

# Avian Influenza

## 1 Abstract

This is an informative abstract presenting the effects on the food market of Avian Influenza of Thailand in depth. In the current society, people are able to witness various pandemics since the past. Some nations adapt well, but some are not. In other words, different countries represent diverse performances to solve the troubles caused by the epidemics.

The Avian Influenza negatively affects Thailand poultry related industries. Regarding the presence of the bird flu, Thai's measurement during the outbreak negatively affected poultry trade of Thailand, the number of available poultry has been reduced heavily affecting the trading quantities resulting in dropped of total poultry exports during the epidemic period, In addition, the rising of market competitiveness in poultry industry has extended the recovery period of Thailand economy from the declined poultry exports. Furthermore, our group analyzed the overall effects of the epidemic on the consumption of substitute products in which in this case swine meat or pork related products are considered to be substitute products for poultry consumption. Regarding the law of demand and supply, the negative demand and supply shocks from the H5N1 epidemic are affecting poultry consumption, not only domestically but also to the international. In addition to the uses of price elasticity of demand, the negative changes in poultry consumption has only increased the swine meat consumption by small fractions due to the occurrence of rising swine meat price, the crowding out effects can be seen in the swine meat industry. As a result, overall internal and external demand for Thailand's poultry products has been reduced from the H5N1 outbreak, whereas a slight increase in consumption of swine products due to changes to substitutable products and increases in overall swine's price.

## 2 Introduction

The occurrence of Bird Flu or Avian Influenza outbreak causes severe damage to the production and consumption of poultry industry including chickens, ducks, and geese due to the fact that the disease can be transmitted from infected birds to human through air transmission and direct contact with contaminated saliva, mucus and feces from infected animal (Centers for Disease Control and Prevention, 2017). Poultry is considered to be one of the majority agricultural products of Thailand in account for 52 percent of total meat production produced in Thailand (NaRanong, 2007, 3) generated a large proportion of national income through domestic consumption and international trade. The epidemic of Bird Flu entered Thailand in late 2003, faltering Thailand's stability as the agriculture industry is crucial to the development of a country. The virus widely directly and indirectly affected the poultry industry, production of poultry was terminated and consumers were highly concerned toward consumption of poultry goods. The outbreak temporarily affected Thailand's food industry, in particular a reduction in quantity supplied and lowered consumption of poultry products in concern of the virus, raising up an issue in Thailand's food industry including substitutes of poultry for instance the avian

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influenza impact the swine meat price to rise sharply due to the excessive demand from people switching from poultry consumption.

## 2.1. Related theory

In order to construct the study, we implemented the law of demand and supply. Law of demand states that *ceteris paribus*, a negative relationship between quantity demand for the products in consideration of changes in price. Whereas law of supply defines that changes in price and quantity supplied are directly related. For the information provided by responsible online sources, we consummated the scheme by using social comparison theory proposed by Leon Festinger in 1954 (ScienceDirect, 2020) applying to international topics. In other words, we witnessed Thailand's performance in specific periods compared to other countries. Moreover we also use the elasticity concept with applying the number from (Lippe et al., 2010)

## 3 Body

Bird Flu or Avian Influenza refers to the virus type of Influenza globally circulates among birds, especially wild aquatic birds that play a major role as a host for the virus. However the host of Avian Influenza do not get sick they only carried the virus and shed the virus in their saliva, nasal discharge, and feces spreading the virus to other birds. The virus is highly contagious and capable of sicken and fatal to bird species including chickens, ducks, geese and turkeys.

Avian Influenza can be classified by their molecular characteristics of a virus and virus's ability to cause disease and mortality in chickens in a laboratory setting (Centers for Disease Control and Prevention, 2017). The classified Avian Influenza includes low pathogenic Avian Influenza (LPAI) which causes mild illness to the infected poultry, resulting in lowered egg production and feathers disorder. High Avian Influenza may be highly fatal to infected birds by a severe disease with a mortality rate between 90 to 100 percent (Centers for Disease Control and Prevention, 2017). History of Avian Influenza began in Italy, 1878 known as fowl plague, despite many of the mutated Avian Influenza a subtype virus of HPAI, H5N1 has outperformed all other subtypes of the virus. The realization of H5N1 began in Guangdong China, 1996 occurred in commercial geese. Later on in Hongkong, 1997 the outbreak of H5N1 arose on chicken farms, severely damaging Hongkong poultry consumption. The slaughter of poultry was enacted as a control with over 1.5 million deaths of Hongkong poultry. Unfortunately 18 cases of Hongkong residents were infected with 6 reported deaths, luckily H5N1 were not capable of developing human to human transmission (Virol, 2009). The presence of H5N1 in Hongkong indicates that the virus is easily transmitted among poultry with possibility of multiple waves of outbreak.

