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Financial determinants of consumer price inflation. What do dynamics in money, credit, efficiency and size tell us?

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AFRICAN GOVERNANCE AND DEVELOPMENT
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WP/12/019

**Financial determinants of consumer price inflation. What do dynamics in
money, credit, efficiency and size tell us?**

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AGDI Working Paper

Research Department

Financial determinants of consumer price inflation. What do dynamics in money, credit, efficiency and size tell us?

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Abstract

Purpose – The purpose of this paper is to examine the effects of financial dynamic policy options in money, credit, efficiency and size on consumer prices. Soaring food prices have marked the geopolitical landscape of developing countries in the past few years.

Design/methodology/approach – The estimation approach used is a Two-Stage-Least Squares Instrumental Variable technique. Instruments include: legal-origins; income-levels and religious-dominations. The first-step consists of justifying the choice of the estimation approach with a Hausman-test for endogeneity. In the second-step, we verify that the instrumental variables are exogenous to the endogenous components of explaining variables(financial dynamic channels) conditional on other covariates(control variables). In the third-step, the validity of the instruments is examined with the Sargan overidentifying restrictions test. Robustness checks are ensured by: (1) use of alternative indicators of each financial dynamic; (2) estimation with robust Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors; and (3) adoption of two interchangeable sets of instruments.

Findings – Findings broadly reveal the following: (1) money(depth) and credit(activity) which are in absolute measures have positive elasticities of inflation; while (2) financial efficiency and size in relative measures have negative elasticities of inflation.

Social implications – This paper helps in providing monetary policy options in the fight against soaring consumer prices. By keeping inflationary pressures on food prices in check, sustained campaigns involving strikes, demonstrations, marches, rallies and political crises that seriously disrupt economic performance could be mitigated.

Originality/value – As far as we have perused, there is yet no study that assesses monetary policy options that could be relevant in addressing the dramatic surge in the price of consumer commodities.

Keywords : Banks; Inflation; Development; Panel; Africa

JEL Classification: E31; G20; O10; O55; P50

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1. Introduction

In the past decade, the world has experienced a dramatic surge in the price of many staple food commodities. For instance the price of maize increased by 80% between 2005-2007 and has since risen further. Many other commodity prices have also risen sharply over this period: milk powder by 90%, rice by 25% and wheat by 70%. Such large variations in prices have had tremendous impacts on the incomes of poor households in developing countries (FAO, 2007; World Bank 2008; Ivanic & Martin, 2008). The overall effect on poverty rates in African countries is contingent on whether the gains to poor net producers outweigh the adverse impact on poor consumers. The bearing of food prices on the situation of particular households also depends importantly on the products involved, the patterns of households income and expenditure, as well as policy responses of governments. On account of existing analyses, the impacts of higher food prices on poverty are likely to be very diverse; depending on the reasons for the price change and the structure of the economy (Ravallion & Lokhsin, 2005; Hertel & Winters, 2006). The World Bank has also raised concerns over the impact of high prices on socio-political stability (World Bank, 2008). Most studies confirm the link between rising food prices and the recent waves of revolutions that have marked the geopolitical landscape of developing countries over the last couple of months.

The premises of the Arab Spring and hitherto unanswered questions about some of its dynamics could be traced to poverty; owing to unemployment and rising food prices. “*We will take to the streets in demonstrations or we will steal,*” a 30-year old Egyptian woman in 2008 vented her anger as she stood outside a bakery. Riots and demonstrations linked to soaring consumer prices took place in over 30 countries between 2007-08. The Middle East encountered food riots in Egypt, Jordan, Morocco and Yemen. In Ivory Coast, thousands marched to the

home of President Laurent Gbagbo chanting: “*you are going to kill us*”, “*we are hungry*”, “*life is too expensive*” ...etc. Similar demonstration followed in many other African countries, including , Cameroon, Senegal, Ethiopia, Burkina Faso, Mozambique, Mauritania and Guinea. In Latin America, violent clashes and demonstrations over rising food prices occurred in Guatemala, Peru, Nicaragua, Bolivia, Argentina, Mexico and the Haitian prime minister was even toppled following food riots. In Asia, people flooded the streets in Bangladesh, Cambodia, Thailand, India and the Philippines. Even North Korea surprisingly experienced an incident in which market women gathered to protest against restrictions on their ability to trade in food(Hendrix et al.,2009). The geopolitical landscape in the last couple of months has also revolved around the inability of some political regimes to implement concrete policies that ensure the livelihoods of their citizens. Tunisia, Egypt, Morocco, Senegal, Uganda, Zambia, Mauritania, Sudan, Western Sahara and most recently Nigeria are some countries that have witnessed major or minor unrests via techniques of civil resistance in sustained campaigns involving strikes, demonstrations, marches and rallies.

