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The Causes of Hiking Ethiopian Consumer Prices

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ABSTRACT

A growing consumer price is creating instability in the macroeconomic environment and hinders the consumption level of especially the poor society. This paper then explored the major causes of such increasing consumer prices using Ethiopian cases. Using data from the National Bank of Ethiopia from 1982/1983 to 2019/2020, it condensed the information of monetary sector, external sector and fiscal sector variables to a small set to estimate the causes of Ethiopian consumer price hiking using the ARDL model. The factors determining consumer price differ from food to non-food. The most important factors determining food price are price expectation and fiscal factors. On the other hand, the main determinant of non-food consumer prices is the fiscal factor. The author also found evidence of fiscal factors and price expectation effects on general consumer prices. Therefore, to contain the rise in consumer prices, it needs to exercise conservative fiscal stances, which require minimizing deficit financing, reducing the import tax rate and reducing domestic indirect tax rates such as excise tax and value added tax on basic consumer goods and services. Moreover, sound government policies are essential to address inflation anticipations (providing information for society about the future of inflation) to change public opinion.

Keywords: Price inertia; External factor; Grain price; Fertilizer price; Principal component analysis

1. Introduction

There has been a growing interest in the determinants of consumer price hiking. A growing consumer price creates instability in the macroeconomic environment and hinders the consumption level of especially the poor society [1]. For instance, the increase in food prices increases the proportion of consumers'

total expenditures, which further exacerbates poverty [2].

It is also revealed that the rate of inflation in the services sector for everything from housing rents to personal services seems to be increasing from already high levels, and it is unlikely that it will decline soon. Rapid nominal wage increases might make these pressures worse. In nations with robust labor markets, nominal salaries may begin to rise quickly, more quickly than what businesses could realistically absorb, with the ensuing increase in unit labor costs being passed on to consumers as higher prices. Such "second-round effects" would result in higher inflation expectations and more sustained inflation. Finally, a prolonged period of high inflation may result from a further escalation of geopolitical tensions that sparks a new increase in energy costs or exacerbates current problems [3]. Because of this reason, the root causes of consumer price hiking should be clearly understood to minimize its daunting effect on the lives of the poor and instability in the macro economy [4].

Many studies have sought to uncover the fundamental causes of price increases, often ranging from supply to demand shocks such as money supply, government expenditures, depreciation of the exchange rate, household confidence, exports, costs of production (i.e. real wages, prices of raw materials, oil and corporate taxes imposed by governments) over the time horizon [5-9]. Nevertheless, we are less aware of how these factors impact price components in various emerging nations [10]. One of Sub-Saharan Africa (SSA), Ethiopia, has mostly been affected by price inflation, and mainly food prices contributed more to inflation than non-food prices. It is reported that headline inflation has risen to 19.3%, with food price inflation being even higher (23.2%); the headline inflation rate was in the range of 11% in January 2019 [11].

There is no consensus as to why prices rose so dramatically in Ethiopia. A hike in inflation had been typically associated with unfavorable harvest due to drought or conflict, exchange rates depreciation, monetary growth, price expectation, rise in fuel and fertilizer prices, imports and nominal interest rates in Ethiopia [12]. Other factors such as lack of smooth distribution, political uncertainty, volatility in output, fiscal balance, etc were also the reasons for increases in Ethiopian consumer prices [13].

Different studies identified different factors for consumer price hiking in Ethiopia and have not yet reached on conclusion. The choice of the study variables and the technique of analysis may have contributed to the variation in the literature. This paper's goal is to close this gap by re-assessing the factors that influence the rise in consumer prices in Ethiopia. Unlike other studies, this paper rigorously analysed the determinants of Ethiopian price hiking by condensing the information of monetary sector, external sector and fiscal sector variables to estimate the causes of Ethiopian consumer price hiking through PCA (Principal Component Analysis) and a distributed autoregression model (ARDL). It also includes the components of CPI in the analysis.

The remainder of the article is structured as follows: The literature is reviewed and a brief account of the price evolution in Ethiopia is provided in Section 2. The data and empirical model are described in Section 3. In Section 4, the models are discussed and analysed. Section 5 brings the paper to a close and finally Section 6 recommends policy implication.

2. Review of literature

The changes in both supply and demand have been believed to be the drivers of consumer prices. Of the utmost importance is to specifically identify the factors that are significantly determining the hike in consumer prices. The goal of this review is to determine whether there is strong evidence showing how various factors affect increases in consumer prices.

2.1 Theoretical literature

An overview of the growth of the literature on the causes of inflation is given in this section. Inflation has emerged as an important concern in the macroeconomic stability of developing countries. Conventionally, monetary policy has been observed as a

major cause of price changes [14,15]. However, there is growing evidence that changes in overall price are the outcome of the complex dynamic interaction of monetary, demand-pull, cost-push, structural change and price itself [16,17].

The proponents of monetary factors, the importance of money were underlined by monetarists. "Inflation is always and everywhere a monetary phenomenon that results from a more rapid expansion in the supply of money than in total output", according to the modern quantity theory led by Milton Friedman. As opposed to that, Keynesians focused on demand-pull side inflation and believed that when aggregate demand is greater than aggregate supply at full employment, the inflationary gap results. In accordance with Keynes' demand-pull inflation theory, policies that lower the total demand are effective at lowering pressure inflation. Tax increases, government spending cuts, and limiting the amount of money available individually or collectively can also be used to reduce demand and control inflation [18].