In 2003, Thailand's poultry farms encountered massive deaths among poultry. Later on January 23, 2004, Thailand officially announced the confirmation of H5N1 subtype of highly pathogenic avian influenza, a closely related genetic sequence to influenza A/Duck/China/E319.2/03 (Tiensin et al., 2005). The virus spread rapidly throughout the country by the end of 2003 144 villages in 32 provinces reported the outbreak of the virus

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in poultry (Tiensin et al., 2005), happened before the official announcement. In the first wave of the epizootic in January to May 2004, the number of infections increased to 188 villages in 46 provinces spreading throughout all regions of Thailand. Number of reported cases were around 1 to 5 cases per day during the first wave of the outbreak, whereas the number of cases increased rapidly to 61 cases per day in the second wave of the outbreak during July to December 2004 (Tiensin et al., 2005). The infection occurred in small farms, backyard chickens and in a massive commercial industry consisting of chickens which account for 56 percent, ducks for 27 percent and the rest including broilers, layers, quails and others. According to study from J R Soc interface, free-grazing ducks were the main contributor to the spreading of the virus during the pandemic (Walker et al., 2012) in which further finding that ducks became significant silent carriers of the virus particularly from the free-range ducks and wild ducks, unfortunately the acquisition of the virus by the ducks remains unclear. In addition to the low temperatures in Thailand during October to December that mainly contribute to the migration of the wild bird into Thailand and traditional activities occurred that involved consumption of poultry also contributed to the spread of the H5N1.

The Department of Livestock Development (DLD) published controls where poultry plants with death rates higher than 10 percent within a single day were obligated to terminate all of their products including livestock immediately (Auewarakul et al., 2008). Flocks were quarantined or terminated if diagnosed with the virus, and restricting the movement of poultry within 1 to 5 kilometres radius to prevent further spread of the virus. In addition, the cooperation between DLD and local police help establish control checkpoints around the infection areas. Furthermore, a nationwide surveillance programme or Bird Flu x-ray was launched in January 2004 to July 2005, using approximately 2 million volunteers in order to door-on-door inspected every villages for infected poultry or the existence of the virus, 75 percent of the market price were paid to the farmers for their infected poultry to be eliminated and appropriately buried. Moreover, suspected areas were locked down restricting poultry and other animal movement within 10 kilometres radius for 30 days (Food and Agriculture Organization of the United Nations, 2008). Free-grazing ducks were seriously considered, due to the fact that free-grazing duck main consumption was golden apple snail which is a critical problem for rice agriculture. As a result, minimizing grazing areas were imposed in the interest of limiting duck's traveling distance to reduce the transmission of the virus and the limitation later were extended to other free-raised poultry as well.

Despite the other countries control measures, the use of vaccination in poultry was not officially announced in concern of the international trade policies as risk of encountering asymptomatic infection that may lead to undetectable spread of the infection (Auewarakul et al., 2008). By contrast, the uses of vaccination in order to accommodate further control measures resulted in success in Mexico and Pakistan (Ellis et al., 2010), this succession shows a strong reinforcement for the use of vaccines to prevent the further outbreak of H5N1 in collaboration with the use of other measures.

As a consequence of the outbreak, approximately 62 millions poultry were eliminated from either the virus or the control measure, and the losses in nation GDP were estimated to be around 25.24 billion Thai baht (Tiensin et al., 2005) severely damaged Thai and global economy.

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## 4 Impact on poultry market

Among all of the agricultural products of Thailand, poultry, especially broiler chickens, represents the prioritized commodity which indicates a major role in the economy of Thailand for the reason that broilers is one of those exported products of the country which will be discussed in depth thereafter.

The table below depicts the relationship between the quantity of broilers produced in tons and two contexts impacting the economy which are domestic consumption, and amount exported in tons creating the appearance of economic movements in the past anyway (Luangjok, 2008, 1).

