

INFLATION IMPACT OF FOOD PRICES: CASE OF SERBIA¹

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Summary

Food prices traditionally have an impact on inflation around the world. Movements in these prices are coming more from the supply side, then from the demand side. If treated as a supply shock, monetary policy should not react. However, food prices are part of headline inflation that is an official target for most central banks. Serbia conducts Inflation targeting and faces serious challenges with food price volatility. Food price volatility in Serbia hampers inflation forecasting, and may have a negative influence on inflationary expectations and public confidence in (i.e. credibility of) the Central bank, all of crucial importance for success of Inflation targeting. There are several important possible improvements that may decrease volatility of food prices but also limit negative impact of food price volatility on Consumer Price Index (CPI) as a measure of inflation. These improvements are very important for success of Inflation targeting in Serbia.

Key words: *food prices, Inflation targeting, price volatility, Serbia.*

JEL: *Q13, Q11, E31, E52*

Introduction

Food prices have increased during the past decade on a global level. That has influenced inflation around the world since food is an important element of Consumer Price Index (CPI) which is most commonly used as a measure of inflation. However, it is important to note that impact of food prices on inflation can be very diverse.

Firstly, it is important to note that on average inflation in emerging market economies is going to be differently affected by food price changes compared to inflation in developed economies. The influence of these prices is directly related to the level of wealth or economic development of the economy, since the share of income spent on food declines as the level of income rises. And this is reflected in the structure of CPI i.e. the weights attributed to specific

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elements of consumption within the CPI. Emerging market countries have a weight of food prices in CPI around 30% on average. Developed economies are more resistant to food price movements since weight of these prices in CPI of these countries is on average about 13% according to some estimates (Cecchetti, Moessner, 2008). Therefore, the same global food price movement, as a rule, has a higher direct effect on inflation in lower income countries, then on inflation in higher income countries.

Secondly, food inflation may be coming from the demand side if the increase in income of households is fueling demand and pushes the food prices up. Since food prices are relatively flexible, their upward movement may be an indication of general rise in demand that can fuel inflationary pressures across the board. If this is the case, increase in food prices should be an early warning signal for the central bank to tighten its monetary stance.

Also important is that if the food price shock is a transitory one, with relatively quick reversal to the previous level of these prices, it would be adequate not to react with monetary policy to these shocks. The influence of this price shock will in any case gradually exit the inflation measure (Aoki, 2001). However, if the central bank would want to eliminate this short term impact on inflation, it would be very hard to achieve this effectively. Namely, food price movements are sometimes very sudden and monetary policy produces results with a time lag, so called transmission lag of monetary policy. On the other hand, even if the food price shock is expected, restrictive monetary policy reaction with ambition to decrease the price shock coming from food prices, and swiftly revert prices back to the previous level, would most probably have to be excessive and almost certainly would cause a substantial overall drop in economic output and employment.

However, despite this possible one-time effect of food prices on inflation, it is important not to ignore possible postponed second-round effects on salaries and inflation expectations. These effects should be taken into account by monetary authorities in formulating an adequate policy response, since they can influence future inflation. Making a distinction between these one-of and second-round inflationary effects, is the reason why central banks also follow inflation without the prices of food and energy, commonly known as core inflation³ to reveal and track the underlying more persistent inflation components. However, core inflation is not commonly used as inflation target, since it can sometimes be detached from the inflation directly observed by consumers, and therefore, targeting core inflation by the central bank may adversely affect its credibility (Cecchetti, 2007). Having said that core inflation should not be kept undisclosed. As a rule, it is less volatile than headline inflation, and can contribute to keeping inflation expectations close to inflation target (OECD, 2005). Measuring its persistence is also very important (Bilke, Stracca, 2008).

It is not always easy to determine the nature of a food price shock. Whether it is a transitory (supply) or permanent (demand) price movement, nor is it easy to be certain whether a food price movement is going to generate second-round effects on inflation. And all of this is important for formulating an adequate and effective monetary policy response. It is

3 There is large number of various definitions of core inflation, but this is the most common one.

important to try to decrease the volatility of food prices, and employ adequate statistical methodologies in creation of CPI as a measure of inflation. This is especially important in emerging market transition countries (like Serbia) where food price impact on CPI is relatively high. Therefore, decreasing unnecessary volatility in food prices is not just good for the farmers and consumers. Lower food price volatility and its lower impact on CPI is very important for Inflation targeting conducted by a central bank as well.

Literature overview

Numerous studies of food price impact on inflation have been conducted for developed and emerging market countries, especially in the past two decades. However, literature on food price impact on inflation in Serbia is very scarce with several internal analyses conducted by the central bank.