Another theory, the Cost-Push theory asserted that Inflation is the increase in money wages that is greater than the increase in labor productivity; an increase in the price of domestic and imported raw materials; or an additional irritation caused by an increase in salaries to reflect an increase in the cost of living. Besides, this theory also emphasized that profit-push, i.e. when Oligopolistic and Monopolistic businesses increase the price of their goods to cover rising labor and manufacturing costs and boost profits leading to higher inflation [19].

Structuralism theorists also viewed that the service sectors accelerated growth, which is linked to immigration and population increase, may put pressure on inflation. They highlighted that given the rapid economic growth and increased social movement, the competition will be heightened. With the use of inflation, new social groups are given access to political and economic activities, and efforts are made to increase power and alter the distribution of income. According to this perspective, inflation is a manifestation of how the economy and society are changing as a result of the quick, dynamic growth of the economy [20,21].

In sum, although monetary policy is conventionally believed to be the major cause of inflation, researchers have cast considerable doubt on the role played by demand-pull, cost-push, structure and inflation itself. Having discussed the theoretical background of inflation, we will now discuss current empirical discussions surrounding inflation's causes.

2.2 Empirical literature

Numerous studies prefer to concentrate on the consequences of inflation, with the objective of testing whether inflation burdens the living standards of the poor [22-24]. Yet, there hasn't been a lot of empirical research analysing the causes of inflation. Studies from different countries on the causes of inflation will provide an important understanding of this section. A common finding is that the change in monetary policy, aggregate supply, aggregate demand, external factors, and domestic factors were the drivers of consumer price hiking; however, the magnitudes and significance of the effects differ across countries.

For instance, utilizing annual data from 1970 to 2011, researchers analysed variables affecting inflation in two sets of nations (high inflation group and low inflation group). The short- and long-term effects of each variable on inflation have been explained using an error correction model based on autoregressive distributed lag (ARDL). They discovered that in low inflation countries, GDP growth and imports of goods and services had a major long-term impact on inflation. They stated that the long-term determinants of inflation in high inflation countries are the money supply, national spending, and GDP growth [25].

In the same way, using time series data from 1974-1975 to 2014-2015 and a vector error correction approach, researchers looked into the factors that affect Ethiopia's experience with inflation. Their results showed that over the long run, the money supply, real gross domestic product, and overall budget deficit all had a positive and statistically significant impact on the consumer price index, which is a measure of inflation [26]. Additionally, they discovered evidence to support the idea that market par-

ticipants factor a predictable fraction of the inflation rate into the nominal interest rate and that a 1-month Euro currency rate contains information about the future course of the inflation rate [27].

On the other hand, money supply, interest rates, and inflation expectations are the long-term drivers of non-food inflation. The short-term model identifies the main sources of inflation as wages, foreign prices, exchange rates, and restrictions on the supply of food [28]. It is discovered that monetary trends continue to be a crucial and major component in explaining Ethiopia's high food inflation. The general level of prices, the world grain price index, the lagged world DAP price index, the domestic benzene price index, the non-food price index, shocks in the money and goods markets, the ongoing depreciation of the Birr against the dollar, and the degree of inflation inertia are additional significant factors that contribute to Ethiopia's soaring food inflation.

Similarly, a monetary union's and the European Central Bank's long-run factors influence inflation differentials analysed. They demonstrated that the main driver of price and inflation differences in the non-traded sector was relative productivity variations. External factors were also found to be a positive and significant factor in raising inflation [29]. Some studies employed Johansen's cointegration test and the Vector Error Correction Model (VECM), respectively, to uncover the long- and short-term foreign and internal drivers driving Ethiopia's food inflation using monthly data from 1997 to 2010 [30]. Based on annual data, researchers estimated determinants of inflation in Pakistan using the data from 1971-722 to 2005-2006. They showed that inflation in Pakistan is influenced by the depreciation of the exchange rate and increases in the value of imports [31].

Research done in Nigeria analysed the dominant factors influencing inflation using ECM depending on conditions of the money market's equilibrium. The findings confirmed that a substantial part of Nigeria's inflationary process can be explained by monetary expansion, which is mostly caused by expansionary fiscal policy [32]. Again, inflation was found to be significantly influenced by monetary and fiscal

policies. Similar studies examined the long-term bivariate link between the US and nine European countries' inflation rates and short-term interest rates in Eurocurrencies. They used co-integration techniques and discovered that there was typically a one-to-one relationship between euro currency rates and inflation that was logically anticipated. Similarly, the study assessed the Republic of Tajikistan's inflationary factors using the ARDL model on monthly data. He discovered that whereas real wages, the GDP gap, and remittance inflows greatly influence price level from the demand side, exchange rate, global wheat prices, and world oil prices significantly influence price level from the supply side. The effect of remittance inflow is also supported well [33].

There is a study on the forces behind the current inflationary experience that has employed the vector autoregressive (VAR) in Ethiopia from 1995 to 2008. It discovered that a fast increase in food demand brought on by a worrisome growth in money supply and credit expansion, inflation expectations, and an increase in international food prices are the main factors contributing to food inflation over the long term. By creating single-equation error correction models for the Consumer Price Index in each nation; it was possible to determine the primary causes of inflation in Ethiopia and Kenya [34]. It discovered that the same variables affect inflation rates in both Ethiopia and Kenya; long-term effects are caused by global food prices and currency rates, while short- to medium-term effects are caused by money growth and shocks to the supply of agricultural commodities. Additionally, both countries showed strong inflation inertia. The main finding was that neither country had a clear and effective monetary or exchange rate policy, which would have served as a nominal anchor for inflation.