Year	Amount produced (tons)	Domestic consumption (tons)	Amount exported (tons)
1998	937,761	662,946	274,815
1999	960,465	695,234	265,231
2000	978,327	668,093	310,234
2001	1,136,130	737,429	398,701
2002	1,180,253	746,743	433,510
2003	1,264,350	766,968	497,382
2004	873,227	672,412	200,815
2005	1,030,578	792,521	238,057
2006	1,068,809	809,105	259,704
2007	1,106,663	809,302	297,361
<b>Total</b>	<b>10,536,563</b>	<b>7,360,753</b>	<b>3,175,810</b>

Source: <https://scholar.utcc.ac.th/bitstream/6626976254/2491/1/216138.pdf>

With the information from the table above, broilers domestic consumption weighted approximately 69 percent from the total amount produced. According to this high percentage, it demonstrates how the poultry industry plays a major role in Thai economy. Likewise, poultry production tends to have incremental movement due to the higher demand every year displayed by the table which the amount of consumption increased every year. It illustrates that one of those Thai's main cuisines is chickens. Looking more closely, in 2004, the year of the Avian Influenza outbreak, it impacted the consumption patterns of citizens drastically ( changed to substitute products ) which will be analyzed later in the next topic.

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## 5 Impact on poultry trade

With the outbreak of Avian Influenza, the WHO has warned that the Asian outbreak could mutate and become more dangerous. Thailand, Asia's main exporter of broiler meats, has been banned imports of poultry by Singapore, Malaysia, Taiwan, Philippines, Hong Kong, Bangladesh, and South Korea. Moreover, Thailand's main poultry purchasers, Japan and the European Union(EU), also prohibited the purchase due to the threatening case of bird flu that jumped from birds to humans in Thailand. In the article, there is the death of a 56-year-old Bangkok man caused by the virus from his raised fighting roosters(BBC news,2004).

	1999	2000	2001	2002	2003 (p)	2004 (f)
<b>Exports 1/</b>						
Brazil	735	870	1,226	1,577	1,904	2,100
European Union 3/	776	774	724	843	730	780
China, Peoples Republic of	375	464	489	438	388	310
Thailand	285	333	424	465	528	300
Canada	47	55	69	92	85	90
Argentina	3	5	6	18	30	45
United Arab Emirates	19	20	20	37	45	40
Hungary	32	29	28	27	30	30
Poland	20	12	13	23	25	25
Australia	12	14	21	17	19	20
Others 2/	58	49	49	52	54	58
Total Foreign	<b>2,362</b>	<b>2,625</b>	<b>3,069</b>	<b>3,589</b>	<b>3,838</b>	<b>3,798</b>
United States	<b>2,080</b>	<b>2,231</b>	<b>2,520</b>	<b>2,180</b>	<b>2,237</b>	<b>2,248</b>
World Total	<b>4,442</b>	<b>4,856</b>	<b>5,589</b>	<b>5,769</b>	<b>6,075</b>	<b>6,046</b>

Source: Counselor and attache reports, official statistics, and results of office research

From the exports table, Broiler meat exports of Thailand for 2004 were expected to decline about 43 percent to 300,000 tons by the reasons of the defective outbreak on poultry production. As a result of poultry denial and strict trade restrictions from a large number of countries, Thai Government at that time, Thaksin Shinnawatra managed to reduce the number of birds by 30 millions around the nation in an effort to deal with the Highly Pathogenic Asian Avian Influenza (HPAI outbreak) or H5N1 virus. This measurement including the loss from poultry export markets refer to an economic shortfall of producers in Thailand. (United States Department of Agriculture, 2004, 19)

As already mentioned that Thailand is the main broiler exporter to the poultry market, from the information via USDA, Thailand's main poultry trade partners are Japan, the EU, and Korea with the proportion from high to low of percentage respectively. There are 50 percent to Japan, 31 percent to the EU, 8 percent to Korea, and 11 percent to other

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small contractors. After the outbreak occurred and Thailand had been banned from exporting poultry products, Thai Government teams tried to control this drastic situation by switching from uncooked to well cooked poultry products. For the aspect that Japan and the EU raised the trade restrictions by uncooked denial and higher tariffs, Japan was more relaxed than the EU due to the fact that Japan eventually re-opened the trade markets and welcomed Thai well cooked poultry products but in slightly smaller portions than before the outbreak began in Thailand. Unlike the EU, they are more unpermissive than other Thailand's trade partners. Restating the relationship between Thailand and the EU as poultry trade partners that Thailand already supplied value-added parts to the EU which they did not ban the cooked broilers considering that the EU expected that Thailand will substitute the uncooked with well-cooked chickens already due to a prohibition of raw poultry. Referring to the 30 million birds culled by the Thai measurement plus more procedure for cooking, the amount of cooked broiler meats exported is not similar to the same amount. This situation made sales decrease dramatically in the EU poultry markets. Thailand, after that worst position, had been beaten by competitors because of the new consumer preferences of the EU turned to the hygienic raw broiler meats which are more versatile than the cooked ones. Additionally, those competitors are Brazil and Poland, the key poultry exporters of Europe (United States Department of Agriculture, 2004, 20).