For the purpose of this research of particular importance is the following literature. Bryan and Cecchetti (1994), and Bryan and associates (1997) investigate various measures of inflation. Mohanty and Klau (2004) investigate monetary policy rules in emerging economies. Paper by OECD (2005) defines various types of core inflation and tests their predictive power for future inflation on a sample of industrial countries (US, Canada, Japan, Euro area and U.K.). Cecchetti and Moessner (2008) investigate the impact of rise in food and energy prices on dynamics of headline inflation in emerging market countries and developed countries. Richards and Pofahl (2009) analyze the pass-through of commodities prices into food inflation and find that it is not constant. Catão and Chang (2010), explore in their paper how small open economies should react on imported inflationary pressures, mainly coming from commodities prices. Walsh (2011) finds that food price impact on inflation is significant especially in lower income countries and that core inflation may be misleading. Gómez and associates (2012) are exploring models for food inflation forecasting to be used by developing countries conducting Inflation targeting. Anand and associates (2014) estimate the second-round effects of food inflation in India and find that it is relatively high due to high share of food expenditures in household incomes and since food inflation influences inflationary expectations and future wage settings.

Contribution of this paper to the literature is that it analyses the recent food price impact on inflation in Serbia and adequacy of monetary policy response. This article also aims to identify potential improvements that could lead to decrease in volatility of food prices, and potential improvements in methodology that could decrease the impact of food price movements on CPI as a measure of inflation in Serbia.

Impact of food prices on inflation

There are several important ways food prices may influence headline inflation. To measure this influence, it is important to have an adequate measure of core inflation⁴ so to determine the relationship of core to headline inflation. The nature of a food price shock is very important and initially it is not easy to conclude what type of shock it is, and what kind of

4 Cecchetti and Moessner (2008) use core inflation measure excluding food and energy prices.
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monetary policy stance would be correct to undertake.

If there is an increase in demand coming from continuous significant growth rates in an economy, we might be faced with continuously increasing demand for food, especially in developing countries. This can lead to a persistent inflationary pressure and lesser degree of reversion of headline inflation to core. So demand driven food price shock may persistently push up headline inflation and would not lead to headline inflation reverting to core.

Second possibility is that increase in food prices has happened because of an adverse supply shock. In that situation, impact on inflation is most probably just a transitory one. If that is so, headline inflation would be reverting to core, and this is the situation we have mentioned in which adequate monetary policy response would be to ignore the food price shock.

Alternative to this would be if these shocks repeat or if they lead to second-round effects on inflation. This could be confirmed if core inflation reverts to headline inflation. That is the situation in which, despite supply nature of food price shock, monetary policy response has to be adequately structured to control inflationary expectations and increase in future wage settings.

If we want to study whether CPI (headline inflation) reverts to core inflation, i.e. whether the supply shock is temporary, without the necessity for monetary policy intervention, we should consider the following regression:

$$\pi_t^h - \pi_{t-12}^h = \alpha + \beta_1(\pi_{t-12}^h - \pi_{t-12}^c) + \varepsilon_t \quad (1)$$

Where:

π^h labels headline inflation, and π^c labels core inflation. If coefficient β_1 is negative, that means that headline inflation reverts to core. In most of developed countries, research has shown (OECD, 2005; Cecchetti, Moessler, 2008) β_1 coefficient tends to be negative. Constant term α in equation (1) if different from zero implies that core inflation can predict, to a certain extent, headline inflation. If α equals 0 and β_1 coefficient equals -1 that would mean that headline inflation would completely revert to core inflation in a year's time. If the monetary policy stance was not to react to initial food price shock, it was correct.

Similar regression can help us conclude about the possible existence of second-round effects of food price supply shock. Namely, if core inflation reverts to headline inflation. That would mean that second-round effects of an initial food price shock have been pushing the core inflation upward most probably through inflationary expectations and future wage settings. This can be analyzed with the following regression:

$$\pi_t^c - \pi_{t-12}^c = \alpha + \beta_2(\pi_{t-12}^c - \pi_{t-12}^h) + \varepsilon_t \quad (2)$$

If β_2 equals 0, that would mean that core does not revert to headline inflation. If α equals 0 and β_2 coefficient equals -1 that would mean that core inflation would completely revert to headline inflation in a year's time.

