2022 INTERNATIONAL TRADE FORECAST

An Overview and Analysis of Orange County and Southern California Exports

CALIFORNIA STATE UNIVERSITY FULLERTON

International Trade Forecasts

An Overview of Orange County and Southern California Exports

By

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California State University Fullerton

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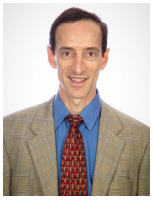
Dr. Mira Farka Ph.D., is an Associate Professor of Economics and Co-Director for the Woods Center for Economic Analysis and Forecasting at CSUF. She has published in leading academic journals in the fields of monetary policy and financial economics and is a nationally recognized economist in business and economic forecasting. Dr. Farka is the recipient of multiple awards for her academic research, teaching and the accuracy of her forecasts. She is also the recipient of the prestigious Outstanding Faculty for the Mihaylo College of Business and Economics, CSUF Faculty Recognition Award for Scholarly and Creative Activity, and the CSUF Service Award. Dr. Farka is a sough-after keynote speaker and is frequently invited to discuss economic and financial issues by various business, government, and educational organizations. Dr. Farka holds a B.A. in Economics from California State University, Fresno and an M.A and Ph.D. in Economics from Columbia University. Prior to joining Cal State Fullerton, she worked in Wall Street, as a senior economist for Deutsche Bank, New York.



Dr. Adrian R. Fleissig has a joint Ph.D. in Economics and Statistics and specializes in regional, macroeconomics and econometric analysis. He is a Professor of Economics at California State University Fullerton and is ranked in the top 1.4% (757 out of 55,000) of economists world-wide based on his academic research. He is well known for developing economic theory and econometric methodology to better understand monetary policy decisions of the Federal Reserve Bank, consumer choices and regional economics. At CSUF, he received the Outstanding University Researcher Award (2001, 2004, 2007 and 2010). Dr. Fleissig currently works on many projects, including the *County of Riverside Forecasts and Economic Outlook, OC Strategic Financial Plan, and Transportation Revenue Forecasts for Orange County* and developed the *Southern California Leading Economic Indicator*. As a former member of the Advisory Board for Monetary Services Index, Federal Reserve Bank of St. Louis, he provided input for the construction of one of the monetary aggregates produced by the Federal Reserve Bank.

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FOREWORD

This is the eight International Trade Report published by the Woods Center for Economic Analysis and Forecasting (WCEAF) at California State University Fullerton. The last report was published in November 2017. Much has happened over the intervening four and a half years that has upended trade and globalization trends, including a full-blown Sino-American trade war, a once-in-a-century pandemic that shut down the world and scrambled supply chains, a chaotic reopening from the pandemic characterized by gummed up supply chains and labor shortages, a spike in inflation across the world, monetary and fiscal tightening, and a disruption in energy and commodity markets due to the Russia-Ukraine war.

The report provides extensive analyses, estimates and forecasts for merchandise exports from the Southern California Region. The most recent data from the International Trade Administration for the Metropolitan Statistical Areas (MSA) end in 2020. The U.S. Census Bureau provides total export volumes for 2021 but there are no detailed on the breakdown of the total export volumes. This report provides detailed estimates of merchandise exports by total volume, main destination country, by region, and by main sectors for the Los Angeles-Long Beach-Anaheim MSA and Orange County. The main goal is to offer a deep analysis on the general export trends, assess the region's performance and identify opportunities for businesses and local governments as they move forward to meet the demands and challenges of the post-pandemic world.

One of the main challenges when analyzing and forecasting international trade patterns at the regional level is the scarcity of micro-level (disaggregated) data. While the data provided by the International Trade Administration (ITA) (and utilized in this report) are fairly extensive at the national and, to a certain extent, at the state level, they are somewhat more limited the closer one gets to the regional economies. For example, even though the data for MSAs are quite in depth (including total export volumes, top countries and regions, and top products exported), the data span is rather limited stretching from 2005-2020 (and much shorter for some destination countries and types of products). An additional complication arises from the fact that the metropolitan data for the Los Angeles – Long Beach – Anaheim MSA, merges together exports from Orange County with a portion of Los Angeles County. County-level data are only available since 2012, which falls far short of the minimum number of observations required to develop a multivariate econometric model for forecasting purposes. Even then, the county-level data is provided for total merchandise exports, without any details on countries of destination, regions, or sectors.

This report aims at filling the void of data limitations both at the MSA and county level. It also aims at providing a detailed analysis and forecasts for the Los Angeles MSA and for Orange County merchandise exports. First, to overcome data limitations, the study estimates historical merchandise exports for the Los Angeles – Long Beach – Anaheim MSA (from 1990-2004) and for Orange County (from 1990 - 2011). The time series is subsequently updated using ITA data from 2005-2020 for the Los Angeles MSA and from 2012-2020 for Orange County. Total export volume for 2021 from the U.S. Census Bureau is used for the Los Angeles – Long Beach – Anaheim MSA. Deriving a historical time-series is crucially important to understand structural breaks, secular trends, and business cycle patterns in the series and is central to producing accurate forecasts. Our historical estimates are consistent with the new methodology adopted by the U.S. Census Bureau for tracking merchandise exports by *origin of movement* (see Appendix

A2 and A3) and are derived from an econometric model that accounts for regional, state, national and international trends.

Second, the report provides forecasts over the period 2021-2024 for the broader Los Angeles-Long Beach-Anaheim MSA and Orange County. These forecasts are based on statistical and econometric models using multivariate multi-equation estimation techniques based on a number of key economic and trade-related variables, such as: historical Woods Center estimates for the Los Angeles MSA and Orange County exports, regional export shares, trend-growth rates, trade-weighted exchange rates, labor productivity in export-related industries, as well as U.S., foreign and regional growth rates as measured by national Real GDP metrics and MSA Gross Metropolitan Product (GMP).

EXECUTIVE SUMMARY

The once-in-a-century pandemic which shuttered factories, grounded planes and shut down the normal course of doing business caused an immediate and significant collapse in global trade and economic activity. However, as expected, upon reopening, economic activity revived and global trade rebounded strongly. By the end of 2020, trade volumes were up 20% relative to the April-2020 levels, at the height of pandemic restrictions. World exports rose by an unprecedented 26.2% in 2021. In fact, global trade weathered the pandemic storm far better than during the Great Recession: trade fell by 7% in 2020, far less than the 22% collapse recorded during the height of the financial crisis. The contrary can be said about economic activity: heavy-handed lockdowns delivered a gut-wrenching drop in world GDP of 3% in 2020, a much larger decline than the miniscule -0.1% growth registered in 2009. This is not a surprise: Locked down consumers could not go out to dine, eat at restaurants or travel, but the excess savings from services translated to soaring demands for goods. In the US alone, expenditure on goods rose by an unprecedented nearly 50% in the third quarter of 2020. For the entire year in 2021, goods consumption grew by 18.8% -- a first in over seventy years, since records began.

Alas, this is as far as the good news goes: our outlook for the global economy has dimmed significantly over the forecast horizon. Our view is that the global recovery is set to continue over short-term (next 10-12 months), but its path will be marred by strong stagflationary dynamics: alarmingly high inflation coupled with slowing growth. Beyond the immediate setting, the outlook is even more grim. The confluence of an escalating war, rapid rate hikes, unprecedented labor shortages, persistent supply disruptions, higher energy costs, a multi-decade spike in inflation, and continued flare-ups in a once-in-a-century pandemic, have raised the odds of a global recession. Engineering an "immaculate soft-landing" — wringing out inflation without dislodging growth — under these conditions is a herculean task, and central banks across the world will need extraordinary luck to pull it off.

Southern California exports have followed a similar path as the world trade over the past two years: a significant drop during the initial pandemic lockdown, followed by a spectacular rebound after. Orange County merchandised exports rose by 18.7% in 2021 reaching $16.8 billion (Table 1). Merchandise exports from the broader Los Angeles-Long Beach-Anaheim MSA (which includes both Los Angeles and Orange Counties) rose by 16.7% to $58.6 billion in 2021, while exports from the Riverside-San Bernardino-Ontario MSA (commonly referred to as the Inland Empire) increased by 30.8% to $11.1 billion.

The outlook over the three-year forecast horizon is less buoyant than what we witnessed in 2021, though growth this year should be fairly robust and taper off in 2023 and 2024. Exports from Orange County are projected to grow by 11.2% to $18.7 billion in 2022, and reach $20.3 billion by the end of 2024. For the Los Angeles-Long Beach-Anaheim MSA, we expect a growth of 12.9% in 2022 (to $66.1 billion) reaching $71.3 billion by the end of 2024. For the Inland Empire we project a 9.5% growth in 2022 with exports from this region reaching an all-time-high of $13.5 billion by the end of 2024.

Table 1
Merchandise Exports
Orange County, Los Angeles-Long Beach-Anaheim and the Inland Empire
(millions of dollars)

Year	OC Export Volume	OC Exports Growth Rate	LA-LB-SA Export Volume	LA-LB-SA Exports Growth Rate	IE Exports Volume	IE Exports Growth
2021	16,806	18.7%	58,588	16.7%	11,064	30.8%
			Forecast			
2022	18,695	11.2%	66,129	12.9%	12,120	9.5%
2023	19,699	5.4%	69,123	4.5%	12,873	6.2%
2024	20,339	3.2%	71,316	3.2%	13,519	5.0%

Source: *Woods Center, California State University Fullerton and ITA*

Los Angeles-Long Beach-Anaheim MSA

The Los Angeles-Long Beach-Anaheim MSA (hereafter also referred to as "Los Angeles MSA") is ranked third in the nation in terms of merchandise exports with $58.5 billion in 2021, behind Houston-The Woodlands – Sugar Land MSA (with $140 billion) and the New York-Newark-Jersey City MSA (with $103 billion). The New York MSA exports nearly twice as much as the Los Angeles MSA, while Houston MSA nearly three times as much. Merchandise exports account for about 5.0% of the Los Angeles MSA Gross Metropolitan Product.

Merchandise exports from the Los Angeles MSA are projected to grow by 12.9% to $66.1 billion in 2022 followed by a 4.5% increase to $69.1 billion in 2023 and another 3.2% to $71.3 billion by the end of 2024. It is important to note that while growth is better than the alternative, even at the end of the forecast horizon, merchandise exports from the region are still projected to remain below the all-time peak of $76.3 billion recorded in 2013.

The estimates for the five main destination countries for merchandise exports from the Los Angeles MSA in 2021 are: Mexico ($11.6 billion), Canada ($7.3 billion), China ($5.0 billion), Japan ($5.1 billion), and South Korea ($4.3 billion). Mexico continues to remain the leading destination for exports from the region, accounting for 19.8% of merchandise exports, 1.6 times larger than Canada. We project that exports to Mexico will continue to grow over the forecast horizon, though at a much slower clip than the torrid pace of 2021, reaching $14.7 billion by the end of 2024 – a level that is still significantly below the record high of $19.4 billion in 2013. Merchandise exports to Canada, the second largest trading partner for the region, are projected to reach $9.2 billion by the end of 2024, a record high. Exports to China are projected to reach $5.9 billion by the end of 2024, still below the record high of $7.3 billion in 2013. Exports to Japan and Korea are expected to set fresh new highs, reaching $6.5 billion and $4.9 billion, respectively, by 2024.

Our projections of exports by main regions are as follows: exports to Asia -- the largest destination region for exports from the region -- are projected to set a record high of $29.9 billion by 2024, while

exports to NAFTA – the second largest destination – will grow to $23.9 billion by 2024, still below the record high of $27.7 billion in 2013. For the European Union, merchandise exports are projected to reach a record high of $12.5 billion by 2024.

Merchandise exports of the two largest sectors -- Computer & Electronic Products and Transportation Equipment – combined for a total of $20.0 billion (34.1%) in 2021 and are projected to reach $22.3 billion by the end of the forecast horizon. Exports for Chemical Manufacturing have grown fast over the past year, and this category is now ranked third among other products. It is projected to grow from $4.5 billion in 2020 to $7.2 billion in 2024. Merchandise exports of Food, Machinery, Petroleum & Coal Products, Electrical Equipment & Appliances, Fabricated Metal Products and Apparel are projected to total nearly $12 billion by the end of 2024.

Orange County

Orange County merchandise exports grew at a robust clip of 18.7% to $16.8 billion in 2021, as the world reopened and economic activity resumed. At nearly $17 billion exports from Orange County are now close to their 2015 level. We project that Orange County exports will grow by 11.2% to $18.7 billion in 2022, followed by a 5.4% growth (to $19.7 billion) in 2023 and a more muted 3.2% (to $20.3 billion) in 2024. At the end of the forecast horizon (2024) exports will still remain below the record high of $25.9 billion in 2013, as the global economy is projected to slow appreciably in 2023 and 2024.

Orange County's five largest trading partners in 2021 are Mexico ($3.2 billion), Canada ($2.2 billion), China ($1.5 billion), Japan ($1.5 billion) and South Korea ($1.2 billion). These five counties account for nearly 57% of exports from the county. Mexico was the destination for 19.0% of Orange County merchandise exports, while Canada has the second largest share at 13.0% in 2021. Exports from Orange County are projected to reach $4.1 billion to Mexico by 2024 (considerably lower than the $7.2 billion high of 2013). Exports to Canada are projected to total $2.7 billion by the end of 2024 (below the $3.1 billion high of 2012); those to China will reach $1.6 billion by the end of 2024, below the record high of 2011. Merchandise exports to South Korea are projected to reach a record high of $1.3 billion by the end of 2024.

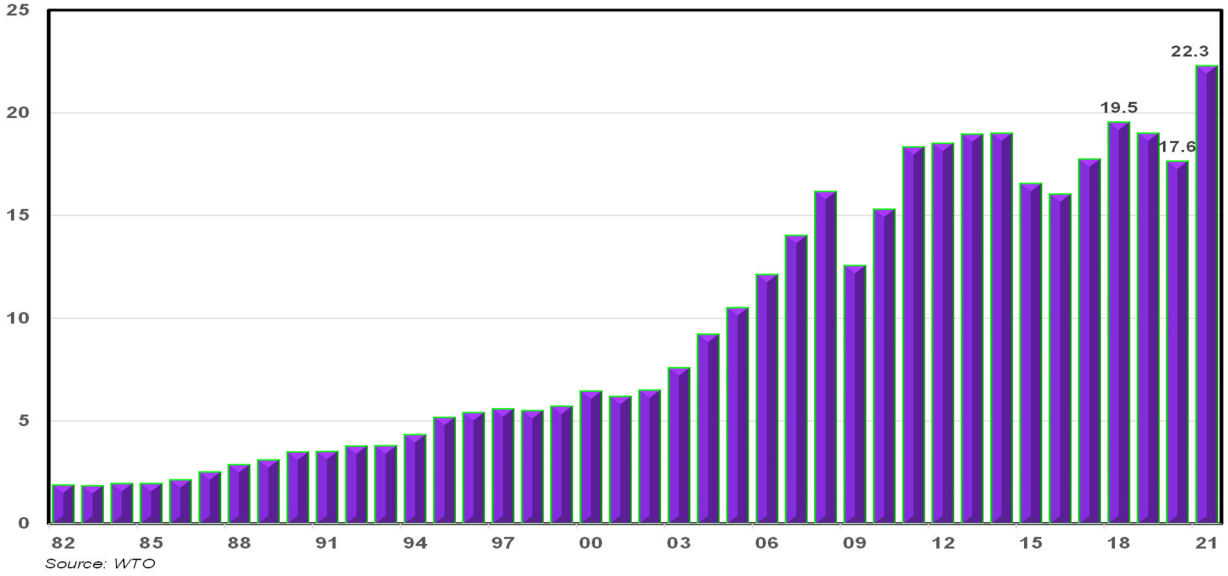
Our projections of merchandise exports by regions are as follows: we expect exports to Asia to reach $8.7 billion in 2024 (below the record high of $9.5 billion in 2013); exports to NAFTA are projected to reach $6.8 billion in 2024 (below the record high level of $10.3 billion in 2013); exports to the European Union are projected to total $3.7 billion by the end of 2024, almost reaching the record high of $3.8 billion in 2013.

Orange County's two main export sectors in 2021 were Computers & Electronic Products with $3.9 billion (23.2% of merchandise exports) and Transportation Equipment with $2.6 billion (15.5% of merchandise exports). Computers & Electronic exports are projected to reach $4.6 billion by the end of 2024, while Transportation Equipment exports will grow to $3.3 billion. The rest of the top five sectors are also projected to grow: Miscellaneous Manufacturing reaching $1.8 billion, Chemical Manufacturing $1.7 billion and Food Manufacturing $1.4 billion by the end of 2024. Merchandise exports from Petroleum & Coal Products, Machinery, Fabricated Metal Products, Electrical Equipment & Appliances and Apparel are projected to reach a total of $3.6 by the end of 2024.