<b>Production</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>Thailand</b>	<b>980</b>	<b>1,070</b>	<b>1,230</b>	<b>1,205</b>	<b>1,320</b>	<b>1,025</b>

Source : Counselor and attache reports, official statistics, and results of office research, USDA

The table above exhibits the amount of cooked broilers ( 1,000 metric tons) (United States Department of Agriculture, 2004, 23). From the data, compared with the amount exported of uncooked broiler meats it showed that Thailand produced well-cooked chickens than uncooked poultry but the number accessed to export is lower than 2003 ( before the outbreak began). However, the amount exported is expected to rise after the pandemic disappeared which should be a long roadmap to recover the number of birds annihilated during the bird flu period.

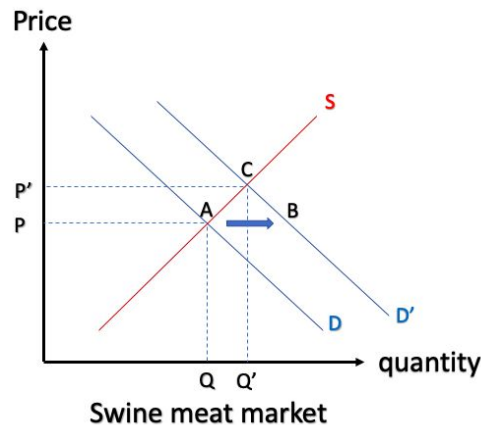
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## 6 Impact on swine meat

Avian influenza impacts the consumer confidence on consumption of poultry due to the fear of infected meat, which makes people consume substitutes instead. And the most preferred meat following the chicken is pork or swine meat. So, we can capture the impact of avian influenza on poultry substitutes by using pork as a proxy for them.

From this impact, we can use the law of demand and supply along with graphically explaining the impact of avian influenza to the swine meat market.

At the beginning let assume that the market is in equilibrium at point A, when avian influenza occurred people's confidence toward the consumption of poultry products decreased due to the rising awareness of the virus encouraging people to consume more of the substitute products which is swine meat. So, the demand for swine meat would be increased at every level of price which will shift the demand curve to the right from D to D'.



After the demand curve was shifted, at point B where the price has not changed yet there will be an excess demand on the swine meat market left. And as a result of the demand surplus, sellers or suppliers will increase the price to maximize profit at the optimal level of price making the demand and supply to be in an equilibrium again at point C.

For the net impact at the new equilibrium point which is the differences between point A and point C, the total quantity or the consumption of the swine meat will be increased from Q to Q' and the equilibrium price will rise up from P to P'. Accordingly, we can roughly make the assumption that, *ceteris paribus*, the impact from avian influenza will affect the equilibrium price and quantity in such a way that the consumption of poultry production will be increased.

In order to prove our assumption that avian influenza will affect the consumption and price to be increased in the swine meat market that we use as the proxy for poultry substitute. We must come up with the data to support our hypothesis.

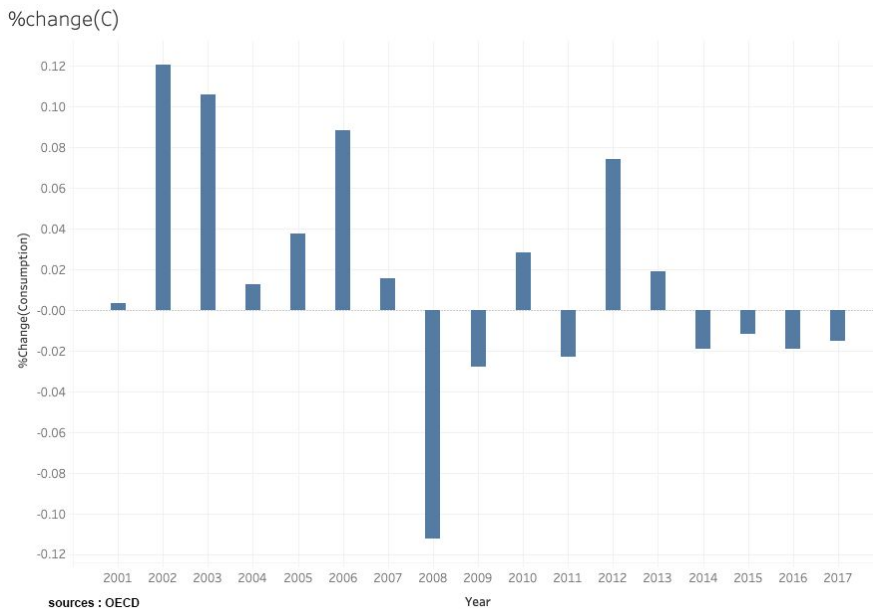
According to the OECD data which we plot them as a relation between swine meat consumption and year from 1990 to 2018. Focussing on the avian influenza impact the swine meat consumption was approximately increased by 1% in 2004.

