conforms to the argument of Asongu and Nwachukwu (2015) that financial dynamics of depth, activity and size induced by bank pricing improve inclusive human development in Africa.

Some of the control variables also significantly affect human development. The age of the bank has a significantly positive relationship with human development across all regressions. Loan to total asset is also positive and significant in columns 4 and 6 but negative in column 2, this indicates that the amount of loan given directly influences human development. Again, the coefficients of banks' funding sources were negative and significant in columns 5 and 6, suggesting that increase in banks' funding sources tend to decrease human development. Finally, the macroeconomic stability variable (inflation) negatively and significantly influences human development across all regression, suggesting that high inflation level decreases human development. However, bank efficiency, market share and political rights rating were not statistically significant across regressions.

4.4 Human development and effective monetary policy: the role of banks' pricing behaviour

This section presence the role of banks' pricing behaviour in the effect monetary policy effectiveness has on human development. Having established that effective monetary policy affects the pricing behaviour of banks, and that banks' pricing behaviour influence human development in Africa, we now present evidence of how effective monetary policy affect human development in the light of banks' pricing behaviour. We again use the fixed effect and random effect estimations. Similarly, we use the 2SLS-IV regression to improve on our estimates and account for any potential endogeneity. Here too, our endogenous regressor is well identified with F statistics of 26.71, 79.85 and 33.14 from the first-stage regressions. In line with the works of Asongu et al. (2017) and Tchamyou (2020), net impacts are computed in order to assess the overall effect from the complementarity between banks' pricing behaviour and effective monetary policy in influencing human development. For example, in column 1 of Table 6, the net effect from the interaction between loan price and monetary freedom is 0.00068 ([0.004 × 0.0800186] + [–0.001]). In the computation, the mean value of loan price is 0.0800186, the unconditional effect of monetary freedom is –0.001 while the conditional impact from the interaction between monetary freedom and loan price is 0.004.

In Table 6(a), the results of monetary freedom across all regressions indicate that, all else equal, more effective monetary policy tends to unconditionally decrease human development, and consistent when we account for endogenous effective monetary policy in Table 6(b). This finding is in line with our earlier argument (section one) that, if the effectiveness of the policy tends to reduce money flow in the hands of people, welfare may worsen, and buttress by the conclusion that higher money supply leads to improving economic conditions (McMillan, 2017). Again, the conclusion made by Romer and

Romer (1998) that a monetary policy that does not aim at stable aggregate demand is most likely to worsen conditions for the poor, can also be used to support the results. The results of loan and fee prices remained negative and significant which is consistent with our finding and analysis in Table 5 that if these prices are high, there will be less borrowing and hence less money to improve welfare. However, the sign of the coefficient of deposit price changed to positive after controlling for the interactive terms (even though not significant in the IV regression, Table 6(b), suggesting that higher prices awarded to depositors tend to improve human development. This finding is logical and in line with our expectations. More importantly, in Tables 6(a) and 6(b), the coefficients of the interactive terms 'M. freedom*L. price' and 'M. freedom * F. price' were positive and significant, indicating that high loan and fee prices induced by monetary policy effectiveness tend to increase human development. The interactive term 'M. freedom * D. price' on the other hand was negative and significant, suggesting that higher deposit price in the light of effective monetary policy leads to a decrease in human development. This was however, not significant when we account for endogeneity in Table 6(b), we, therefore, will not emphasise on it. Following our previous results from Tables 4 and 5, the findings from the interactive terms 'M. freedom * L. price' and 'M. freedom * F. price' are not expected, albeit when monetary policy achieves its aim of low inflation and stable aggregate demand through banks' pricing, it is likely to improve welfare (Romer and Romer, 1998). In spite of the positive relationship, however, the net effects across all regressions in Tables 6(a) and 6(b) were negative. Thus, overall, effective monetary policy causes low human development in African countries, all else equal.

