Rural Areas and Middle America See Smaller Employment Losses from COVID-19

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The COVID-19 pandemic has disrupted economic activity and resulted in historic unemployment levels (BLS 2020). However, the severity of employment losses varies across industries and geographic areas (Cho, Lee, and Winters 2020). While the economic situation is still evolving quickly, it is important to understand where the job losses are most and least concentrated. To do so, we first examine differences in employment losses between rural and urban areas in the United States, and then we examine differences across regions of the United States.

We expect rural areas to have less severe employment losses from COVID-19 than urban areas. COVID-19 confirmed infection rates have been initially higher in densely populated urban areas as compared to less-dense rural areas, and the higher infection rate in urban areas should result in higher rates of firms shutting down and workers losing jobs. Additionally, jobs in rural areas have stronger ties to agriculture and other aspects of food production that are essential. We also expect employment losses in Middle America to be less severe than losses in coastal regions because of lower infection rates and stronger connections to agriculture and food production.

We examined data from the US Current Population Survey accessed from the Integrated Public Use Microdata Series (IPUMS) (Flood et al. 2020). For our purposes, we consider all residents of metropolitan areas as urban, and all persons not living in a metropolitan area as rural. The US Bureau of Labor Statistics (BLS) classifies individuals age 16 and older (excluding active-duty military) as employed, unemployed, or not in the labor force. Individuals are unemployed if they are not working but would like to work and have looked for work in the past four weeks or are on temporary layoff. The labor force includes both employed and unemployed persons. Following BLS definitions, we compute the unemployment rate as the total number of unemployed persons divided by the total number of persons in the labor force. The labor force...
participation rate is the percentage of the civilian adult population that is in the labor force. Finally, employed persons are separable into those at work and those temporarily absent. We also compute the percentage of the civilian adult population that is employed and at work and focus on that as our preferred overall measure of employment changes, similar to Cho and Winters (2020). This latter measure accounts for changes in labor force participation and changes in workers temporarily absent from work that the unemployment rate does not account for.

Figure 1 reports the monthly unemployment rate from January 2019 to May 2020 separately for rural and urban areas. The rural unemployment rate was consistently above the urban unemployment rate from January 2019 to February 2020. However, the urban unemployment rate surpassed the rural rate in March 2020 as the early effects of COVID-19 began hitting urban labor markets. April 2020 experienced a massive rise in unemployment for both rural and urban areas with the rural unemployment rate rising to 13% and the urban unemployment rate reaching 14.7%. The unemployment rates for both decreased somewhat in May 2020 as some closed businesses began reopening. However, the May 2020 unemployment rate was still painfully high at 10.6% for rural areas and 13.3% for urban areas.

Figure 2 illustrates the monthly labor force participation rate from January 2019 to May 2020. Rural areas have consistently lower participation rates than urban areas throughout this period, which may reflect a combination of differing employment opportunities, age structure, gender norms, and other factors. The COVID-19 pandemic reduced labor force participation rates in both rural and urban areas, but the decrease was slightly larger in urban areas.

Figure 3 presents the employment-at-work rate for rural and urban areas. Rural areas again have consistently lower rates than urban areas throughout the entire period, likely for similar reasons as for the labor force participation rate. COVID-19 considerably reduced employment-at-work rates in both rural and urban areas with sharp decreases in April 2020 and some recovery in May 2020. However, the magnitude of the decrease due to COVID-19 is much smaller in rural areas, and the urban-rural gap in the employment-at-work rate reached its lowest level in May 2020 among the period examined. That is, the COVID-19 pandemic has thus far imposed greater employment rate decreases on urban areas than rural areas.
Implications of Hong Kong’s Special Status Revocation for Agricultural Trade between the United States, Hong Kong, and Mainland China

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In 1992, the United States–Hong Kong Policy Act granted Hong Kong status as a separate customs territory. On June 29, 2020, however, the US Department of Commerce withdrew that status due to recent tensions between China and the United States and concerns about Hong Kong’s degree of autonomy from mainland China (Stevenson 2020).

Hong Kong is an international trading hub with zero tariffs on most products except for hard alcohol (distilled spirits), tobacco, hydrocarbon oil, and methyl alcohol. Due to its free trade policies, Hong Kong is the world’s largest re-exporting port—in 2018, re-exports totaled $556 billion (97.8% of total exports) (WTO 2019).

With the United States revoking Hong Kong’s status as a separate customs territory, China may potentially retaliate with a mix of economic and political policies, thereby further deteriorating US-China trade prospects. Considering that Hong Kong is an important intermediary in US-China trade, it is important to examine both US-Hong Kong and US-China trade to fully assess the special status revocation’s potential impacts.

We examine US agricultural trade with Hong Kong and mainland China and Hong Kong’s role in intermediating US-China agricultural trade. We also discuss meat products. In particular, we examine beef smuggling via Hong Kong that is hidden behind the unusual beef imports there since 2004.

