

# CITD BRIEF:

## Trading Up 2.0



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**INTERNATIONAL  
TRADE DEVELOPMENT**  
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## TABLE OF CONTENTS

HS Codes.....	2
Executive Summary.....	3
Introduction.....	4
Oklahoma’s Trade Balance .....	5
Global Aerospace .....	6
Peptones and the Swiss .....	7
Imported Oil and the US Consumer .....	9
African Swine Fever, Pork Exports, and Chicken Eggs.....	10
Conclusion.....	11
References .....	12

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## HS Codes

In order of appearance

**HS 8411** Turbojets, Turbopropellers and Other Gas Turbines

**HS 841191** Turbojet and Turbopropeller Parts

**HS 8800** Civilian Jet Engines

**HS 841112** Turbojets of a Thrust Exceeding 25 Knots

**HS 3504** Peptones, Other Proteins & Derivatives Etc; Hide Powder

**HS 2709** Crude Oil From Petroleum And Bituminous Minerals

**HS 0203** Meat Of Swine (Pork), Fresh, Chilled, or Frozen

**HS 0407** Birds' Eggs, in Shell, Fresh, Preserved or Cooked

**HS 040721** Eggs Of Chickens, Fresh, Nesoi

**HS 040711** Eggs Of Chickens, Fertilized for Incubation

## Executive Summary

Since we released our initial "Trading Up" report in 2020, much has changed. Covid-19 and waves of variants are no longer crashing into our day to day; meanwhile, Russia's invasion of Ukraine is lingering into a second year of what could be protracted conflict. Over the past year, as we have had the opportunity to travel, participate in international conferences, and to host several international delegations, we were asked "How has Oklahoma's trade fared through the pandemic and since?" This report is our response.

One of our primary aims at the Wes Watkins Center for International Trade Development (CITD) is to bring the topic of Oklahoma's global trade into the public domain through research that is both rigorous and accessible. While we call this report "Trading Up 2.0", it is not simply an update. We took a fresh look at which commodities and sectors played the most prominent role in Oklahoma's global trade over the past few years and uncovered a few interesting threads. In the midst of a turbulent period for much of the aerospace industry, several Oklahoma sub-sectors fared well and exports grew quite substantially. One area where Oklahoma played a prominent role in global supply chains was in its contribution of peptones, a key component of vaccine production, and the particular increase in our exports of this commodity to Switzerland is an interesting story. The Oklahoma oil and gas industry through the volatility of 2020, 2021, and 2022 continued to be pivotal for domestic consumers in the US. Finally, when we turn to agricultural products, zoonotic diseases continue to affect a range of products, and we explore an interesting "chicken or egg" dilemma in the agricultural sector as well as the impact of African Swine Flu on global pork markets.

Our team of Global Trade Fellows under the guidance of Dr. John Schoeneman have done it again: creating an interesting, engaging, accessible update on the state of Oklahoma's global trade through the pandemic and beyond.



**Back row:** Elaheh Eshraghi, Paulo Haendel Freitas, Maria Lopez, Andrew Ranson, John Schoeneman, Michael Johnson, Ye Wana Hlaing,  
**Front row:** Evelin Mendoza, Annie Vo

# Introduction

To the average citizen, global trade and Oklahoma are not often thought of as synonymous. How could a central landlocked state that shares no international borders and no coastal ports be important to global trade? At the Center for International Trade Development, we make it our business to demonstrate how vital commodities utilized across the globe originate as Oklahoman exports or as key components used in domestic industries. In this report, which is an update to our 2020 report, *Trading Up*, we analyze commodities based on the Harmonized System Codes (HS Codes) as administered by the World Customs Organization. These codes classify categories of exports and imports at a general four-digit level and become more specific at a six-digit level. The purpose of this report is to examine how over the period from 2017 to 2022, Oklahoma’s global trade progressed in the midst of a dynamic, often volatile landscape. The report utilizes trade data and industry anecdotes to reveal insights into how the Oklahoman economy is far more internationally oriented than many would expect. Our analysis suggests that Oklahoma’s trade remained resilient through the Covid-19 pandemic, global supply chain chaos, and geopolitical uncertainty of the last several years. While it may appear to be a minor point, we begin by explaining why a narrow focus on overall trade balances is insufficient for grading success in global business. This nuance has important implications for how we understand the role of trade in our state’s and our nation’s economy.