Again, using 32 years of data from 1985 to 2016 and ARDL to evaluate the supply and demand side factors affecting inflation in Ethiopia; studies found that in contrast to real gross domestic product, which has a large negative impact on the price level, they discovered evidence of a long-term positive relationship between the money supply, global oil price,

budget deficit, and real effective exchange rate on inflation in Ethiopia. Real effective exchange rates, money supply, budget deficits, and global oil prices are the primary short-term drivers of Ethiopian inflation [35].

Moreover, the factors affecting inflation in two groups of countries (high inflation group and low inflation group) using annual data from 1970 to 2011 were examined. An Error Correction Model based on the Auto-Regressive Distributed Lag (ARDL) modelling has been used to explain the short-run and long-run impacts of each variable on inflation. They found that GDP growth and imports of goods and services have a significant long-run impact on inflation in low-inflation countries. They indicated that money supply, national expenditure and GDP growth are the long-run determinants of inflation in high-inflation countries. In the short run likewise, none of the variables is found to be significant determinants in high-inflation countries. However money supply, imports of goods and services and GDP growth have significantly impacted inflation in low-inflation countries [36].

Others assessed the main drivers of inflation in Ethiopia and Kenya by developing single-equation error correction models for the Consumer Price Index in each country. They found that inflation rates in both Ethiopia and Kenya are driven by similar factors; world food prices and exchange rates have a long-run impact, while money growth and agricultural supply shocks have short-to-medium run effects. There was also evidence of substantial inflation inertia in both countries. The key conclusion made was that there was no nominal anchor for inflation in either country in the form of a clear and well-functioning monetary or exchange rate policy [37]. Likewise, the sources of inflation in India, both in the long run and in the short run were examined by using the co-integration method and found that in the long-run money supply (MS), depreciation of the rupee and supply bottlenecks causes inflation to rise in the country. It's revealed that in the long-run domestic factors such as monetary growth and supply bottlenecks dominate the external factors for a rise in the domestic prices in the economy [38].

Generally speaking, it appears appropriate to hold the perspective that has been a significant effect of various factors on consumer price inflation. In reality, the works that have been discussed thus far represent some of the most in-depth research on this topic and significantly add to the body of literature in this field. However, each work mentioned above was not rigorous and again inconclusive. This is because, the factors determining consumer prices were dependent on the indicators chosen by each researcher. Some of them include some variables ignoring the variability in the others which may lead to omitted variable bias. Although it is challenging to distinctly control all of the issues misleading the results, by attempting, this work will contribute to the literature to include at least the variation in many variables expected to affect the change in consumer prices by developing different indices using Principal Component Analysis (PCA) and estimating the effects using level ARDL model.

3. Data and methods

3.1 Data source

This study has made use of time series datasets obtained from the National Bank of Ethiopia (NBE). These datasets include statistics on pricing, money and finances, external variables, and other topics for the years 1983 to 2020. Due to their extensive temporal ordering, these datasets key advantage is their capacity for generalization.

3.2 Study variables

This study analysed a variety of variables to determine what was causing Ethiopian consumer prices to rise. Different literature has forwarded the importance of variables from different perspectives. These are mainly from monetary policy perspectives, fiscal policy perspectives, international economic policy perspectives and structural economic perspectives in determining the price hiking in different countries. This paper selected variables on the basis of such perspective from existing scholarship and compre-

hensively analysed the causes of price hiking using Ethiopian cases. The response variables are General CPI (GCPI), Food CPI (CPIF) and Non-Food CPI (CPINF); whereas the explanatory variables are monetary factors (Mp), fiscal factors (Fp), external factors (Ep), Dummy for regime change (DRC) and dummy for financial crises (DFC). The explanatory variables such as Mp, Fp and Ep were computed using PCA. The Mp variable is created by the linear combination of money supply (M2) and nominal lending interest rate (i) using PCA. Similarly, the Fp variable is created by the linear combination of total government expenditure, import tax revenue, and domestic indirect tax revenue using PCA. Finally, the Ep variable is created by the linear combination of the nominal effective exchange rate, the value of fuel import, the value of fertilizer imports, imports of raw material, and remittance inflow.

3.3 Principal component analysis (PCA)

In order to reduce the dimensionality of huge data sets, a technique known as PCA, is frequently utilized. PCA works by condensing a large collection of variables into a smaller set that still retains the majority of the data in the larger set. It reduces the number of variables of a dataset, while preserving as much information as possible [39]. In order to preserve as much of the information in the original variables as feasible, the PCA derives a few linear combinations, or principle components (PCs), of a set of variables.

It was been used in aggregating microeconomic, macroeconomic and international indicators into a single measure in the Bank of Jamaica [40], to re-evaluate the relationship between various central bank independence characteristics and inflation performance; to study the relationship between financial conditions and economic activity and etc. [41]. This statistical method is utilized in this investigation to accumulate the variables in the monetary, fiscal and external factors [42]. There are three methods that are frequently used to select the right number of principal components: (1) select a small number of components to obtain between 70 and 90% of the variation, so that only a small amount of information

is lost; (2) keep the components whose corresponding eigenvalues are larger than average; or (3) look at a scree plot. They all essentially produced the same choices and were used in this investigation.