Table 1 shows US agricultural trade with Hong Kong and mainland China in 2017–2019 and January–April 2020. In 2017, US agricultural exports to Hong Kong and mainland China totaled $28.43 billion; however, by 2019 the total reduced to $19.42 billion. In 2017 and 2019, respectively, Hong Kong was the destination for 15.6% and 16.3% of those US agricultural exports. In January–April 2020, US agricultural exports to Hong Kong and mainland China were $5.33 billion, of which Hong Kong accounted for 12.8%.

US agricultural imports from Hong Kong and mainland China are always smaller than exports. In 2019, US agricultural imports from Hong Kong and mainland China were $5.33 billion, of which Hong Kong accounted for 12.8%.

Table 2 presents Hong Kong’s re-exports of key agricultural commodities destined to China. Please note that due to data limitations, we cannot provide data on Hong Kong’s re-exports of US agricultural products destined to China—we can only provide data on Hong Kong’s total re-exports to China.

In 2016, Hong Kong re-exported $4.36 billion in agricultural and related

Notes: Based on GATS data (USDA 2020a).

1 Re-exportation, also called entrepot trade, is when goods enter a customs territory from one country/customs territory and are shipped to another country/customs territory without significant transformation.
THE COVID-19 pandemic has forced a lot of changes in the six months since the previous issue of Agricultural Policy Review—schools shuttered, businesses closed, physical distancing and stay-at-home orders were put in place, and the economy severely contracted and jobs were lost.

Agriculture felt the sting of COVID-19, just like other sectors of the economy. The virus limited production and processing, stifled demand, and undercut prices. Now, as many states reopen major segments of their economies, most people are reassessing their short-term business plans and adjusting to the business environment under the auspices of living with the virus. Agricultural producers and USDA are reevaluating commodity market outlooks; and, thus far, the outlook changes are much more concentrated on prices than production.

We compare USDA’s meat, corn, and soybean projections from January 2020 (before the first confirmed case of COVID-19 in the United States) to the most recent update, released in mid-June 2020. The changes reflect not only the impact of COVID-19, but also the first few months of progress (or lack thereof) with the phase one trade deal with China. In general, the outlook switched from cautious optimism to a financial struggle.

The livestock sectors have all taken a step backward in terms of production. In January, projections were for record or near-record production across the meat counter. Animal numbers were building as domestic demand was good and exports were strong. However, between the closing of restaurants and schools and the COVID-19 outbreaks at processing facilities, the meat supply chain has been forced to adjust and evolve. The ability to process animals in a timely manner faltered and livestock producers found severely curtailed markets for their animals, even though demand for meat remained strong. As things currently stand, USDA projects lower total meat production for 2020 by 3.15 billion pounds. Pork and broilers face the largest losses, with roughly 3% drops in projected production. However, USDA also reduced beef and turkey production by more than 2%.

Processing capacity has mostly recovered, but a backlog of animals still exists. That backlog is the driving factor for livestock prices. The initial hit in prices from COVID-19 was fairly sharp, with futures prices for cattle and hogs falling by 30%–40% in the depths of the outbreak. Cash prices for animals fell even harder, as processing plants shut down and the number of animals moving to market overwhelmed the remaining shackle space. However, as plants reopen, the backlog is shrinking and prices have rebounded. USDA shows less recovery for hogs and broilers than for cattle and turkeys, with both hogs and broilers seeing prices 20% below the January estimates. Thanks to stronger prices in May and June, USDA projects the turkey industry will capture a higher average price this year. Thus, for most of the livestock sector, the 2020 outlook is a double hit financially, with production and

### Table 1. USDA 2020 Meat Production Estimates

<table>
<thead>
<tr>
<th></th>
<th>January</th>
<th>June</th>
<th>%Change</th>
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</thead>
<tbody>
<tr>
<td>Beef</td>
<td>27.44</td>
<td>26.67</td>
<td>-2.8%</td>
</tr>
<tr>
<td>Pork</td>
<td>28.65</td>
<td>27.77</td>
<td>-3.1%</td>
</tr>
<tr>
<td>Broiler</td>
<td>45.40</td>
<td>44.04</td>
<td>-3.0%</td>
</tr>
<tr>
<td>Turkey</td>
<td>5.91</td>
<td>5.77</td>
<td>-2.4%</td>
</tr>
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### Table 2. USDA 2020 Livestock Price Estimates

<table>
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<th></th>
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<th>%Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>117.25</td>
<td>108.58</td>
<td>-7.4%</td>
</tr>
<tr>
<td>Hogs</td>
<td>54.50</td>
<td>42.38</td>
<td>-22.2%</td>
</tr>
<tr>
<td>Broiler</td>
<td>86.30</td>
<td>69.90</td>
<td>-19.0%</td>
</tr>
<tr>
<td>Turkey</td>
<td>92.30</td>
<td>104.90</td>
<td>13.7%</td>
</tr>
</tbody>
</table>
price losses.

For crops, the outlook changes are smaller, but the financial hit is similar—price declines dominate the story. The COVID-19 outbreak is impacting two crop years—last year’s harvest, which farmers are marketing now, and the crop currently growing in fields, which farmers will market next fall through the summer of 2021. The USDA projections display that same double barrel shot for crop producers for the 2019 crop, reducing both production and prices. The production drop was due to the delayed progress of crop last year, from planting to maturity to harvest. The delays were severe enough that some fields could not be harvested, hence the cut in production. Thus, the production loss was not COVID-19 or trade dispute related, but the 2019/20 price declines were. Corn usage fell as the ethanol industry reeled from the effects of stay-at-home orders and the associated free fall in fuel usage. Soybean exports continued to struggle, even with the signing of the phase one trade deal; and, based on those usage losses, USDA has lowered their season-average price estimates for both crops by roughly 6%.