Some covariates were also significant. Banks' age exerts negative and significant effect on human development only in columns 1, 2 and 3 of Table 6(a), but positive and significant across regressions in Table 6(b). Loan to total asset was negative and weakly significant only for columns 2, 4 and 5 but insignificant in Table 6(b). Again, the coefficients of market share across all regressions in Table 6(a) were not significant but significant in all columns in Table 6(b), indicating that higher banks' market share tend to increase human development. This means that banks with larger market shares are able to manipulate their interest rates for high human development regardless of the monetary policy framework. The coefficient of efficiency in Table 6(a) also indicates that more efficiency of banks tend to increase human development, that is, efficient banks promote human development by facilitating credit services, but the results were not significant in Table 6(b). Results of the banks' funding sources were not significant in both tables. The macroeconomic stability variable (inflation) negatively influences human development across all regressions in Table 6(a) but not significant across regressions in Table 6(b). This means that higher inflation rate tends to reduce human development. Finally, we observe that political rights rating (PRR) as a measure of political risk has a negative and significant impact on human development only in Table 6(a). The PRR indicator awards high scores to countries with less freedom and low scores to countries where residents have freer environments. As a result, the negative impact of political rights is in line with our expectation that greater freedom contributes to better welfare.

Table 6(a) Monetary policy effectiveness and human development: the role of bank pricing behaviour

Independent variables	*Fixed effects model*			*Random effects model*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Monetary freedom	*–0.001***	*–0.001***	*–0.001***	*–0.001***	–0.001***	–0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Loan price	–0.242*			–0.242**		
	(0.141)			(0.113)		
M. freedom * L. price	*0.004**			*0.003***		
	(0.002)			(0.002)		
Fees price		–0.814***			–0.632***	
		(0.180)			(0.157)	
M. freedom * F. price		*0.010****			*0.008****	
		(0.002)			(0.002)	
Deposit price			0.303**			0.183*
			(0.151)			(0.103)
M. freedom * D. price			*–0.004***			*–0.003**
			(0.002)			(0.001)
Net effects	*–0.00068*	*–0.00065*	*–0.0012*	*–0.00075*	*–0.00072*	*–0.0011*
Bank age	–0.001*	–0.001**	–0.001*	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Loan/total assets	–0.011	–0.011*	–0.009	–0.005*	–0.004*	–0.004
	(0.007)	(0.006)	(0.007)	(0.003)	(0.002)	(0.003)

Notes: Dependent variable: human development index (HDI). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. The coefficient of country and year dummies are not stated for brevity.

Table 6(a) Monetary policy effectiveness and human development: the role of bank pricing behaviour (continued)

Independent variables	*Fixed effects model*			*Random effects model*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Mkt. share	0.002	0.002	0.004	–0.001	0.000	0.000
	(0.012)	(0.011)	(0.011)	(0.003)	(0.003)	(0.003)
Efficiency	0.015**	0.015**	0.018***	0.004	0.006**	0.005*
	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)
Funding sources	0.011	0.006	0.008	0.000	–0.002	–0.004
	(0.012)	(0.012)	(0.012)	(0.003)	(0.003)	(0.005)
Inflation	–0.000***	–0.000***	–0.000***	–0.000***	–0.000***	–0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Political rights rating	–0.004***	–0.004***	–0.004***	–0.004***	–0.004***	–0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.539***	0.544***	0.504***	0.518***	0.514***	0.492***
	(0.028)	(0.023)	(0.023)	(0.019)	(0.015)	(0.015)
Country effect	n.a	n.a	n.a	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,295	2,284	2,267	2,295	2,284	2,267
R–squared	0.859	0.865	0.860	0.858	0.864	0.858
Number of banks	265	265	263	265	265	263

Notes: Dependent variable: human development index (HDI). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. The coefficient of country and year dummies are not stated for brevity.

Table 6(b) Monetary policy effectiveness and human development: the role of bank pricing behaviour

Independent variables	*Fixed effect – instrumental variable (IV) (2SLS)*					
	Stage 2	*Stage 1*	*Stage 2*	*Stage 1*	*Stage 2*	*Stage 1*
Monetary freedom	–0.005***		–0.003***		–0.003***	
	(0.002)		(0.001)		(0.001)	
Loan price	–2.699**	–602.605***				
	(1.175)	(42.744)				
M. freedom * L. price	0.037**	8.253***				
	(0.016)	(0.503)				
Fees price			–2.925**	–1230.774***		
			(1.173)	(95.254)		
M. freedom * F. price			0.037**	15.965***		
			(0.015)	(1.321)		
Deposit price					–1.121	–543.917***
					(0.768)	(70.167)
M. freedom * D. price					0.015	7.507***
					(0.010)	(0.859)
Net effects	–0.0020		–0.0017		–0.0023	
Bank age	0.008***	–0.328***	0.008***	–0.460***	0.008***	–0.406***
	(0.001)	(.039)	(0.001)	(0.033)	(0.001)	(0.043)
Loan/total assets	0.000	2.384***	–0.004	3.994***	0.000	3.089***
	(0.008)	(0.852)	(0.008)	(1.046)	(0.008)	(1.088)