3.4 The model and its estimation strategy

The purpose of this study is to look at what influences Ethiopian consumer prices. This paper focused on three outcomes, namely GCPI, CPIF and CPINF. A logical place to start would be to estimate a model using traditional ordinary least squares after controlling for other variables and presuming that the outcome of interest depends on predicted components. One of the main issues with interpreting such estimates without taking into account the fact that the data are time series is that most economic variables have non-stationary data, which makes it possible for observations to become correlated with time. It's possible that the order of integration will differ as well. Such issues may result in serial correlation, which can produce erroneous or inconsistent estimates [43]. The statistical characteristics of time series data should be studied first in order to account for these impacts, and then the right model should be applied. We investigated potential indicators or possible indications of Stationarity using Augmented Dickey-Fuller (ADF) test.

The other major issue is that it takes some time for factors like monetary and fiscal policy to have an impact on prices. Their impact is delayed and dispersed over several years [26]. It is advised to use a dynamic single model, such as the ARDL model, to address this issue [34]. Finally, the inclusion of many variables will increase the degree of freedom, which may reduce the total observation used to estimate the parameters. Including all many explanatory variables to the model will lead to misspecification and again, ignoring some of them will bias the estimates. Therefore, the appropriate way is to reduce the dimension without losing the information. This was done by using PCA. Taking into account all the above information and following the previous work done, this study adopts the position that price changes caused by other costs or by price adjustments in

markets with surplus supply or demand account for the majority of inflation and has specified the following ARDL (P, Q) models in the literature.

$$\varphi(L)CPI_t = \alpha + \theta(L)X_t + \mu_t \qquad (1)$$

where:

- CPI_t is the Consumer Price Index (general, food and non-food);
- X_t - observable exogenous variables expected to affect prices: Monetary factor (Mp or M2), fiscal factor (Fp or FD), external factor (Ep or NEERI), a dummy for regime change (DRC), a dummy for financial crises (DFC) (Indgap), and lag of consumer price index (general, food and non-food).
- $\varphi(L) = 1 - \varphi_1(L) - - -\varphi_p L^P$ and $\theta(L) = 1 - \theta_1(L) - - -\theta_q L^q$,
- μ- is the residual term.

This model will be assessed using the maximum likelihood function and the variables such as DRC and DFC are expected to positive effect on the Ethiopian consumer price index.

4. Results and discussion

4.1 Results

The findings and discussions were provided in this part. Data were first examined using ADF test statistics, followed by model estimation using ARDL, and a discussion of the derived coefficients.

### *Trends of consumer prices and other variables in Ethiopia*

The consumer price is growing in Ethiopia on average. The consumer price growth is faster since 2002 which was accompanied by improvements in the economy. Although the trends somehow decreased between 2013 to 2018, it has started to increase since 2018. The growth in food consumer prices is contributing more than non-food consumer prices to the general consumer price in Ethiopia (**Figure 1b**). Similar cases were observed in the money supply. The money supply is also increased since 2002. Although, in many cases, the growth in money supply follows a similar path to growth in prices, the average annual growth rates of money supply started to decrease in 2013 annually (**Figure 1c**). The other variables such as government expenditure, import tax revenue and domestic indirect tax revenue (such as VAT, and excise tax) also followed the same growth trends, on average, with the average growth trends of general consumer prices. Especially the growth trends of import tax revenue seem growing proportional to consumer prices (**Figure 1a**). The values of raw material imports and remittance inflow are also growing since 2013. The depreciation of currency (NEERI) also seems to have an increasing effect on the growth of general prices (**Figure 1d**). The trends in remittance inflow seem to move together with the average growth in general consumer prices since 2003 (**Figure 1d**). In general much has been observed from the trends in **Figure 1**, food consumer price is contributing more to inflation and again there is an indication of proportional trends with GCPI from other factors including the money supply and import tax revenue, total government expenditure and remittance inflow.

On the other hand the variables such as Mp, Fp and Ep were generated based on the three methods mentioned under methodology which are frequently used to select the right number of principal components. We have selected a small number of components to obtain between 88% of the variation, kept the components whose corresponding eigenvalues are larger than average and scree plot (See **Figure 2**).