Whereas the literature on the causes and impacts of the crisis in global food prices in the developing world has mushroomed in recent years(Piesse & Thirtle,2009; Wodon & Zaman, 2010; Masters & Shively,2008; Journal of Nutrition, 2010), we are unaware of studies that have closely examined how financial policies affected consumer prices. Remedial policy and pragmatic choices aimed at fighting inflation that have been documented include both short and medium term responses(SIFSIA,2011). Short-term and immediate measures include: input vouchers and input trade fairs(seed, fertilizer and tools) for vulnerable farmers; reinforcement of capacity(training and equipment) in income generating activities; safety-nets(cash transfers or food vouchers); tax measures and government policies. Medium term measures could be clubbed

into three strands: trade and market measures; production and productivity incentives; coordination and activation of food security plan. Firstly, trade and market measures include: reduction of import taxes on basic food items and grain export bans when needed; strengthening the food and agricultural market information system; conducting of value chain analysis; building of efficient marketing institutions; facilitation of farming contract arrangements; lowering of distribution cost; strategic reserve support and government anticipation of price increase. Secondly, production and productivity incentives include: investing in agriculture; addressing of poor harvest and promotion of shelf-life products. Thirdly, coordination and activation of food security action plan involve: coordination and coherence among various agencies engaged in price stabilization efforts; comprehensiveness of multi-sectoral response to price hikes and coordination(synchronization) of food insecurity plan in a bid to achieve the maximum impact.

According to Von Braun (2008), monetary and exchange rate policy responses were not effective in addressing food inflation. This revelation by the Director General of the International Food Policy Research Institute urged us to peruse the literature in search of monetary policies on soaring food prices. Finding none, the paper fills this gap in the literature by assessing how financial development dynamics in money, credit, activity, efficiency and size could be exploited in monetary policy to keep food prices in check. In plainer terms, this work aims to assess the impact of the following dynamics on food prices. (1) Money: the role of financial depth (in dynamics of overall economic money supply and financial system liquid liabilities). (2) Credit: the bearing of financial activity dynamics in banking and financial system perspectives. (3) Efficiency: the impact of financial intermediary allocation efficiency(from banking and financial system angles). (4) Size: the part financial size plays.

Another appeal of this paper is the scarcity of literature on the effect of financial development on inflation despite a substantial body of work on the economic and financial consequences of inflation (Barro, 1995; Bruno & Easterly, 1998; Bullard & Keating, 1995; DeGregorio, 1992; Boyd et al., 2001). The rest of the paper is organized as follows. Section 2 presents data and discusses the methodology. Empirical analysis is covered in Section 3. Section 4 concludes.

2. Data and Methodology

2.1 Data

We examine a panel of 34 African countries (see Appendix 4) with data (see Appendix 3) from the Financial Development and Structure Database (FDSD) and African Development Indicators (ADI) of the World Bank (WB). The ensuing balanced panel is restricted from 1980 to 2010 owing to constraints in data availability. Information on summary statistics and correlation analysis is detailed in Appendix 1 and Appendix 2 respectively. For clarity in presentation, we club selected variables into the following categories.

2.1.1 Independent variables

a) Financial depth

Siding with the FDSD and recent finance literature (Asongu, 2011abc), we measure financial depth both from overall-economic and financial system perspectives with indicators of broad money supply ($M2/GDP$) and financial system deposits ($Fdgdgdp$) respectively. Whereas the former represents the monetary base plus demand, saving and time deposits, the later denotes liquid liabilities of the financial system. Since we are dealing exclusively with developing countries, we distinguish liquid liabilities from money supply because a great chunk of the

monetary base does not transit via the banking sector (Asongu, 2011d). The two indicators are in ratios of GDP (see Appendix 3) and can robustly check one another as either account for over 97% of information in the other (see Appendix 2).

b) Financial intermediation efficiency

By financial efficiency here, we neither refer to the profitability-related concept nor to the production efficiency of decision making units in the financial sector (through Data Envelopment Analysis: DEA). What the paper aims to elucidate is the ability of banks to effectively fulfill their fundamental role of transforming mobilized deposits into credit for economic operators. We adopt indicators of banking-system-efficiency and financial-system-efficiency (respectively ‘bank credit on bank deposits: *Bcbd*’ and ‘financial system credit on financial system deposits: *Fcfd*’). As with financial depth dynamics, these two financial allocation efficiency proxies can check each other as either represent more than 89% of variability in the other (see Appendix 2).

c) Financial size

In accordance with the FDSD we proxy financial intermediary development size as the ratio of “deposit bank assets” to the “total assets” (deposit bank assets on central bank assets plus deposit bank assets: *Dbacba*).

d) Financial activity

By financial intermediary activity here, the paper points out the ability of banks to grant credit to economic operators. We appreciate both bank-sector-activity and financial-sector-activity with “private domestic credit by deposit banks: *Pcrb*” and “private credit by domestic

banks and other financial institutions: *Pcrbof*” respectively. The former measure checks the later as it represents more than 92% of information in the later(see Appendix 2).