Next, since inflation forecasting is very important for Inflation targeting, it would be important to understand whether food price inflation has any predictive power on future headline inflation i.e. can help in forecasting headline inflation. For this purpose, a following regression could be used:

$$\pi_t^h = \alpha + \sum_{k=1,12} \beta_k \pi_{t-k}^h + \sum_{k=1,12} \gamma_k \pi_{t-k}^f + \varepsilon_t \quad (3)$$

Where:

π^f stands for food inflation. This regression should answer the question whether headline inflation is reliant on lagged headline inflation and lagged food price inflation. Second term on right hand side of equation (3) should take into account potential autocorrelation of headline inflation. Therefore, the sum of regression coefficients on lagged food price inflation γ in third term can provide us with a desired answer. If this sum is significantly different from zero past food price inflation in a country can help predict headline inflation.

Finally, if we measure the autocorrelation of food price inflation, we may have an indication of persistency of food price inflation:

$$\pi_t^{f^5} = \alpha + \sum_{k=1,12} \rho_k \pi_{t-k}^f + \varepsilon_t \quad (4)$$

If the sum of ρ correlation coefficient on lagged food inflation is zero, then conclusion could be that food inflation is not persistent.

Recent food price and Inflation dynamics in Serbia

Food prices represent a very significant portion of CPI as a measure of inflation in Serbia (Table 1). As we can see from Table 1, food (unprocessed and processed) prices had a joint contribution of 38.8% of CPI prior to last major CPI revision at the beginning of 2013. After the last CPI revision, food prices have a somewhat smaller weight in CPI, but still very significant – 34.5%. It is lower but still above average for advanced emerging market countries. Therefore it is obvious that food price inflation in Serbia is potentially very important for overall headline inflation dynamics.

5 In this equation food inflation should be expressed as a monthly change in food prices with excluded seasonality.

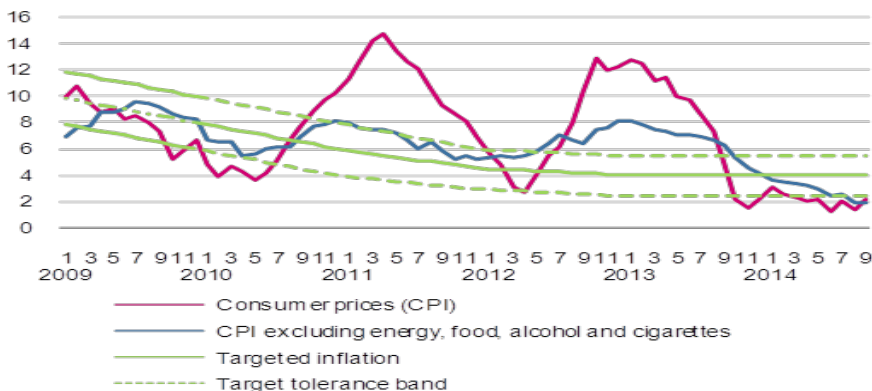
Table 1. Comparison of weights for selected CPI categories in Serbia

	Old weights	New weights	Difference
Consumer prices (CPI)	100.0	100.0	0.0
Unprocessed food	13.0	12.6	-0.4
Processed food	25.8	21.9	-3.9
Industrial products excluding food and energy	25.5	29.9	4.4
Energy	17.5	14.8	-2.8
Services	18.2	20.8	2.6
Core inflation indicators			
CPI excluding energy, food, alcohol and cigarettes	38.3	42.9	4.6
CPI excluding energy and unprocessed food	69.5	72.6	3.1
CPI excluding energy	82.5	85.2	2.8
Food and non-alcoholic beverages	38.8	34.5	-4.2
Administered prices	22.5	20.4	-2.0
Excise products	11.6	14.1	2.5

Source: NBS Inflation Report, May 2013.

Serbia implements Inflation targeting officially since end of 2008, but unofficially since 2006 (Šoškic, 2015). One of the main reasons for implementation of Inflation targeting was that it was expected that this monetary regime will be effective in terms of bringing the inflation down, and stabilizing inflation within the target corridor, with a potential side effect of stabilizing output.

However, if we look at the Figure 1 it is obvious that inflation path since inception of IT in Serbia exhibits substantial volatility. In the initial phase of implementation, it seemed that inflation has been steadily brought down within a target corridor. However, this period is also a period of first wave of recession in Serbia after the global financial crisis, with GDP dropping down around 3.5% in 2009. So, the gradual decline in inflation within the corridor of inflation targeting was most probably more an outcome of decline in aggregate demand due to severely depressed output caused by the global crisis, then by effectiveness of Inflation targeting.