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However, from the graph the slope at 2003-2004 compared to other years. The increase was relatively low, for instance, compared to the growth from 2002-2003 which's 10%(OECD, 2020)

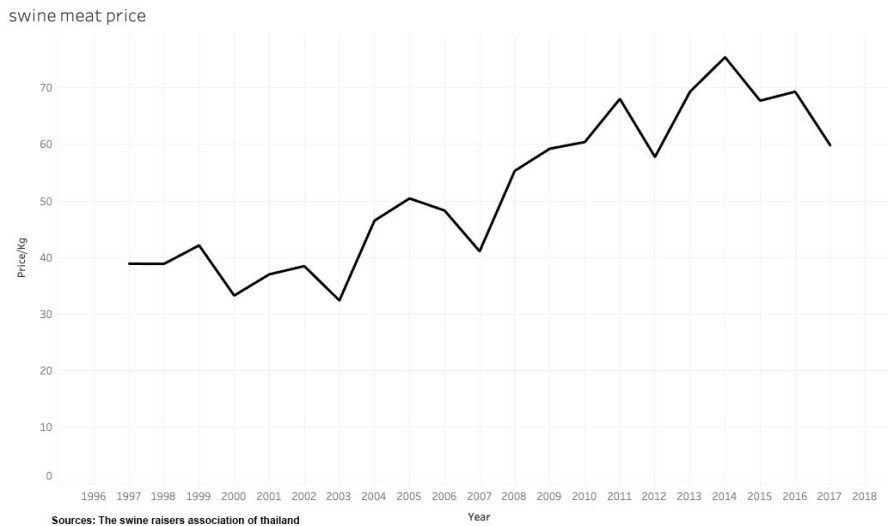


So, we could not say that the avian influenza impact the poultry substitutes consumption to be increased due to the fear of infected chicken. Because the data does not reflect the impact of significantly if other things are constant and according to the available data, which is on a yearly basis. However it's inconclusive since we didn't put other factors into account.

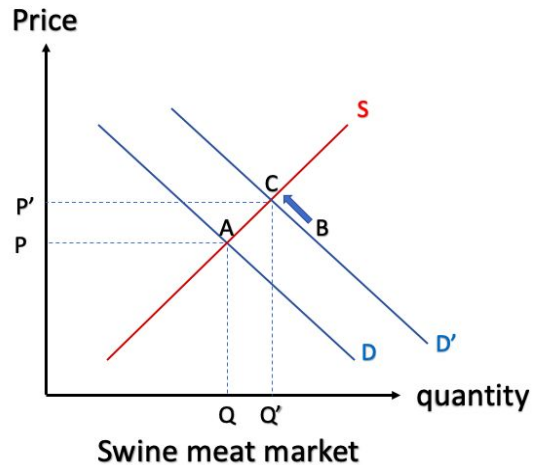


On the other hand, according to the data from the swine raisers association of thailand the price per kilogram of swine during 2004 have increased significantly, which is approximately to 44%.

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From the law of demand which states that quantity purchased has a negative relationship with price. In other words, the higher the price, the lower the quantity demanded. (Investopedia, 2020) so, we can make another assumption that the impact from avian influenza to consumption of swine meat may be offsetted by the increase in price sharply during 2004. Which can be explained by the movement along the curve from point B to point C in the graph below.



