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## Controlling Avian Flu and Protecting People's Livelihoods in Africa/Indonesia

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### Impact of HPAI on the Ghanaian Economy

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#### Key Findings

- Demand shock driven by consumer panic is the foremost factor in the reduction of poultry production.
- The soybean and maize sectors will be the most negatively affected by HPAI.
- The economywide impacts of HPAI on both agricultural and total GDP are very modest.
- The impact of HPAI shocks on the household income of the rural poor is negligible since the majority of their income is derived from crop production.

From April to June 2007, there were three HPAI outbreaks in Ghana, which were effectively controlled by the Veterinary Services Directorate of the Ministry of Food and Agriculture. Even though there is information available on some of the economic costs of these outbreaks (such as the costs of disease control), there is limited information on the economywide losses suffered. In order to fill this gap, we developed a dynamic computable general equilibrium (DCGE) model and used a recent (2005) and detailed social accounting matrix to estimate the economy wide impacts of different HPAI outbreak scenarios.

#### Role of Poultry in Ghanaian Economy

Within Ghana's diversified agricultural economy, poultry constitutes a relatively small subsector. The contribution of poultry to agricultural GDP is as low as 1.1 percent. As a result of low tariffs that render domestic broiler production uncompetitive, 77 percent of domestic demand for chicken is met by imports, whereas demand for eggs is mainly met by domestic supply. The commercial poultry industry in Ghana is therefore dominated by layers and egg production, which account for more than 95 percent of all poultry production in the country.

The importance of the poultry industry varies across Ghana. In this analysis, four agro-ecological zones are studied: Coastal, Forest, South Savannah, and North Savannah. Poultry production is a relatively more important agricultural activity in the Coastal zone,

contributing 7.7 percent. In terms of national total poultry production, however, the Forest zone, which is the most important agricultural production area in the country, accounts for 39 percent of all national poultry production.

Zones	Contribution of poultry to zonal agriculture	Contribution of zonal poultry to national poultry	Contribution of zonal agriculture to national agriculture
Coastal	7.7	36.4	10.9
Forest	2.2	39.0	41.4
S. Savannah	0.5	6.0	27.3
N. Savannah	2.1	18.5	20.4

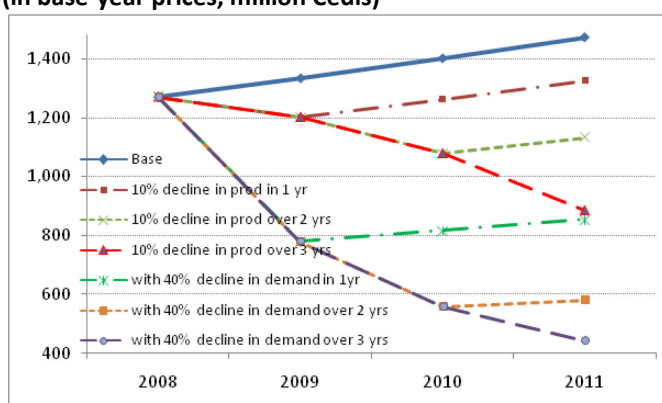
## HPAI Scenarios

The first three scenarios are designed to capture the effect of a production shock of 10-percent loss in poultry stock due to HPAI outbreaks. The base year is 2005, and the model runs from 2006 to 2011. We introduce the production shock in the fourth year (2009). In Scenario 1, we shock the stock of chicken by 10 percent in 2009 from the same year's level in the base-run, and then the production comes back to the base-run level of growth in 2010 and 2011. In Scenario 2, we consider a slow recovery situation in which production will only recover in 2011, while in Scenario 3, production remains at its 2009 level until 2011. Scenarios 4 to 6 incorporate the impacts of 40-percent demand shocks to Scenarios 1 to 3, respectively.

## Impacts of HPAI on chicken production and revenue

Figures 1 and 2 illustrate the impacts of these scenarios on chicken production and revenue, respectively. Comparing these two figures, we see relatively larger differences between production and revenue effects in the absence of demand shocks. With the 10-percent production shock in Scenarios 1 to 3, prices rise due to reduction in supply, and consequently, revenue falls less than production. When a demand shock is imposed, chicken prices stop rising and the declines in chicken production and revenue are comparable. We did not observe a significant decline in chicken prices in Scenarios 4 to 6, because both demand and production fall at a similar speed. Thus, a new equilibrium for the chicken market is reached, with a similar level of prices as before but with much lower levels of supply and demand

**Figure 1: Chicken production under different scenarios (in base-year prices, million Cedis)**



Source: Ghana CGE model results.