2.1.2 Dependent and Control variables

In line with the literature(Hendrix et al.,2009) we measure inflation in terms of annual percentage change in the Consumer Price Index(CPI). We control for population growth, openness(trade) and public investment(Asongu, 2011c; Yang, 2011) in the regressions. It is imperative to note that the strength of the instruments is contingent on these variables; as in the first-stage of the Instrumental Variable(IV) estimation procedure, the instruments must be exogenous to the endogenous components of the independent variables, conditional on other covariates(control variables).

2.1.3 Instrumental variables

Previous research has shown the correlation between financial institutions and instruments(moment conditions) of legal-origin, income-level and religious-domination. (La Porta et al., 1997,1998; Stulz & Williamson, 2003; Beck et al., 2003; Asongu, 2011ab; Yang, 2011).

2.2 Methodology

2.2.1 Endogeneity

While financial development might exert inflationary pressures on consumer prices, a reverse causality cannot be ruled-out especially as market pressures do influence the direction of monetary policy. This potential correlation between independent variables and the error term in the equation of interest(endogeneity) is taken into account by an Instrumental Variable (IV) estimation technique.

2.2.2 Estimation technique

Borrowing from Beck et al. (2003) this work adopts the Two-Stage-Least Squares (TSLS) with religious, income and legal-origin dynamics as instrumental variables. As highlighted earlier, the paper requires an estimation technique that takes into consideration the issue of endogeneity. The Instrumental Variable(IV) estimator can avoid the bias that Ordinary Least Squares(OLS) estimates are victim-of (absence of consistency) when independent variables are correlated with the error term in the main equation. Thus the IV model examines how the moment conditions are instrumental in financial channels to inflation. Borrowing from Asongu (2011e) the IV process of the paper shall adopt the following steps:

- justify the use of an IV over an OLS estimation technique by virtue of the Hausman-test for endogeneity;
- show that instrumental variables are exogenous to the endogenous components of explaining variables (financial dynamic channels), conditional on other covariates (control variables);
- verify if the instrumental variables are valid and not correlated with the error-term in the equation of interest with a Sargan Over-identifying Restrictions (OIR) test.

Thus the methodology above shall entail the following models:

First-stage regression:

$$Finance_{it} = \gamma_0 + \gamma_1(legalorigin)_{it} + \gamma_2(religion)_{it} + \gamma_3(incomelevel)_{it} + \alpha_i X_{it} + \nu \quad (1)$$

Second-stage regression:

$$CPI_{it} = \gamma_0 + \gamma_1(Finance)_{it} + \beta_i X_{it} + \mu \quad (2)$$

In the two equations, X is a set of independent control variables . For the first and second equations, ν and μ , respectively represent the disturbance terms. Instrumental variables include legal-origins, dominant-religions and income-levels. CPI is the Consumer Price Index.

2.2.3 Robustness checks

In order to examine the robustness of the findings, the paper: (1) uses alternative indicators of each financial dynamic; (2) employs robust Heteroscedasticity and Autocorrelation Consistent(HAC) standard errors; and (3) adopts two interchangeable sets of instruments.

3. Empirical Analysis

This section presents results from panel TSLS regressions to assess the importance of instrumental variables in explaining cross-country variances in the endogenous components of financial development dynamics, and the ability of the exogenous components of financial channels to account for cross-country differences in consumer prices.

3.1 Finance and instruments

In Table 1, we regress the financial variables on the instruments. The instrumental variables are classified into two sets to avoid issues related to over-parametization and multicollinearity. Thus we regress proxies for every indicator within each financial dynamic on a different set of instruments. Our use of alternative financial indicators with distinct sets of instruments at every phase of the analysis ensures robustness in the findings. Broadly, the results in Table 1 indicate that distinguishing African countries by income-levels, religious-dominations and legal-origins helps explain cross-country differences in financial development. These findings have been documented by an extensive literature (La Porta et al., 1997; Stulz & Williamson, 2003; Beck et al., 2003) and much recently confirmed in the law-finance literature (Asongu, 2011ab; Yang, 2011). Even upon controlling for trade, public investment and population growth, the instruments enter jointly significantly in all regressions at a 1% significance level.

The dominance of English common-law (French civil-law) countries in prospects of financial depth, activity and size (efficiency) is in line much recent African law-finance literature (Asongu, 2011abcf). Results also indicate Christian-dominated countries have higher (lower) levels of financial efficiency (depth) than their Islam-oriented counterparts. Income-levels also play a role in financial development as poor countries have a lower propensity to improve their financial dynamics than wealthy nations. This postulation can be further ascertained in the role Upper Middle Income (UMI) countries play in Middle Income (MI) finance elasticities. While Lower Middle Income (LMI) effects are negative, their combined effect with UMI countries in the MI elasticity is positive.