To see whether our assumption is true or not we do have to apply the concept of price elasticity of demand to determine how much of the consumption was offsetted by the increase of price. However, with the available data we could not determine the price elasticity of demand because we have insufficient data that lead to many problems, thus in order to use multiple linear regression in the case that the data is not normally distributed. In addition, we could not apply the law of large numbers, moreover we also

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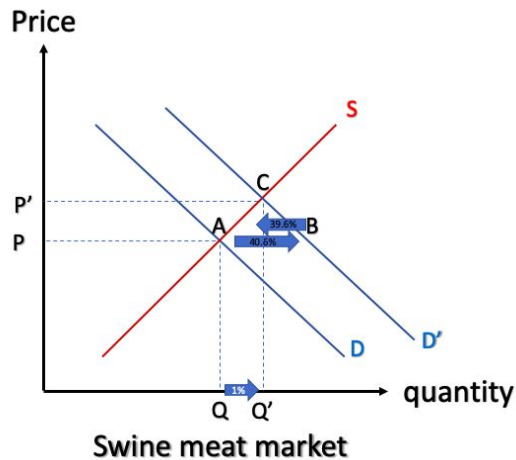
omitted some variables due to the insufficient data that would lead to biased and inconsistent estimators.

In order to come up with the solution, we have to use the meat demand price elasticity equal to  $-0.84$  (Lippe et al., 2010, 16) as a proxy for swine meat. By the way, we cannot find the price elasticity of supply due to insufficient data making the data not normal distribution and limiting us from using regression analysis to come up with elasticity similar to the price elasticity of demand case, furthermore we could not find any substitute for it from any trustable sources.

From the demand price elasticity and the price data we have, ceteris paribus, we can calculate the estimated crowding out effect arising from the increase in price from the equation below.

$$\begin{aligned} \text{price elasticity}(\epsilon) &= \frac{\% \Delta Q}{\% \Delta P} \\ \% \Delta Q &= (\% \Delta P)(\epsilon) \\ \% \Delta Q &= (44\%)(-0.84) \\ \% \Delta Q &\approx -36.96\% \end{aligned}$$

The net change in equilibrium = impact from Avian influenza + crowd out effect from the price  
 $1\% = \text{Impact from Avian influenza to demand curve} - 39.6\%$   
 Impact from Avian influenza to demand curve =  $40.6\%$



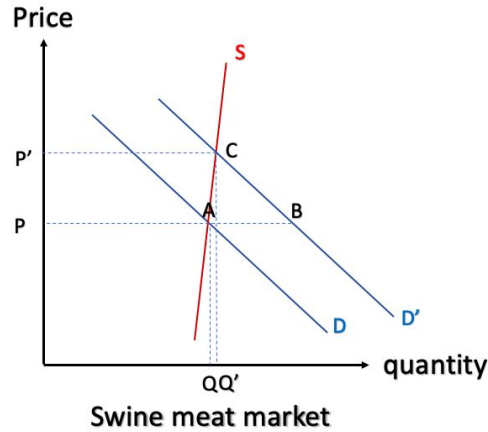
Which means that the impact of influenza on demand, considering other things held constant as well as the price. The quantity of demand or consumption will be increased by  $40.6\%$  and if all of our assumptions are correct we could find the estimated price elasticity of supply by the calculation from the equation below.

$$\begin{aligned} \text{price elasticity}(\epsilon) &= \frac{\% \Delta Q}{\% \Delta P} \\ \text{price elasticity}(\epsilon) &= \frac{1\%}{44\%} \\ \text{price elasticity}(\epsilon) &= 0.02 \end{aligned}$$

Similarly, our analysis conclude that it is possible since the price elasticity in the short run could be very elastic for the reason that suppliers or producers have their own

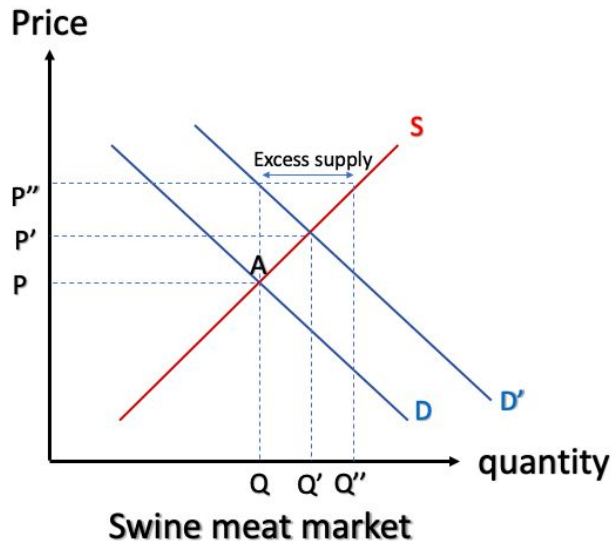
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capacity and it could be very hard for the farmers to increase their capacity in a short period of time due to the technological limitation, budget limitation, and etcetera. Which our group was able to come up with a more realistic graphical illustration to explain more precisely appeared below.



