



## Economic impacts of African swine fever in Vietnam

Nguyen Ngoc Que, Pham Thi Ngoc Linh, Tran Cong Thang, Nguyen Thi Thuy, Nguyen Thi Thinh, Karl M. Rich and Hung Nguyen-Viet

### Summary

The rapid spread of African swine fever (ASF) in Vietnam since the first case was reported in early February 2019 has created considerable uncertainty in the Vietnamese pig sector. On the supply side, how ASF spreads across time and space will influence not only the course of veterinary control but also its economic impact on affected farmers and other value chain actors. These effects will differ if ASF spreads in poorer, more remote areas vis-à-vis more industrial production sites. Moreover, the lack of consumer awareness of ASF could further portend shocks to demand for pork, reducing the ability of the industry to recover. Understanding the prospective economic effects of ASF will allow the government and other actors to understand the scale of possible impacts and the types of investments needed to offset these negative effects; and on this basis make the response to disease and control efforts more efficient. To do this, ILRI conducted a modelling exercise to assess the economic impact of ASF under different scenarios.

### Overview of case and African swine fever

Pig production remains one of the strategic sectors of Vietnam's economy given its contribution to 60% of total livestock outputs (MARD 2017) and to the livelihoods of approximately three million households (DAH 2019). Pork is the most important type of meat produced and consumed in Vietnam, representing 70% of total meat output. Annual per capita consumption of pork increased from 13.0–31.3 kg between year 2000 and 2018 and is projected to continue rising up to 37.5 kg by 2027 (OECD 2019). Likewise, over the same period, the total pig population increased from 16.3 million to 28.2 million heads. The majority of pig holdings (nearly 83%) remain small-scale with 1–10 pigs (DAH, 2019). The Red River Delta and Northern Uplands are the two main pig production regions which together account for 50% of Vietnam's pig population.

ASF was first detected in Vietnam in February 2019 and has caused tremendous losses in the pig industry. As of December 2019, more than 5.9 million pigs, equivalent to approximately 21% of the total pig population, have either been culled or died from the disease despite significant government efforts to control the spread of the virus. These measures have included the strict control of movement of pigs and pig products from infected provinces; support to early detection, culling, disinfection, compensation; and enhanced risk communication and public awareness (DAH 2019). The majority of pigs culled (nearly 60%) were from the Northern Uplands and Red River Delta, followed by the Mekong River Delta (14.1%) and Southeast (11.6%) areas. More than 90% of outbreaks occurred in small- and medium-sized farms, while commercial farms with better biosecurity have been less affected (FAO 2019).

## Key messages

- ASF outbreaks pose adverse impacts on national pork supply and demand, especially in the traditional sector. The national pig supply falls by nearly 27.8% in the traditional sector with a 5% negative demand shock and by 33.2% with a 20% negative demand shock in the simulated scenarios compared to the non-outbreak scenarios. The impacts are differentiated by region and show the Red River Delta and Southeast suffer the highest losses.
- The modern sector is less likely to be affected and even benefits from the ASF outbreak. National pig sector income from the modern sector increases by 16.9% with a 5% negative demand shock and by 14% with a 20% negative demand shock in the simulated scenarios compared to the non-outbreak scenarios. The results are driven by the modern sector's strict biosecurity practices and high technology growth.
- ASF outbreaks tend to accelerate the restructuring process of the pig industry towards faster expansion of the commercial and modern pig sectors and shrinking of the traditional sector. Creation of employment opportunities for smallholders who are squeezed out as a result of ASF should be considered to ensure that livelihoods are not compromised as a result of disease.

## Methodology

We used the Vietnam pig sector model (VPM) to look at the regional and dynamic impacts of ASF and prospective intervention options (Lapar et al. 2018). It was originally developed in 2010 for the Australian Centre for International Agricultural Research (ACIAR)-funded project 'The competitiveness of smallholder pig producers in Vietnam,' to look at trajectories of smallholder participation in

the Vietnamese pig sector as the sector and economy modernized. VPM is a four-sector, eight-region, partial-equilibrium model focused primarily on the dynamics of different pig systems (traditional, commercial and modern) and their interactions with maize for both food and feed. Fresh pork sold in rural traditional wet markets produced by traditional smallholder producers is categorized in the traditional sector. Fresh pork sold in urban/peri-urban traditional wet markets produced by commercially oriented producers is categorized in the commercial sector, while processed pork sold in formal market outlets including supermarkets comprises the modern sector. The eight regions in VPM are the Northern Uplands, Red River Delta, North Central Coast, South Central Coast, Central Highlands, Southeast, Mekong River Delta, and the rest of the world. VPM simulates the evolution of the pig sector over a 13-year period starting from 2018 until 2030. Dynamics in the model over time are driven by changes in income, population and technology, which in turn can influence the evolution of income elasticities that drive demand.