But the adjustments did not stop with the 2019 crops. The COVID-19 outbreak coincided with the planting windows for corn and soybeans. Previously, during the winter, USDA had projected that farmers would plant more corn and soybeans in 2020 than they did in 2019, partially in response to last year’s weather issues. In March, farmers indicated to USDA that they would plant even more corn than expected, but a few less soybeans. At the end of this month, USDA will provide an update on plantings, and given the planting progress data over the spring, we know planting went well across the vast majority of the country.

Thus, projected crop supplies are up significantly from last year, but for soybeans, projections are down slightly from the winter estimates.

On the usage side, USDA has projected some recovery from the COVID-19 impacts, but not complete recovery. For corn, ethanol usage is projected to remain lower. While ethanol production has increased over the past few weeks, several ethanol plants remain closed. USDA’s outlook keeps some of those plants closed for the foreseeable future. Corn feed usage is projected to increase, mainly due to the backlog in animals discussed earlier. The meat processing disruptions translated into longer transitions for animals on feed. Also, with the closures of ethanol plants, distillers grains production fell, leaving a significant hole in the feed market. Direct corn feeding is replacing some of that lost distillers grains.

The drop in distillers grains production also opened an opportunity for more soybean meal in feed rations, which explains the rise in soybean crush for both the 2019 and 2020 soybean crops. But the largest wildcard for soybeans remains exports. The export sales pace for the 2019 soybean crop has lagged well behind the previous year’s pace and USDA has had to lower their expectations accordingly. But for this year’s crop, USDA is projecting a sizable rebound in soybean exports, mainly driven by China and the phase one trade deal.

After accounting for all of the shifts, USDA’s price outlook for the 2020 crops mimics the adjustments made for the 2019 crops. Season-average prices are set to be roughly 6% below the January estimates. So while both the nation and agriculture are recovering from the COVID-19 outbreak, the recovery will take some time and the impacts will still be felt months, if not years, after the fact.

### Table 3. USDA Corn Estimates, 2019/20 and 2020/21

<table>
<thead>
<tr>
<th></th>
<th>2019/20</th>
<th>2020/21</th>
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<tbody>
<tr>
<td></td>
<td>January</td>
<td>June</td>
</tr>
<tr>
<td>Production</td>
<td>13.692</td>
<td>13.617</td>
</tr>
<tr>
<td>Feed &amp; Residual</td>
<td>5.525</td>
<td>5.700</td>
</tr>
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<td>Ethanol</td>
<td>5.375</td>
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<tr>
<td>Exports</td>
<td>1.775</td>
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<tr>
<td>Price</td>
<td>3.58</td>
<td>3.60</td>
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</table>

### Table 4. USDA Soybean Estimates, 2019/20 and 2020/21

<table>
<thead>
<tr>
<th></th>
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<th>2020/21</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>January</td>
<td>June</td>
</tr>
<tr>
<td>Production</td>
<td>13.692</td>
<td>3.552</td>
</tr>
<tr>
<td>Crush</td>
<td>5.525</td>
<td>2.140</td>
</tr>
<tr>
<td>Exports</td>
<td>5.375</td>
<td>1.650</td>
</tr>
<tr>
<td>Price</td>
<td>9.00</td>
<td>8.50</td>
</tr>
</tbody>
</table>

Source: USDA-WAOB.
THE NATIONAL closing of schools due to the COVID-19 pandemic has heightened awareness of the digital divide in access to reliable internet use. Remote access to online schooling requires broadband internet service, which the Federal Communication Commission defines as service with download speeds of at least 25 megabits/second (Mbps) and upload speeds of at least 3Mbps. About 17 million rural residents (26.4% of all rural residents) do not have access to reliable broadband internet (FCC 2019). This means that 80% of the US population who lack the broadband services necessary for online schooling reside in rural areas.

The federal government has invested $60 billion thus far in rural broadband deployment, and state governments have also been actively trying to incentivize rural access (ABA 2019; Stauffer et al. 2020). FCC chairman Ajit Pai recently launched the Rural Digital Opportunity Fund, which will add up to $20.4 billion to further expand broadband in underserved rural areas. Various presidential candidates have proposed even larger amounts.

While experts tout the internet as a good economic development strategy, it is not obvious that it would reverse the decades-long population shift from rural to urban markets. Since 1940, the urban population has grown 17.4% per decade while the rural population has grown just 0.5% per decade.

While it does appear that rural areas with internet access attract more new firm entry (Kim and Orazem 2016), it is more difficult to show that rural internet expansion resulting from government subsidies have been successful in generating local economic growth. For example, response to the USDA Rural Utilities Service (RUS) program was criticized for funneling many of its earliest grants to more populated counties and rural counties that already had broadband service, rather than targeting unserved rural areas (Brake 2017).