1. A CHANGED WORLD: GLOBAL TRADE RECENT TRENDS AND OUTLOOK

The last decade and a half have been unkind to global trade. The financial crisis of 2007-2009 caused the largest collapse in global trade volumes in at least five decades, with merchandise exports dropping a whopping -22% (Figure 1). A mid-cycle correction in 2015-2016 prompted by a sluggish global growth (particularly in China), a collapse in oil prices, and a dollar surge, led to a decline in trade volumes by a sizable -12.8% in 2015 and an additional -3.1% in 2016. Protectionism fears, which first surfaced at the onset of the Great Recession, did not fully materialize until later in the decade as the UK exited the European Union and the Sino-American trade war gained full traction. Tariffs and retaliatory trade measures lopped off another -2.7% from global merchandise trade in 2019. And though neither the Great Recession nor trade wars caused a complete collapse of trade, as was much feared, trade flows, foreign direct investments and stocks of cross-border bank lending as share of global GDP never regained the zenith reached prior to the financial crisis. In the two decades prior to the financial crisis, world trade grew twice as fast as world GDP; since then the pace fallen with global trade rising at the same rate as global GDP.

Figure 1
World Merchandise Exports
(trillions of dollars)



Then Covid-19 hit. Governments across the world imposed draconian measures that were unimaginable prior to the pandemic, including school closures, travel restrictions, limitations on large gatherings, localized lockdowns and broad shutdowns. From mid-March to end-April 2020, cities across the world came to a standstill; bars and restaurants were deserted, and businesses went dark. The planet had shut down. World trade volumes fell by -13.7% in the short period from February 2020-May 2020. Globalization suffered a heavy blow as the pandemic disrupted commercial cross-border flows, causing border checks and export restraints.

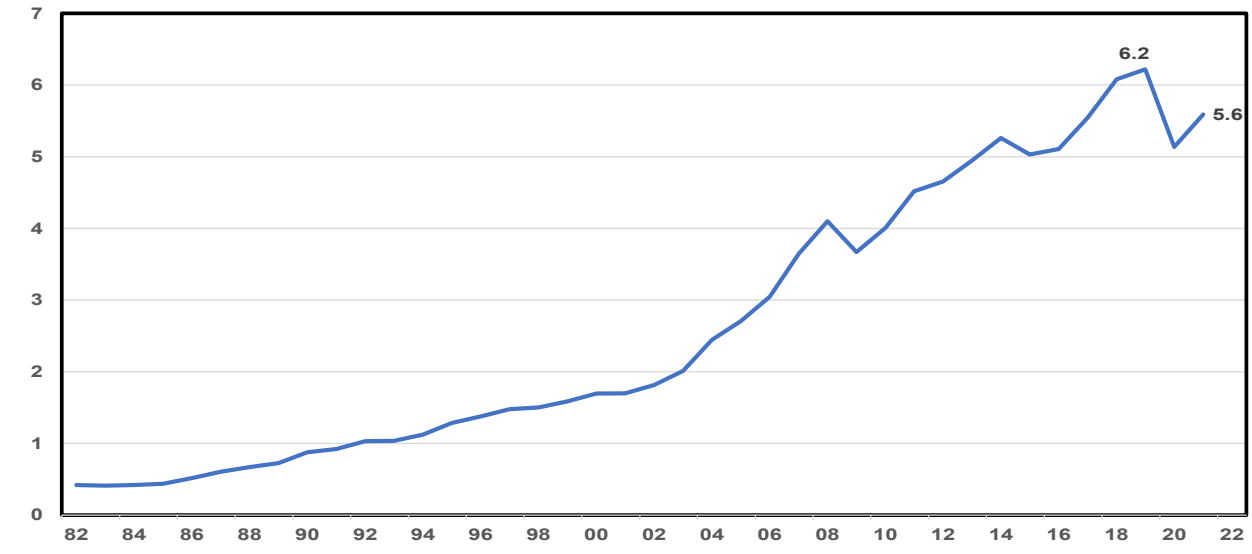
Protectionist measures were put in place across the world, some in the name of national security, others in response to a public desire for safety. This came after a distressing realization that China was a larger producer of medical supplies than previously thought: it accounts for some 42% of the world's

exports of personal protective equipment (PPE) (gloves, surgical masks, etc.). The share of China-produced PPE for the US is above 95%. More worryingly, even though the US is not as dependent on Chinese exports of pharmaceutical supplies as some believe, its reliance on China for some items is absurdly high: 92% of hydrocortisone comes from China as does 90% of tetracycline, 63% of acetaminophen and 62% of other penicillin. Italy imports nearly three quarters of its blood thinners from China; Japan nearly 60% of its antibiotics.

Countries around the world scrambled to address such strategic vulnerabilities, by requiring that companies reshuffle and diversify their supply chains by sourcing their intermediate inputs from several sources/countries. And it was not all about medical supplies: The Trump administration managed to convince Intel, Taiwan Semiconductor Manufacturing Company and Texas Instruments to onshore some of its global production of semiconductor chips. The EU tightened its requirements for screening foreign investment. Japan added advanced medicine and medical equipment to its list of sectors deemed critical to national security and tightened scrutiny for foreign direct investments. The Australian government began requiring that all foreign investments go through a screening process and be approved by the Foreign Investment Review Board.

Perhaps the worst suffering aspect of trade, more so than merchandise trade, was trade in services. The pandemic had an unquestionably lopsided effect in economies across the world, hitting the service sector much more severely than the goods sector: travel collapsed, dining out, entertainment, and tourism shuttered for long stretches of time. Foreign travel was all but non-existent in Spring 2020. International studies were disrupted as foreign students were unable to travel to destination countries when most learning transitioned online. Service exports fell by a jaw-dropping -17.4% in 2020 – a far larger collapse than merchandise trade (which suffered a drop of 7% that year). In contrast, service exports fell only by 10.5% in 2009 – at the height of the financial crisis. At that time, world merchandise trade collapsed by 22% (Figure 2).

Figure 2
World Service Exports
(trillions of dollars)



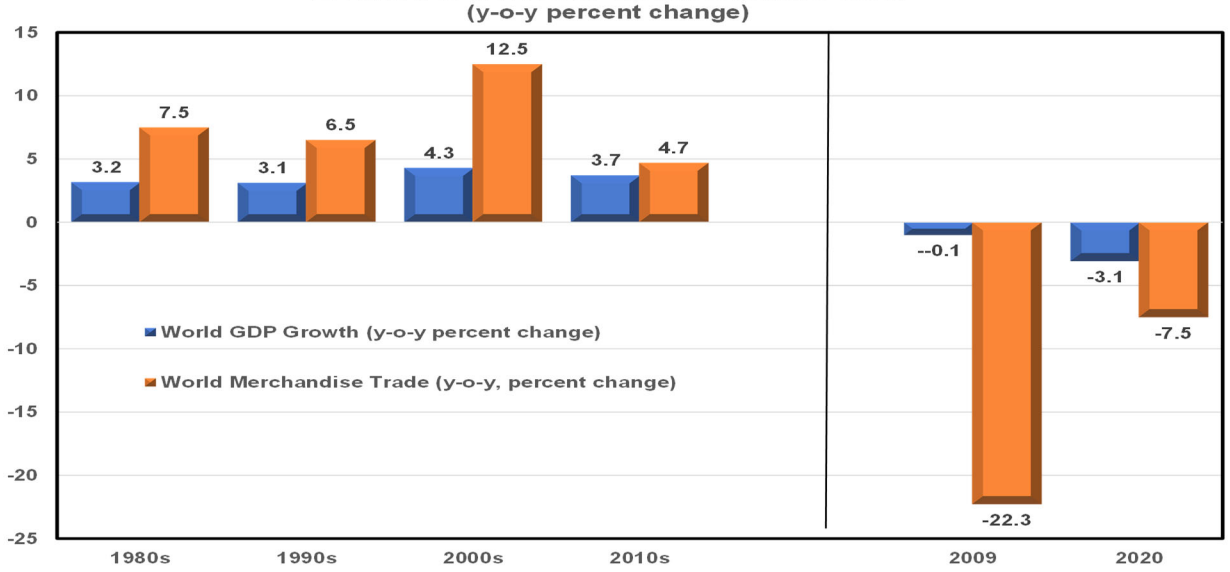
Source: International Monetary Fund

The recovery from the pandemic, at least for merchandise trade has been nothing short of spectacular. Indeed, despite gloomy predictions in April 2020 (some forecasted that global trade would collapse by 30%), international trads in goods took off at an unprecedented rate as early as June 2020, as soon as the first COVID restrictions were lifted. By the end of 2020, trade volumes were up 20% relative to the April-2020 levels, at the height of pandemic restrictions. World exports rose by an unprecedented 26.2% in 2021.

This resilience defied recent experience. In 2009, world GDP fell by a miniscule 0.1% while world exports collapsed by 22%. In 2020, world GDP shrunk by a gut-wrenching 3%, even as exports declined by a much muted 7% (Figure 3). This is not a surprise: at the height of the financial crisis when debt levels were high and jobs hard to come by, households hunkered down, stopped spending and started the very painful and long deleveraging process: paying down unsustainably high debt levels. This shrank demand for virtually everything – cars, furniture, business equipment – leading to a collapse in global trade. In contrast, the COVID-pandemic was more akin to a natural disaster: productive capacity fell dramatically during the crisis, but it rebounded quickly after. Locked down consumers could not go out to dine, travel, or attend concerts, but the excess savings from services translated to soaring demands for goods. In the US alone, expenditure on goods rose by an unprecedented nearly 50% in the third quarter of 2020. For the entire year in 2021, goods consumption grew by 18.8% -- a first in over seventy years, since records began.

Another reason for the fast recovery in trade volumes was the quick reopening of China during the first wave of the pandemic. After a strict lockdown in January/February 2020, Chinese factories began to reopen fast and global shipping resumed, even as the rest of the world began shutting down. Covid-related demand including computing and tech gadgets fitted for home-working accounted for the largest share of exports from China from June 2020 to December 2020.

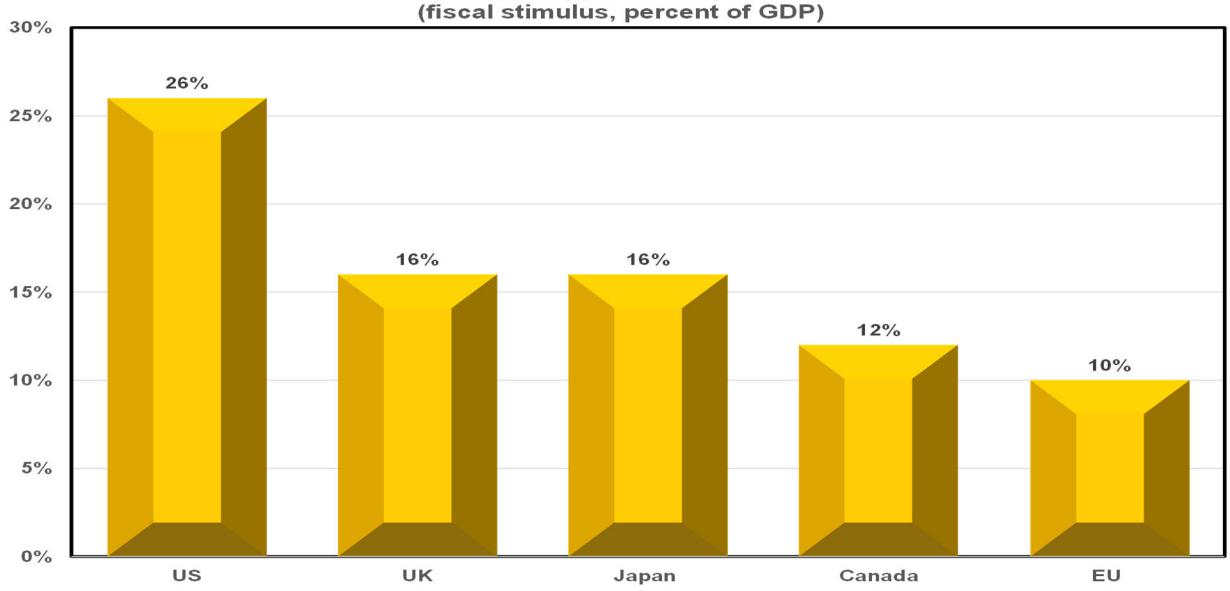
Figure 3
Evolution of World GDP and Merchandise Trade
(y-o-y percent change)



Source: International Monetary Fund, WTO and Wood Center

Policy support further fueled consumer demand. In a dramatic break from its past, the U.S. was at the forefront of these efforts during the pandemic. In a span of a year, Congress passed six successive bills aimed at shoring up the economy, shoveling funds everywhere from households to businesses to state and local governments. First, came the Coronavirus Preparedness Act ($8.3 billion), followed in succession by the Families First Act ($192 billion), the CARES Act ($2.3 trillion), the PPP Act ($483 billion), the Consolidated Appropriation Act ($868 billion) and the American Rescue Plan ($1.9 trillion). All told, the fiscal support amounted to a jaw-dropping $6 trillion or roughly 26% of GDP. Other countries fiscal support was also sizable, accounting for 16% of GDP in the UK and Japan, 12% in Canada and 10% in the EU (Figure 4). Monetary policy added more fuel to the fire: The Federal Reserve purchased nearly $4 trillion dollars in government bonds and mortgage-backed securities; the ECB around $2.3 trillion.

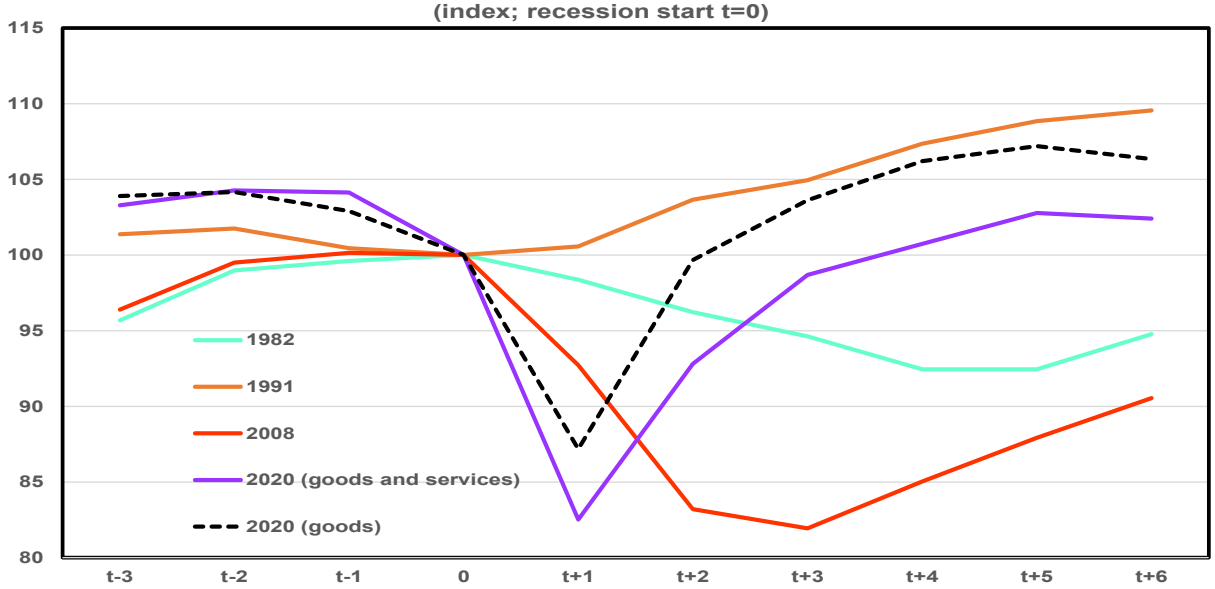
Figure 4
Massive Fiscal Support During the Pandemic
(fiscal stimulus, percent of GDP)



Source: International Monetary Fund and Wood Center

All this has led to dramatic increase in world trade; trade in goods has experienced a particularly strong rebound since the first and most stringent phase of the pandemic ended in early summer of 2020. Compared to the last three recession, the recovery in global trade post-pandemic has been by far the fastest, barring that of 1991 which barely put a dent on global trade (Figure 5).