Table 1: Finance and instruments(first-stage regressions)

		Financial Depth		Financial Efficiency		Financial Activity		Financial Size	
		M2	Fdgdg	BcBd	FcFd	Pcrb	Pcrbof	Dbacba	Dbacba
Instruments		1 st Set	2 nd Set	1 st Set	2 nd Set	1 st Set	2 nd Set	1 st Set	2 nd Set
	Constant	0.400*** (15.05)	0.203*** (9.818)	0.637*** (11.84)	0.907*** (14.10)	0.276*** (12.71)	0.208*** (7.906)	0.533*** (21.55)	0.527*** (34.26)
	English	---	0.055*** (4.840)	---	-0.352*** (-9.956)	---	0.034** (2.412)	---	-0.103*** (-7.535)
	French	-0.029** (-2.315)	---	0.383*** (12.60)	---	0.001 (0.139)	---	0.103*** (7.535)	---
	Christianity	---	-0.041*** (-3.526)	---	0.161*** (4.444)	---	0.004 (0.289)	---	-0.002 (-0.177)
	Islam	0.067*** (5.178)	---	-0.056* (-1.748)	---	0.017 (1.609)	---	0.002 (0.177)	---
	L.Income	-0.141*** (-9.358)	---	-0.099*** (-2.840)	---	-0.131*** (-10.68)	---	-0.112*** (-6.992)	---
	M. Income	---	0.187*** (12.27)	---	0.260*** (5.486)	---	0.276** (14.30)	---	0.201*** (10.15)
	LMIncome	---	-0.047*** (-2.966)	---	-0.136*** (-2.769)	---	-0.123*** (-6.139)	---	-0.089*** (-4.290)
	UMIncome	0.037** (2.118)	---	-0.011 (-0.262)	---	0.062*** (4.331)	---	0.089*** (4.290)	---
Control Variables	Trade	-0.0003** (-2.061)	-0.0003** (-2.013)	---	-0.001*** (-3.320)	-0.0004*** (-3.001)	-0.001*** (-5.580)	0.002*** (10.19)	0.002*** (10.19)
	Public Ivt.	0.007*** (5.101)	0.007*** (5.337)	-0.007** (-2.209)	-0.005 (-1.381)	0.002* (1.688)	0.0007 (0.461)	---	---
	Pop. Growth	-0.027*** (-5.071)	-0.029*** (-5.951)	0.049*** (3.742)	0.044*** (2.915)	-0.012*** (-2.749)	-0.017*** (-2.761)	---	---
	Adjusted R ²	0.258	0.304	0.176	0.169	0.260	0.234	0.295	0.295
	Fisher-test	42.234***	53.055***	31.878***	25.221***	42.672***	37.542***	80.070***	80.070***
	Observations	830	834	868	834	829	836	945	945

M2: Money Supply. Fdgdg: Liquid liabilities. BcBd: Bank credit on Bank deposit (Banking Intermediary System Efficiency). FcFd: Financial credit on Financial deposits (Financial Intermediary System Efficiency). Pcrb: Private domestic credit (Banking Intermediary Activity). Pcrbof: Private credit from domestic banks and other financial institutions (Financial Intermediary Activity). Dbacba: Deposit bank assets on deposits banks plus central bank assets (Financial size). L: Low. LM: Lower Middle. UM: Upper Middle. Ivt: Investment. Pop: population. *, **, ***: significance levels of 10%, 5% and 1% respectively.

3.2 Consumer prices and finance

This section investigates two main issues: (1) the ability of financial dynamics to exert inflationary pressures on consumer prices and; (2) the ability of the instruments to explain consumer price fluctuations beyond financial dynamic mechanisms. To make these investigations we use the TSLS approach with income-levels, legal-origins and religious-dominations as instrumental variables. The first issue is assessed by the significance of estimated coefficients while the second is examined by the Sargan-OIR test. The null hypothesis of this test is the stance that the instruments are valid and not correlated with the error term of the main equation. By implication the null hypothesis is the position that asserts the absence of endogeneity. Thus failing to support the null hypothesis is a rejection of the absence of endogeneity: a rejection of the stance that the instruments explain consumer prices through no other mechanisms than financial channels. In substance, failure to reject the null hypothesis points to the validity of the instruments(absence of endogeneity) and implies the instruments do not exert inflationary pressures on consumers prices beyond financial dynamic mechanisms. We also carry-out the Hausman-test for endogeneity in a bid to give credit to the choice of our estimation approach. The null hypothesis of this test is the position that estimates by OLS are efficient and consistent(absence of endogeneity). Thus a rejection of the null hypothesis of this test indicates that the OLS approach will result in inconsistent estimates due to endogeneity. Hence the need for an estimation technique that upholds consistency. In regressions without HAC standard errors, we provide the Cragg-Donald statistics(Weak instrument test) for the strength of the instruments at first-stage regressions (Table 2). Table 3 reports a replication of the analysis in Table 2 with HAC standard errors.

With regard to the first issue, based on the findings in Table 2, the following could be established: (1) financial depth both in terms of money supply(overall economy) and liquid liabilities(financial system perspective) exert inflationary pressures on consumer prices; (2) financial efficiency both from banking and financial system perspectives exercise deflationary pressures on consumer prices; (3) financial activity both from banking system and financial system dimensions exert inflationary effects on consumer prices; and (4) the financial size elasticity of inflation is negative.