Figure 1. Inflation in Serbia (YoY rate, in %)

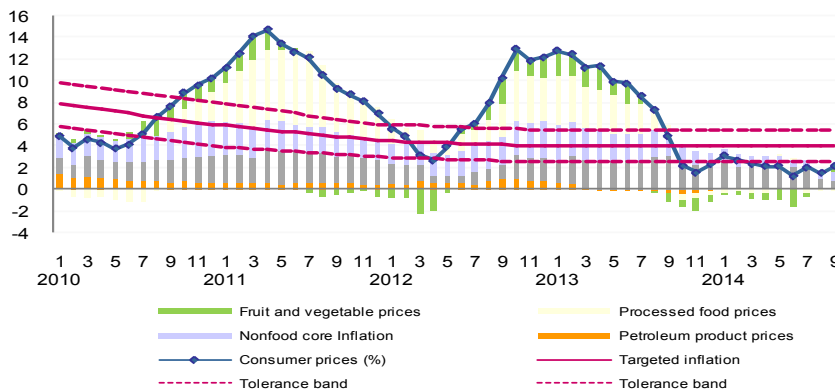
Source: National bank of Serbia, www.nbs.rs/internet/cirilica/30/30_9/kretanje_inflacije.html

As it is obvious from Figure 1, inflation very soon by the end of 2009 slipped below a lower bound of inflation target corridor and has remained out-side of this corridor most of the time ever since. Inflation has gone through two huge spikes above the upper band in 2011 and 2013. In the rest of the period Inflation was mainly below the lower band of inflation target corridor but as is widely known (Mishkin, Savastano, 2002) undershooting an inflation target is just as bad and costly as overshooting it.

So what is the main driver of inflation volatility in Serbia, and has monetary policy response been adequate?

Let us go deeper in the structure of inflation dynamics in Serbia in recent years (Figure 2). It is obvious that main drivers of inflationary and disinflationary pressures are coming from food price movements (both processed and unprocessed). Non-food core inflation throughout the period has remained relatively stable. Food price shocks have been treated as supply side shocks with temporary effects, and monetary policy response was in a form of modest tightening (small and gradual increase in reference rate of NBS). Such policy stance was designed to prevent second-round effects on inflation expectations and future wage settings, and to limit long term inflationary effects of these price shocks. Also worth noting is that main drivers of disinflationary and deflationary monthly and quarterly inflation episodes in Serbia were again driven by disinflation and deflation of food prices.

Figure 2. Contribution to CPI growth in Serbia (YoY, in %)



Source: NBS Inflation Report, November 2014.

Therefore it is fair to say that huge spikes of inflation above the upper band in 2011 and 2013 are a consequence of a supply shock in food production and increase in food prices. Subsequent disinflation is again driven by food prices. Obviously, food prices are very volatile in Serbia.

Serbian CPI is oversensitive to prices of unprocessed and processed food. In addition, according to an internal central bank of Serbia regional food price analyses for South East Europe, volatility of food prices in Serbia proved to be highest in the SEE region.

Let us now analyse the influence of food prices on inflation in Serbia, and the adequacy of monetary policy response. It is obvious that after initial food price shock, headline inflation is reverting to core inflation⁶ in the following period (Figure 1. Also, it is clear from the food inflation movements in Serbia, that there is no food inflation persistence. Therefore, the food price shock was not coming from the demand side (lack of food price persistence, equation (4)), and was transitory in its nature since the headline inflation soon reverted to core inflation (equation 1). So, the central bank has treated the food price shocks of 2011 and 2013 in a correct way.

Was there a second-round effect of food inflation on headline inflation? If we observe the data it is clear that there is no evidence of core inflation reverting to headline inflation⁷. That means that there were no significant second round effects on headline inflation from initial food price shock. Monetary policy stance of modest gradual tightening with a signalling effect to prevent increase in inflationary expectations and future wage setting was adequate.

This over sensitivity of inflation to food prices makes it very hard to conduct Inflation targeting successfully in Serbia. Food price volatility hampers inflation projections, may incorrectly influence inflationary expectations, and, can adversely affect public confidence in the central bank. As we know, precise inflation forecasts, central bank credibility, and anchored inflationary expectations with an inflation target, are essential prerequisites for success in Inflation targeting (Batini, Laxton, 2007).

Therefore, food price impact on inflation in Serbia has to be considered seriously if Inflation targeting monetary regime is to have a chance of success.

There are two important domains of potential improvements in the area of food price impact on inflation in Serbia. One is to decrease the volatility of food prices, and the other is to limit the influence of food prices and their volatility on CPI.

Recommendations and conclusions

There are several measures that could contribute to decrease in volatility i.e. stabilization of food prices in Serbia.