Figure 5
Trade and Global Recessions: Imports of Goods and Services
(index; recession start t=0)



Source: International Monetary Fund and Wood Center

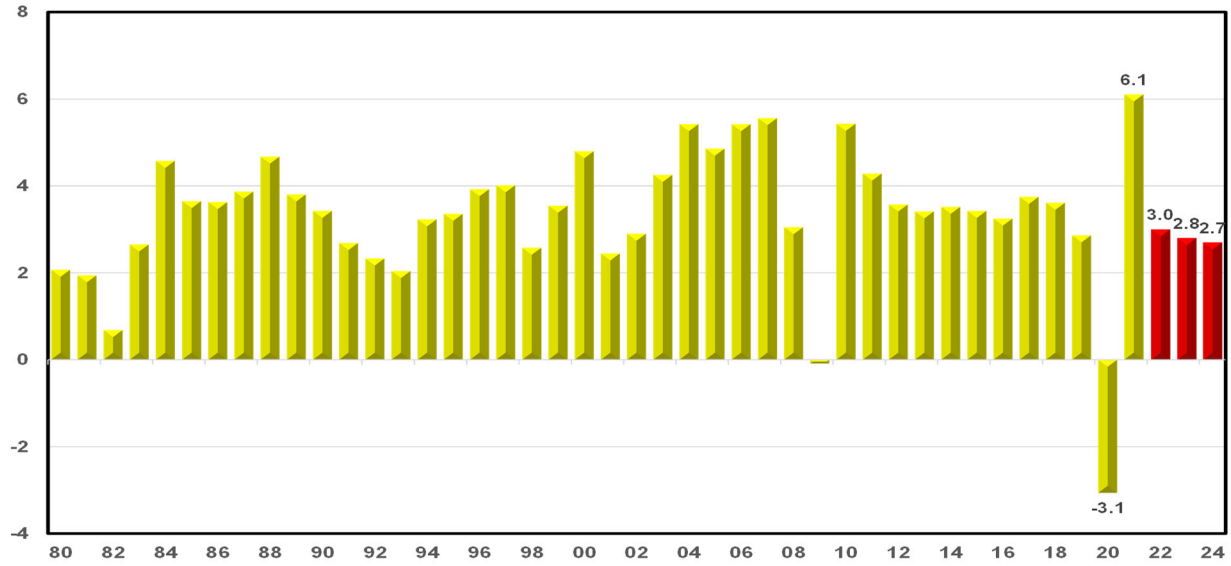
Nonetheless, despite these positive trends, the outlook for the global economy and with it, the path for global trade has become increasingly more challenging in the next two years. For over a year now, it has become painfully obvious that the surge in demand is running against unprecedented supply constraints, stoking inflation and denting growth. The post-pandemic world has been mired in reopening bottlenecks, clogged ports and pandemic-induced reshuffling of supply chains across the globe, which have caused businesses to run headlong into shortages of everything: from microchips to transcontinental container ships. Even labor is in short supply as businesses struggle to lure reluctant workers.

Instead of resolving, as appeared to be the case early in the year, supply chain snags are getting worse. Container shipping rates are creeping back up to the stratospheric levels of last summer. China's zero-covid policy has scrambled supply lines yet again: as of mid-March, 40 million people were under some form of lockdown due to a recent virus breakout in the country. By end-March, Shanghai – with 24 million inhabitants – was added to the unlucky list, forcing countless businesses (including Tesla, FoxConn and Toyota) to shut operations.

Adding to these woes is the Russia/Ukraine war. Human costs aside, the war has delivered an unquestionable stagflationary shock to the world economy: though the economic heft of both Russia and Ukraine is puny (less than 2% of world's GDP), they command an outsized presence in global commodity exports. Russia ranks number one, two and three, respectively, among the world's exporters of natural gas, oil and coal. Russia produces 10% of world oil supplies and exports around 7.5 million barrels per day (5 million of crude and 2.5 million of oil-product exports). Oil prices have surged by 30% since the invasion, while food prices are up by 24%, on top of already elevated levels seen last year as the global economy reopened.

But the specter of stagflation was lurking in the horizon even prior to the war. Global growth was set to slow after setting a torrid pace of 6.1% in 2021 – the highest in over four decades – in large part because the reopening from the pandemic was always going to be a one-off event (Figure 6). And base year comparisons were bound to deliver unflattering figures in 2022 and beyond relative to last year when a reopening global economy sent growth into overdrive.

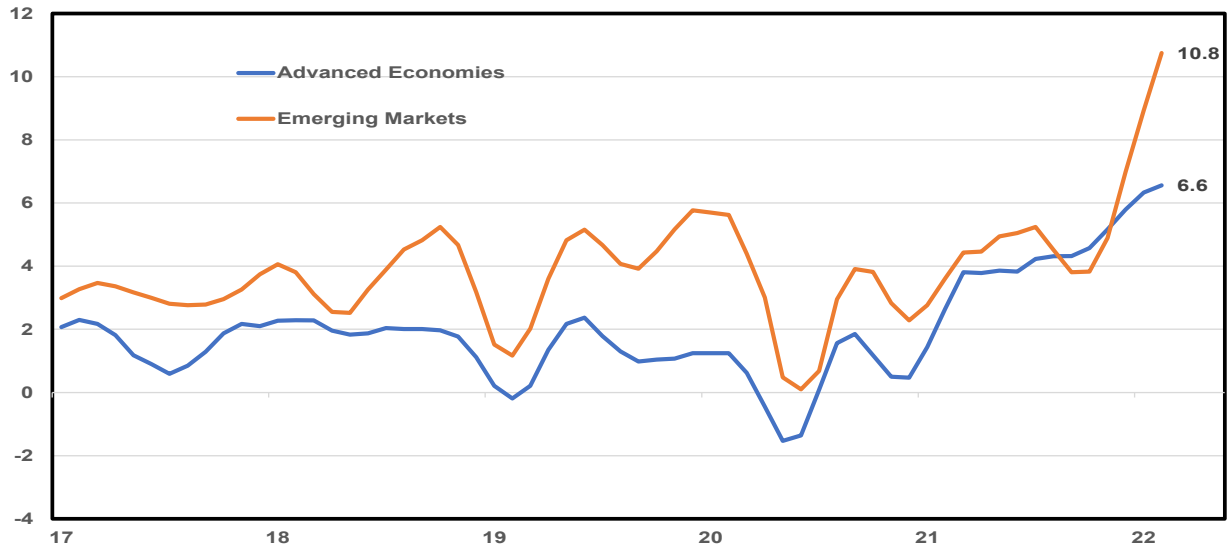
Figure 6
Global Growth Rates
(percent change, year-over-year)



Source: International Monetary Fund and Wood Center

But problems run a lot deeper than mere cosmetic quirks related to base-year comparisons. For starters, inflation has skyrocketed on a global scale: As of February 2022 (latest available data) Emerging

Figure 7
Skyrocketing Inflation Worldwide
(CPI inflation, y-o-y percent change)



Source: International Monetary Fund and Wood Center

Market CPI inflation was running at 10.75%, while it was 6.5% in Advanced Economies (Figure 7). These figures do not reflect the impact of the Ukraine war, which has further exacerbated price pressures. Runaway inflation has forced central banks across the world to reverse course, mop-up excess liquidity and hike rates in an effort to combat rampant price pressures.

Beyond the immediate setting, the outlook is even more grim. The confluence of an escalating war, rapid rate hikes, unprecedented labor shortages, persistent supply disruptions, higher energy costs, a multi-decade spike in inflation, and continued flare-ups in a once-in-a-century pandemic, have significantly raised the odds of a global recession. Engineering an "immaculate soft-landing" — wringing out inflation without dislodging growth — under these conditions is a herculean task, and central banks across the world will need extraordinary luck to pull it off. Moreover, the confluence of events is decidedly against them. History offers some important lessons on the factors that bring about the demise of an expansion. Going back to the early 1950s, they fall in either one of the four categories: external shocks (oil price shocks of 1973 and 1980 and the pandemic of 2020); fiscal tightening (1953 as the Korean War wound down); overheating, which leads to an overtightening by the Fed (1957, 1960, 1969, 1973, 1980 and 1981); or financial imbalances (1990, 2001 and 2007). As we discuss in more detail ahead, with perhaps the exception of the last factor (imbalances), all the other three seem to be largely present in some form or another in the current environment.

Global trade is firmly wedded to the fate of the global economy and with the fortunes of the global economy decidedly darker now than a few months ago, we expect global trade to moderate significantly over the forecast horizon. Moreover, the retrenchment from globalization has not reversed even as the pandemic ends and global trade posts its best year in many decades. Despite striking a friendlier tone than its predecessor, the current administration has largely kept in place many of the trade provisions of the previous administration including higher tariffs for many countries. Below, we discuss in more detail our outlook for global trade, national and regional exports, and the four main developments that are likely to shape their path forward: 1) the lingering impact of the pandemic, 2) the Russia/Ukraine war, 3) stagflation and recession risks, and 4) trends and attitudes on trade and globalization.

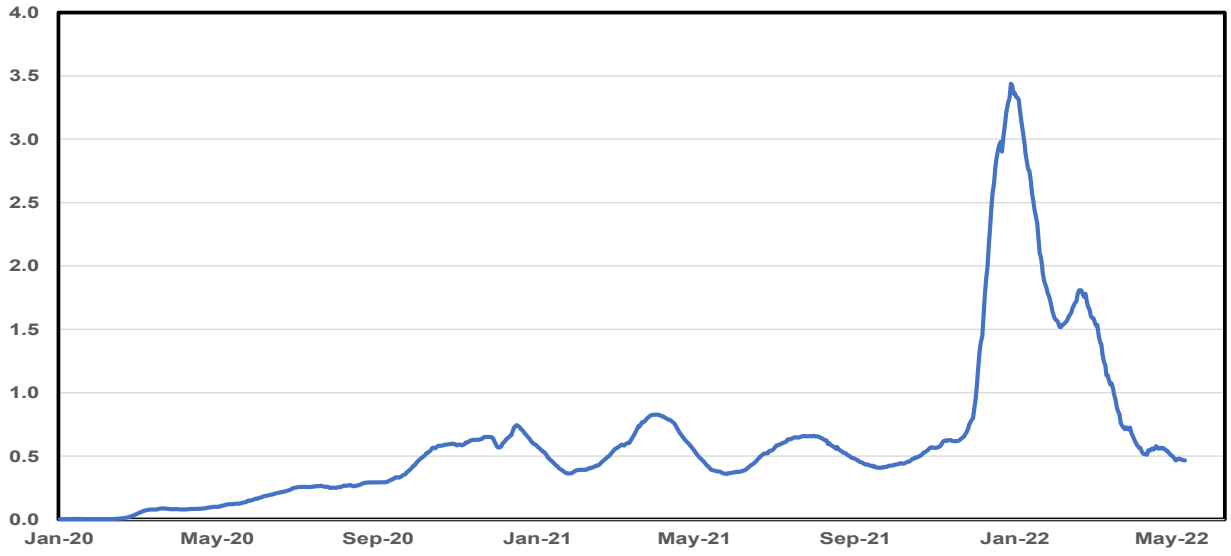
1.1 The Lingering Effect of the Pandemic on the Global Economy and Trade

Four major fare-ups have hit the world since Covid-19 first emerged two and a half years ago: The original wild-type (spring 2020), the alpha wave (winter 2020), the delta wave (summer 2021) and Omicron (winter/spring 2022) (Figure 9). Worldwide, the total number of infections since the pandemic began currently stands at an estimated 534 million; deaths at 6.3 million.

The good news is that even though successive waves of the virus have been more contagious, they appear to be less deadly. Nearly half of infections worldwide – around 250 million have occurred since January of this year as Omicron stormed the world, yet during this time span there have been only 860,000 deaths, nearly 13% of the total. Indeed, Omicron, in particular, seems to have dramatically altered attitudes around the virus, both on the part of the public and policymakers. Given its high transmissibility due to its immune-evasive features but lower virulence, it brought on a new realization that while the world likely won't permanently stomp out the virus, it may well learn to live with it. Indeed, as the Omicron spread,

people largely carried on as normal even though infections were more than three times higher than the tidal wave of the previous winter. The largest disruptions were neither due to government diktats nor to individual desire to shield from the virus but rather to a widespread absence of workers because they were either ill themselves or caring for someone with COVID-19. If anything, COVID-fatigue rather than virus-related anxieties appeared to have dominated the Omicron wave. Taking a cue from public sentiment, policymakers around the globe rushed to relax pandemic restriction measures, from easing travel bans to removing any remaining constraints on economic activity, even before Omicron had run its course.

Figure 8
World Daily Covid-19 Infections
(millions of people)



Source: Our World in Data and Woods Center

This sea-change in attitude matters greatly for economic outlook, in large part because the fate of the global economy has been tightly wound to that of the virus over the past two years. It means that should the next waves of the disease hit, as they undoubtedly will, both public and personal behavior will embrace more sensible virus-related adjustments, causing far less economic damage than the panic-driven response of the earlier days. More importantly, the disease is slowly approaching an endemic state — one that will likely flare-up with seasonal frequency but without overwhelming the health care system due primarily to existing immunity through prior infections, vaccines and boosters.

Mitigating the effects of the virus are vaccines, natural immunity, and the arrival of effective therapeutics. Around 60% of the world's population is fully vaccinated though significant regional differences continue to persist: The share of fully vaccinated people is as high as 73% in the European Union and as low as 17% in Africa. Perhaps the best news in dealing with the virus and mitigating its impact on the global economy is the development of effective therapeutics, such as Pfizer's Paxlovid, a breakthrough invention that entirely stops virus replication and is almost variant-proof since it targets the part of the virus that does not mutate. Widespread availability of this drug could effectively counteract slow vaccine uptakes and booster-related fatigue. Indeed, the share of US vaccine uptake has remained stubbornly low despite a massive campaign: Only 67% of Americans are fully vaccinated, and only 31% have received a booster. But even in highly vaccinated countries such as Portugal (87%) and Canada (83%),

booster rates lag substantially — 60% and 52%, respectively — underscoring the challenging task of having to jab the entire world every six months. Effective therapeutics, such as Paxlovid, may offer a simpler and cleaner way to deal with these issues while successfully combating the virus.

But despite these positive developments, the pandemic may not be done with humanity yet. New variants will undoubtedly continue to spread: some of them may be deadlier than the last few waves and some may be able to completely escape vaccine immunity. This would deal another significant blow to the world economy and world trade. Even a mild version like Omicron managed to sideline 8.8 million workers in the US alone — a full 5% of the workforce — denting growth and slowing economic activity. First quarter real GDP growth in the US was -1.5%, the first negative quarter since the recovery from the pandemic began, in large part, due to the Omicron variant.

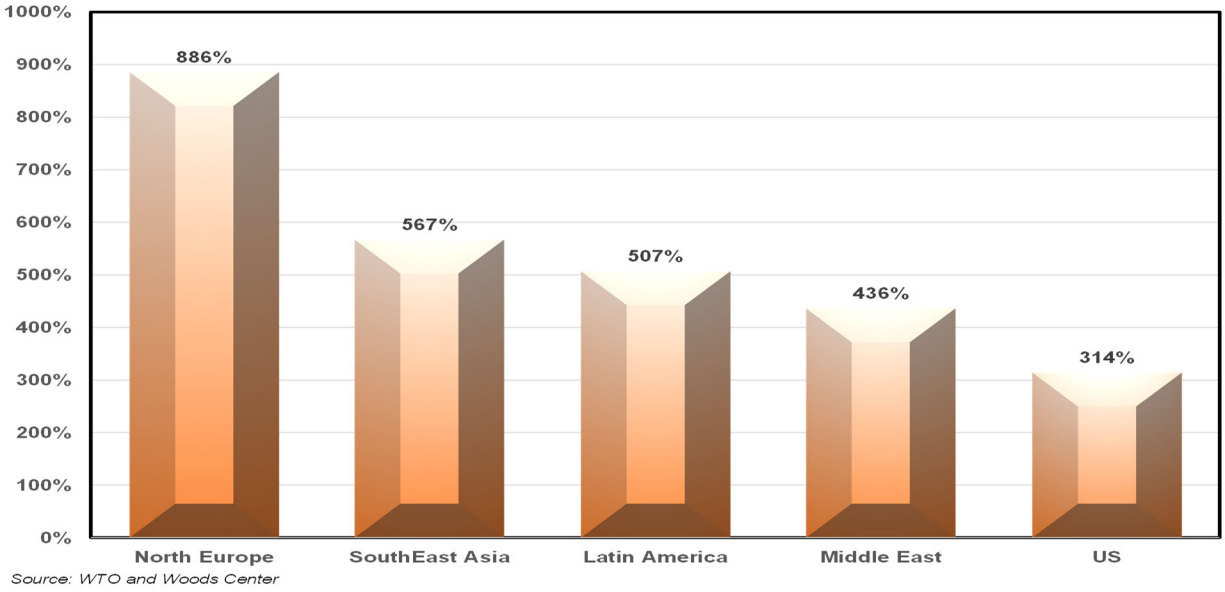
More concerning is the governments' response to virus flare-ups. Most governments have scrapped their "zero-COVID" policy, given how untenable it is to stamp out the disease down to its last case, particularly in the presence of highly transmittable variants such as Delta and Omicron. Australia and New Zealand, which managed to keep infections and deaths quite low early in the pandemic by shutting borders, contract-tracing and instituting repeated lockdowns, abandoned their "zero-covid" approach when Delta hit. But China has continued to stubbornly cling to zero-Covid through Delta and Omicron, aiming to snuff out any outbreak through mass testing and isolation at centralized facilities of anyone who is infected. A single Delta case prompted a two-week lockdown of the Ningbo port in August 2020 and a quarantine of more than 50,000 people — 20 times the recorded number of cases. The port of Yantian shut down for a few weeks in May 2020, again due to a small COVID outbreak. But things have gotten immeasurably worse with Omicron: Xi'an suffered a lockdown in early January of this year. The large cities of Shenzhen and Shenyang, accounting for 16% of China's exports, were locked down in mid-March. 25 million residents of Shanghai endured an eight-week long lockdown throughout much of this spring. The lockdowns appear to be easing as of late as cases drop, but hopes that China will change course when the next COVID waves hit are dim. The Politburo Standing Committee stood firm behind the current policy, scrapping language such as "reconciling zero-covid with growth" and "minimizing the impact of the pandemic on the economy", which aimed at balancing the pandemic with economic growth.