Table 2: Second-stage regressions

		Dependent variable: Consumer Price Index							
	Intercept	47.81*** (10.63)	52.31*** (10.54)	57.11*** (6.624)	83.25*** (7.547)	49.88*** (11.81)	51.37*** (11.25)	174.08*** (3.315)	108.49*** (5.556)
Financial	M2	-2.36 (-0.242)	---	73.58*** (3.307)	---	---	---	---	---
Depth	Fdgdg	---	-5.16 (-0.495)	---	138.84*** (5.842)	---	---	---	---
Financial	BcBd	-40.75*** (-8.722)	---	---	---	-41.71*** (-8.176)	---	---	---
Efficiency	FcFd	---	-42.24*** (-8.779)	---	---	---	-42.13*** (-8.346)	---	---
Financial	Pcbr	---	---	---	---	-9.21 (-0.775)	---	348.58*** (2.741)	---
Activity	Pcbof	---	---	---	---	---	-1.76 (-0.176)	---	148.79*** (4.206)
Financial	Dbacba	---	---	-133.2*** (-6.346)	-148.4*** (-6.694)	---	---	-322.4*** (-3.010)	-182.3*** (-4.867)
Size	Trade	---	---	0.370*** (5.679)	---	---	---	---	---
Control									
Variable									
	Hausman test	83.06***	91.36***	140.96***	112.71***	87.82***	96.14***	106.16***	89.93***
	OIR(Sargan) test	3.537	2.909	1.468	3.950	2.868	3.073	1.792	7.73**
	P-values	[0.170]	[0.233]	[0.225]	[0.138]	[0.238]	[0.215]	[0.408]	[0.020]
	Cragg-Donald	26.726**	31.453**	7.63**	10.281*	35.38**	31.22**	1.938	5.106
	Adjusted R ²	0.058	0.059	0.141	0.142	0.060	0.056	0.115	0.114
	F-stats	40.441***	39.056***	19.331***	22.40***	40.77***	38.32***	5.068***	12.356***
	Observations	904	913	863	881	908	913	876	882
1st Set of Instruments	Constant; English ; Christianity; Middle Income; Lower Middle Income								
2 nd Set of Instruments	Constant; French; Islam; Lower Income; Upper Middle Income								

M2: Monetary Base. Fdgdg: Financial system deposits. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcbr: Private domestic credit by deposit banks. Pcbof: Private domestic credit by financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. *, **, ***; significance at 10%, 5% and 1% respectively. (): z-statistics. Chi-square statistics for Hausman test. LM statistics for Sargan test. []: p-values. OIR: overidentifying restrictions. Cragg-Donald: test for the strength of instruments at first-stage regressions.

As concerns the second issue, we notice that the null hypothesis of the Sargan-OIR test is rejected in only one of the eight regressions. The overwhelming failure to reject the null hypothesis therefore points to the validity of the instruments. In other words, it implies the

instruments do not suffer-from endogeneity. In contextual terms, the instruments do not explain consumer price fluctuations beyond financial development dynamic mechanisms.

Now we turn to the choice of our methodology and strength of the instruments at first-stage regressions. Firstly, rejection of the null hypothesis of the Hausman-test in all regressions justifies the presence of endogeneity and hence our choice of methodology. Secondly, based on the Cragg-Donald test, the instruments are strong in six of the eight models; since the null hypothesis for weak instrument is rejected for the most part. For robustness purposes we replicate the eight regressions using the second set of instruments and find the same results.

Table 3: HAC second-stage regressions

		Dependent variable: Consumer Price Index							
	Intercept	47.81*** (5.202)	52.31*** (4.984)	57.11** (2.065)	67.34*** (2.734)	49.88*** (5.315)	51.37*** (5.217)	117.93 (1.465)	74.29** (1.963)
Financial	M2	-2.36 (-0.089)	---	73.58 (1.144)	---	---	---	---	---
Depth	Fdgdg	---	-5.163 (-0.150)	---	90.720 (1.453)	---	---	---	---
Financial	BcBd	-40.75*** (-3.586)	---	---	---	-41.71*** (-3.322)	---	---	---
Efficiency	FcFd	---	-42.24*** (-3.903)	---	---	---	-42.13*** (-3.297)	---	---
Financial	Pcrb	---	---	---	---	-9.213 (-0.304)	---	---	---
Activity	Pcrbof	---	---	---	---	---	-1.766 (-0.046)	208.95 (1.072)	76.798 (0.844)
Financial	Dbacba	---	---	-133.29** (-2.197)	-132.8*** (-2.980)	---	---	-236.95 (-1.530)	-140.06** (-2.099)
Size	Trade	---	---	0.370* (1.691)	0.234 (0.336)	---	---	0.310 (0.945)	0.284 (1.209)
Control	Hausman test	83.06***	91.36***	140.96***	127.20***	87.82***	96.147***	133.01***	111.36***
Variable	OIR(Sargan) test	3.537	2.909	1.468	0.061	2.868	3.073	0.001	7.533***
	P-values	[0.170]	[0.233]	[0.225]	[0.804]	[0.238]	[0.215]	[0.971]	[0.006]
	Adjusted R ²	0.058	0.059	0.141	0.163	0.060	0.056	0.155	0.155
	F-stats	8.248***	8.209***	2.506*	3.69**	7.922***	38.32***	1.351	3.341**
	Observations	904	913	863	863	908	913	876	882
1 st Set of Instruments	Constant; English ; Christianity; Middle Income; Lower Middle Income								
2 nd Set of Instruments	Constant; French; Islam; Lower Income; Upper Middle Income								