## OKLAHOMA’S TRADE BALANCE

A trade balance is a simple calculation of total exports minus total imports. The result is labeled as either a surplus if the number is positive or a deficit if it is negative. Oklahoma’s exports, shown in Figure 1, grew from 5.3 billion USD to 6.1 billion USD or 14.68 percent between 2017 and 2019. This trend was interrupted due to COVID-19 and the supply chain disruptions experienced globally. The chaos in supply chains led to a 12.28 percent drop in Oklahoma’s exports during 2020. These shifts in Oklahoma’s export/import portfolio do not necessarily mean, however, that the Oklahoma economy is suffering. Indeed, if imports for consumer products are up and overall export value remains flat, then it may be the case that the economy is doing well as people have disposable income to spend on goods. The result of the calculation “total exports minus total imports” ignores this complexity and often leads to judgements described as inherently good or bad. Examining shifts in the values of Oklahoma’s imports and exports can reveal insightful stories about how the state’s economy is integrated into the world at large.

### OKLAHOMA TOTAL EXPORTS & IMPORTS (USD BILLIONS)

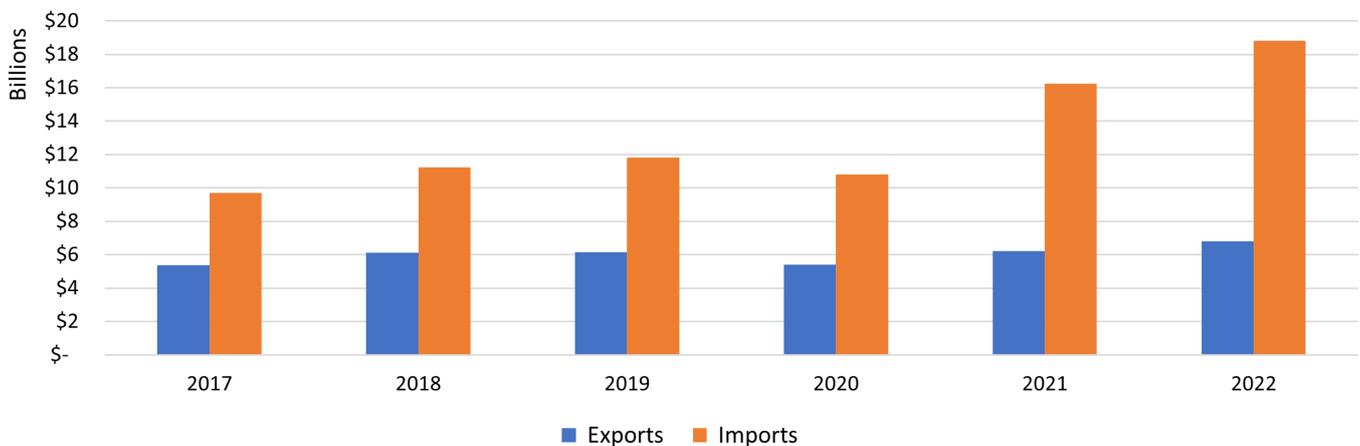


Figure 1: Source U.S. Census Bureau

While the top-level numbers show general trends in Oklahoma’s trade patterns, trade is complex, rarely straightforward in its implications, and therefore warrants deeper investigation. Due to the scope of this report, we will not detail changes in every commodity, but will focus on several commodities that we believe are or could become valuable to the Oklahoma economy. We examined these commodities along several dimensions: existing trade relationships (based on the current value of exports), revealed comparative advantage analysis, and the various challenges several particular industries face.