This means that gummed up supply chains and snarled intercontinental travel will continue to persist at least for the remainder of this year. Shanghai's port — the world's busiest — handles more than four times the volume of the ports of Los Angeles and Long Beach combined. As of early May, there were more than 300 ships waiting to berth at its port, a nearly five-fold increase compared to two weeks earlier. It is currently taking 114 days for shipments to move from suppliers' warehouses in China to the departure gate of the destination port in America, up from around 50 days prior to COVID. The journey to Europe takes almost as long: 110 days compared to just 60 days prior to the pandemic. These figures have yet to reflect the most recent lockdown in China, which means supply chain issues will likely get worse before we see any meaningful improvements.

Supply chain logjams have persisted for over one year now, ever since the world began to stir from the pandemic slump. Some of this has to do with misjudgment on the part of many firms which idled production during the pandemic and forecasted tepid demand after. Instead, massive government support

in the US and in the rest of advanced economies, and a dearth of service sector venues, lead to a skyrocketing of demand for goods. The system was never built to handle such an unprecedented demand, which means that a gush of demand and a dearth of supply sent transportation costs into overdrive. By mid-September spot-container-freight rates from China to the US rose by 314% (compared to the 2019 average), those to Northern Europe by 886%, and to Latin America by 507% (Figure 9). The armada of ships waiting at the ports of Los Angeles and Long Beach abated to 30–40 vessels in January 2022, down from 80 in mid-October, but only because of logistical changes that require ships wait in line further out at sea. The real line was north of 100 ships.

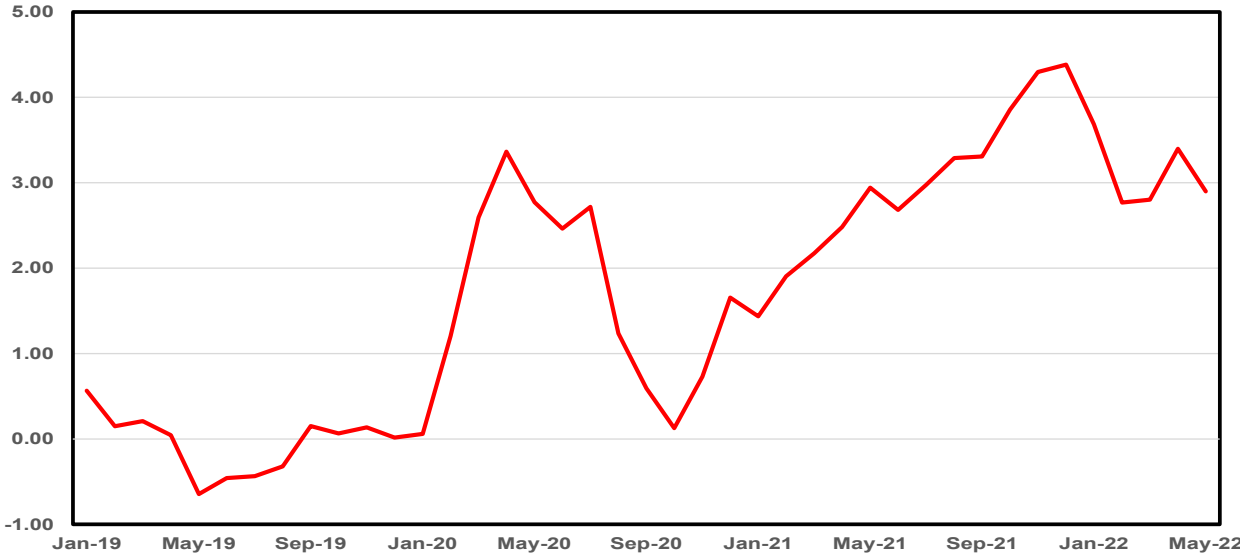
Figure 9
Off the Charts: Container-Freight Rates from China to Rest of World
(percent change from 2019 average)



Source: WTO and Woods Center

Some of the strain from supply chains should abate as the world economy slows down from the torrid pace set last year as demand cools off, government stimulus fades, and central bank tightening delivers additional contractionary shocks. But even so, improvements are always likely to occur in incremental steps given historically high levels of disruption. Indeed, as shown by the New York Fed Global Supply Chain Pressure Index, supply snarls have eased a bit this spring, but just by a touch (Figure 10). And improvements are not broad-based: some indicators have gotten a bit better, others haven't. For example, retail inventory-to-sale ratio, at 1.17, is currently a hair above rock-bottom values, but light-years below the historical average of 1.6. The ISM survey of manufacturers shows continued improvement in delivery times, but shipments from supplier's warehouses in China to the departure gate in America continue to take a while. Containership rates have eased from a high of $9,500 in January to a current $7,200, but they are still five times higher than pre-pandemic levels. Worker shortages in warehousing and distribution are as dire as they have ever been.

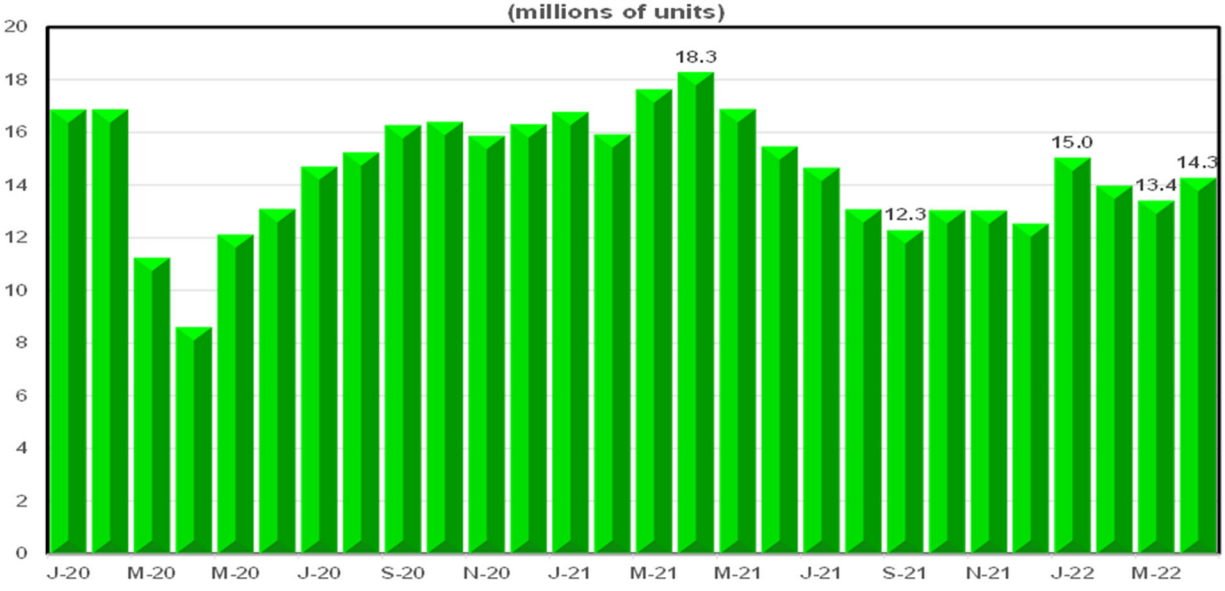
Figure 10
Global Supply Chain Pressure Index
(index)



Source: Federal Reserve Bank of New York

But perhaps one the most enduring legacy of the pandemic is a persistent shortage of nearly everything: from cars to construction materials, diapers and baking pans. The persistent gluts of the 2010s have given way to a shortage economy, thanks to the outsized imbalances between demand and supply. Perhaps the most pervasive is the shortage of semiconductor chips, especially legacy older-technology chips, which go into the production of autos and other appliances. A dearth of chips constrained U.S. vehicle sales to below 15 million units in 2021 for a second year in a row — 2 million below normal levels — lopping off around $80 billion revenues from the industry (Figure 11).

Figure 11
Motor Vehicle Sales
(millions of units)



Source: US Department of Commerce

Things are not getting better: In February and again in May of this year, Toyota said it would cut production by a total of 250,000 cars, because of chip shortages. A recent Commerce Department survey found that large manufactures' chip inventories have fallen to 5 days from 40 days in 2019. And though new capacity is beginning to expand — Taiwan Semiconductor, Samsung and Intel are planning a combined $100 billion in new investments — relief will not be immediate as it takes time to set up new plants and expand production. Moreover, chip production is rather an intricate and multi-step process: It takes three to four months to turn a blank silicon into a final batch of chips, which means that tight chip supplies are likely to persist well into 2023.

The most jarring imbalance is the one between the need for workers and their availability. Labor shortages have plagued this recovery for more than one year now, and they do not appear to be easing. In July of last year, when the persistence of labor shortages became painfully acute, there were 10.7 million job openings in the US while the total number of unemployed was 8.7 million. Now, there are 11.5 million job openings and a much smaller pool of unemployed: only 5.9 million. Labor shortages are particularly severe in low-skilled, low-wage areas such as Leisure and Hospitality where the job opening rate is as high as 10%. But the labor force participation rate among workers with lower levels of education — the main workforce supplier for this sector — is still around 1.5% below pre-pandemic levels. The trucking industry is short 80,000 workers. An excess of 2.5 million workers has retired sooner than expected over the 2020-2021 period, which means that the labor force pool has permanently shrunk more rapidly than what demographics dictate. We expect these figures to improve over time as excess savings run out, inflation takes a bite and the labor market normalizes. But this will take a while, which means that labor shortages will persist over the next 10-12 months, putting upward pressure on wages and inflation and slowing growth.

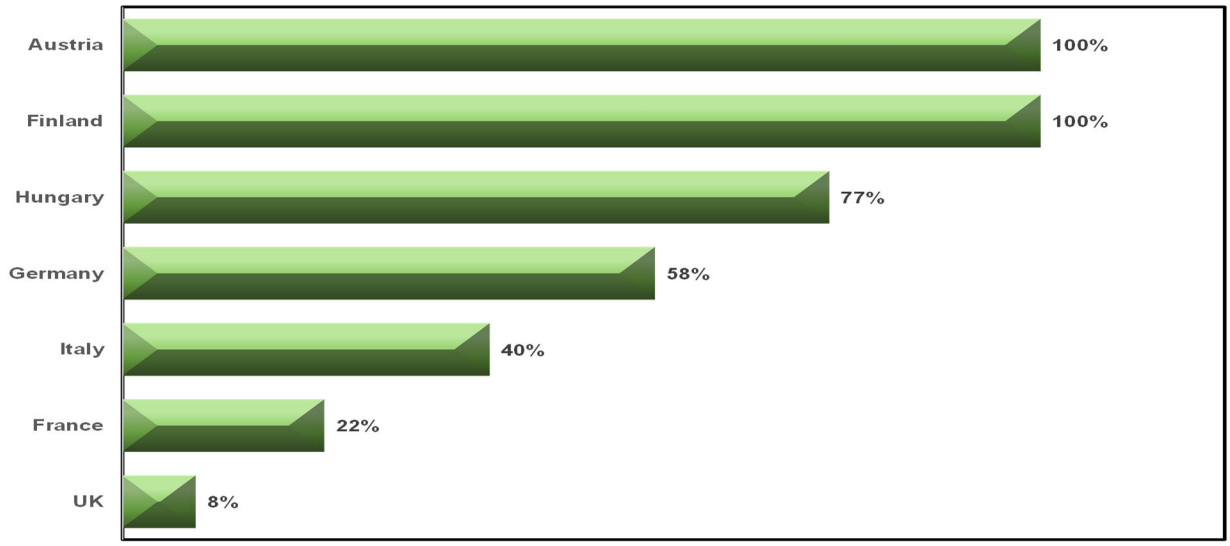
1.2 Russia-Ukraine War: A Stagflationary Shock to the World Economy

The war in Ukraine has dealt another blow to the world economy that had only begun to recover from the global pandemic. So far, the war has dragged on for more than three months, and there are few signs that it is about to end any time soon. Peace talks have not gone far, in large part, because the two countries stand a gulf apart on many issues, even though Ukraine has hinted that it will no longer pursue NATO membership, a major Russian grievance. Neither has there been an earnest push for peace from the West: After dispatching hefty humanitarian and military aid to Ukraine and bone-crushing sanctions to Russia's economy, it has made little effort to try to bring about a diplomatic solution to the crisis.

How long the war lingers matters greatly for global economic outlook. At $1.6 trillion, Russia's economy is the world's 11th largest, smaller than each of the top three U.S. states (California, Texas and New York). Ukraine's economy — at $155 billion — is on par with Nebraska's. But what they lack in terms of sheer size, they more than make up with their disproportionate impact in world commodity exports. Russia alone accounts for 10% of world oil production and 17% of gas production. Its impact on European markets is much larger: Russia accounts for 26% of European oil imports and 42% of its gas imports. For some countries, the vulnerability is even more acute: Germany imports nearly 60% of its natural gas from Russia, which accounts for 27% of its total energy consumption. Russian gas makes up 40% of Italian gas

imports, accounting for nearly one-third of its energy consumption (Figure 12). By comparison, U.S. exposure is miniscule: only 4% of oil consumption and no gas imports.

Figure 12
Oil Imports from Russia
(percent of total consumption)



Source: International Monetary Fund and Woods Center

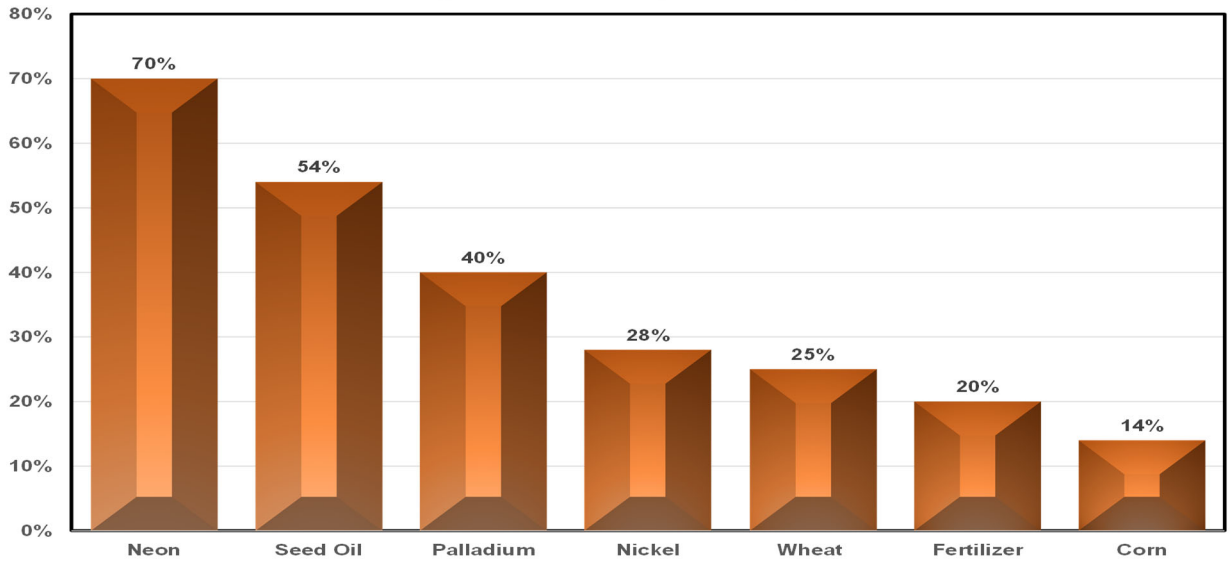
But even America is not spared the pain. Oil trades in global commodity markets and as issues of scarcity arise — due to supply disruptions, outright sanctions or self-sanctions — global oil markets are ablaze. The price of Brent crude soared to nearly $140 in early March — double the price of mid-December — and though it has come down from these levels, it remains elevated at a current $124 per barrel. A $10 increase in oil translates to roughly $0.30 cent higher price per gallon of gas at the pump for U.S. consumers. The average gas price in the U.S. has trotted upwards since May: it is currently approaching $5/gallon — the highest in history in nominal terms. The average gas price in California is a staggering $6.40. Should prices remain at these levels for the remainder of the year, fueling tanks alone would cost the average household $3,400 more this year compared to last, or roughly $100 billion in aggregate, sapping 0.5% of GDP growth this year and adding around 1 percentage points to inflation.

Things may not get better anytime soon. Sanctions — official and self-imposed ones — and disruptions of oil production in Russia may already have taken off around 2 million barrels per day (bpd) from global markets. No other supplier, or any combination of them, can ramp up production fast enough to backfill this shortage. The U.S. has the capacity to expand oil and LNG production, but administrative obstacles, a push towards de-carbonization, years of under-investment and investor pressure to maintain capital discipline after the global oil rut in 2015 are hampering those efforts. OPEC's spare capacity is around 2 million bpd, but it has struggled to meet its own production quotas due to pandemic-related disruptions. Some estimates show that the global market was already undersupplied by 1 million bpd even before the war in Ukraine. Iran and Venezuela may chip in with around half a million of bpd each, but even

assuming that the delicate negotiations with these countries succeed, it would take a while, nearly six to eight months, for their production to hit the global markets.