Kandilov and Renkow (2019) examine three USDA-RUS programs, the Pilot Broadband Loan Program, the Community Connect Grant Program, and the USDA Broadband Loan Program. They find that only the Broadband Loan Program had an impact on rural wages, and that no USDA-RUS programs affected rural employment.

One factor limiting the effectiveness of increased broadband supply is that rural residents are less likely to adopt broadband, even if it is available. One study reviewed by Humphreys (2019) finds that rural residents were more than twice as likely as urban residents to decline broadband service regardless of the price. The combination of thinner population density and a lower likelihood of service subscription discourages private expansion into rural markets. However, what really drives the economic reward from rural internet service is adoption by firms. Rural businesses are more likely to adopt broadband than are rural households; however, most surveyed rural businesses were unwilling to pay 10% more to get significantly improved internet speeds, as many small rural businesses do not use applications that require high-speed internet (Humphreys 2019).

One complication to finding substantial economic expansion from the installation of broadband in a rural county is its presence will not affect all rural sectors equally. Consider the retail sector as an example—broadband internet will possibly allow a rural retailer to market to remote customers, thus expanding sales. On the other hand, local customers of rural retailers can access remote sellers, such as eBay and Amazon, which may diminish local retailers’ markets.

At the same time, broadband internet may allow rural manufacturers to improve their supply chain management and access lower cost inputs or higher paying customers more easily. As a result, broadband access may make some firms or industries more profitable while lowering the profitability of other firms or sectors.

To examine this scenario, we identify a sample of counties that did not have broadband in 1999 but did acquire it by 2015. We then examine the pace of firm entry and exit overall and by sector before and after broadband access, and further decompose the results by size of market (large metropolitan areas; markets adjacent to a metropolitan area; rural markets). We find that, on net, rural broadband expansion has a small positive effect on net firm entry; however, the overall effects disguise the very different responses by individual sectors.

Table 1 shows the effect of broadband installation on firm entry and exit for different market sizes. We can interpret the values as the percentage change in the rate of firm entry or firm exit attributable to the presence of broadband internet. The first row of table 1 shows that broadband installation in a county lowers the entry rate for retail establishments by 16.8%, on average.

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Large Hog Companies Gain from China’s Ongoing African Swine Fever

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It has been almost two years since China first reported an outbreak of African Swine Fever (ASF). As of June 5, 2020, China’s Ministry of Agriculture and Rural Affairs (MARA) had reported more than 177 ASF outbreaks, which resulted in an almost 32% reduction in hog and sow inventories since November 2018. These reductions—103 million pigs and 8.7 million sows—account for more than one-fifth of the world’s hog inventory (figure 1).

As China largely gained control of COVID-19 and reopened its economy, several ASF outbreaks occurred, especially in pig transporting vehicles. Despite the gravity of these events, our recent research (Xiong et al. 2020) shows that ASF outbreaks may come as a blessing in disguise for large hog companies—they financially gain from ASF outbreaks due to the dramatic supply shortage of pork the outbreaks create.

The widespread ASF outbreaks and declines in hog inventories shown in figure 1 led to significant changes in China’s pork prices, pork supply, and its need for imports. China’s pork prices started rising in February 2019 and surged 154% over the next 11 months due to the severe shortage in supply. Before the ASF outbreaks, China was able to produce 97% of its pork consumption domestically, but the ASF-induced supply shortage quickly led to an urgent need to import pork from the global market. According to the General Administration of Customs, in comparison to August 2018, China’s pork imports surged almost 102% in May 2019 and 314% in March 2020, and they are slated to reach historic levels this year (Xi et al. 2020; Carriquiry et al. 2019).

With all the ASF-induced market fluctuations joining forces, it remains unclear what we can say about the welfare of hog firms, who were among the most impacted industries. Conventional wisdom suggests that food safety events, such as disease outbreaks or food recalls, should adversely impact the financial standings of contaminated firms. However, the evidence seems to suggest otherwise—since early 2019, stock prices for many Chinese hog companies saw a dramatic upsurge along with the rising pork prices and widening supply gaps.

To formally assess the financial impacts of ASF outbreaks on hog firms, we use a method called the event study approach, which allows us to isolate the response of stock prices attributed exclusively to ASF outbreaks. In particular, we use historical stock price data prior to any ASF outbreaks to estimate a counterfactual baseline scenario of what the stock returns for a company would have been had the ASF event never occurred. The deviation of the actual stock returns from the baseline ASF-free returns are referred to as the abnormal stock returns. Positive abnormal stock returns suggest the firm benefits financially from the event and negative returns suggest otherwise.