**While the top-level numbers show general trends in Oklahoma’s trade patterns, trade is complex, rarely straightforward in its implications, and therefore warrants deeper investigation.**

Oklahoma’s total exports recovered after the 2020 decrease and, despite the pandemic-related challenges, new trade partners emerged. South Africa, a country not listed in Oklahoma’s 2017 top ten trade partners, jumped to a top-five trade partner spot and imported \$289 million USD worth of Oklahoma goods (largely in the chemical element Rhodium) in 2021.<sup>1</sup> Similarly, the pandemic reduced Oklahoman imports in 2020 but they rebounded in 2021, exceeding the 2019 levels by 5.4 billion USD, a 30% increase. This rapid growth of imports in 2021 created an increased trade deficit (i.e., imports exceeded exports) for the state. Based on our analysis the trade deficit grew in 2021 mainly due to the large imports of crude oil, which we discuss in more detail below. Even during times of great change, most sectors of the Oklahoman economy remained stable and continued to grow. An example is the aerospace industry, whose growth is evident from both increases in exports and key imports.

## GLOBAL AEROSPACE

### HS 8411 TURBOJETS, TURBOPROPELLERS & OTHER GAS TURBINES (USD MILLIONS)

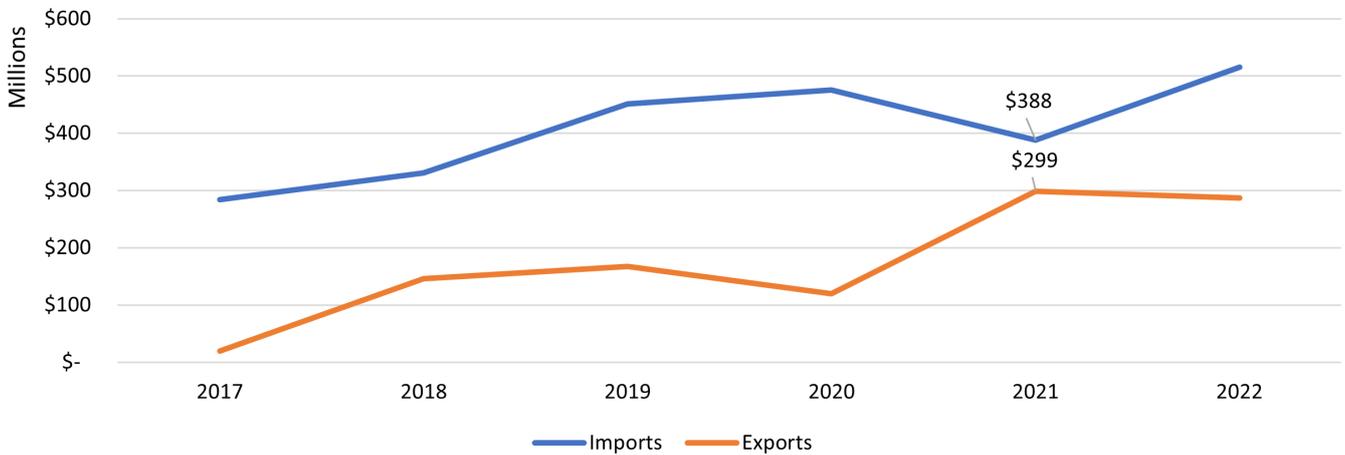


Figure 2: Source U.S. Census Bureau

The state of Oklahoma is seeking to become a leader in the aerospace and defense industry in both the US and global markets. The state, through various initiatives, is now a budding force in the marketplace. One example to note is that from 2017 to 2022, only a six-year period, Oklahoma went from the 24th ranked US state in exports of turbojets, turbopropellers and other gas turbines (HS 8411) to 9th place. This specific export increased from 9 million USD in 2017 to a high of 252 million USD in 2021. The largest growth was specifically in turbojet and turbopropeller parts (HS 841191; see Figure 3) with large increases in shipments to both the Netherlands and Australia.

This news should come as little surprise due to the strengthening of industry ties between Oklahoma and these countries. For example, in 2019 Ferra Aerospace, an Australian based firm with customers such as Boeing and Lockheed Martin, opened a facility in Oklahoma City and continues to expand its production here in the state.<sup>2</sup> Exports to South Korea increased as well with the country’s desire to become a major producer of defense products like their recently debuted KF-21 fighter jet.<sup>3</sup>