M2: Monetary Base. Fdgdg: Financial system deposits. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcrb: Private domestic credit by deposit banks. Pcrbof: Private domestic credit by financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. *, **, ***; significance at 10%, 5% and 1% respectively. () : z-statistics. Chi-square statistics for Hausman test. LM statistics for Sargan test. [] : p-values. OIR: overidentifying restrictions.

Table 3 checks the robustness of findings in Table 2 with Heteroscedasticity and Autocorrelation Consistent(HAC) standard errors. Firstly, we notice that our choice of the IV

estimation method is valid as the null hypothesis of the Hausman-test is rejected in all regressions. Secondly, estimated coefficients are robust to those in Table 2 based on significance in financial efficiency and financial size elasticities of inflation. Despite the insignificance of the other two financial dynamics, from common-sense and to some extent economic theory, improvements in financial depth and activity exert inflationary pressures on consumer prices. Thirdly, the instruments are valid in six of the eight models as the null hypothesis of the Sargan-OIR test is not overwhelmingly rejected. We notice no significant change in results when this analysis(with robust HAC standard errors) is replicated with the second set of instruments.

3.3 Monetary policy implications, caveats and future directions

Before we delve into monetary policy implications of our findings, it is imperative to highlight the economic intuition motivating the analysis above. It is now widely agreed that monetary policy can participate in sustainable growth by maintaining price stability. Price stability, in turn as defined by the rate of inflation is sufficiently low such that households and businesses do not need to take into account in making everyday decisions. High inflation has an adverse effect on growth due to a number of factors: distortion of relative prices which undermines economic efficiency; redistribution of wealth between debtors and creditors; aversion to long-term contracts and excessive resources are devoted to hedging inflation risks.

In developing economies particularly, an additional cost of high inflation emanates from the adverse effects on the poor segments of the population. This has been the case with food prices in the African continent since the year 2000. Maintenance of low and stable inflation in consumer prices is thus important in curbing social unrest and political instability. Whereas the literature on the causes and impacts of the global food price crisis in the developing world has mushroomed in recent years(Piesse & Thirtle,2009; Wodon & Zaman, 2010; Masters &

Shively,2008; Journal of Nutrition, 2010), we are unaware of any studies that have closely examined how financial policies affected consumer prices. Remedial policy and pragmatic choices aimed at fighting inflation that have been documented include both short and medium term responses(SIFSIA,2011). However, according to Von Braun (2008), monetary and exchange rate policy responses were not effective in addressing food inflation. Thus in trying to fill this gap in the literature we have examined the potential impact of monetary policy through financial dynamics of depth(money), activity(credit), efficiency(optimal allocation) and size.

3.3.1 Financial activity and depth

Financial activity in the context of this paper refers to the ability of financial institutions to grant credit to economic operators. It follows from the findings that financial activity increases economic activity which exerts inflationary pressures on consumer prices. Financial depth from overall economic perspective refers to money supply while from a financial intermediary perspective, it is assimilated to the liability side of the bank's balance sheet(deposits). We have found that financial depth elasticities of consumer prices are positive. It is also worth noting that financial depth(money or deposits) and financial activity(credit) go hand in glove under the implicit assumption that deposits are transformed into credit. Another important aspect worth pointing out is the absolute nature of these two variables(see Beck et al.,1999). Since both are in ratios of GDP it follows that growth in financial depth and activity relative to overall economic performance(GDP growth) exerts inflationary pressures on consumers prices. Therefore, in an atmosphere where rising food prices are not accompanied by an increase in economic productivity, monetary policy should target decreasing financial dynamics of depth and activity.

3.3.2 Financial efficiency and size

Financial allocation efficiency in the context of this paper refers to the probability of deposits being transformed into credit for economic operators. In other words, financial intermediation efficiency is the ability of financial depth to allocate credit for financial activity. Thus financial efficiency is a relative measure(see Beck et al.,1999). It follows from our findings that increasing financial activity relative to financial depth will exert deflationary pressures on consumer prices. Financial size as defined by our paper is also in relative terms(bank assets on total assets). Total assets here refer to bank assets plus central bank assets. It follows that increasing bank assets relative to total assets will exert deflationary pressures on consumer prices.