In conclusion, according to our assumptions and data of the Avian Influenza in 2004, the impact on the demand of poultry substitutes which we use swine meat as a proxy to increase. However the impact from inelastic supply curve makes the equilibrium consumption to be increased a little since we have sharply increased in the price of swine meat. Which is illustrated by the graph above.

On the other hand, there's another scenario that is possible. Suppose that the supply elasticity is higher than 0.02, regarding that the current price is actually higher than the equilibrium price from the exploitative pricing in which the crowding out effect from price will be even more and also leave the excess supplies.



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## **7 National plans (include The National Strategic Plan for Avian Influenza Control and the National Strategic Plan for Influenza Pandemic Preparedness)**

Due to the threat of avian influenza and pandemic influenza, the government of Thailand guarantees the three-year strategic plan that is implemented to improve the biosecurity of poultry raising, including active surveillance and rapid control of animal and human outbreaks via grassroots participation. The National plans have been separated into two parts and they have the different targets. First plan, the National Strategic Plan for Avian Influenza Control has targets as follows: 1.) After 2006, it is going to have a zero percent outbreak of Avian Influenza in economic poultry. 2.) Declined outbreaks in domestic poultry, also included the fighting cocks, exotic birds and migratory birds, to the standard level that is not considered as a problem beyond 2007. 3.) After three years of implementing the plan, there will be no outbreak in other animals. 4.) No transmission between animal to human after 2006. 5.) Thailand is going to be efficiently prepared to handle an influenza pandemic by 2005. Second plan, the National Strategic Plan for Influenza Pandemic Preparedness has targets as follows: 1.) To reinforce an effective influenza surveillance system, the government plans to establish 12 centers for laboratory surveillance of viruses throughout the country within three years. 2.) To enable Thailand to be ready to manage the emergency situation during an influenza pandemic within two years. 3.) Increase the size of stockpile of antiviral drugs for the treatment up to 325,000 patients and the size of stockpile of raw materials for the antiviral drugs's production up to 1,625,000 patients within five years. 4.) To improve and develop the capacity to manufacture influenza vaccines within five years. 5.) In the case of an influenza pandemic, for all hospitals in the country to have the capacity of up to 100,000 beds for the patients who are in critical condition. And for the case of outbreaks in specific areas, for field hospitals to have the capacity of 5,000 beds to standby for services. All of these are what the government tries to do to solve an influenza pandemic problem.

## **8 Important government's policy that help to reduce the spread of germs**

### **8.1. Human surveillance**

Active surveillance of suspected cases is continuously employed by public health authorities in Thailand, citizens who have a history of exposure to poultry or living in risky locations such as farms and poultry keeping areas (including villages and homes where poultry are allowed to roam free); wild bird areas or wetlands, borders, ports and airports; markets and slaughterhouses; poultry and poultry products (such as eggs and feathers); veterinary medicines and facilities; and animal feeds are identified to provincial health offices and the Bureau of Epidemiology, Department of Disease Control, respectively, in order to ascertain human to human transmission of drastic influenza of pandemic potential. And for the most efficient way to control the transmission in human

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to human, the Ministry of Public Health, at that time, has started to stockpile (Oseltamivir) and to prepare for rapid containment action. The plan is to use this pile as soon as possible for all cases to get rid of the virus before it becomes a widespread outbreak. But if the pile fails to eliminate the virus as the expectation, this plan could still buy some time for vaccine production or may delay the outbreak.

## **8.2. Animal surveillance**

The National surveillance programme of Avian Influenza is stringently conducted throughout the country. The active, passive, and syndromic surveillance systems have been undertaken to monitor any suspected case of Highly Pathogenic Avian Influenza. The surveillance is targeted on six poultry groups: 1.) poultry in compartmentalization, 2.) poultry in certified Good Agricultural Practices (GAP) farms, 3.) poultry in non-certified GAP farms, 4.) native poultry, fighting cocks with basic biosecurity management, 5.) backyard poultry and 6.) free grazing ducks.

## **8.3. Coordination**

The government set up a coordinating body known as the “War Room”. This co-ordinating body was a committee of top administrative officers from all responsible governmental organizations. The committee consisted of high level decision-makers from many ministries. War Room is the place where the authorities from many parts come and update the situations were reported and specific measures were issued. At the international level, Thailand government also reported the situation to the World Health Organization (WHO) and Office International des Epizooties (OIE), both are the organizations that directly related to this pandemic.