### HS 8411/ HS 841191 EXPORT VALUE IN (USD MILLIONS)

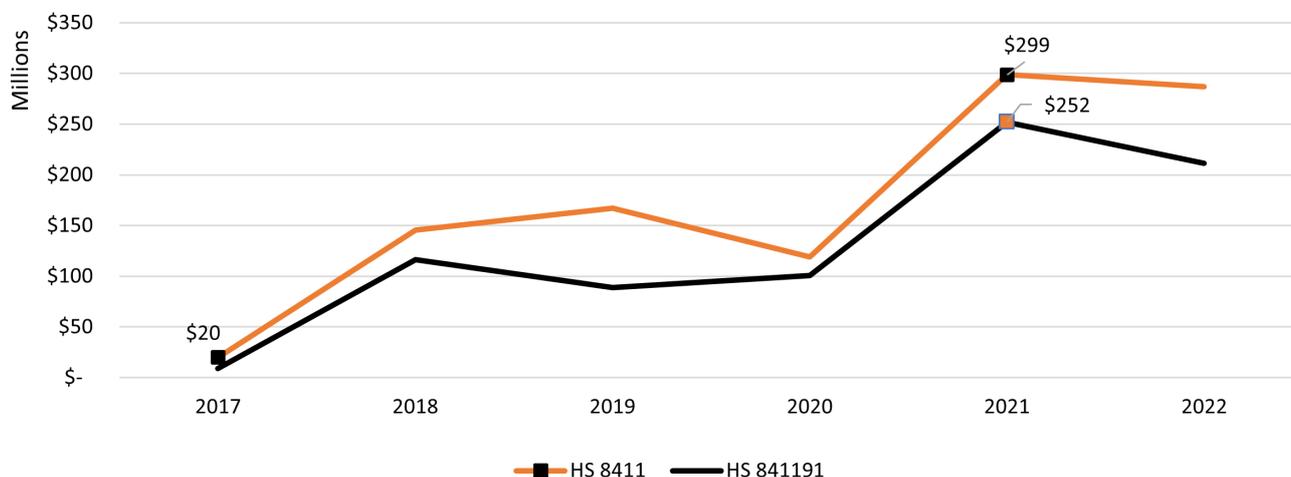


Figure 3: Source U.S. Census Bureau

While jet engine and aircraft propeller exports have been growing in recent years, Oklahoma’s largest aerospace oriented export is civilian aircraft jet engines (HS code 8800). At its peak in 2019, the commodity accounted for 643 million USD of exports. There was a large drop during 2020 due to COVID but this was followed by an impressive rebound. This growth occurred despite the industry being highly competitive internationally, and often the target of foreign government subsidies. As circumstances change, so do trade partners. In the case of civilian jet engine exports from Oklahoma, several notable shifts occurred. Namely, Germany became a premier export destination for the commodity while the UK and Singapore fell drastically. Germany is a known aerospace manufacturing hub with the world renowned Airbus locating large assembly facilities in Hamburg.<sup>4</sup> Also noteworthy is Mexico’s rise as an export destination. This sort of activity between Oklahoman and Mexican industry is promising as both the State of Oklahoma and the Mexican government have expressed interest in continuing to build a strong trade relationship including establishing a Mexican Consulate in Oklahoma City.<sup>5</sup>