Figure 2 shows Chinese hog firms’ cumulative abnormal stock returns (CAR) for the first 15 days after each...
We examine differences in employment losses across the United States based on the eight broad US Bureau of Economic Analysis regions (see figure 4). Table 1 shows year-over-year changes in employment-at-work rates. The Plains region has the smallest year-over-year decrease for both April and May. Specifically, the employment-at-work rate for April 2020 was 8.01 percentage points lower than in April 2019 for the Plains and 14.75 percentage points lower for the neighboring Great Lakes region. The 2019–2020 decrease for May was 6.01 percentage points for the Plains region, while the corresponding decrease for New England was twice as large. By May 2020, the Southwest and Rocky Mountain regions were also doing much better than New England, the Mideast, and the Far West regions. Overall, the middle regions of the country (i.e., “Middle America”) experienced less adverse employment impacts. Columns 3 and 4 of table 1 show that the less severe impacts in Middle America generally hold even when just comparing rural areas or just comparing urban areas. Furthermore, comparing columns 3 and 4 shows that rural areas have been less severely affected than urban areas within every BEA region.

COVID-19 has severely disrupted the US labor market, and full recovery will take time. However, the early impacts vary across areas. Rural areas have been less hard hit than urban areas, and regions in Middle America have been less hard hit than the Northeast and Far West regions.

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Table 1 Notes: Column 1 shows the change from April 2019 to April 2020 and column 2 shows the change from May 2019 to May 2020. Columns 3 and 4 report year-over-year changes for rural and urban areas, respectively, averaged over April and May.
products to China. The top three commodities are hides and skins, forest products, and fresh fruit. The average annual growth rate of Hong Kong’s re-exports of agricultural and related products to China was 7.6% from 1993 to 2004, and 5.9% from 2004 to 2016; however, beef and pork products grew at a much faster pace. From 1993 to 2004, the average annual growth rate of Hong Kong’s re-exports of pork and beef to China was 110.1% and 23%, respectively. From 2004 to 2016, the average annual growth rate of Hong Kong’s re-exports of pork and beef to China was 90.3% and 297.7%, respectively. Hong Kong’s surging beef re-exports since 2004 might be caused by smuggling and mainland China imposing a 14-year ban on US beef imports from 2003 to 2017 (Cao 2017).

Table 2. Hong Kong’s Re-exports of Key Commodities to China ($Million)

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Hides &amp; Skins</td>
<td>82</td>
<td>839</td>
<td>34</td>
<td>13,067</td>
<td>24.8%</td>
<td>-8.7%</td>
</tr>
<tr>
<td>Forest Products</td>
<td>368</td>
<td>426</td>
<td>78</td>
<td>10,860</td>
<td>3.6%</td>
<td>-7.9%</td>
</tr>
<tr>
<td>Fresh Fruit</td>
<td>27</td>
<td>190</td>
<td>1,470</td>
<td>10,190</td>
<td>26.7%</td>
<td>19.9%</td>
</tr>
<tr>
<td>Poultry Meat &amp; Prods. (ex. eggs)</td>
<td>136</td>
<td>94</td>
<td>24</td>
<td>6,531</td>
<td>6.8%</td>
<td>16.0%</td>
</tr>
<tr>
<td>Pork &amp; Pork Products</td>
<td>1</td>
<td>181</td>
<td>727</td>
<td>5,634</td>
<td>110.1%</td>
<td>90.3%</td>
</tr>
<tr>
<td>Distilled Spirits</td>
<td>215</td>
<td>58</td>
<td>162</td>
<td>3,788</td>
<td>-9.1%</td>
<td>10.8%</td>
</tr>
<tr>
<td>Wine &amp; Beer</td>
<td>27</td>
<td>11</td>
<td>582</td>
<td>2,506</td>
<td>6.4%</td>
<td>51.1%</td>
</tr>
<tr>
<td>Dairy Products</td>
<td>60</td>
<td>51</td>
<td>265</td>
<td>1,886</td>
<td>3.0%</td>
<td>32.5%</td>
</tr>
<tr>
<td>Tree Nuts</td>
<td>30</td>
<td>31</td>
<td>163</td>
<td>1,810</td>
<td>4.1%</td>
<td>24.3%</td>
</tr>
<tr>
<td>Food Preps. &amp; Misc. Bev</td>
<td>35</td>
<td>26</td>
<td>287</td>
<td>1,677</td>
<td>1.8%</td>
<td>27.2%</td>
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<tr>
<td>Beef &amp; Beef Products</td>
<td>10</td>
<td>53</td>
<td>34</td>
<td>819</td>
<td>23.0%</td>
<td>297.7%</td>
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<tr>
<td>Cotton</td>
<td>10</td>
<td>15</td>
<td>0</td>
<td>632</td>
<td>50.4%</td>
<td>4.4%</td>
</tr>
<tr>
<td>All Agricultural &amp; Related Products</td>
<td>1,643</td>
<td>2,539</td>
<td>4,363</td>
<td>76,524</td>
<td>7.6%</td>
<td>5.9%</td>
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</table>

Notes: Based on GATS data (USDA 2020).

Figure 1 presents the top-10 US agricultural commodity exports to Hong Kong from 1989 to 2019. The top five commodities are tree nuts, poultry meat and products, beef and beef products, fresh fruits, and pork products. US exports of tree nuts, beef, and pork to Hong Kong have increased quickly since 2004.