## **9 Important government’s policy that subsidize people who have suffered from the crisis of Avian Influenza**

### **9.1. Support a chicken consumption**

The government supported the poultry industry by convincing Thai people to go back to their favourite chicken dishes. The authorities intended to restore public confidence in Thai’s poultry and to resume exports. There were plenty of advertising boards with a hand-written sentence signed by the Governor of Bangkok. The government created the “chicken festival” after the campaign of supporting to return to eat chicken reached its peak on February 8 which featured CP and other industry giants distributing thousands of free chicken dishes, a chicken eating competition, and celebrities and politicians showing their eagerness to eat Thai chicken.

### **9.2. Food safety**

The Thai’s poultry sector suffered from a widespread outbreak of Avian Influenza in 2004. Since then, Thailand’s exporting companies have implemented food quality and food safety standards by providing pre-catching tests and post-catching tests to guarantee

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freedom of disease in broilers. Moreover, Thai exporters have introduced a traceability system for the complete production process from feed to end product. Higher food quality and safety standards have also been applied to those who produce for the local market. The Thai Department of Livestock Development is the competent authority to the strict enforcement of the law and regulations around food safety standards.

## 9.3. Chicken insurance

Ministry of Commerce by the Department of Insurance has issued an avian influenza insurance policy to protect chicken farmers or the general public in case of infection with avian influenza within Thailand during the insured period and death within 365 days from the date of receiving judging by setting a fixed premium rate of 100 baht (including taxes and duties) per 100,000 baht sum insured. In addition, the Department of Insurance In the process of coordinating with the Asset to Capitalization Supervisory Board (Local Organization) to carry out insurance related activities for chicken farmers. Along with proposing a basic form and premium rates, now waiting for the Ministry of Education and Cooperatives to collect data on chicken farms And the number of chickens that will be participating in the lending program For urgent assistance to agriculture and poultry farming.

## 10 Conclusion

Our group is inquisitive that whether Thailand, in the period of Avian Influenza, were able to encounter the virus effectively or not regarding to the impacts to poultry market; exports and domestic consumptions which exhibit an interior impact, imports of poultry and adapted products which depict an exterior impact on Thailand's performance in the international world trade market. In this part, many measurements occurred to face with the bird flu which we are able to check the effectiveness of the measurements from the data provided in the trustworthy online sources. Our group also focuses the virus's effect on the swine market which is the greatest substitutable product replacing poultry ones. Analyzing from the consumption and production aspects, along with the given information and elasticity with its formula proof, we are able to construct a timeline of Thailand in the past facing the Avian Influenza about the scale of affectation the nation faced. Despite the insufficient data provided in the acceptable reports, using theories relating to the economics concept allows us to predict the situation in that period with the highest possibility close to the real happening scene. In addition, our group also looks into the measurements, policies, or national plans dealing with Avian Influenza declared by the governments and relevant sections to delineate the chance of success, effectiveness, performance, influence and credibility of the governments and relevant sections in that period. For demonstration, the national strategic plan for influenza pandemic preparedness, spread of germs reduction policies concerning citizen surveillance, animal surveillance, and some coordination, victim of virus subsidizes policy regarding the support of chicken consumption which is the outstanding move by

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the leader at that time Dr. Thaksin Shinnawatra, food safety, and lastly the chicken insurance which you can see in depth through the analysis after this.

From the learning through many sources of information and applied theories, our group comes up with the interesting results. Research illustrates many positive and negative aspects of Avian Influenza depending on the vision of readers. From poultry market impact, case study for the next pandemic occurred relating to the trade concept which is able to strengthen Thailand's trade position in the future plus the weight of production types as a diversification technique to avoid the great recession of the nation's economy which in this case swine meat takes place for example. Also, policies show many disallowing rules on the opportunistic behavior of human exploiting from the spread for instance speculating the price of riskless products. Learning from the past, the future establishment of policies can scope efficiently with righteousness and fairness to all people suffering from the pandemic.

## **10.1. Suggestion**

With the lack of sufficient data, our group failed to construct price elasticity of Thailand poultry suppliers which could be significant for the changes in swine meat consumption regarding the rising of swine meat price in Thailand could crucially affect the swine production of Thailand regarding the distribution of poultry outbreak.

In addition, substitutable products for poultry consumption can be varied in Thailand, such as beef and seafood. In order to construct a conclusion to be more realistic, consumption and production of beef and seafood industry should help stimulate a better overall change in Thailand consumption regarding the presence of H5N1.

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