### HS 8800 CIVILIAN JET ENGINE EXPORTS (USD MILLIONS)

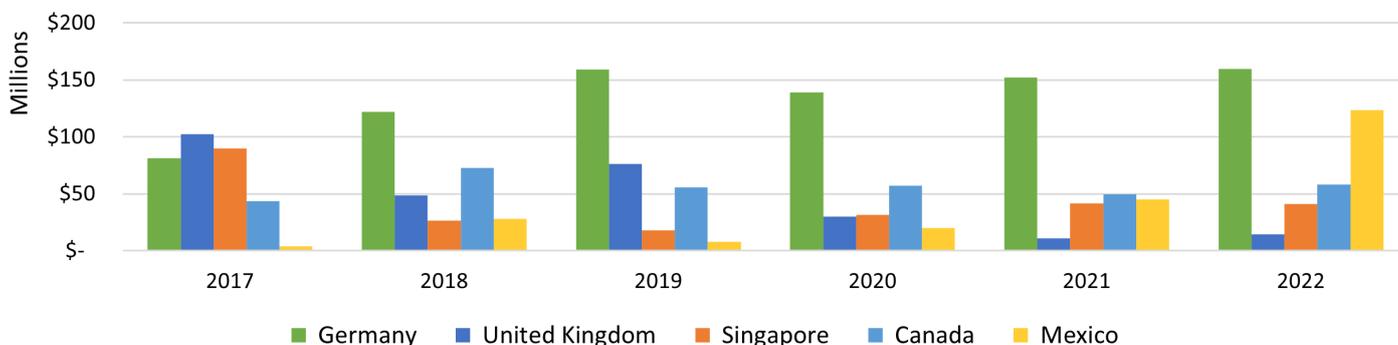


Figure 4: Source U.S. Census Bureau

On the import side, Oklahoma increased its intake of turbojets of a thrust exceeding 25 Knots (HS 841112) by 247 million USD from 2017 to 2022. This is notable as it implies that the state is gaining traction for its expertise in the aerospace field as well as becoming a critical site for final assembly of aircraft and defense articles. These successes continue to spur investment in the state. American Airlines recently announced an investment of 550 million USD to build the company's



maintenance and engineering center in the state.<sup>6</sup> Private investment does not come to the state by accident, and several proactive initiatives by the State of Oklahoma are worth highlighting, including various incentives for private industry such as maintaining a low cost of business and creating targeted programs to prepare the workforce for the

Ensuring that Oklahoma's workforce is ready to meet growing industry demands, the Aerospace Commerce Economic Services or "ACES" program, administered by the Oklahoma Department of Commerce, provides consulting services to organizations across the state to strengthen the aerospace industry.<sup>7</sup> Since 2018, ACES has helped companies secure just under one billion USD in new capital investment, and 648

million USD in DoD contracts.<sup>8</sup> Oklahoma is taking the challenge of meeting labor demand seriously as high school programs, such as the Aviation Academy in Norman, offer an early career start in aerospace. Additionally, specialized aerospace degree programs improve Oklahoma's standing as a preeminent source of educated labor for the industry. Oklahoma State University (OSU), the University of Tulsa (TU), and the University of Oklahoma (OU) created specialized programs and invested in facilities for conducting research on aerospace related subjects such as environmental sensing, defense, weather prediction, and more. In fact, OSU created the first US graduate degree program in unmanned aerial systems and is also home to the Unmanned Systems Research Institute (USRI).<sup>9</sup> Building this knowledge and education cluster should provide opportunities for both graduates and industry. Even through the COVID pandemic, the State of Oklahoma continued to be on a strong trajectory in the aerospace and defense field both domestically and abroad. Increased exports, beneficial rises in imports, trade partner shifts, government initiatives, and private investment all are contributing to a thriving Oklahoma aerospace industry.

**Even through the COVID pandemic, the state of Oklahoma continued to be on a strong trajectory in the aerospace and defense field both domestically and abroad.**

## PEPTONES AND THE SWISS

While aerospace is flashy for news headlines and garners statewide attention, there is an interesting, though quieter story of Oklahoma's export success in the peptone industry. While somewhat unexpected, Oklahoma since 2017 has been an annual top three exporter of peptones (HS 3504), a protein broken down by chemical reactions and derived from sources such as animal byproduct or yeast (not to be confused with



**2022 TOP 5 US EXPORTERS OF PEPTONES (USD MILLIONS)**

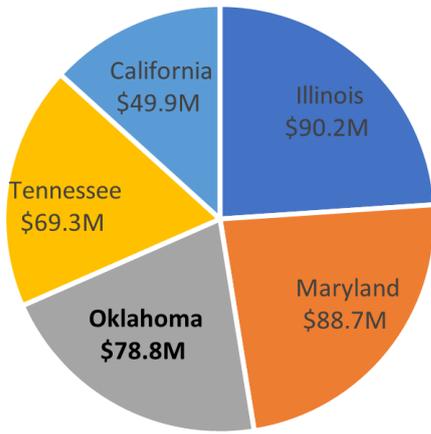


Figure 5: Source: U.S Census Bureau

peptides, which are amino acids used commonly in workout supplements). Peptones are used in a wide variety of applications such as skincare, and industrial fermentation, and most notably, pharmaceutical applications such as vaccines. The state is a substantial supplier for international markets as Oklahoma’s share of all US peptone exports in 2021 reached 10.4 percent and a value of 78 million USD. Since 2017, Japan has continued to be a large destination for these exports as has South Korea, but looking at Switzerland may reveal an insight into the role Oklahoma plays in the international pharmaceutical industry. As highlighted in Figure 6,