3.3.3 Caveats and future directions

To the best of our knowledge, the absence of literature dedicated to examining the bearing of financial dynamics on inflation makes our results less comparable. In this paper we have only considered financial determinants of inflation. But in the real world, inflation is endogenous to a complex set of variables: exchange rates, wages, price controls...etc. Thus the interaction of money, credit, efficiency and size elasticities of inflation with other determinants of inflation could result in other dynamics of consumer price variations.

Further work aimed at throwing more light into the findings of this paper could focus on: (1)the determinants of financial dynamics of depth, efficiency, activity and size; and (2) elucidating why relative financial measures exert deflationary pressures while absolute measures do the opposite(inflationary pressures).

4. Conclusion

In recent years, the African geopolitical landscape has been marked by political strife and social unrests due to increases in consumer prices. This paper assesses how financial development dynamics could be exploited in monetary policy to keep food prices in check. We have investigated the impact of financial dynamics on inflation by examining the roles of money, credit, efficiency and financial size on inflationary pressures. Findings broadly reveal the following: (1) money(depth) and credit(activity) which are in absolute measures have positive elasticities of inflation; while (2) financial efficiency and size in relative measures have negative elasticities of inflation.

Appendices

Appendix 1: Summary Statistics

			Variables	Mean	S.D	Min.	Max.	Obser.
Financial Development	Financial	Money Supply		0.299	0.190	0.001	1.141	938
	Depth	Liquid Liabilities		0.228	0.174	0.001	0.948	942
	Financial	Banking System Efficiency		0.856	0.517	0.070	5.411	1003
	Efficiency	Financial System Efficiency		0.897	0.505	0.139	3.979	942
	Financial	Banking System Activity		0.176	0.155	0.001	0.869	937
	Activity	Financial System Activity		0.200	0.211	0.001	1.739	944
	Fin. Size	Financial System Size		0.686	0.235	0.017	1.609	971
Dependent Variable			Consumer Price Index	12.264	21.244	-100.00	200.03	989
Control Variables			Population growth	2.563	1.117	-8.271	10.043	1054
			Public Investment	7.649	4.211	0.000	31.047	899
			Trade	68.175	37.041	6.320	275.23	1012
Instrumental Variables	Legal	English Common-Law		0.441	0.496	0.000	1.000	1054
	Origin	French Civil-Law		0.558	0.496	0.000	1.000	1054
	Religion	Christianity		0.617	0.486	0.000	1.000	1054
		Islam		0.382	0.486	0.000	1.000	1054
	Income	Low Income		0.529	0.499	0.000	1.000	1054
	Levels	Middle Income		0.470	0.499	0.000	1.000	1054
		Lower Middle Income		0.294	0.455	0.000	1.000	1054
			Upper Middle Income	0.176	0.381	0.000	1.000	1054

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obser : Observations. Fin : Financial.

Appendix 2: Correlation Analysis

Financial Development Independent Variables							Other Variables				Instrumental Variables									
F. Depth		F. Efficiency		F. Activity		F.Size	Control Variables			E.V	Law		Religion			Income Levels				
M2	Fdgdp	BcBd	FcFd	Pcrb	Pcrbof	Dbacba	Popg	Publ	Trade	Infl.	Eng.	Frch	Chris	Islam	LI	MI	LMI	UMI		
1.000	0.972	-0.11	-0.07	0.74	0.627	0.403	-0.28	0.160	0.148	-0.12	-0.02	0.028	-0.175	0.175	-0.41	0.412	0.249	0.238	M2	
	1.000	-0.12	-0.05	0.78	0.705	0.459	-0.32	0.159	0.206	-0.12	0.068	-0.06	-0.101	0.101	-0.44	0.448	0.238	0.299	Fdgdp	
		1.00	0.89	0.35	0.298	0.242	0.078	-0.05	-0.048	-0.23	-0.38	0.388	-0.099	0.099	-0.07	0.072	0.057	0.026	BcBd	
			1.00	0.44	0.507	0.269	0.085	-0.06	-0.098	-0.24	-0.33	0.339	0.039	-0.039	-0.10	0.104	0.008	0.126	FcFd	
				1.00	0.926	0.542	-0.24	0.044	0.145	-0.19	-0.07	0.075	-0.092	0.092	-0.46	0.466	0.230	0.333	Pcrb	
					1.000	0.479	-0.22	-0.02	0.058	-0.15	0.008	-0.00	-0.009	0.009	-0.39	0.394	0.127	0.361	Pcrbof	
						1.000	-0.14	0.11	0.390	-0.41	-0.15	0.150	-0.009	0.009	-0.40	0.408	202	0.306	Dbacba	
							1.000	-0.03	-0.124	0.124	-0.04	0.048	0.064	-0.064	0.211	-0.21	-0.14	-0.10	Popg	
								1.000	0.269	-0.07	-0.04	0.043	-0.022	0.022	-0.04	0.046	0.016	0.039	Publ	
									1.000	-0.12	0.238	-0.23	0.185	-0.185	-0.39	0.397	0.196	0.283	Trade	
										1.000	0.329	-0.32	0.061	-0.061	0.090	-0.09	-0.01	-0.09	Inflation	
											1.000	-1.00	0.211	-0.211	0.007	-0.00	-0.05	0.054	English	
												1.000	-0.211	0.211	-0.00	0.007	0.05	-0.05	French	
													1.000	-1.000	0.107	-0.10	-0.28	0.205	Christian	
														1.000	-0.10	0.107	0.289	-0.20	Islam	
															1.000	-1.00	-0.68	-0.49	Lower I	
																1.000	0.684	0.491	Middle I	
																	1.000	-0.29	L Middle I	
																		1.000	U Middle I	