VPM was used to simulate the impact of ASF-related shocks in two scenarios: (i) a baseline scenario of income, price and technology growth following current trends and (ii) a higher-income growth scenario. The different assumptions behind each scenario are summarized in Table 1. In all scenarios, we assumed that ASF-induced supply shocks were only applied to the traditional and commercial systems given their low levels of biosecurity. Moreover, shocks to demand were differentiated by sector. We assumed a 10% rise in demand for products from the modern sector driven by consumer desires for perceived safer products. For products from the traditional and commercial sectors, we considered two levels of demand reduction, 5% and 20%, given uncertainties on how consumer demand responded to ASF outbreaks. The 5% demand shock is derived from an assumption that ASF does not significantly influence pork eating habits of Vietnamese consumers and their strong preference for fresh pork sold in wet markets. On the other hand, the 20% shock reflects consumer boycotts of pork products due to (unfounded) concerns over disease transmission from sick pigs to humans during the outbreak. We further differentiated shocks to supply and demand by region based on regional information obtained on the number of animals that were either culled or died from ASF. We finally imposed trade restrictions between the Northern Uplands and Red River Delta, and the Mekong River and Southeast, to simulate the effects of targeted movement restrictions to slow the spread of ASF in the outbreak year (2019).

## Model results

In the baseline scenario with a 5% shock to demand for traditional and commercial pork, national pig supply falls by nearly 28% in the traditional sector, and by over 11% in the commercial sector in 2019 compared to the no-outbreak scenario (Figure 1). This is driven by sharp declines in supply, particularly in the largest production region (Red River Delta) where meat supply in the two sectors decreases by 87% and 26%, respectively. These declines persist throughout the simulation period even after the year of the outbreak (2019).

Table 1. Summary of assumptions used in the base scenario and alternative scenarios simulated in VPM

Scenarios and corresponding assumptions
<p>1. Base scenario</p> <p>Per capita income growth: 5%</p> <p>Population growth: 1.05%</p> <p>Nominal exchange rate growth<sup>1</sup>: 1.5%;</p> <p>Maize technology growth: 0.5%</p> <p>Traditional pig technology growth: 0%</p> <p>Commercial pig technology growth: 1%</p> <p>Modern pig technology growth: 1.5%</p> <p>World price growth for maize: 2.08%</p> <p>World price growth for pork: -1.32%</p> <p>Income elasticity of maize: 0.4</p> <p>Income elasticity of traditional pork products: 1.25</p> <p>Income elasticity of commercial pork products: 1.38</p> <p>Income elasticity of modern pork products: 1.51</p> <p>Own price elasticity of supply for traditional pig: 0.6</p> <p>Own price elasticity of supply for commercial pig: 0.65</p> <p>Own price elasticity of supply for modern pig: 0.75.</p>
<p>2. Higher income growth scenario</p> <p>Same as base scenario except that per capita income growth increased by 7.5%</p> <p>Income elasticity of traditional pork products: 0.6</p> <p>Income elasticity of commercial and modern pork products: 2.3</p>

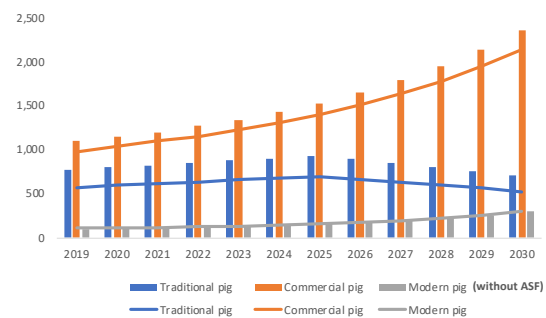
On the other hand, an ASF outbreak leads to an increase of over 5% in pig supply from the modern sector, driven by consumer preferences for perceived safer products. However, after 2020 and until 2027, supplies from the modern pig sector increase at a more modest rate of 0.5% compared to the no-outbreak scenario and start to decrease after 2028. Supply shortages trigger significant increases in the pig prices by 45% in the traditional sector, 14% in the commercial sector and 11% in the modern sector in 2019. From 2020–2030, similar growth rates in prices hold for traditional and commercial sector but increase at a declining rate for the modern sector.