**TOP OKLAHOMA PEPTONE DESTINATIONS (USD MILLIONS)**

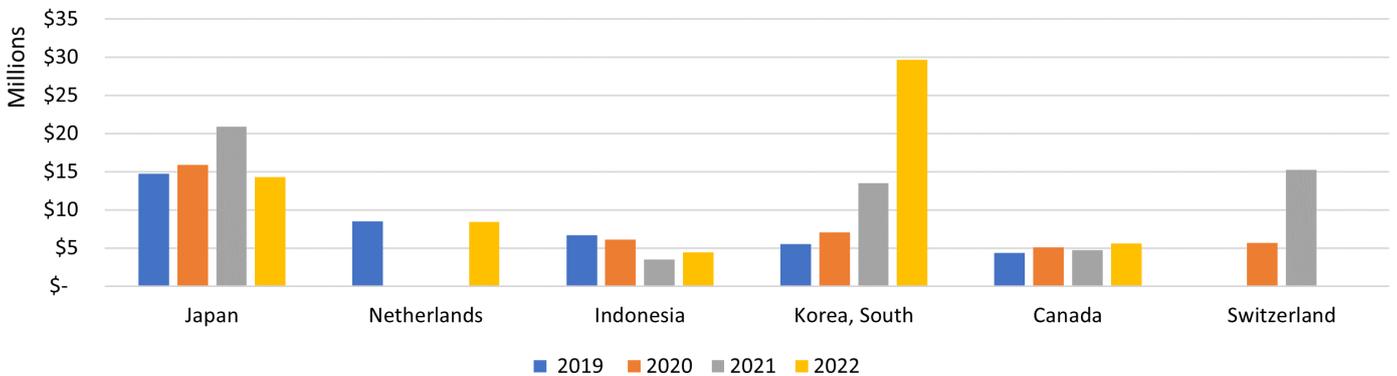


Figure 6: Source: U.S Census Bureau

before 2020, Switzerland did not import peptones from Oklahoma and imported very little from the US generally. Over the course of 2020 the country imported 5 million USD and in 2021 tripled the imports of the commodity to 15 million USD. These values dwarfed any other state’s exports to Switzerland with Tennessee being the nearest at 3 million USD in 2021. Our leading hypothesis for the increase in exports is that the COVID-19 pandemic and resulting vaccine production were a key factor tied to Switzerland’s pharmaceutical manufacturing sector where companies such as US-based Moderna utilized the country’s resources for mass producing vaccines. Another and much more renowned Oklahoma industry played an especially important role in the last several years as global energy shocks reared their ugly heads: oil.

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# IMPORTED OIL AND THE US CONSUMER

Helping meet the demand of 320 million Americans whose lifestyles include regular driving, flying, and other energy intensive economic activities is no simple feat but one in which Oklahoma continues to be a leader. In the years since the



world watched the price of West Texas Intermediate (WTI) oil contracts plummet to negative 37 USD in April 2020, global demand for the commodity reached all new highs in 2021 and then remained relatively stable throughout 2022. Oklahoma, renowned for its energy industry, imported record high amounts of crude oil (HS 2709) in 2021 and 2022. Home to six refineries and 26,815 miles of oil and gas pipelines, Oklahoma, and particularly the town of Cushing, has been deemed the "Pipeline Crossroads of the World". Cushing earned the moniker due to its status as the world's largest oil storage facility and the physical location where large volumes of WTI crude oil are traded. There was plenty of demand for its services as an oil hub in 2021 and 2022. When the US populace registered

blistering demand for oil on the markets, US oil companies proceeded full steam ahead with record production but not nearly enough to meet this demand. Two tools that were deployed to meet this demand are noteworthy: importing foreign oil and the strategic petroleum reserve release by the Biden administration in 2021 and 2022. Both actions contributed to the supply side of oil markets. Oklahoma alone imported \$7 billion USD of crude oil in 2021 and nearly 8 billion USD in 2022, all of which came from Canada. Canadians contribute massively to their southern neighbor's demand for petroleum and Oklahoma is a natural destination due to its infrastructure and status as an energy hub. At the time of this writing, global forecasts remain divided on what

