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# Export restrictions – Do consumers really benefit? The wheat-to-bread supply chain in Serbia

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ABSTRACT

Our approach combines price transmission and gross margin analysis at different stages of the wheat-to-bread supply chain. Results suggest that the effects of export restrictions on the end consumer prices for bread, and thus food price inflation, heavily depend on the price behavior of the intermediates. In contrast to theory, consumers in Serbia experienced welfare losses despite comprehensive governmental market interventions. In particular, consumers were confronted with increasing flour and bread prices, which cannot be fully explained by increasing production costs, whereas mills, bakeries and retailers increased their profits. Thus, export controls in combination with high price volatility in the supply chain have to be considered as a further factor driving food price inflation.



## 1. Introduction

Many countries intervened in their agricultural import and export markets to curb food price inflation during the two recent commodity price peaks in 2007/08 and 2010/11. By restricting exports, each country aimed to increase its domestic supply, which should dampen domestic agricultural prices and ultimately counteract domestic food price inflation.

Many studies have addressed the effects of trade interventions on international prices (e.g., Yu et al., 2011; Anderson, 2012; Anderson and Nelgen, 2012; Martin and Anderson, 2012; Rutten et al., 2013; Jensen and Anderson, 2014), while other studies have investigated the export controls' effects on domestic producer prices (e.g., Ihle et al., 2009; Götz et al., 2013; Baylis et al., 2013; Djuric et al., 2015; Baffes et al., 2015). However, analyses on the export controls' effects on the whole food supply chain and domestic end consumer prices are scarce (e.g., Diao et al., 2013; Maletta and Balbi, 2014; Nogués, 2014; Wong, 2014). Nevertheless, there is a strand of literature that uses price transmission analysis to investigate the determinants of food price inflation (for an overview see McCorriston, 2015).

This paper addresses this research gap by developing a research framework that allows identifying the effects of the wheat export restrictions and supplementary policies on end consumer prices. We focus on how prices were transmitted and gross margins were altered by actors at different stages along the wheat-to-bread supply chain. We center on Serbia, a small wheat exporting country and EU accession candidate, which restricted wheat exports both in 2007/08 and 2011.

Our research question is whether consumers really benefitted from wheat export restrictions in Serbia, or if other members along the wheat-to-bread supply chain were able to realize advantages. Our approach involves analyzing vertical price transmission between the wheat and flour as well as the flour and the bread end consumer price to uncover possible changes in price relationships along the wheat-to-bread supply chain. To evaluate which actor of the supply chain benefitted or lost from those changes,

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we also investigate the development of the gross margin of the milling and baking industry during export restrictions. Finally, we assess the change in consumers' expenses for bread.

Wheat supply in Serbia is of strategic importance because it provides a foundation for the milling and feed production industries. Besides its importance for the domestic market, Serbian wheat and flour exports are important for food security in its neighboring countries (e.g., Bosnia and Herzegovina, Macedonia, Montenegro and Albania). Thus, substantial changes in wheat and flour prices could have a significant impact on the agricultural and food processing sectors in Western Balkan countries. Aside from the study of Djuric et al. (2015), which analyzes the impact that governmental interventions had on the domestic wheat producer prices in Serbia from the spatial price transmission perspective, this is the first study to investigate vertical price relationships in Serbia's agro-food sector.

## 2. Literature review

From a general perspective of the price transmission literature, we contribute to the studies investigating factors that determine price transmission along the stages of the food supply chain and ultimately dictate food price inflation.

Focusing on the dimensions of competition in the food sector, Lloyd et al. (2015) point out that market power influences price transmission and the extent of food inflation by changing the food industry markup. However, the potential to increase the markup in a non-competitive environment in the food sector depends on several additional factors, for example the nature of the retail demand function (McCorriston et al., 1998), the existence of economies of scale in the food industry cost function (McCorriston et al., 2001), buyer power that could outweigh seller power (Weldegebriel, 2004), and the extent of market power at succeeding stages of the supply chain, which is also called "double marginalization" (McCorriston and Sheldon, 1996).

More specifically, this paper contributes to the strand of literature that focuses on the effects of trade interventions, particularly export controls, on price relationships along domestic supply chains during periods of high international commodity prices.