M2: Money Supply. Fdgdp: Liquid liabilities. BcBd: Bank credit on Bank deposit (Banking Intermediary System Efficiency). FcFd: Financial credit on Financial deposits (Financial Intermediary System Efficiency). Pcrb: Private domestic credit (Banking Intermediary Activity). Pcrbof: Private credit from domestic banks and other financial institutions (Financial Intermediary Activity). Dbacba: Deposit bank assets on deposits banks plus central bank assets (Financial size). EV:Endogenous Variable. Popg: population growth. Publ: Public Investment. Infl: Inflation. Eng: English Common-Law. Frch: French Civil-Law. Chris: Christianity. LI: Low Income Countries. MI: Middle Income Countries. LMI: Lower Middle Income Countries. UMI: Upper Middle Income Countries.

Appendix 3: Variable Definitions

Variables	Sign	Variable Definitions	Sources
Inflation	Infl.	Consumer Prices (Annual %)	World Bank(WDI)
Openness	Trade	Imports(of goods and services) plus Exports(of goods and services) on GDP	World Bank(WDI)
Public Investment	PubI	Gross Public Investment(% of GDP)	World Bank(WDI)
Population growth	Popg	Average annual population growth rate	World Bank(WDI)
Growth of GDP	GDPg	Average annual GDP growth rate	World Bank(WDI)
Economic financial depth(Money Supply)	M2	Monetary Base plus demand, saving and time deposits(% of GDP)	World Bank(FDSD)
Financial system depth(Liquid liabilities)	Fdgdp	Financial system deposits(% of GDP)	World Bank(FDSD)
Banking system allocation efficiency	BcBd	Bank credit on Bank deposits	World Bank(FDSD)
Financial system allocation efficiency	FcFd	Financial system credit on Financial system deposits	World Bank(FDSD)
Banking system activity	Pcrb	Private credit by deposit banks (% of GDP)	World Bank(FDSD)
Financial system activity	Pcrbof	Private credit by deposit banks and other financial institutions(% of GDP)	World Bank(FDSD)
Financial size	Dbacba	Deposit bank assets on Central banks assets plus deposit bank assets	World Bank(FDSD)

Trade: Openness. Popg: Population growth rate. GDPg: GDP growth rate. M2: Money Supply. Fdgdp: Liquid liabilities. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcrb: Private domestic credit by deposit banks. Pcrbof: Private domestic credit by deposit banks and other financial institutions. Dbacba: Deposit bank assets on Central bank assets plus deposit bank assets. WDI: World Development Indicators. FDSD: Financial Development and Structure Database.

Appendix 4: Presentation of Countries

Instruments	Instrument Category	Countries	Num
Law	English Common-Law	Botswana, The Gambia, Ghana, Kenya, Lesotho, Malawi, Mauritius, Nigeria, Sierra Leone, South Africa, Sudan, Swaziland, Uganda, Zambia, Tanzania.	15
	French Civil-Law	Algeria, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Ivory Coast, Egypt, Equatorial Guinea, Ethiopia, Gabon, Madagascar, Mali, Morocco, Niger, Rwanda, Senegal, Togo, Tunisia.	19
Religion	Christianity	Botswana, Burundi, Cameroon, Central African Republic, Ivory Coast, Equatorial Guinea, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Rwanda, South Africa, Swaziland, Togo, Uganda, Zambia, Tanzania.	21
	Islam	Algeria, Burkina Faso, Chad, Egypt, The Gambia, Mali, Morocco, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Tunisia.	13
Income Levels	Low Income	Burkina Faso, Burundi, Central African Republic, Chad, Ethiopia, The Gambia, Ghana, Kenya, Madagascar, Malawi, Mali, Niger, Rwanda, Sierra Leone, Togo, Uganda, Zambia, Tanzania.	18
	Middle Income	Algeria, Botswana, Cameroon, Ivory Coast, Egypt, Equatorial Guinea, Gabon, Lesotho, Mauritius, Morocco, Nigeria, Senegal, South Africa, Sudan, Swaziland, Tunisia.	16
	Lower Middle Income	Cameroon, Ivory Coast, Egypt, Lesotho, Morocco, Nigeria, Senegal, Sudan, Swaziland, Tunisia.	10
	Upper Middle Income	Algeria, Botswana, Equatorial Guinea, Gabon, Mauritius, South Africa.	6

Num: Number of cross sections(countries)

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