Under this scenario, despite the negative impacts of ASF on the supply side, the total revenue of the pig sector does not fall. Rather, the losses in affected farms are offset by higher income in remaining farms due to higher prices for pig meat. Nationally, pig sector income in 2019 increases by just over 3% (USD89 million), with changes of nearly 4% (equivalent to USD41 million) in the traditional sector, 1.6% (USD24 million) in the commercial sector, and 17% (equivalent to USD24 million) in the modern sector compared to a no-outbreak scenario.

If we consider a higher demand shock of 20%, we observe somewhat sharper declines in the meat supply of the traditional sector (33.2%) and the commercial sector (17.9%) compared to the previous simulation (Figure 2). Meanwhile, pig prices increase at significantly lower rates than the previous simulation (by nearly 26% in the traditional sector, but just by 0.3% in the commercial sector compared to the no-outbreak scenario). Total revenue

losses under a 20% demand decline are estimated at USD420 million, led by declines in the traditional sector (nearly 16% decline, or a loss of USD172 million) and the commercial sector (18%, or a loss of USD269 million), with only the modern sector showing gains in revenue (a 14% rise, or USD20 million). These results highlight the sensitivity of our sector revenue projections to changes in demand, with more information needed to quantify how demand changed during the 2019 ASF outbreak.

Figure 1: Pig supply projection with and without ASF outbreak under baseline assumptions (5% reduction in demand from traditional and commercial sectors).

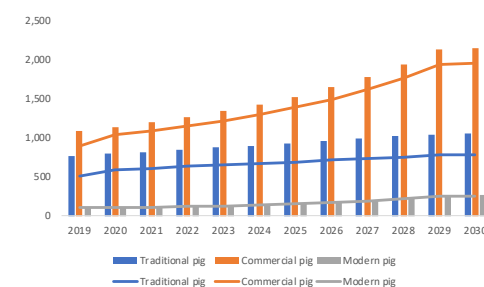


Source: Model simulations

Under the high-growth scenario, the impacts of an ASF outbreak on supply, demand and income are relatively similar to the previous baseline scenario but at a larger magnitude in absolute values. The Red River Delta and Southeast continue to be the most affected regions showing sharp declines in meat supply annually, especially in the traditional sector. Pig prices in all pig sectors increase at considerably larger rates (2–3 times higher than the 2019-level) in comparison to the baseline scenario after 2026.

In both the baseline and high-growth scenarios, the share of production from the traditional sector is likely to contract, while the commercial and modern sectors increase their shares. By 2030, approximately 20% of total pigs in Vietnam are produced by the traditional sector while over 70% are from the commercial and modern sector in the no-outbreak scenarios. ASF outbreaks accelerate this process, as evidenced by the shift of a 5% share in meat sales from the traditional sector to the commercial and modern sector.

Figure 2: Pig supply projection with and without ASF outbreak under baseline assumptions (20% reduction in demand from traditional and commercial sectors)



Source: Model simulations

1. Nominal exchange rate growth averaged 3.15% in the period 1992–2002, 3.18% in 2002–2012, and 1.61% in 2012–2018. As there has been a downward trend in exchange rate depreciation, we chose 1.5% as our exchange rate projection for the simulation period.

## Recommendations

The model results indicate that ASF outbreak poses adverse impacts on the domestic pork supply and demand, especially in the traditional sector. Smallholder pig producers in the Red River Delta and Southeast suffer the highest losses driven by sharp declines in supply. Meanwhile, the modern sector with its higher levels of biosecurity and high technology growth is less likely to be affected and even benefits from the outbreak, which is evidenced by increased supply and income throughout the simulation period. Differences in demand significantly affect model results on the revenue side, highlighting the need for monitoring and data collection on the consumer side during disease outbreak events to guide policy response.

The model also shows how the traditional pig sector is affected by ASF versus other production systems. While we would expect the gradual reduction in importance of the smallholder sector, particularly given Vietnam's livestock development strategy which promotes the development of commercial and modern farms, results from this model indicate that an ASF outbreak accelerates this process. Creation of employment opportunities for smallholders who are squeezed out as a result of ASF should be considered to ensure that livelihoods are not compromised as a result of disease.

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Nguyen Ngoc Que, Pham Thi Ngoc Linh, Nguyen Thi Thuy and Tran Cong Thang work for the Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD), Ministry of Agriculture and Rural Development of Vietnam. Nguyen Thi Thinh, Karl M. Rich and Hung Nguyen-Viet work for the International Livestock Research Institute (ILRI).

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### Contact

Karl M. Rich  
ILRI, Nairobi  
[k.rich@cgiar.org](mailto:k.rich@cgiar.org)

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