### *Result for unit roots and co-integration test*

Table 1 investigates whether the means are constant and variances are only reliant on the time lag, as well as the initial steps to identify and define the underlying properties of data throughout time. To demonstrate if such principles apply, we employed the ADF test at the level with intercept and again with different variables with intercept. The test demonstrates that none of the variables were level stationary. Nonetheless, found stationary after applying the first difference with the intercept. Therefore they are I(1) (see **Table 1**). All variables were determined to be non-stationary when the stationarity of the variables was checked, as previously stated. Each model underwent the limits test to see whether none stationary series had long-run shared trends (see **Table 2**).
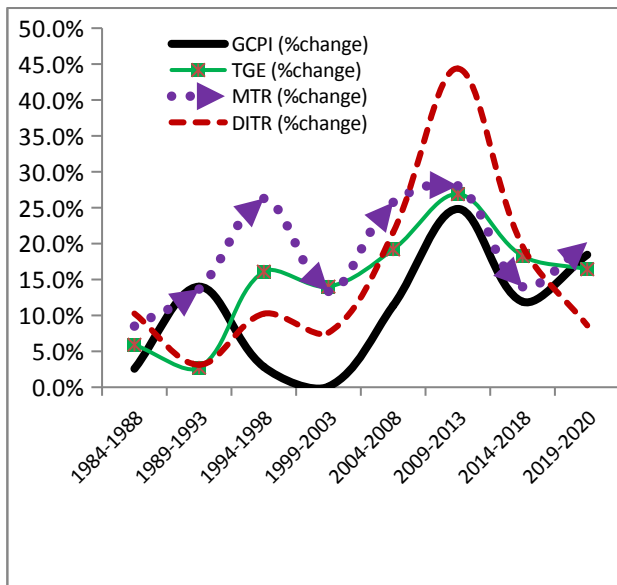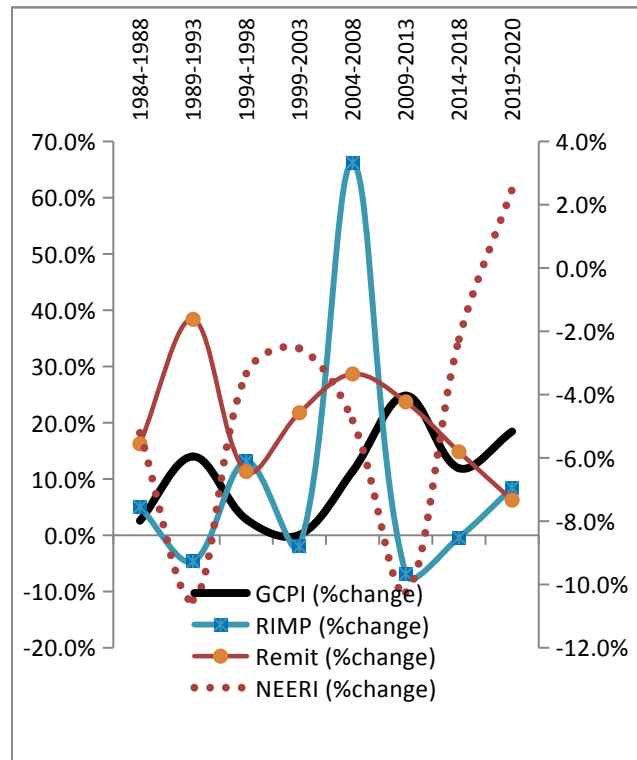
a) Change in GCPI and Fiscal Factors (in percent)
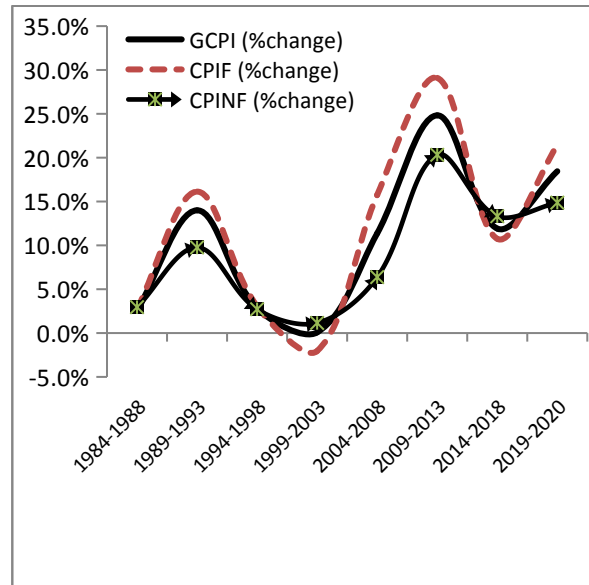
b) Change in GCPI and its components (in %)
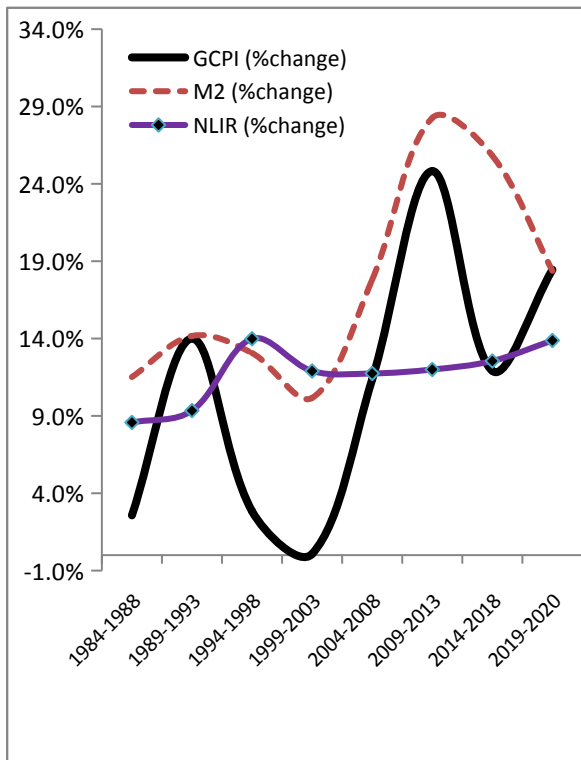
c) Change in GCPI, M2 and NLIR (in percent)

d) Change in GCPI and External factors (in percent)

Figure 1. Trends of recent developments in a) Consumer Price Index compared to fiscal, b) GCPI components, c) monetary factors and d) external economic variables.