**Oklahoma alone imported \$7 billion USD of crude oil in 2021 and nearly 8 billion USD in 2022.**

sort of year the world's economy may have in 2023 and its impact on consumer oil demand. Whether growth or contraction lies ahead, Oklahoma's role as an energy provider remains strong. Oil is not the only industry to flex in this report as Oklahoma's pork industry contributed to meeting global market demand after disease wiped out China's swine herds.

**OKLAHOMA OIL IMPORTS (USD BILLIONS)**

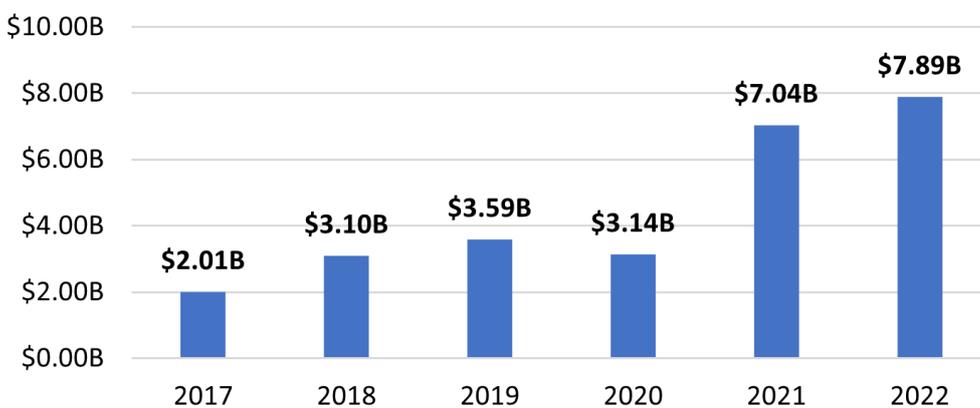


Figure 7: Source: U.S Census Bureau

## AFRICAN SWINE FEVER, PORK EXPORTS, AND CHICKEN EGGS

Pork is a staple in many diets across the world and Oklahoma pork producers play no small part in meeting this demand. Through the years of 2017 to 2022, Oklahoma exported an average of 210.6 million USD of "meat of swine" (HS code 0203) colloquially referred to as pork. These exports peaked in 2020 with a total value of 240 million USD. Japanese consumers

### OKLAHOMA PORK EXPORTS TO CHINA (USD MILLIONS)



Figure 8: Source: U.S Census Bureau

are massive consumers of pork and the island nation is consistently Oklahoma's top pork export destination. However, over the course of the six-year period mentioned above, China nearly doubled its imports of Oklahoman pork (see Figure 8). In 2017, China imported roughly 30 million USD worth of pork and by 2020 that figure jumped to 72 million USD. What caused such a spike in exports? As discussed above, trade patterns are far from simple and are often impacted by more than policy. Such is the case when the African Swine Fever (ASF), a zoonotic disease that renders swine meat unfit for consumption, decimated the herds of Chinese pork producers in 2018.<sup>11</sup> As a policymaker, when you oversee a population as large as China's with an appetite for pork, you aim to ensure that appetite is met despite ongoing trade wars or political spats. In other words, despite the tensions between the US and China over trade, China dramatically ramped up its imports of US pork to meet its citizens' demand. The majority of these imports were specifically in the form of frozen pork in contrast to Japan who largely imports fresh or chilled product.