**Figure 2: Chicken production revenue under different scenarios (in base-year prices, million Cedis)**

Source: Ghana CGE model results.

## Impacts of HPAI on the other sectors

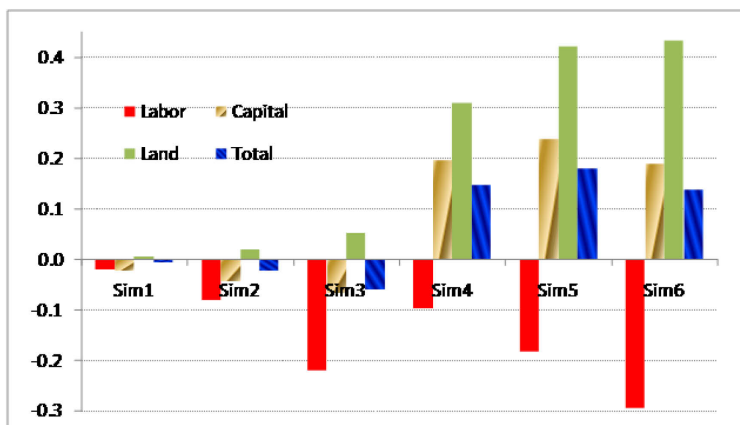
The DCGE model captures the indirect impacts of HPAI on other sectors of the economy. As expected, HPAI outbreaks have detrimental effects on those sectors that provide inputs to chicken production (such as maize and soybean, which are used as feed). The results reveal that a 10-percent reduction in chicken supply (Scenario 1) would cause maize and soybean production to fall by 1 and 5.4 percent respectively, whereas in the worst-case scenario of 40-percent demand shock and 10-percent supply shock over three years (Scenario 6), maize and soybean production fall by 6.4 and 37 percent, respectively.

Although the impact of the worst-case scenario (Scenario 6) on total livestock production is as high as 37.3 percent, this reduction in total livestock translates to a 0.4 percent decline in the overall agricultural GDP, while there seems to be no effect on national GDP. The almost insignificant effects on the agricultural sector and overall economy are not only due to the small share of chicken in the economy, but also to the certain substitution effects in both production and consumption.

## Impact of HPAI on the rural poor

The DCGE model includes 40 representative rural household groups, 12 of which lie below the national poverty line. The main income-generating activity for these households is crop production, followed by off-farm and on-farm labor income. These two sources account for 55 and 37.5 percent of total income, respectively, whereas income from capital, including capital used in chicken production, accounts for only 7.2 percent of rural poor households' income. Consequently, Scenario 1 (a 10-percent decline in chicken production in one year) results in an overall 0.01-percent reduction in the total income of the rural poor households. When the 10-percent supply shock lasts for a longer period (Scenario 3), farmers switch from chicken production to crop production, and the overall impact of HPAI on total income is a modest 0.06-percent decrease. When the 40-percent demand shock is taken into consideration (Scenarios 4 to 6), returns to crop production increase as a result of substitution in food consumption, and the total income of the rural poor households increases slightly (between 0.14 and 0.18 percent).

**Figure 3: Income effect of HPAI on the poorest 30% of rural households under different scenarios**  
 (% change from the base-run same year, incomes are deflated by the same year's CPI)



Source: Ghana CGE model results.

## Concluding Remarks

As a result of the diversity of the Ghanaian diet, and the high levels of international competition in the domestic poultry market, poultry production constitutes a very small subsector in the Ghanaian economy. The main findings of the Dynamic General Equilibrium analysis are the following:

- Demand shock driven by consumer panic is the foremost factor in the reduction of production, rather than the actual supply shocks caused by the HPAI outbreaks.
- Soybean and maize (which serve as inputs to poultry production) are the two sectors that will be most negatively affected by the reduction in poultry production.
- The economywide impacts on both agricultural and total GDP are very modest owing to the small contribution of the poultry subsector to the overall economy and to substitution in food consumption.
- The impact of the HPAI shocks on the rural poor households' income is negligible since the majority of their income is derived from crop production. A detailed analysis of the impacts of HPAI on the chicken-producing rural poor households' income is therefore necessary.

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