The study by Grueninger and von Cramon-Taubadel (2008) investigates the effects of the wheat export quota system in Ukraine. These authors find that the export quota had a negative impact on producers, whereas the wheat export quota was beneficial for the milling and feeding industries, which managed to increase their margins.

Nogués (2014) evaluates the influence that export taxes, quantitative export restrictions and supplementary market interventions as governmental subsidies and target prices have on producer and consumer prices for wheat, maize and soybean in Argentina since 2006. This author finds that flour mills benefited from subsidies paid on flour sold on the domestic market, whereas wheat producer prices were dampened by the export tax and export quota comparable to the effects of an export tax of 40%. Furthermore, the ad-valorem tariff equivalent of quantitative restrictions on maize and maize flour had a price-increasing effect of 21%, which was higher than the 20% export tax. In contrast to wheat and maize prices, the ad-valorem equivalent of quantitative controls on soybean exports had little effect on domestic soybean price changes.

Wong (2014) investigated wheat, maize and rice export bans and tariff breaks in Ecuador during the global commodity price peak in 2007/08. Comparing the development of prices and indices for wheat, flour and bread, Wong finds that the policy interventions in the wheat sector were not effective at stabilizing domestic food prices during the crisis period. Rather, prices of bread and other wheat products increased sharply. Wong concludes that milling companies and some bakeries profited from this policy, whereas consumers had to pay higher food prices. Wong also argues that similar results are observed for the maize sector in Ecuador. In contrast to the wheat and maize sectors, Wong argues that policy interventions in the rice sector were effective at stabilizing domestic rice prices during the commodity price peak in 2008. Supported by domestic rice purchases, domestic rice producers and milling companies also benefited from the governmental interventions, as did consumers.

Maletta and Balbi (2014) investigate the effects of the removal of import barriers on consumer prices in Bolivia. These authors find that bakers and noodle-makers increased their gross margin in the crisis period by raising end consumer prices, which can be explained neither by increases in the flour wholesale price, nor increases in other inputs such as energy, industrial processing and transportation.

Götz et al. (2015) investigate the effects that wheat export restrictions imposed in Kazakhstan, Russia, and Ukraine (RUK countries) have on price developments along the wheat-to-bread supply chain. The findings indicate that the profits of the large milling industry in Russia and Ukraine were considerably higher when emergency policies were in place compared to free trade conditions. However, the increase in bread prices in the RUK countries can be traced back to the increase in wheat and flour prices, as well as other production costs such as labor and energy. Thus, in contrast to the milling industry, the bakery industry in the RUK countries has not profited from export controls.

This paper also adds to the existing price transmission literature on using a Markov-switching model framework. Ihle and von Cramon-Taubadel (2008, p. 26) have found that the MSECM is particularly suitable for contexts in which the regime switching is independent of the market and trade processes, but rather external impacts such as political, economic or natural interferences. For example, Brümmer et al. (2009) use a MSVECM to investigate the impact of policy measures on vertical price transmission between wheat and flour prices in Ukraine. Results indicate that intensive policy interventions in Ukraine contributed to domestic wheat and flour price instability. Concerning the price transmission approach, this study is closest to our analysis. However, we extend this approach by using the results from our model to simulate the laissez-faire policy case to identify who benefited and who lost along the supply chain. In addition to the above mentioned study, there are only a few papers that apply MSVECM in vertical price transmission analysis. For example, Rezitis et al. (2009) use MSVECM to identify the impact that the Common Agricultural Policy (CAP) reforms have on the lamb sector in Greece. Busse et al. (2012) used MSVECM to investigate the vertical price transmission along the biodiesel supply chain in Germany between 2002 and 2008. These authors argue that different governmental policies (mainly support for bio diesel production) contributed to uncertainty and instability on the German biodiesel supply chain.

## 3. Welfare effects of an export ban

The Serbian government radically intervened on the domestic wheat, flour and bread markets by using numerous ad hoc policy measures during the global commodity price peaks of 2007/08 and 2010/11 (see Djuric, 2014). These governmental interventions were triggered by rapidly increasing wheat exports and strongly increasing global, regional and domestic wheat prices. The government justified its policy, especially the wheat export ban, with the threat of running out of wheat and flour stocks for domestic consumption, thus risking high food prices that could negatively affect consumers.