a) Scree plot for monetary factors

b) Scree plot for External factors

c) Scree plot for Fiscal factors
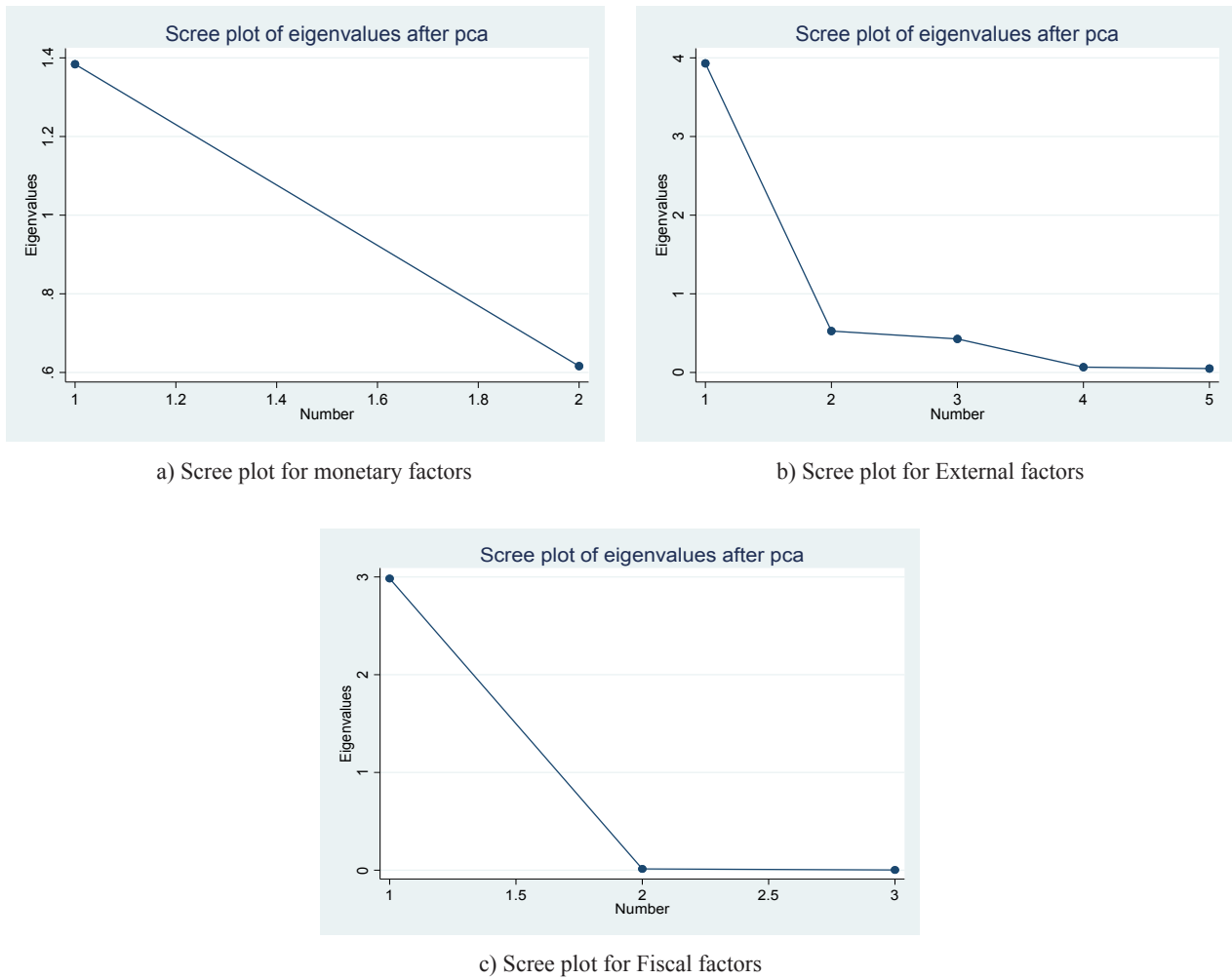
Figure 2. Scree plot for principal component analysis for a) monetary, b) external economy and c) fiscal factors.

Table 1. Augmented Dickey-Fuller tests for unit roots.

Variables[1]	t-ADF	Lags	Variable	t-ADF	Lags
GCPI	10.7	1	ΔGCPI	−6.513***	1
CPIF	8.2	1	ΔCPIF	−7.870***	1
CPINF	12.9	1	ΔCPINF	−4.847***	1
Mp	0.39	1	ΔMp	−5.610***	1
Fp	18.0	1	ΔFp	−2.165***	1
Ep	0.27	1	ΔEp	−6.023***	1
NEERI	−1.95	1	ΔNEERI	−4.219***	1
M2	21.8	1	ΔM2	−4.453***	1
FD	1.86	1	ΔFD	−3.654***	1

[1] Note: *** Indicates significance at 0.1 percent significance level.

Table 2. Diagnosis tests including Co integration test.

Tests	[1] Dep't Var.					
	(1)	(2)	(3)	(4)	(5)	(6)
	GCPI	CPIF	CPINF	GCPI	CPIF	CPINF
DW	1.54	1.63	1.50	2.07	2.08	1.90
LM test	1.75(0.19)	1.5(0.22)	1.8(0.18)	0.09(0.77)	0.09(0.77))	0.05(0.82))
IM test	31.5(0.09)	33.8(0.052)	32.9(0.06)	29.6(0.13)	29.6(0.13)	32.6(0.07)
sbcusum	0.27(0.95)	0.26(0.95)	0.26(0.95)	0.17(0.95)	0.16(0.85)	0.14(0.85)
BoundTest	21.1(0.00)	21.1(0.00)	21.1(0.00)	21.1(0.00)	21.1(0.00)	21.1(0.00)

[1] LM test indicates the Breusch-Godfrey LM test for autocorrelation. Its test static is chi square. The value in parenthesis is p-value.