Zoonotic diseases in the world's agricultural industry remain an ever-looming threat to markets globally. In 2022, the US experienced an avian flu outbreak leading to an unprecedented increase in the price of eggs.<sup>12</sup> As a result, the US imported the highest level of eggs (HS 0407) since 2015 to meet the demand of consumers in 2022. Yet, as an additional demonstration of how trade is rarely straightforward, there is nuance we can see in these egg imports by drilling down to the 6-digit commodity code level. Examining Figure 9, while whole chicken eggs (HS 040721) were imported, the largest amount imported by the US actually consisted of fertilized chicken eggs (HS 040711), presumably to replace the millions of birds that were culled to stem the flue's spread. Shifts in trade patterns often happen in such non-obvious ways, and so the relatively small amount of whole chicken egg imports may explain the



lack of price pressure relief consumers experienced in the short run, but the imports of the fertilized eggs to replace the chickens may offer a longer-term structural solution. This situation is another highlight of how the mindset described crudely as "imports bad / exports good" is too simplistic a paradigm to guide trade policy.

### US IMPORTS OF BIRD EGGS (USD MILLIONS)

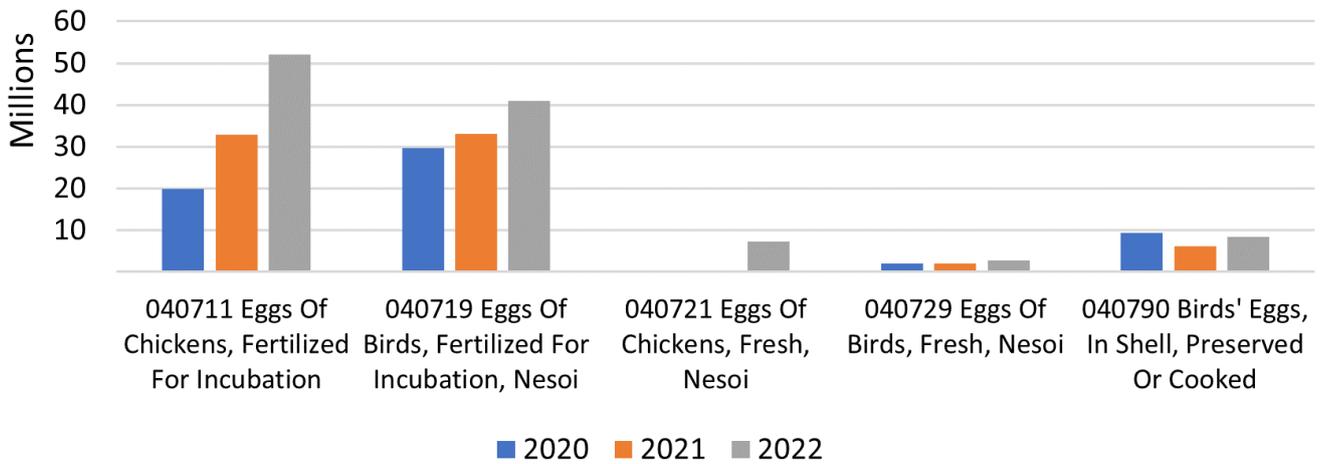


Figure 9: Source: US Census Bureau

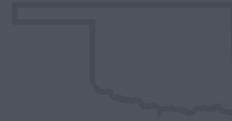
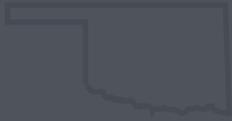
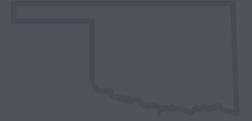
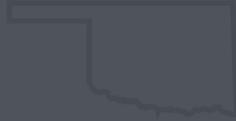
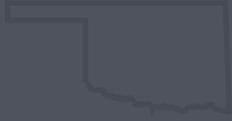
**As a policymaker, when you oversee a population as large as China's with an appetite for pork, you aim to ensure that appetite is met despite ongoing trade wars or political spats.**

## Conclusion

Trade, as in this report, contains complexity and nuance not readily available from examining top level aggregate economic data alone. Regulatory regimes, consumer demand, private industry investment, and even zoonotic diseases all play their respective roles in the shifting landscape of international trade. The state of Oklahoma trade remained resilient through global disruptions, as shown by Oklahoma impacts on the global markets for oil, jet engines, pork, and vaccines. Finally, Oklahoma industry is not only resilient, but its global reach provides tangible impact to people, places, and societies far beyond its own borders. In this respect, the world at large is not something abstract that exists thousands of miles away, but rather it is right down the street, or in the next town over in the manufacturing plant, the oil field, or the pig farm operated by our neighbors and fellow Oklahomans.

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