One phenomenon worth attention is that Hong Kong’s top re-exported agricultural commodities are very similar to its top agricultural imports from the United States. Specifically, since 2004, Hong Kong’s beef and pork re-exports to China have grown quickly and Hong Kong’s imports of US beef and pork also grew at an unusual pace. Mainland China’s ban of US beef imports in 2003 due to the discovery of mad cow disease in US livestock may account for Hong Kong’s surging US beef imports from 2004 to 2016. While Hong Kong also banned imports of US beef after the mad cow disease outbreak in 2003, it resumed purchases in 2005. Smugglers could have taken the increased beef imports through Hong Kong to mainland China (Fung and Woodhouse 2015).

To illustrate potential smuggling of Hong Kong’s meat products to mainland China, we calculate Hong Kong’s per capita beef consumption using (imports + production - exports)/population (see table 3). Data show that, in 2016, Hong Kong consumed 114.3 pounds of beef per capita (Cook 2020), slightly lower than our estimates of 134.6 pounds. For comparison, in 2016, Uruguay consumed 124.2 pounds and Argentina 120.2 pounds per capita, while the United States averaged 79.3 pounds per capita (Cook 2020).

We estimate the potential amounts of beef smuggled from Hong Kong via grey markets by calculating the gap between Hong Kong’s beef imports and production and demand based on the per-capita beef consumption of 51.2 pounds in 2010. The last column in table 3 presents the beef smuggling...
Rural Broadband and Firm Entry

across all markets. However, it also slows the exit rate of firms by 7.6%, in part because new firm entry poses less threat to incumbent firms. The effect is smallest in metropolitan markets and largest in suburban markets. In rural areas, broadband is associated with a 6.6% reduction in the pace of firm entry and a 4.9% reduction in the firm exit rate.

Contrast the effects of broadband on retail firm entry and exit with the effects on manufacturing—broadband raises the rate of manufacturing firm entry by 14.7% with only a modest reduction in the rate of firm exits; however, rural areas experience a rising rate of manufacturing firm entry while suburban markets experience a falling rate manufacturing firm entry.

The third row of table 1 shows the effects of broadband access across all sectors of the economy. Broadband installation lowers the rate of firm entry and exit across all markets. The net effect on the number of firms depends on whether the decline in firm entry rate outweighs the decline in firm exit rates.

To measure the net effect of broadband on firm numbers, we convert the estimates into implied numbers of firm entries and exits (see table 2). In retail, broadband reduces the number of firms by 2.4 establishments per market per year, which ranges from a decline of 4.5 firms in metropolitan markets to the loss of 0.06 firms, on average, in rural markets. These effects are quite small. In construction, net firm numbers rise in rural markets and fall in metropolitan markets. For other sectors—transportation, finance and insurance, and arts and entertainment—broadband leads to firms shifting from more-populated to less-populated markets. Across all sectors, broadband service leads to a shift, albeit small, of net firm entry to rural markets. The actual impact is that rural areas gain 0.054 net firms per sector per year.

In opposition, there is a substantial shift in healthcare delivery—firms are favoring metropolitan areas. We also find a shift in the hospitality industry (restaurants and hotels) toward denser markets.

Looking at the overall effect of broadband on net firm entry, it appears that the biggest winners from high-speed internet access are the construction, manufacturing, wholesale trade, real estate, and arts and entertainment industries. On average, broadband expansion has led to a net increase in the number of firms, all other things equal.

Our results suggest that broadband installation in rural markets does lead to a net shift of firm entry from metropolitan and suburban markets to rural markets. However, the net effects are small—a net entry of 0.054 firms
per sector per year. This suggests that over 20 years, rural markets would have one additional firm in each industry, which means that the broadband effect is too small to reverse the 70-year long rural to urban shift in population and economic activity.

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Hong Kong’s Special Trade Status

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estimates from 2011 to 2019. The estimated smuggled amount reached a peak of 495,000 metric tons in 2014. We estimate that amount was 188,000 metric tons in 2019.

In summary, the United States’ revocation of Hong Kong’s special status will affect Hong Kong’s exports to the United States, but not Hong Kong’s imports from the United States or Hong Kong’s re-exports to the United States, so long as there are no further retaliatory economic and political actions. As Lardy (2020) points out, as only goods produced in Hong Kong are eligible for MFN tariff treatment by the United States, and given that more than 95% of Hong Kong’s exports are goods produced elsewhere and re-exported to global markets, the revocation is not likely to directly affect US-China agricultural trade prospects too much if neither party responds with further retaliatory economic and political actions. However, given Hong Kong’s status as a trading and financial hub, the revocation’s indirect impact via financial markets could be much larger than its direct impact on trade—several hedge funds are reportedly considering leaving Hong Kong after Beijing’s moves to tighten control of the territory (Lockett and Shane 2020).