[2] IM test indicates the Cameron and Trivedi's decomposition of IM-test. Its test static is similarlychi square for Ho: homoscedasticity. The value in parenthesis is again a p-value.

[3] Sbcusum indicates the Cumulative sum test for parameter stability. Its test static is chi squarefor Ho: No structural break. The value in parenthesis is the critical value.

[4] Bound Test indicates the Pesaran, Shin, and Smith (2001) bounds test. Its test static is F test for Ho: no level relationship. The value in parenthesis is the p value.

[5] Models 1 and 2 are estimated using ARDL (1, 0, 0, 0, 0, 0) respectively and ARDL (1,0,0,0,0,0 is used to estimate Model (3). ARDL (1,0,0, 0,0,0) is used to estimate Model (4). (1,0,0,0,0,0), Models (5) and (6) are calculated using ARDL (1,0,0,0,0,0) respectively.

Result for ARDL model estimation

The empirical findings for the ARDL model estimate are shown in **Table 3**. The response variables were GCPI and two of its components CPIF and CPINF. Totally six ARDL models were estimated to implement the plan described under the procedures. The first three models were estimated based on the indicators generated by PCA (Mp, Ep and Fp) along with other variables such as a dummy for regime change (DRC), a dummy for financial crises (DFC), and price expectation (lag of consumer prices). The second three models were estimated based on conventional indicators such as money supply (M2) instead of monetary factor (Mp), a nominal effective exchange rate (NEERI) instead of an external factor (Ep) and deficit financing (FD) instead of fiscal factors (Fp).

The importance of reporting both findings was to compare what kind of effects would have happened if we have used conventional indicators for monetary, fiscal and external factors instead of the PCA generated. Again, the optimum lag was automatically selected for all models and was checked for possible indication of serial correlation using Breusch Godfrey LM test (bgodfrey), homoscedasticity using Cameron and Trivedi's decomposition of IM test and structural break using the recursive cumulative sum

test. In all cases, nothing was found to change the results (**Table 2**).

The result shows that price expectation (lag of consumer price index) seemsto positively and statistically significantly affect the general consumer price index and one of its component food consumer price. Similarly, fiscal factors seem to positively and statistically significantly affect general consumer price and its constituents, food and non-food consumer price index. Fiscal factor is consistently significant in all GCPI and its components. On the other hand the result for an estimated model using conventional indicators for monetary, fiscal and external factors, the second part GCPI and its components, shows that price expectation seems to have consistent effects on all GCPI and both of its components CPIF and CPINF. Again, deficit financing (FD) and M2 have a significant effect on general consumer price and one of its components, food consumer price. While the others, fortunately, resulted in similar findings in both significance and directionfor both types of models, the effect of M2 on consumer price diverges from the indicator generated through PCA. This might be due to the inclusion of lending rates in monetary factors (Mp).

In general, the empirical result indicated by the ARDL model seems to show that, the factors de-

Table 3. ARDL model output using conventional and PCA generated.

	(1)	(2)	(3)	(4)	(5)	(6)
	CPI	CPIF	CPINF	CPI	CPIF	CPINF
CPI(1)	0.550*			0.968***		
	(0.226)			(0.105)		
CPIF(1)		0.544*			0.871***	
		(0.221)			(0.115)	
CPINF(1)			0.356			0.998***
			(0.210)			(0.113)
Mp	0.0364	0.0465	0.0370			
	(0.0327)	(0.0424)	(0.0250)			
Ep	0.0195	0.0189	0.0155			
	(0.0196)	(0.0260)	(0.0141)			
Fp	0.270*	0.272*	0.362**			
	(0.103)	(0.100)	(0.100)			
DRC	−0.0155	−0.0419	0.0352	0.0286	0.0303	−0.00904
	(0.0631)	(0.0811)	(0.0517)	(0.0694)	(0.0865)	(0.0629)
DFC	0.0598	0.0985	−0.0125	0.0958	0.126	0.0306
	(0.0585)	(0.0769)	(0.0426)	(0.0469)	(0.0581)	(0.0435)
M2				0.312**	0.465***	0.194
				(0.104)	(0.121)	(0.106)
NEERI				0.00860	0.00420	−0.0119
				(0.0374)	(0.0455)	(0.0345)
FD				0.132*	0.201*	0.0510
				(0.0619)	(0.0770)	(0.0567)
cons	0.0650	0.0820	0.0116	0.0720	0.0591	0.108*
	(0.0596)	(0.0704)	(0.0541)	(0.0536)	(0.0666)	(0.0495)
N	37	37	37	37	37	37
R2-Adj	0.80	0.72	0.87	0.77	0.77	0.82
likelihood Test	46.74	36.73	57.61	47.89	39.84	51.07
AIC	−79.48	−59.45	−101.2	−81.78	−65.69	−88.15

Standard errors in parentheses, model (1-3) were estimated using PCA indicators model (4-6) were estimated conventional indicators * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

termining consumer price differ from food to non-food. The price expectations and fiscal factors were the main causes of Ethiopian general consumer price hiking. While these hold for food consumer prices, the non-food consumer price is mainly affected by fiscal factors.