Existing Government institution for commodities reserves should consider adjusting its operations in line with markets movements. It would be not just profitable to buy unprocessed foods when their price is low, and sell when their price is high, but it would also contribute to stabilization of prices of some major unprocessed food commodities.

If the Government is already conducting subsidies for certain economic activities, then subsidies within agricultural production aiming to decrease the output volatility in food production, should be considered too. Loans to agricultural producers for hail protection, irrigation, flood protection etc. are not just beneficial for agricultural production itself, but also for decrease in its output.

6 Measured as CPI excluding, food, energy, alcohol and cigarettes.

7 This could be confirmed with running a regression of equation (2).

Decrease in tariff and nontariff barriers for import and export of unprocessed and processed food could help prevent excess volatility in food prices⁸.

Special attention in workings of existing Government Antimonopoly commission should be given to trading channels with unprocessed and processed food. Measures to increase competition in this domain would be welcome for stabilization of food prices.

Government endeavor to initiate and develop derivatives markets for major unprocessed food commodities would, again, be good not just for the farmers, but also for decrease in volatility of food prices.

There is room for some methodological improvements concerning the CPI construction, as well. These could dampen the impact of food price movements on headline inflation measured by CPI.

A step in a good direction has already been taken at the beginning of 2013 when food price weight in CPI was decreased from 38.8% to 34.5%. It is worth exploring whether there is additional room within a statistical framework of Harmonised Index of Consumer Prices (HICP) and EU Statistical office (Eurostat) for additional methodological improvements to decrease the sensitivity of CPI to food inflation.

Besides, it is worth exploring whether in gathering data on food prices, averaging of observed levels of prices for longer periods of time (moving averages) could potentially contribute to lower volatility of data on food prices, and therefore decrease the volatility of food inflation and CPI as a headline inflation measure.

It is important to know more about the nature of food price impact on inflation in Serbia. But it is also important to improve the system of food production and trade. Improvements are possible also in the methodology used to compile food prices and CPI. Some of these measures aiming for decreasing the volatility of food prices are not just important for Inflation targeting of the central bank, but most probably have direct positive implications for farmers and food production in the country.

High impact of food prices on CPI, accompanied by food price volatility seriously hampers conduct of Inflation targeting of the central bank. In such circumstances it is hard to make credible inflation projections, inflationary expectations may be adversely biased, and confidence of general public in the central bank may be compromised. All of this seriously deteriorates chances of success of Inflation targeting. Serbia has experienced recently a detrimental short term impact of food price shock on inflation. At the same time there is a number of possible improvement concerning food prices, its volatility and impact on headline inflation in Serbia. Successful improvements in these areas would significantly raise the chances of successful implementation of Inflation targeting in the country.

8 Tariffs for import of agricultural products from the EU have been lowered starting January 1st 2014, but for non EU countries remain relatively high according to the Decision on Food import tariffs (Official Gazette of Republic Serbia, no. 113/2013), available at: www.carina.rs/lat/Zakoni/lat-ODLUKA%20o%20odredjivanju%20pp%20proizoda%20za%20koje%20se%20placa%20posebna%20dazbina.pdf

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UTICAJ CENA HRENE NA INFLACIJU: SLUČAJ SRBIJE

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Sažetak

Cene hrane tradicionalno utiču na inflaciju u čitavom svetu. Promene u ovim cenama uglavnom dolaze zbog promena u ponudi, a manje zbog promena u tražnji. Ako se tretiraju kao šok ponude, monetarna politika na njih ne treba da reaguje. Ipak, cene hrane su deo zvanične inflacije čiji se nivo zvanično cilja od strane većine centralnih banaka. Srbija zvanično sprovodi Ciljanje inflacije i suočena je sa ozbiljnim izazovima uzrokovanim nestabilnošću cena hrane. Nestabilnost cena hrane u Srbiji otežava projekcije buduće inflacije, i može imati negativan uticaj na inflaciona očekivanja i poverenje javnosti u (tj. kredibilitet) centralne banke, a sve to je od izuzetnog značaja za uspeh Ciljanja inflacije. Postoji nekoliko važnih i mogućih poboljšanja koja mogu da smanje nestabilnost cena hrane i ograniče negativan uticaj nestabilnih cena hrane na indeks potrošačkih cena (IPC) kao meru inflacije. Ova poboljšanja su vrlo važna za uspeh Ciljanja inflacije u Srbiji.

ključne reči: *cene hrane, ciljanje inflacije, cenovna nestabilnost, Srbija.*

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