Notes: Dependent variable: human development index (HDI). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 6(b) Monetary policy effectiveness and human development: the role of bank pricing behaviour (continued)

Independent variables	*Fixed effect – instrumental variable (IV) (2SLS)*					
	Stage 2	*Stage 1*	*Stage 2*	*Stage 1*	*Stage 2*	*Stage 1*
Mkt. share	–0.027**	–3.015*	–0.024**	–4.761***	–0.033**	–7.444***
	(0.013)	(1.787)	(0.011)	(1.310)	(0.016)	(1.854)
Efficiency	–0.013	–4.355***	–0.001	–3.909***	–0.003	–3.405**
	(0.011)	(0.852)	(0.007)	(1.307)	(0.009)	(1.356)
Funding sources	–0.015	–3.020*	–0.001	3.373	0.007	3.789
	(0.014)	(1.620)	(0.010)	(2.460)	(0.010)	(2.638)
Inflation	–0.000	–0.056***	–0.000	–0.123***	–0.000	–.143***
	(0.000)	(0.018)	(0.000)	(0.020)	(0.000)	(0.025)
Political rights rating	0.002	0.451***	–0.000	0.090	0.002	0.907***
	(0.0412)	(.172)	(0.0353)	(0.193)	(0.0405)	(0.234)
CBI		–3.792***		–8.103***		–5.913***
		(0.734)		(0.907)		(1.027)
F stat.		26.71		79.85		33.14
Observations	2,063		2,056		2,039	
R-squared	0.738		0.756		0.716	
Number of banks	254		254		252	

Notes: Dependent variable: human development index (HDI). Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

5 Conclusions and policy implications

This paper contributes to literature by providing empirical evidence on how monetary policy effectiveness through banks' pricing behaviour affects human development in Africa. In particular, the paper uses a panel dataset of 320 banks across 29 African countries over the period 2002–2013 and employs fixed effect, random effect and the 2SLS IV-regressions. The study first analyses how monetary policy effectiveness affects banks' pricing behaviour. Secondly, it assesses the effects of banks' pricing behaviour on human development, and finally, looked at the sensitivity of human development to monetary policy effectiveness and banks' pricing behaviour. The paper uses the HDI from UNDP's database to measure human development. Monetary freedom is used to measure effective monetary policy, and three specifications of banks' pricing behaviour; loan price, fee price, and deposit price. This is to make our results withstand intellectual criticisms with regard to the use of alternative specifications.

The following key results were found: First, the results demonstrate that, effective monetary policy affects banks' pricing behaviour in Africa. For instance, our results suggest that effective monetary policy translates to high banks' loan and deposit prices. This result is consistent with the argument that a country's monetary policy not only can but does largely determine the evolution of its general pricing behaviour of banks. Second, on the effects of banks' pricing behaviour on human development, the results show that high banks' prices decrease human development; on the other hand, low banks' prices improve human development. This means that an increase in for instance loan price deters people from taking loans for their well-being and hence develops themselves. Finally, the results also show that, human development is sensitive to effective monetary policy and banks' pricing behaviour. In particular, the results indicate that higher banks' pricing induced by effective monetary policy tend to improve human development. However, our net effects coefficients suggest that effective monetary policy, overall, does not improve human development. We, thus, conclude that, in terms of human development, monetary policy that targets low inflation to be effective leaves much to be desired in African economies. This may not be true for countries without inflation targeting.

On policy implications, domestic policy makers of African countries should be mindful that, if welfare is improving in their various countries, is not because of the effectiveness of their monetary policy, particularly countries with inflation targeting central banks. Therefore, governments of these countries should work hand-in-hand with their central banks to ensure that the effectiveness of their policies should not limit its target only to price controls and stability, but low banks' pricing which will translate to better welfare as well.

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