References

Table 3. Estimated Smuggling of Beef from Hong Kong

<table>
<thead>
<tr>
<th>Year</th>
<th>Imports (1000 MT)</th>
<th>Exports (1000 MT)</th>
<th>Production (1000 MT)</th>
<th>Population (Million)</th>
<th>Per-capita Cons. (Pounds)</th>
<th>Estimated Smuggling (1000 MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>154</td>
<td>0</td>
<td>9</td>
<td>7.02</td>
<td>51.16</td>
<td>0.00</td>
</tr>
<tr>
<td>2011</td>
<td>160</td>
<td>0</td>
<td>9</td>
<td>7.07</td>
<td>52.69</td>
<td>4.90</td>
</tr>
<tr>
<td>2012</td>
<td>250</td>
<td>0</td>
<td>8</td>
<td>7.15</td>
<td>79.55</td>
<td>92.08</td>
</tr>
<tr>
<td>2013</td>
<td>481</td>
<td>0</td>
<td>8</td>
<td>7.18</td>
<td>150.17</td>
<td>322.41</td>
</tr>
<tr>
<td>2014</td>
<td>655</td>
<td>0</td>
<td>8</td>
<td>7.23</td>
<td>202.18</td>
<td>495.24</td>
</tr>
<tr>
<td>2015</td>
<td>344</td>
<td>0</td>
<td>6</td>
<td>7.29</td>
<td>105.83</td>
<td>180.80</td>
</tr>
<tr>
<td>2016</td>
<td>442</td>
<td>0</td>
<td>6</td>
<td>7.34</td>
<td>134.62</td>
<td>277.75</td>
</tr>
<tr>
<td>2017</td>
<td>524</td>
<td>0</td>
<td>6</td>
<td>7.39</td>
<td>158.08</td>
<td>358.47</td>
</tr>
<tr>
<td>2018</td>
<td>521</td>
<td>0</td>
<td>6</td>
<td>7.45</td>
<td>155.93</td>
<td>354.10</td>
</tr>
<tr>
<td>2019</td>
<td>356</td>
<td>0</td>
<td>5</td>
<td>7.44</td>
<td>107.03</td>
<td>188.44</td>
</tr>
</tbody>
</table>

Notes: Trade data is from GATS (USDA 2020a). Data on Hong Kong’s beef and pork production come from USDA’s Production, Supply, and Distribution query system (USDA 2020b). Population data come from the World Development Indicators (World Bank 2020).

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China’s Largest Hog Companies and ASF
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ASF outbreak during four subsequent stages from August 2018 to September 2019. We calculate CAR as the day-to-day accumulation of abnormal stock returns following each event. The sample includes the top-10 publicly listed Chinese hog firms. We observe mixed responses of stock prices when ASF first broke out in August 2018—some hog firms’ CARs were negative, but of modest magnitude, and some firms were either not impacted by the outbreaks or even saw positive CAR values. As time went on, the increasing CAR values for Chinese hog firms following each outbreak reflected the concerns over shortages of pork supply.

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Figure 2. Cumulative abnormal stock returns for China’s top-10 hog producing companies in four separate periods.

Notes: We accumulate CAR values over 15 trading following each event. The vertical axis displays the top-10 Chinese hog firms (in no particular order) and the horizontal axis is CAR values in percentage change. Each box, moving from the left edge to the middle line and to the right edge is the 25th percentile, median, and 75th percentile of the distribution. Whiskers extending from the box show the minimum and maximum CAR values. A yellow box indicates that the average value is statistically different from zero from the adjusted BMP t-test at the 5% significance level (the box is blank otherwise). Each + symbol in red indicates an outlier that is not included in the test sample.
Figure 3. Cumulative abnormal stock returns due to ASF outbreaks in China for 15 foreign hog firms in four separate periods.

Notes: We accumulate all CAR values over 15 trading days following each event. The vertical axis displays the 15 foreign hog firms (in no particular order) and the horizontal axis is CAR values in percentage change. Each box, moving from the left edge to the middle line and to the right edge is the 25th percentile, median, and 75th percentile of the distribution. Whiskers extending from the box connect the minimum and maximum CAR values. A yellow box indicates that the average value is statistically different from zero from the adjusted BMP t-test at the 5% significance level (the box is blank otherwise). Each + symbol in red indicates an outlier that is not included in the test sample.
The impact was the most significant from January to February 2019, which was during the Chinese New Year Festival and a peak demand season for pork. In particular, some Chinese companies, such as Tangrenshen Group, and Zhengbang Tech, saw positive CARs greater than 40% at some point during the Chinese New Year. These substantial positive returns highlight the dominance of pork for Chinese consumers’ diets.

Figure 3 shows CAR values for 15 publicly listed foreign hog firms from eight countries across four different stages. Similar to the Chinese hog firms, these foreign firms initially exhibited mixed, and mostly insignificant, CAR values at the beginning of the ASF outbreak. Similarly, some foreign firms also saw positive, though modest, CAR values when China’s pork industry suffered from more severe supply shortages at the beginning of 2019. This is especially true for companies from countries that have larger pork market shares in China, such as Brazil, Canada, Finland, Russia, and Thailand. It is worth noting that, in general, Brazilian companies benefited more than US companies from China’s ASF outbreaks, in part due to the US-China trade war. On the other hand, some foreign hog firms never financially benefited from the outbreaks in meaningful ways, such as Cranswick PLC and Nomad Foods, both from the United Kingdom.

The series of ASF outbreaks have since had profound and likely long-lasting effects on the hog industry in China and abroad. For foreign hog producers, the good news is pork import demand from China, even today, remains strong. For instance, US pork export to China last year has just reached record highs over the past 10 years, which will likely continue to grow given the phase one US-China trade deal (Xi et al. 2020).