4.2 Discussion

This study relies on the outcomes in **Table 3** for the interpretation of the estimated coefficients. The model from columns (1) to (6) fitted the results of consumer price indices and its components, food and non-food. The coefficients can be understood as a one unit increase in units of the significant variables because all variables were normalized, the consumer price indices (general, food or non-food) are anticipated to change for the better or worse by roughly the comparable coefficient value. The variables with p-value < 0.05 were thought of as statistically significant. Bearing these in mind the discussion is summed up in the four points below.

First, the price expectation (lag of consumer prices) has significantly deterred mining Ethiopian consumer prices. Estimates using ARDL for GCPI and

CPIF show that price expectation seems positively and statistically significantly affecting Ethiopian price hiking (see coefficient = 0.55, coefficient = 0.54 respectively in **Table 3**). Change in the unit in price expectation most likely possesses a 0.55 rise of a point in the Ethiopian general consumer prices, ceteris paribus. This generally indicates that the past prices of general and food consumer prices were influencing the current prices and so forth in Ethiopia. In other words, the consumers were purchasing goods and services assuming the price will likely increase in the future, which is pressuring general consumer prices to hike in Ethiopia. This discovery is in line with the findings of research conducted in Ethiopia where it was shown that price expectation is the main driver of price hiking as mentioned in the literature.

Second, the fiscal factors are positively and statistically significantly determining Ethiopian general, food and non-food consumer prices. This variable is generally a combination of total government expenditure, import tax revenue, and domestic indirect tax revenue (excise, VAT, etc.) a change in the unit in fiscal factor most likely possess a 0.27 rise of a point in the general consumer prices ceteris paribus. Two arguments would likely support this evidence. First, part of total government expenditure which is not financed by taxation, and attributes inflation to the financing of the consequent deficit by methods that involve an increase in money supply may have resulted in the significance of these factors. Second, in contrast, the fraction of public expenditure which is financed through taxation like import tax and partly attributes inflation to the extra cost increases that individual seek in their efforts to obtain the rate growth of net of tax real incomes which they have come to expect. This finding is supported by another research [36].

Third, the external factors are positively determining Ethiopian general, food and non-food consumer prices as indicated by the variable Ep, whereas a different effect of direction is observed when a conventional indicator is used for general consumer price. This variable is generally created by the linear combination of the nominal effective exchange rate, the value of fuel import, the value of fertilizer imports, imports of raw material, and remittance inflow. The statistical insignificance of this indicator is, however, odd to what we have expected. The aggregated data, that we have used in this study, may have contributed to such findings, as it may hide the daily, and monthly effects of such variables.

Finally, the effect of monetary factors in determining consumer prices (general, food or non-food) was changed by the inclusion of nominal lending rate, when information in money supply is combined with the information in lending interest rate as condensed to a single variable Mp by PCA. Although money supply seems to affect consumer prices positively and significantly, this effect was changed by the nominal lending rate (tighter monetary policy). This is clearly indicated in the model when M2 was used instead of Mp (monetary factor), which was found positive and statistically significantly determining general and food consumer price indices in Ethiopia. Such evidence was found by numerous researchers as mentioned in the literature.

5. Conclusions and recommendation

This paper explored the major causes of Ethiopian consumer price increases. Utilizing data from the Ethiopian National Bank, we condensed the information from an array of monetary sector, external sector and fiscal sector variables to estimate the causes of Ethiopian consumer price hiking through the ARDL model.

Our key findings are threefold. Firstly, price expectation is one of the drivers of general and food consumer price hiking in Ethiopia. The consumers purchasing basic items in the expectation of a price increase in the future are actually pressuring consumer prices to hike in Ethiopia. Secondly, we found that fiscal factors were consistently contributing to the food, non-food and general consumer price hiking. Increasing expenditure involving increasing tax rates mainly on import and domestic indirect tax by the government attributes to the rise in consumer prices. Third, the effect of monetary factors in de-

termining consumer prices (general, food or non-food) was attenuated by nominal lending rate, when information in money supply is combined with the information in lending interest rate as condensed to a single variable Mp by PCA. Although money supply seems to affect consumer prices positively and significantly, this effect was countered by the nominal lending rate. In sum price expectation and fiscal factors were seems to have a positive and significant effect on the Ethiopian consumer prices hiking.

We hope that the context under investigation is characteristic of the majority of developing countries. The majority of developing countries experience instability in the macroeconomic environment (unstable general price). Whatsoever, monetary factors, fiscal factors and price expectations seem to increase consumer prices, although the magnitude of significance is different. So, this study area may serve as a case of how different factors can contribute to price hiking. Due to the paucity of data in the developing countries context, it would be beneficial to pursue additional research in developing countries in order to set the most appropriate policies; much remains to be understood about the effect of each consumer price expectation on consumer prices using policy intervention. A drawback here is the lack of disaggregated longitudinal data in developing countries, which would allow us to see price over time and to study how changes in factors could change several years after some intervention has been made. Openly, more complete data would be recommended in order to further analyse the effect of different factors on aggregate price.

The empirical result in this study indicated by the ARDL model seems to show that, the price expectations and fiscal factors were the main causes of hiking Ethiopian consumer prices. To contain the rise in consumer prices (inflation), therefore, the government needs to reduce the import tax rate and domestic indirect tax rates such as excise tax and value-added tax on basic consumer items. Sound government policies are essential to address inflation anticipations (by providing clear information to the societies) and government policies to change public opinion.

Conflict of Interest

There is no conflict of interest.

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