It's not just the energy shock. Commodity markets are reeling as well. Russia is the biggest global producer of palladium, accounting for 40% of the world's production, and 16% of the world's platinum. Both are used to produce catalytic converters for the auto industry, which is already gripped by an historic shortage of raw materials. Russia and Ukraine combine for 70% of the world's exports of neon gas, a critical ingredient in the production of semiconductor chips (Figure 13). Neon gas prices are up 900% compared to mid-February, before the war. This will undoubtedly worsen the global chip shortage problems, which have plagued manufacturers for over a year. Russia also accounts for 28% of world exports of nickel used in lithium batteries essential for electric vehicles. Prices of other commodities have also skyrocketed: Compared to January 2022 levels, coal prices are up nearly 70%, while the price of nickel is up nearly 50% (Figure 14).

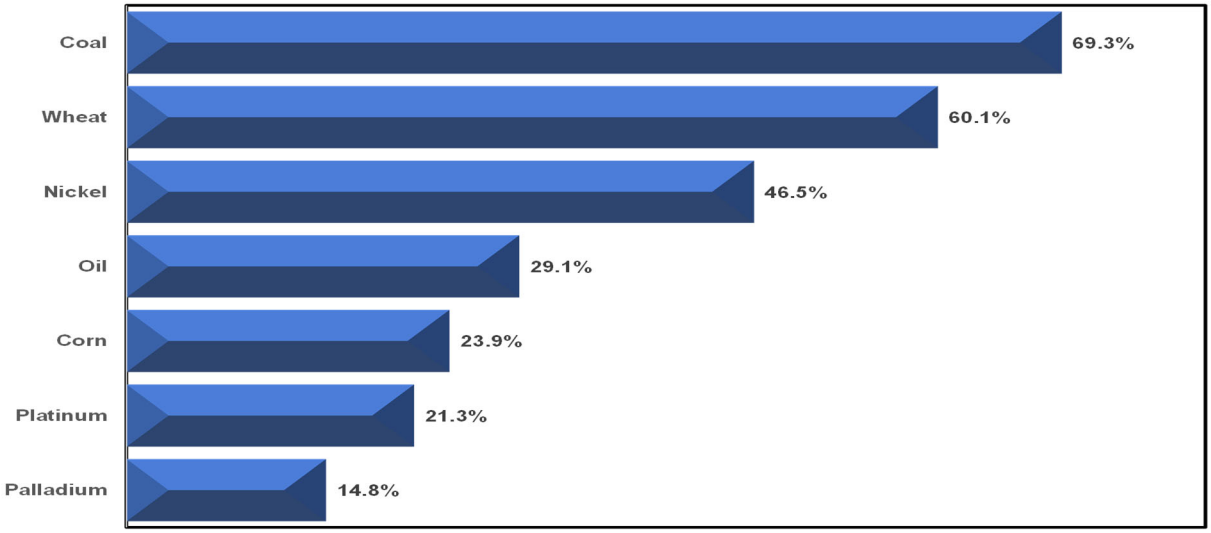
Figure 13
Russia and Unkraine Commodity Exports
(percent of world production)



Source: International Monetary Fund and Woods Center

Food supply disruptions are another concern. Russia and Ukraine combine for 54% of the world's shipment of seed oil, 30% of barely and 25% of wheat production. Ukraine is the world's fourth largest corn exporter, accounting for roughly 14% of global shipments. Russia and Belarus (another heavily sanctioned country) produce nearly 20% of fertilizer chemicals, a vital ingredient for crops. The war is adding on to global supply woes: Global stocks were 31% below the five-year average even before the conflict began due to several poor harvests, frenzied buying during the pandemic and supply-chain disruptions over the past year. Price have shot up: the price of wheat is up 60% since January 2022; corn is up nearly 24% (Figure 14).

Figure 14
Commodity Prices Off the Charts
(percent change relative to January 2022)



Source: OECD

Sanctions have also had an impact. Understandably unwilling to confront a nuclear adversary on the battlefield, Western allies have instead wielded crippling economic sanctions on Russia. It is now the most heavily sanctioned country in the world, outranking North Korea and Iran. The most headline-grabbing was the expulsion of most Russian banks from SWIFT — an international payment system facilitating financial transactions. But perhaps the most surprising and the most severe is the freezing of more than half of Russia's $630 billion foreign exchange reserves, an unprecedented step that sent alarming signals to other regimes across the world. Russian airlines are banned from airspace across the West; Russian companies have been expelled from U.S. credit markets, and Russian vessels cannot enter British waters. More than a million containers due to travel to Europe from China by train—on a route that goes through Russia—must now make their journey by sea as sanctions bite. Export controls will deny Russia access to high-tech gadgets used in military and high-tech sectors ranging from microchips to cutting-edge machinery. A growing number of companies have fled the country — from McDonald's to Nike, Apple, Visa and Mastercard — though perhaps the most significant is the exit of BP, Shell and Equinor from their Russian oil ventures.

Russia has weathered the current crisis relatively well so far. It managed to stave off a free fall of its currency: The ruble lost 40% of its value in the aftermath of sanctions, but it has fully recovered and then some, currently standing above its pre-war value. A run in the banks resulting in the withdrawal of a dizzying $31 billion has been stemmed, and customers have returned much of their cash back into their accounts. The stock market initially collapsed by half, but it has recovered a chunk since. Some of the tools used to dull the pain of the sanctions have been conventional: The Central Bank of Russia (CBR) raised interest rates from 9.5% to 20% to stem the ruble's collapse (it has since brought the rate down to pre-ware values now that the ruble has stabilized). But some are unconventional, such as the ban on short-sales, the

requirement that exporters convert 80% of their proceeds in rubles and the insistence that energy exports be paid in currencies other than dollars or euros. There is talk of a ruble-rupee oil trade with India.

More broadly, Russia has spent a good portion of the last decade, since its annexation of Crimea in 2014, seeking to shield its economy from precisely these sorts of sanctions. It shored up its external and fiscal balances, and its current account surplus has risen to 9% of GDP, leaving substantial buffers of excess savings. Its public, corporate and financial sectors are now net external creditors. Its share of international financing from the Bank of International Settlements (BIS) has declined by three-quarters, and the share of Russian Eurobonds have essentially halved since 2014. It has substantially reduced its reliance on the U.S. dollar: Its oil fund no longer holds dollar-denominated assets, and the CBR has dramatically decreased the share of its dollar reserves from around 40% to a current 16%.

The worry is that this decoupling may lead to a broader and more permanent rupture of the post-Cold War world. The rapprochement between China and Russia is a prime example. The trade between the two countries is already insulated from Western sanctions with only 33% of payments taking place in dollars, down from 97% in 2014. While far from dethroning the dollar as the world's reserve currency — only 3% of international payments are in yuan compared to 40% in dollars — it may accelerate a push to develop alternative financial and technological infrastructures. China has developed a parallel system to SWIFT (called CIPS) in yuan and is working towards developing a digital currency. None of this augurs well for globalization, which, in the span of a decade and a half, has endured a crippling financial crisis, trade wars, a virulent global pandemic and now a full-blown physical war. More immediately, the war is another supply shock layered on top of existing supply shocks, dealing additional blows to a global economy that was set to disappoint in the first place.

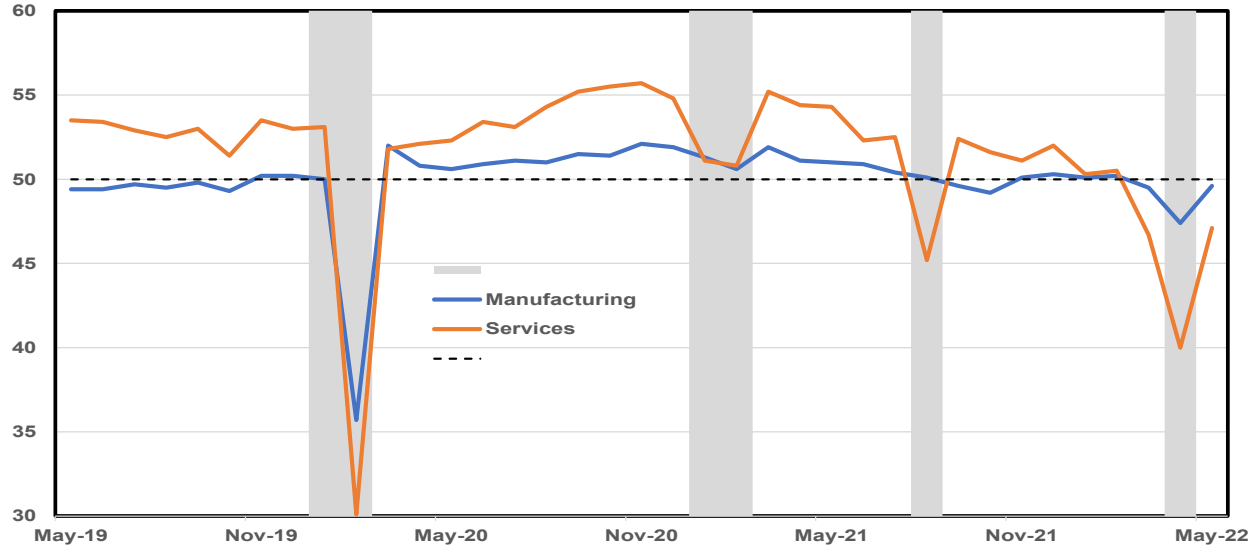
1.3 Between Stagflation and Recession: The Global Economy in a Precarious Spot

There is no question that the path of this expansion has become much narrower now compared to a year ago, with the global economy perched precariously on a cliff with stagflation-like abyss on one side and a recession-depth gulf on the other. We expect the expansion to continue in the short-term, over the next 10–12 months, albeit a decelerating one, coupled with high inflation: an expansion with stagflation dynamics. Longer term, the economic outlook is more challenging, as the removal of monetary and fiscal support, continued supply snarls, high energy costs and potential virus flare-ups, will likely combine for a toxic mix of risks. Odds are more than even that a recession is lurking beyond the immediate setting.

Take the short-term first: growth with stagflationary dynamics. Growth is set to slow worldwide. At the start of the year, China reckoned its growth for 2022 would be 5.5%. That figure seems fanciful now after the country has endured two major lockdowns (one in early winter and one in the spring), which have hit at the heart of the manufacturing sector (Figure 15). Retail sales, and industrial production have also declined sharply. Though covid cases have receded in recent weeks inching the country closer to normalcy and prompting a gradual reopening of Shanghai, the approach toward containing the spread of the virus has not changed and we expect the "zero-covid" strategy to remain in place for the foreseeable future. The real estate market remains in shambles: fearful of a growing real estate bubble, the Chinese authorities have turned off the taps on easy credit by capping developers' ratios of liabilities to assets, net debt to equity,

and cash to short-term debt. This has put China's property market on the edge of a collapse. A dozen developers including Evergrande – China's largest – have defaulted on their bonds. Kaisa, another large developer defaulted on $400 million debt late last year.

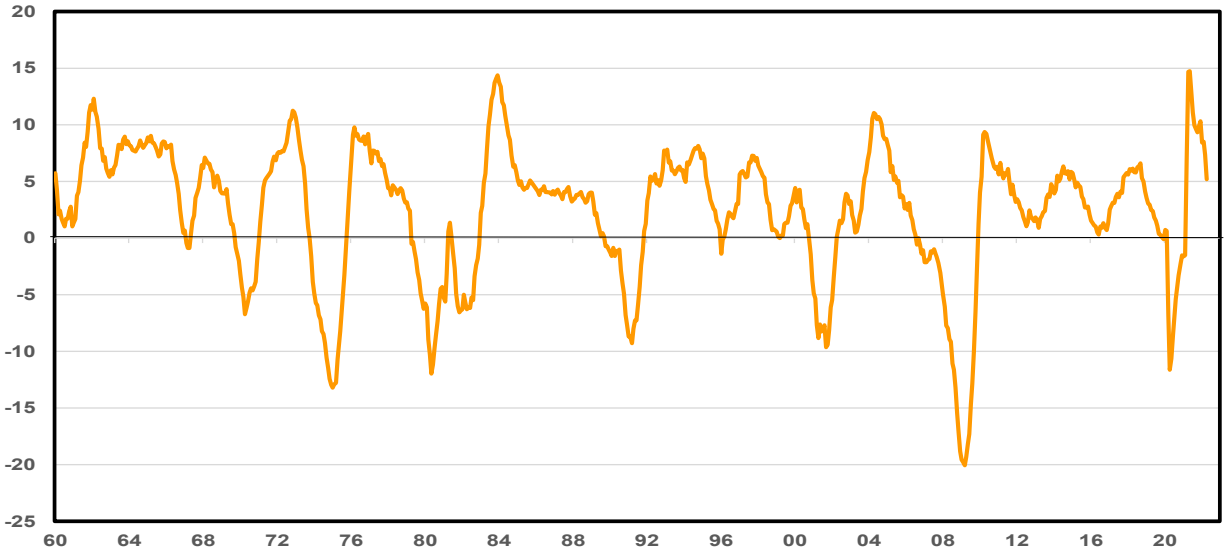
Figure 15
China Manufacturing and Service PMI
(index; a number>50 indicates expansion)



Source: OECD

Elsewhere the outlook is equally grim. Oodles of government cash, household excess savings, and pandemic-related pent-up demand should keep the expansion going, at least for a little while, but the trend is slowing. The US Conference Board's Leading Economic Index (LEI) while still expanding, is past its peak, indicating that this recovery has aged faster than most (Figure 16). And though most subcomponents are generally solid, trends for most leading variables (bank tightening credit, financial conditions, unemployment claims, housing starts, and capex orders) are worsening. The eurozone economy showed some resilience earlier this year, but the Russia/Ukraine war has significantly raised the risks of a sharper growth slowdown due to its reliance on Russian energy exports. The recent partial ban of Russian oil will place further strains on European economies. Perhaps Japan holds a bit more hope: while it started the year in a dour note, the Japanese economy picked up steam in the spring. More importantly, unlike other countries, inflation continues to remain relatively tame, which means that the Bank of Japan has ample space to continue with its easy monetary policy.

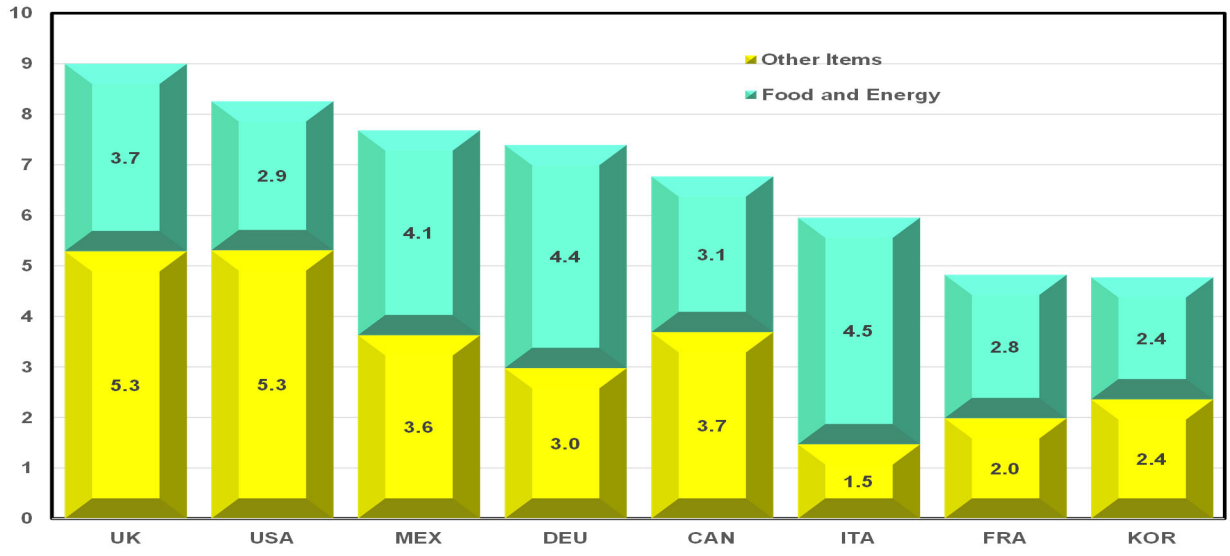
Figure 16
Leading Indicator Past Its Peak
(year-over-year percent change)



Source: The Conference Board

And the second part of stagflationary dynamics – inflation – is likely to remain high during the forecast horizon. Inflation in the UK has hit 9%, the highest of any advanced economy, and though some of this is due to higher energy prices, core CPI inflation is running at 6.2% and service CPI has inched up to 4.7%. The US is not faring any better: the 8.6% figure released for May was the highest since December 1981. Underneath the headline numbers the trends are quite worrisome: core CPI is up 6.1% while service inflation is running at 5.4%. Rents, which make up around one-third of the CPI basket, rose 15.1% in May compared to the previous year. But they filter through to inflation statistics with significant lags. They also tend to be stickier. This means that much of the recent rise in rents (shelter costs) has yet to be reflected in headline inflation figures. Wage growth is another laggard: Wages are up 6% — the highest rate since mid-1980s, according to the Atlanta Fed wage tracker. But overall numbers do not do justice to the building wage pressures in some sectors: wages for Leisure and Hospitality are up a jaw-dropping 15% from a year earlier; those in Transportation have risen by 11%. A full 26% of businesses plan to raise wages over the next six months and nearly half plan to raise prices, according to the survey from the National Federation of Independent Businesses. Core inflation is also creeping up in other countries: Canada's core inflation is now running at 3.7%; Mexico's at 3.6%. And the problem with core inflation is that it is stickier and thus harder to stomp out even if energy prices come back down to earth (Figure 17).

