



# The impact of avian influenza on the Korean egg market: Who benefited?

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## Abstract

The historical decomposition and directed acyclic graph methods are employed to estimate the effect of avian influenza in Korea on egg price transmission between the farm, wholesale, and retail levels. Our findings suggest that farm and retail egg prices are connected by the wholesale price. We also find that the farm-wholesale and the wholesale-retail margins increase during the avian influenza period. Our results imply that the retailer and wholesaler use their market power to increase their price during the food safety crisis. Therefore, the Korean government should control market power by allowing more emergency egg imports.

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## 1. Introduction

The Highly Pathogenic Avian Influenza (HPAI) was first discovered in South Korea (hereafter Korea) in December 2003. Thereafter, avian influenza reappeared in 2006, 2008, 2011, 2014, and

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2016. As consumers have experienced food safety issues, such as HPAI and Bovine Spongiform Encephalopathy (BSE), their sensitivity about food safety has changed, impacting food marketing and demand (Hassouneh, Serra, & Gil, 2010). Their study shows that beef consumers in Spain have different long-run consumption patterns after BSE scares. These food safety outbreaks have important implications for government policies and regulations that improve the safety of food — its production, processing, and distribution. A rich literature has developed on this topic (Hassouneh et al., 2010; Hassouneh, Radwan, Serra, & Gil, 2012; Park, Jin, & Bessler, 2008; Saghaian, 2007; Saghaian et al., 2008).

These food safety scares have impacts throughout the marketing chain, causing prices from the farm level to the consumer level to change dramatically at times. Consumers are often shocked by these occurrences, so they change their consumption patterns. Producers must suffer losses because their production is curtailed as animals die or are slaughtered when the disease is eradicated. The industry is certainly concerned with the short-run impacts of the outbreak, but participants throughout the marketing chain also worry about the long-term consequences for consumption. Farmers also often feel that they are hurt more than wholesalers or retailers by such shocks because they lack market power. Industrial concentration in the food industry is very high, so it is possible that wholesalers or retailers can force much of the burden of price adjustments onto farmers and consumers, implying an asymmetric price relationship due to industrial concentration (Serra & Goodwin, 2003).

This paper studies the impacts of a 2016 HPAI outbreak in Korea that mostly affected egg production and consumption. This analysis is unique because it focuses on the egg market, which has been the subject of scant research on disease outbreaks. The results can be more telling about potential market power because the product changes little as it travels throughout the marketing chain (unlike meats or processed fruits and vegetables). The analysis focuses on not only the overall effects on egg prices in Korea, but also the impacts at the farm, wholesale, and retail level to gauge whether the impacts vary along the value chain. Differential impacts among the value chain imply varying degrees of market power and a role for the government to implement measures to improve competition. These findings have important implications on how various agents in the marketing system suffer economic losses from the disease outbreak.

Previous literature such as Burton and Young (1996) and Peterson and Chen (2005) investigate the BSE effect on beef demand. Their results show that the advent of BSE has a negative effect on beef demand, which implies a possible relationship between food safety shocks and prices. Hassouneh et al. (2010), Lloyd, McCorrison, Morgan, and Rayner (2001), Lloyd, McCorrison, Morgan, and Rayner (2006), and Mutlu Çamoğlu, Serra, and Gil (2015) find that food scares from avian influenza have a negative effect on poultry prices. However, the magnitude of the price drop is different for each market channel (farm, wholesale, and retail), which implies the existence of differing degrees of market power along vertical chains. Specifically, their findings show that retail prices decline significantly but less than farm prices, so the retail-producer price margin increases with a food safety shock.

Most previous literature for the effects of food crises on vertical price transmission focus on meats such as beef and poultry because animal diseases, such as BSE and HPAI, have frequently occurred during recent decades. The Korean HPAI outbreak in November 2016, however, mostly impacted eggs through the infection of layer chickens rather than meat chickens. The Ministry of Agriculture, Food and Rural Affairs in Korea announced in March 2017 that this HPAI outbreak led to the slaughter of more than 36% of the layers in the country. On the other hand, only 5.5% of the meat chickens were slaughtered due to the outbreak. Therefore, an analysis of avian

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