For China’s hog industry, the dramatic reductions in inventory may in fact serve as a long-awaited opportunity for consolidation and modernization. The vast majority of the outbreaks were on farms with fewer than 300 hogs; and, in that regard, ASF wiped out almost half of China’s small-scale farms, which has paved a path toward more expansion for large farms. For example, Wens Foodstuff Group, the largest Chinese hog firm, acquired a large farm in central China, which increased its annual production capacity by an additional 28,000 sows and 700,000 pigs.

In addition, the outbreaks also seem to have boosted deeper integration along the pork supply chain. Top Chinese hog breeding companies have started extending their reach into the slaughtering and processing industries. One ongoing development in the industry is the transition from a live animal transportation system to chilled meat transportation and cold chain logistics, in light of the fact that 70% of the ASF outbreaks were related to live pig transportation.

The capital gains through the positive stock returns from the ASF outbreaks also have further incentivized large farms to invest in and upgrade facilities, such as transitioning to better emission and waste treatments and creating facilities with a higher degree of breeding automation. This process is likely accelerating given that a large amount of the less-efficient ‘backyard’ farms, which represented 40% of China’s hog inventories before the ASF outbreaks, have since exited the markets and been replaced by large-scale commercial farms.

The Chinese government is pushing out multiple policies to spur domestic hog production, which likely will further accelerate the consolidation and upgrading of the meat production supply chain.

Some highlights of the most critical policies include:

**Additional farm-level testing.** To address ASF contamination risk, China announced a plan to systematically test farms for ASF in 498 major hog-producing counties in order to establish a baseline for the prevalence of the virus. Each province will test every swine farm producing 2,000 head or more and a sample of farms producing 500–2,000 head (Dim Sums 2020).

**Less land use restrictions.** Land for hog facilities will be managed as agricultural land and will no longer go through the lengthy approval procedures required for construction land. Cropland can be used for hog facility construction as long as it is not permanent basic farmland, and the 15-mu (2 US acres) limit requirement for the auxiliary facilities of pig farms is removed (MNR 2019a). Furthermore, multi-story buildings are allowed to use as pig breeding and production facilities (MNR 2019b).

**Less environmental regulation.** More than 96% of hog breeding projects with an annual slaughter of less than 5,000 heads just need to complete an online environmental impact registration form without having to go through environmental impact assessment (EIA) approval. For larger projects, the government is moving toward approving construction without any formal EIA as of December 2021, but will monitor environmental impacts after construction (MEE 2019).

**More financial incentives.** China has expanded the temporary financing and loan discount program to cover hog facility construction and upgrades until December 2020. About 160,000
producers with hog farms that have at least a 500-head annual slaughter can now apply—the previous limit was 5,000 head. In addition, there are pilot projects to allow the use of pigs as collateral in addition to land rights, hog buildings, and machinery (SC 2020).

**More risk management tools.** China will increase the insurance coverage of live pigs; temporarily increase the insurance coverage of fertile sows and fattening pigs; increase the insurance coverage of fertile sows from ¥1,000–¥1,200 to ¥1,500 (Chinese yuan); and, increase the insurance coverage of fattening pigs from ¥500–¥600 to ¥800 (Chen and Xu 2019).

**Live hog futures approved.** On April 27, 2020, China’s securities regulator approved the launch of domestic hog futures, China’s first financial derivative based on a live animal, on the Dalian Commodity Exchange. Although it takes some time for the contracts to be listed and traded, China is set to become the world’s second market to trade live pig futures (CD 2020)—the United States is the only other country to do so.

**References**


**COVID-19 Employment Losses**

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**References**


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Also Available from CARD

Restaurants, Grocery Stores, Food Manufacturers Losing Millions of Workers
CARD economist John Winters has been studying the impacts of the COVID-19 pandemic across different sectors of local, regional, and national economies. When examining unemployment rates in the restaurant, grocery store, food manufacturing, and crop and animal production industries, Winters found that the restaurant industry is being hit particularly hard.

"Prior to the coronavirus pandemic, typically more than 80% of workers continued employment in the same industry, but we’re definitely seeing those numbers go down in some food-related sectors," Winters said. "In April 2019, just over 83% of previous restaurant workers were still employed in the restaurant industry. In April 2020, only about 43% of previous restaurant workers were employed at work in the restaurant industry, which is a significant drop." You can read more about the study at bit.ly/2CUZqkb. You can read the study at bit.ly/2YW1hhs.

Economic Analysis Shows how ISU Soybean Trials Generate Value for Farmers
CARD economist GianCarlo Moschini was involved in a study that examined the economic impact of Iowa State University’s SCN-Resistant Soybean Variety Trials. The study found that the trials have created a surplus of about $140 million in Iowa and Illinois between 2011 and 2016. The analysis estimates that farmers captured roughly one-third of that surplus while seed companies held the rest.

The analysis found that farmers were willing to pay an additional $0.75 per acre for seed of resistant varieties included in the field trials experiments. You can read more about the study at bit.ly/2Z2E4tH. You can read the study at bit.ly/2NZitMv.

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