Figure 17
Contributions to Headline inflation
(y-o-y percent change)



Source: OECD

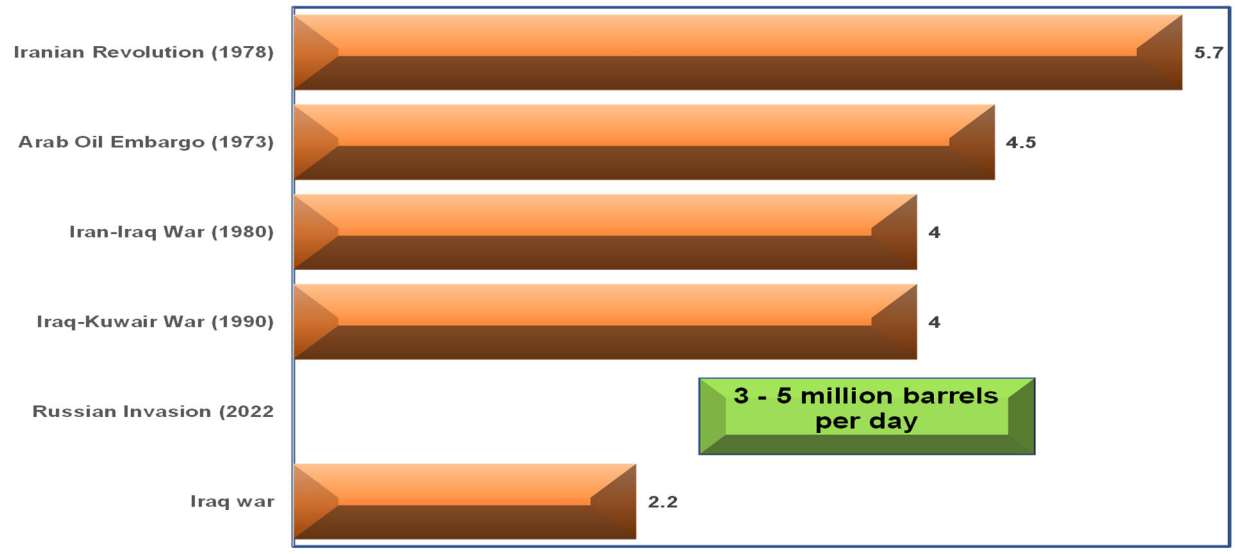
Beyond the immediate setting (next 10-12 months) recession risks loom large. Historically, global expansions have come to an end either because of significant vulnerabilities in the private sector (high debt levels) or due to some type of shock. Going back to the 1950s, there are generally four main catalysts that have preceded the 10 previous recessions: fiscal tightening; external shocks (oil prices; pandemic); overheating, which led to an overtightening by central banks; or financial imbalances. With the possible exception of the last factor, though even here a case could be made for market froth (which is currently being corrected as stock markets reel across the world), all other factors are at play.

Start with fiscal contraction. Fiscal tightening on a massive scale has generally been a feature of significant post-war demobilization efforts such as after World War II (which preceded the recession in 1945) or the Korean War (1953). But the pandemic was treated no different than a conventional war. Governments across the world adopted a war-like approach against the virus: In the U.S., the budget deficit was an astounding $3.1 trillion in 2020 and an additional $3 trillion in 2021. The deficit is set to shrink down to $1 trillion this year, a massive scale-back that, though necessary, will undoubtedly weigh on growth. Fiscal consolidation is also occurring in most other advanced economies where policy space was significantly eroded by spending during the pandemic. Much of this support will be reversed in the next couple of years as policymakers attempt to rebuild fiscal buffers.

External shocks — the second reason why expansions succumb — were a feature of the 1970s as an OPEC embargo and later the Iranian revolution sent oil prices soaring, delivering powerful supply-side shocks to the U.S. and global economies. The similarities between then and now are obvious. In fact, an argument can be made that we are now suffering not one, but two supply-side shocks: the pandemic, which scrambled supply chains, and the war in Ukraine, which has thrown the energy and commodity markets in disarray.

Worse case scenarios could materialize. Should Russia's energy exports be taken entirely off the market — due to sanctions, self-sanctions or reduced capacity — the world supply of oil is likely to suffer a shortfall of between 3.5 million and 5.2 million barrels per day, a yawning gap unlikely to be bridged in the short term. For reference, the Iran Revolution of 1978 removed 5.7 million bpd from world production; the Arab Oil embargo of 1973 left a shortfall of 4.5 million bpd, while the Iran-Iraq War (1980) and the Persian Gulf War (1990/1991) lopped off around 4 million bpd from global oil production (Figure 18). In all those instances oil prices sky-rocketed anywhere from 110%-145%. More worryingly, Russia and Ukraine export virtually everything, and unlike the 1970s, it's not just the price of oil but the price of everything that is surging.

Figure 18
Geopolitical Disruptions to Oil Supply
(millions of barrels per day)



Source: OECD and Woods Center

The most concerning factor is monetary tightening. Across the world, central banks are pivoting from excessively lose monetary policy adopted at the height of the pandemic (kept in place for far too long) to rapidly raising interest rates in an attempt to cool off alarmingly high inflation. There are a few exceptions: The People's Bank of China has eased mortgage rates in an attempt to stem the fallout from the residential market, and the Bank of Japan has enough space to maintain its accommodative bias given that inflation is not out of hand. But these examples are the exception rather than the rule: in much of the rest of the world, central bankers are on a quest to squelch decades-high inflation.

The Fed is at the forefront of these efforts. It is becoming painfully obvious that it is ready to do "whatever it takes" to bring inflation closer to its target, even if it means throttling growth. Indeed, between the horrors of persistent stagflation and the pain of a quick but short-lived recession, the Fed, while preferring neither, would settle for the latter. Faced with unpalatable choices, it is also in full panic mode.

The problem with panicky central bankers is that they tend to miscalculate either the speed, the depth or the impact of their actions. Even absent any mistakes, rate hikes almost never perfectly stick the

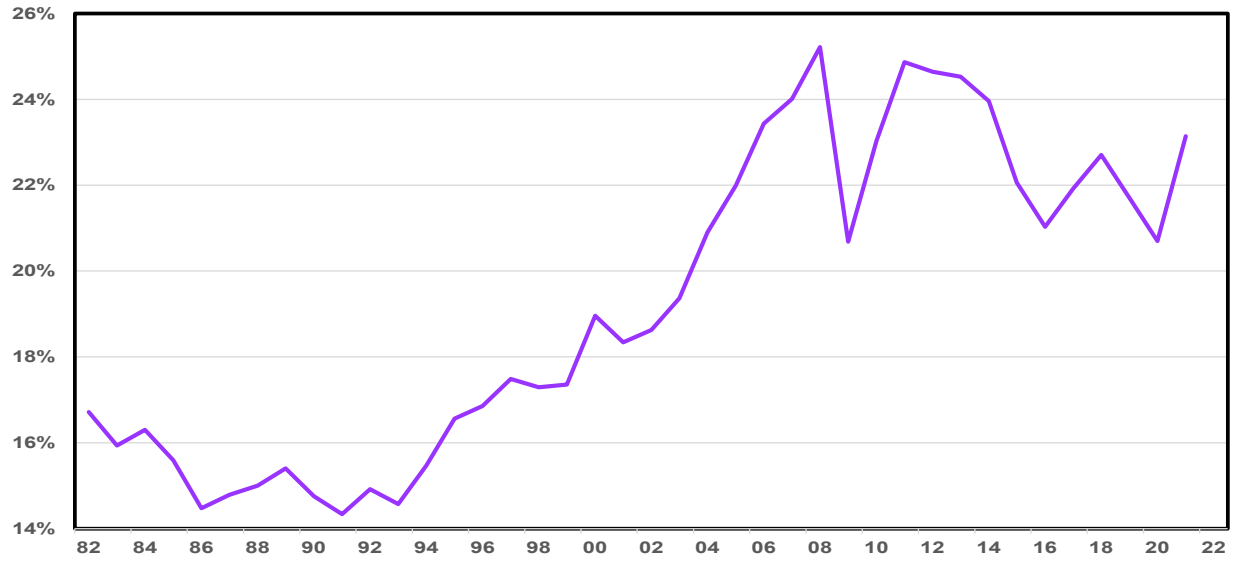
landing: cool off growth enough to rein in inflation but not so much as to choke off the expansion. Of the 13 rate hike cycles during the postwar era, 10 preceded a recession with an average lag of around 24 months. The only exceptions were the rate hike cycles of 1963, 1984 and 1994: in all three cases, inflation was much lower than now (averaging around 3% across the three cycles) and unemployment rate higher (around 6%), which means the Fed had more room to maneuver.

The pace of tightening matters too. The last hiking cycle lasted four years — from 2015 to 2019 — over which interest rates rose by a total of 225 basis points. Now, the tightening is much faster: the Bank of England has tightened a few times this year with more to come. The Fed raised the federal funds rate in June by a staggering 75 basis points, the largest hike since 1994 and signaled that another 75 bp hike is possible. All this is occurring while it is simultaneously attempting to rapidly shrink its bloated balance sheet, adding another layer of contractionary shock to an economy that is set to disappoint. Of course, rapid rate hikes are needed to bring inflation to heel. But if the past two years have taught us anything, it is that rapid moves to a new equilibrium rarely portend good omens. In a world where potential GDP growth is around 2%, rapid adjustments may be the catalyst that sinks this expansion.

1.4 A New World Order: A Pullback from Hyper-Globalization

It is not uncommon for proponents of free trade to fret about “deglobalization” after the setbacks from the Sino-American trade war, the pandemic, and the Russia-Ukraine war. Fears have risen of a slide into autarky akin to the 1930s when protectionist measures (the Smoot-Hawley levies in particular) led to a spiral of international retaliation that likely worsened the Great Depression. Indeed, global goods trade (the sum of exports and imports) has edged down by 4 percentage points to 47% from its peak in 2008, despite a strong rebound in 2021 as the world reawakened from the pandemic slumber. Global exports as a share of GDP are down by nearly 2 percentage points (Figure 19). Though in the intervening years since the Great Recession global trade has grown by 35% in value and 30% in volume, global GDP has risen even faster.

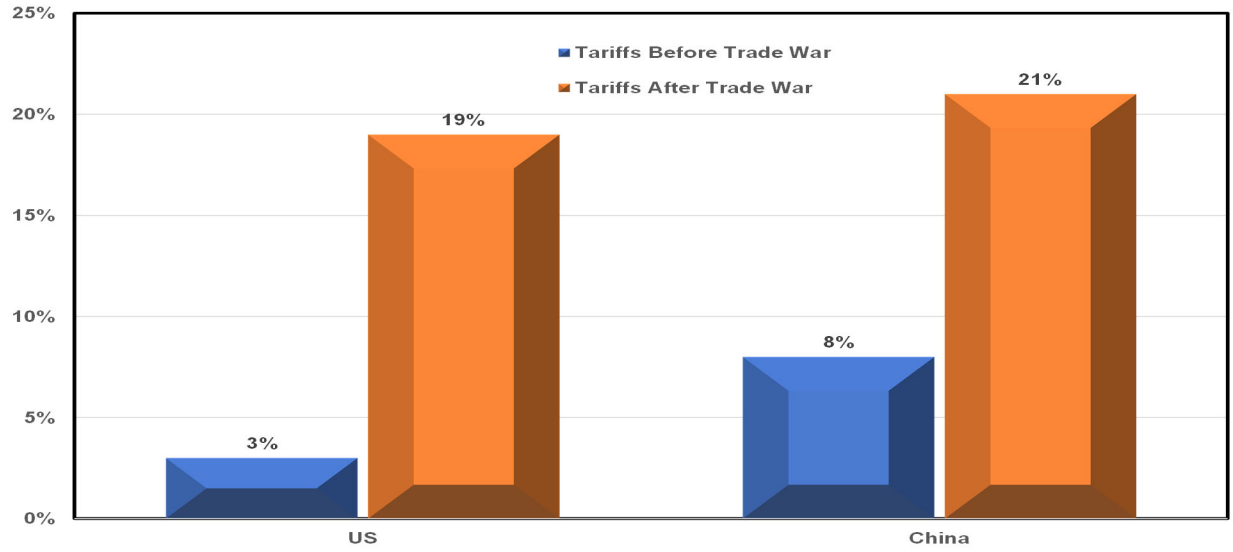
Figure 19
Global Exports Have Not Regained Prior Peaks
(global exports, percent of global GDP)



Source: International Monetary Fund, World Bank and Woods Center

On the face of it, things do look rather gloomy. The Sino-American trade war unfolded over nearly two years, from 2018-2020, during which time the average American tariffs on Chinese imports soared from 3% to 19% while the average Chinese tariffs went from 8% to 21% (Figure 20). The trade war itself took a tit-for-tat path, with measures and countermeasures picking up steam over time. The first tariffs were announced by the Trump administration on March 22 2018, with a tariff rate of 25% on $50 billion of Chinese imports. The Chinese responded with duties between 15% and 25% on $3 billion of imports from the U.S., including food and agricultural products. Since then, the U.S. levied an additional 10% tariffs on an eye-popping $200 billion of imports from China, which rose to 25% in May 2019. China retaliated with additional tariffs of 5% to 10% on $60 billion of American exports which was raised further to 25% in May 2019. On August 2019, the U.S. announced that all remaining Chinese goods ($300 billion) would face a 10% tariff starting in September of that year. The administration announced a few weeks later that the latest tariffs would be applied in two waves: in September 2019 ($112 billion) and the rest in December 2019 (after the shopping season). China responded by weakening its currency to below ¥7 per dollar – a highly symbolic but deeply psychological level – and by slapping tariffs on the remaining $75 billion worth of U.S. exports. Some of these tariffs were later eased under the auspices of the "Phase-One" trade deal signed on January 15 2020. Nonetheless, even with the de-escalating impact of the trade deal, nearly two thirds of imports from China and nearly 60% of Chinese imports from America are currently subject to higher tariffs.

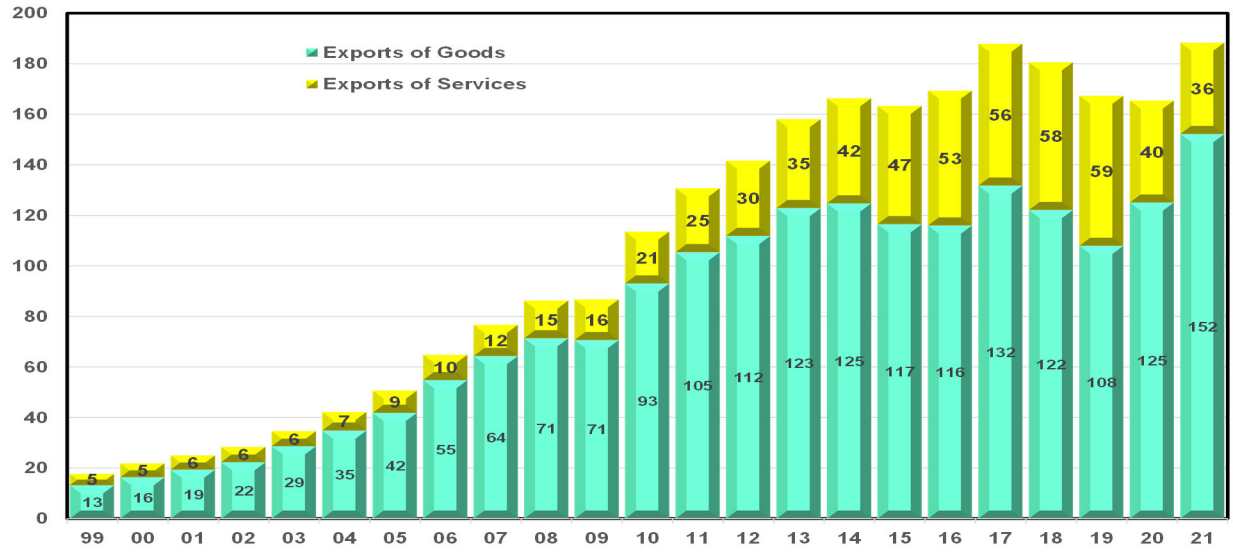
Figure 20
Average Tariffs Between US and China: Before and After the Trade War
(average tarrif rate, percent)



Source: World Trade Organization

The "Phase-One" trade deal held great promise: in return for tariff reductions, China pledged to purchase an additional $200 billion in goods and services in 2020 and 2021, compared to a baseline of $180 billion in 2017. In addition, Chinese agricultural purchases from America would rise from a baseline of $24bn in 2017 to at least $40bn in 2020 and 2021, and perhaps even higher. In the end, whether due to the pandemic, the inability, or the lack of will on the part of Chinese officials, China purchased only 57 percent of the total US goods and services exports over 2020-21 that it had committed to buy under the agreement. China purchased a total of $125 billion of US goods and $40 billion in US services in 2020 and $152 billion in goods and $36 billion in services in 2021, combining for $165 billion in 2020 and $188 billion in 2021. The latter figure is just a hair above 2017 levels, which means that the much-promised extra spending on US products never materialized (Figure 21). To be fair, exports of goods from the US to China have never been this high, rising by 16% over 2017 levels. It is the spending on services that has lagged behind, due in large part to the lingering effect of the pandemic. The overall US trade deficit with China has not improved in any meaningful sense: it fell to $284 billion in 2020 as the world plunged into the pandemic abyss, but it skyrocketed to nearly $340 billion the following year – the second highest in history – as US consumers binged on Chinese-produced goods.

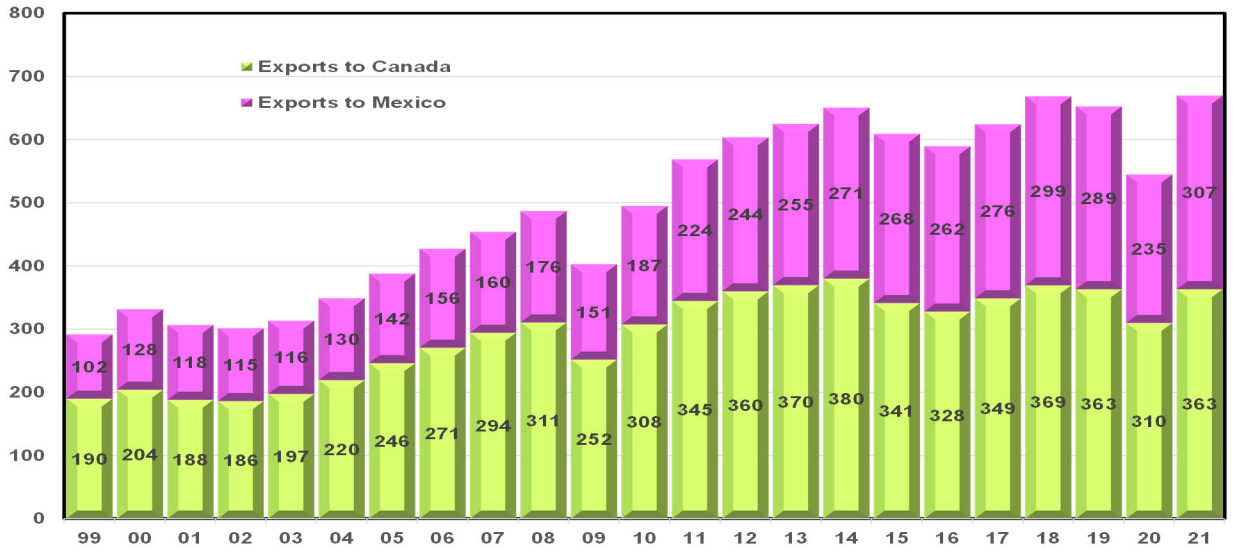
Figure 21
US Exports to China
(billions of dollars)



Source: Bureau of Economic Analysis

The previous administration had much more success in its renegotiation of NAFTA. Christened the United States-Mexico-Canada Agreement, or USMCA, the new treaty had something in it for all parties involved. It includes U.S. demands on changing the rules of origin for vehicles, increasing the threshold produced in North America to 75% from 62.5%. The new treaty also requires that 40% to 45% of a vehicle be made by workers earning at least $16/hour – a measure aimed at discouraging firms from moving supply chains to lower-wage Mexico. It opens the Canadian dairy markets to U.S. farmers, and it updates and modernizes the old treaty based on new economic realities, including whole new chapters on digital trade, financial services and intellectual property. The US was seeking a sunset clause of five years, but it had to compromise on a 16-year period instead (the three countries can meet every six years to decide if they want to renew the pact). Another point of contention – the one on investor-state dispute settlement (ISDS) – also ended in a compromise: the ISDS was sharply scaled back (a win for the Trump administration), but Chapter 19, an arbitration system dealing with trade disputes, survived (a win for Canadian officials). Exports of goods and services to Canada and Mexico reached nearly $670 billion in 2021 – the highest ever -- and even though the trade deficit with these two countries has also reached a record high, at $140 billion it is still less than half of our trade deficit with China (Figure 22).

Figure 22
US Exports to Canada and Mexico
(billions of dollars)



Source: Bureau of Economic Analysis

Though the brunt of the US desire to reshape global trade was primarily borne by China, other countries were not spared some pain, though in these cases the tariffs targeted specific products rather than a broad swath of a country's exports to the US. In January 2018, the Trump administration announced tariffs on solar panels (30%) and washing machines (20%), followed by the March announcement of tariffs on steel (25%) and aluminum (10%) which affected imports from a raft of countries, most notably, the EU, Canada and Japan. In turn, the European Union threatened retaliatory tariffs on a raft of the most iconic American goods, such as Levi's jeans, Kentucky bourbon and Harley Davidson motorcycles.

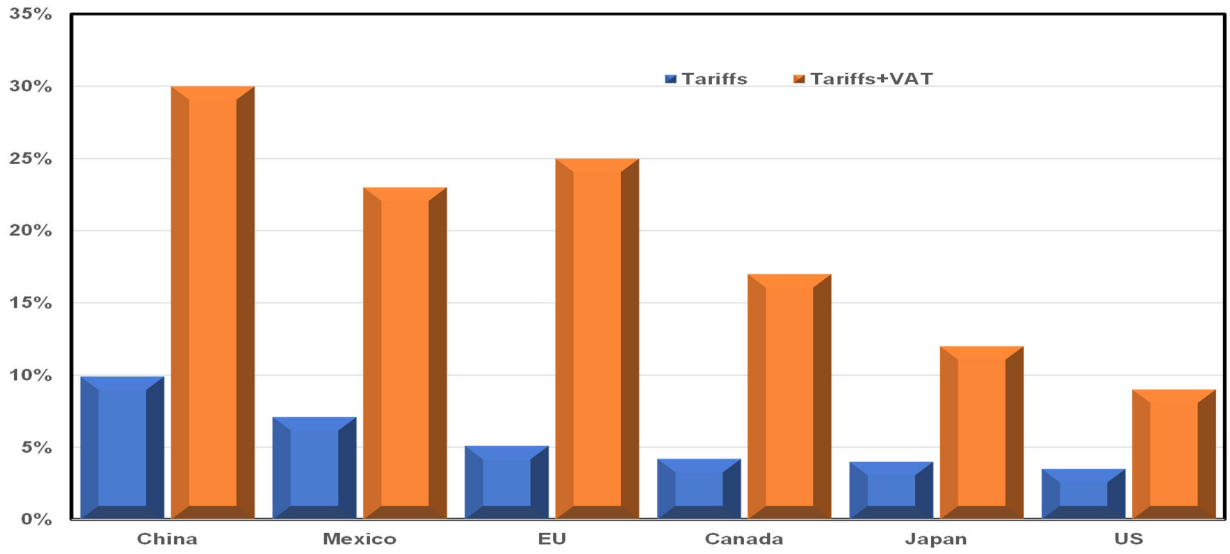
Despite a friendlier attitude and a softer tone in international affairs, the Biden administration has made very few and rather cosmetic changes to Trump's trade policies. Most importantly, it has kept intact the China trade tariffs. Indeed, since entering office, President Biden has replaced the Section 232 tariffs on steel and aluminum imports from the EU and the UK with a tariff rate quota system (TRQ). It also replaced tariffs on steel imports from Japan with a TRQ (tariffs on aluminum imports from Japan are still in effect). On May 23 2022, the administration unveiled a new pact: the Indo-Pacific Economic Framework (IPEF) in an attempt to build a strategic trade structure in Asia aimed at counterbalancing China's power. Nonetheless, the pact is long in promises and short in deliverables: it claims to be built on four pillars with trade promotion being one of them. The other three objectives are to make supply chains more resilient, to promote infrastructure investments and clean energy and to form new rules of taxation. There are no discussions on negotiating tariff rates: that would require Congressional approval and is a rather thorny topic in an age where appetite for more globalization seems to be waning.

This "turn inwards" has raised concerns that the world is retreating from globalization and descending into an era of significant decoupling akin to the 1930s. Some of these concerns appear to be a bit overblown. Our view is more sanguine than the consensus in that some reshaping of the current system may be needed. Deglobalization trends were well underway in some areas even before the pandemic and the Russia/Ukraine war, but they are unlikely to take hold in other areas and the world is not about to

descent into a 1930s style autarky. As Dani Rodrik – the Ford Foundation Professor of International Political Economy at Harvard University – put it: "…what we are seeing is a natural and desirable retrenchment from hyper globalization that characterized the world over the past two decades as the world tries to find a happy medium between the excesses of hyper globalization and the dangers of autarky."

Indeed, some grievances against the "hyper globalization" of recent decades are not without merit. America's tariffs under the WTO are lower than those of other countries: in 2015, the U.S. applied an average tariff rate of 3.5%, compared to 4.0% for Japan, 5.1% for the EU and 9.9% for China (Figure 23). When adding sales taxes (in the U.S.) and a significantly steeper value-added-tax (in Europe and China), the outcome is decidedly more lopsided against the U.S.: trade duties end up being as high as 24% in Germany, 25% in Great Britain and France, and 27% in China. Specific goods fare worse: U.S. car manufacturers face a 25% tariff rate in China, while tariff for car imports in the U.S. are only a tenth of that, at 2.5%. The WTO has allowed developing countries to impose far higher tariffs than industrialized ones, while they build up their industries at home. By joining the WTO, China has benefited immensely from lower tariffs that were negotiated over decades between the U.S. and other industrialized economies, while giving up little in return.

Figure 23
Average Tariffs and VATs Before Trade War
(average, percent, 2017 levels)

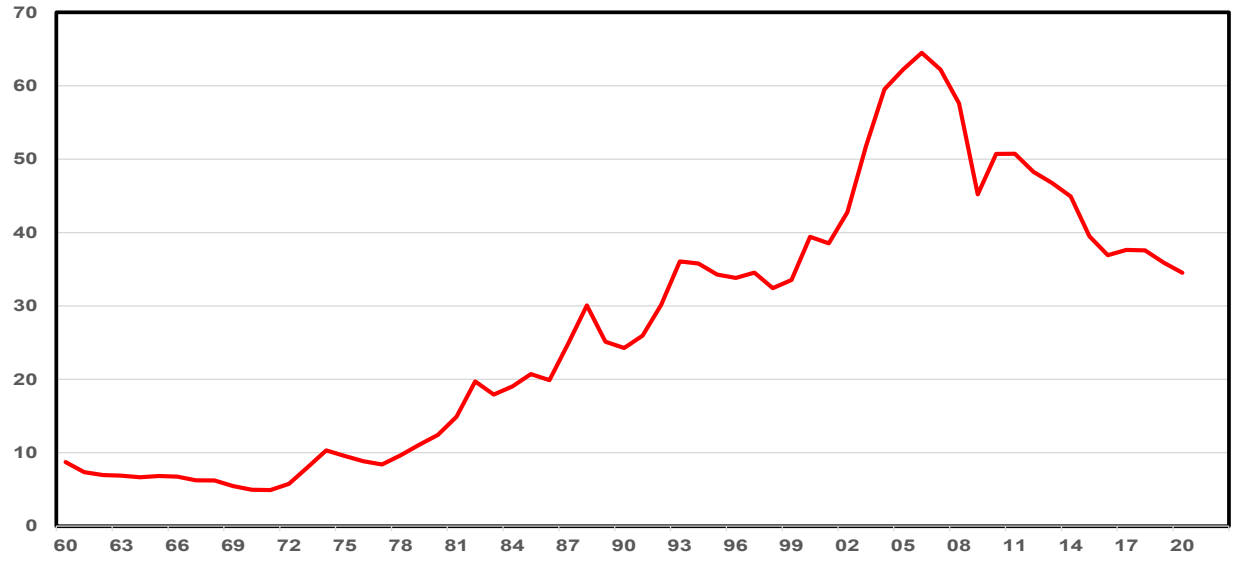


Source: WTO, International Monetary Fund and Woods Center

Few would disagree that fairer but still free trade would benefit everyone, and even the staunchest supporters of free trade (such as ourselves) would agree that China's approach to trade has been consistently underhanded and less than fair. The Made in China 2025 plan – a blueprint for that country to develop its own global presence in fields from information technology to electric cars – relies heavily on coddling domestic firms, increasing trade barriers, and pressuring foreign companies to hand over technology and intellectual property in exchange for access to Chinese markets.

Fairness issues aside, what those worried about the fate of free trade seem to miss is that a deceleration from hyper globalization has also occurred in a more organic and predictable ways. For example, as China gets richer, it has turned away from its outsized dependence on trade: its trade share of GDP has fallen sharply since 2006, from more than 60% of GDP to a current 35% (Figure 24). This is expected: as incomes rise, demand tends to move away from goods towards services which are usually produced and consumed domestically.

Figure 24
China Has Become Less Reliant on Trade
(China trade as percent of GDP)



Source: World Bank and Woods Center

Trade is also becoming more regionalized. Witness the most recent agreements which aim at liberalizing trade: almost all of them are regional trade deals. In November 2020, 15 Asia-Pacific countries signed the Regional Comprehensive Economic Partnership, the world's biggest trade block. A number of Asia-Pacific countries have also signed on to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership. Thirty-eight African countries ratified the African Continental Free Trade Area in January 2021.

Supply chains are also getting shorter at least for some sectors and for some products. Though there has been much fretting about the possibility that firms would opt to altogether scramble their supply chains since the pandemic and opting for reshoring instead, our view is that any significant reshoring is unlikely, at least in the near term. Despite some countries' efforts to reshore semiconductor production (most notably the EU and the US), the feasibility of this venture is still remote due to punitively high costs. Nonetheless, we are likely to see more near-shoring in the foreseeable future and a shortening of supply chains, especially with a continuation of China's zero-covid policy. Indeed, some of this near-shoring was already underway: for example, China's share of car parts imported by the US fell by 2.2 percentage points in 2019 compared to 2017, while the share coming from NAFTA trading partners rose by 2.8 percentage points. Similarly, the share of imports of chemicals from China fell by 1 percentage points, while that from North America rose by nearly 7.5 percentage points.

Some products and sectors are seeing simply a reshaping of supply chains away from China and towards other Pacific Asian countries. US imports of furniture and toys from China fell by 10 percentage points from 2017 to 2019, but those from South East Asia rose by 7.5%. Similarly, imports of textiles from China fell by 5%, while those from South East Asia rose by 4%.

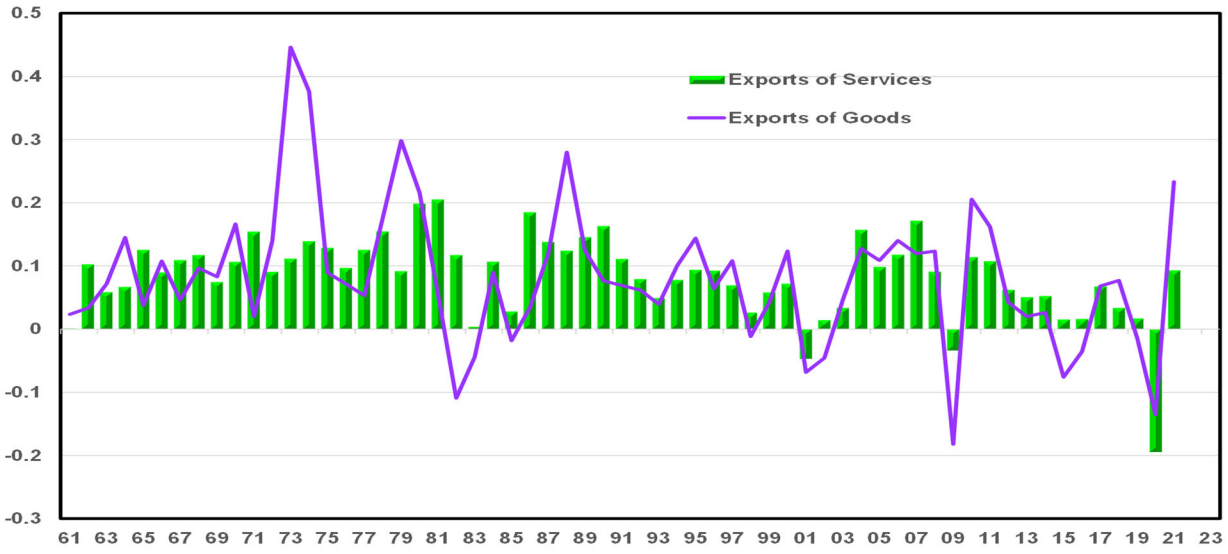
These developments do not spell the doom of global trade, but rather a reshaping of trade towards a more sustainable path. The face of new globalization is more regionalized, with perhaps fewer Chinese characteristics, and more diverse supply lines. Also, while the flow of goods and capital has undoubtedly slowed over the past decade and a half, digital cross-border activity has ramped up with exports of computers and communication services now accounting for 3% of world GDP, up from 2% a decade ago. The new face of globalization has changed and will continue to change as countries retrench from the hyper globalization of the past few decades, but this does not mean we are about to experience a complete corrosion of global integration and a descent into autarky.

2. US EXPORTS: RECENT TRENDS AND OUTLOOK

US exports of goods have closely followed the pattern of global merchandise exports. They collapsed by 13.5% in 2020 when the world shut down from the pandemic, but rebounded by a hefty 23.3% in 2021, the fastest pace in more than 30 years (Figure 25). US merchandised exports rose to a record $1.76 trillion in 2021 with this trend continuing in the current year. As was the case for global trade, the pandemic proved to be far less disruptive to US exports of goods than the Great Recession: exports fell by a stomach-churning 18.2% in 2009 at the height of the financial crisis. The intervening years saw a few setbacks as well: merchandise exports fell by 7.6% in 2015 and an additional 3.6% in 2016 as oil prices collapsed, China wobbled and the world economy slowed down. The escalation of trade wars in 2019 took another bite, with US exports of goods declining by 1.5% that year. Nonetheless, the rebound from the pandemic has been so utterly spectacular that merchandise exports are expected to set new record highs over the next few years, albeit at a more rapid pace in 2022 than the following two years. That's because, as this report argues, the global economy is set to decelerate sharply from the rapid growth (5.8%) it experienced in 2021, growing by 2.8% in 2022 and 2.7% in 2023. This will undoubtedly slow demand for US products: we forecast US merchandise exports to grow by 10.2% in 2022, 4.8% in 2023 and 3.7% in 2024.

US exports of services have experienced quite a different pattern from exports of goods over the past decade and a half. While service exports barely budged during the Great Recession, falling by a mere 3.4% in 2009, they outright collapsed by nearly 20% in 2020 due to the severe impact of the pandemic on the service sector (Figure 25). Outside these two recessionary years, service exports have experienced continued growth since the Great Recession showing far less volatility than merchandise exports, growing even in 2015-2016 when global growth softened. Nonetheless, the pandemic had a significant damaging effect on service demand and as the virus continues to linger and flare-up periodically, the rebound from the pandemic-abyss has been less buoyant than that of merchandise exports: while the latter grew by a staggering 23.3% in 2021, service exports posted a more muted 9.3% growth.

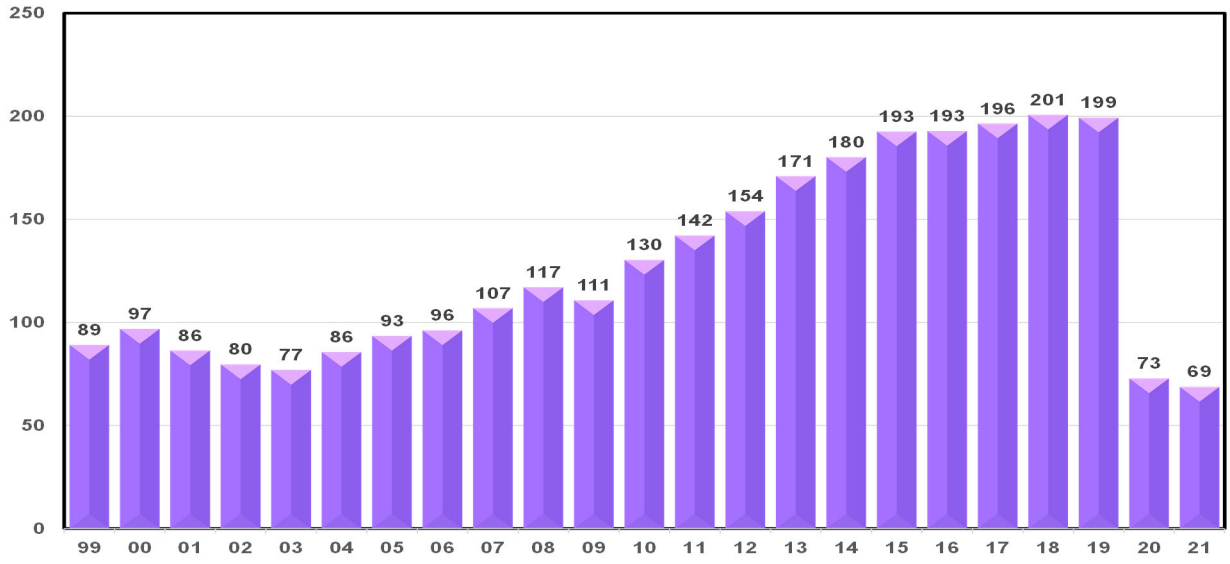
Figure 25
US Exports of Goods and Services
(percent change, y-o-y)



Source: Bureau of Economic Analysis and Woods Center

The good news is that service exports should be pick more robustly over the forecast horizon as the pandemic recedes and pent-up demand for services picks up. In the US alone, Moody's Back-to-Normal Index is still 6% below its pre-recession level, largely because of a persistent shortfall in various service-related sectors. As of early June, TSA foot traffic is around 8% below normal levels, and while dining out has almost caught up with pre-pandemic figures at the national level, significant disparities persist as some of the largest cities continue to languish: Seated diners are down 43% in New York City, 42% in San Francisco and 38% below normal levels in D.C.. Spending from international travelers to the US shriveled

Figure 26
Spending by International Travelers Has Shriveled but Will Pick Up
(billions of dollars)

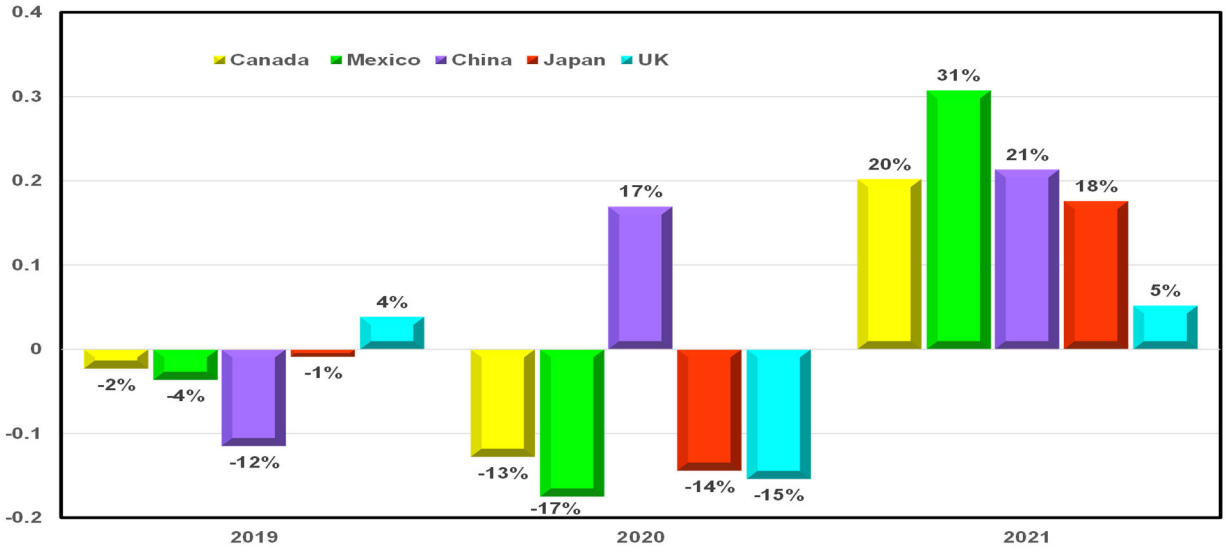


Source: Bureau of Economic Analysis and Woods Center

to $72 billion in 2020 and $68 billion in 2021 down from an average of $200 billion pre-recession, but should pick up significantly over the summer months and for the rest of the year particularly now that covid-related restrictions have been eased (Figure 26).

The top five destinations for US merchandise exports in 2021 (latest ITA data available) were: Canada (with 17.5% of total goods exports), Mexico (15.8%), China (8.6%), Japan (4.3%) and the UK (3.5%). India has edged Hong Kong for the 10th spot as an export destination since 2018, accounting for 2.3% of US merchandise exports. Indeed, the US has surpassed China to become India's top trading partner in 2022, reflecting strengthening economic ties between the two countries, with the bilateral trade between them rising to nearly $120 billion ($76 billion in US imports and $46.8 billion in US exports) from $80.5 billion in 2020. Exports fell in four out of five top export destinations in 2019 as trade wars ramped up, with exports to China collapsing by more than 11% (Figure 27). Interestingly, US exports to China have grown for two straight years after that, posting a growth rate of nearly 17% in 2020 and 21.3% in 2021, despite the pandemic. In fact, US exports to China were the only ones that grew at the height of the pandemic (in 2020), perhaps reflecting some commitment on the part of Chinese to stick with the "Phase-One" trade deal. It also reflects a stronger rebound from the pandemic in China which was one of the first countries to swiftly reopen in 2020, after quashing the first wave of the virus. We anticipate US exports to China to cool of dramatically during the forecast horizon as China grapples with the pandemic this year and as its economy continues to slow.

Figure 27
US Exports of Goods: Top 5 Countries
(y-o-y percent change)

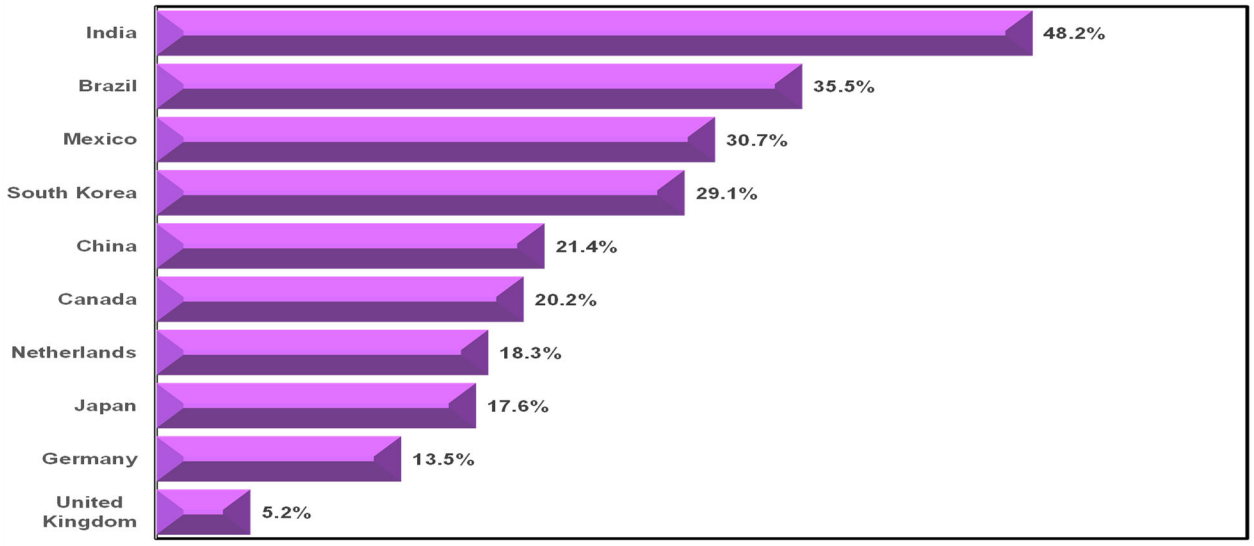


Source: ITA and Woods Center

Exports to Canada, Mexico and Japan also fell modestly in 2019 as trade skirmishes ramped up and the Trump administration levied tariffs on imported steel and aluminum from these countries. The pandemic took another toll with exports to Mexico falling by -17% in 2020, to UK by -15%, to Japan by -14% and to Canada by -13%. Nonetheless, the post-pandemic rebound has been even more spectacular: of the top 10

export destinations, US merchandise exports to India grew the most -- by an astounding $48% -- followed by those to Brazil (35%), Mexico (30%), and South Korea (29%) (Figure 28).

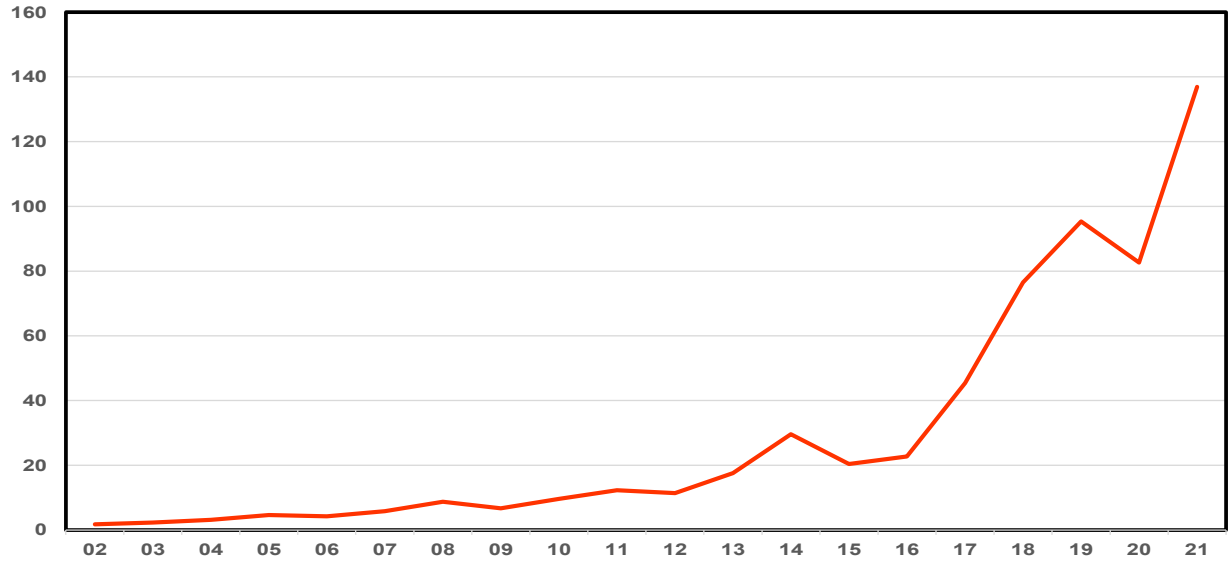
Figure 28
US Export Rebound Has Been Spectacular
(export growth, y-o-y percent change, top 10 countries)



Source: ITA and Woods Center

There has been a sizable shift in the types of products that US exports to the world. For nearly a decade since the financial crisis the biggest export category was Transportation Equipment, accounting for nearly 17% of total exports. This has changed over the last two years, with Transportation Equipment's share of total exports dropping to 14% in 2020 and 12.6% in 2021, ranking third in the types of products the country exports. Chemicals have now claimed top spot, accounting for 14.4% of total exports, followed

Figure 29
Oil and Gas Exports: A Staggering Increase
(billions of dollars)

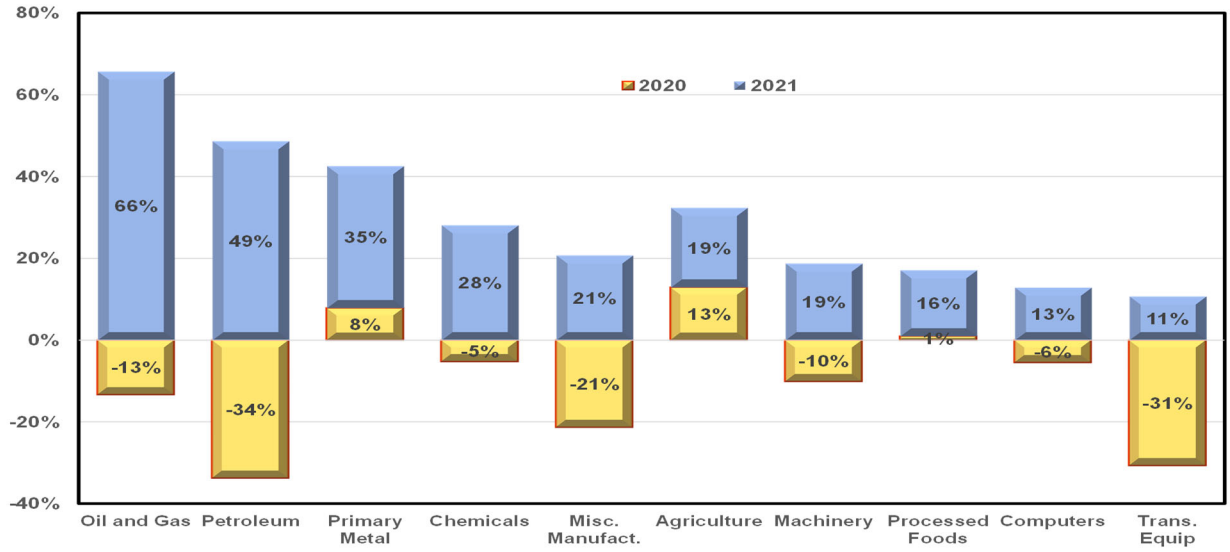


Source: ITA and Woods Center

by Computer and Electronic Products (with a share of 12.7% of total exports). But the fastest growing category has been Oil and Gas exports: Since 2013, exports from this sector have grown from a mere $17 billion to a current jaw-dropping $136 billion, a nearly seven-fold increase (Figure 29). This does not come as a surprise: the shale industry has made America the world's top producer of crude oil and the top producer of natural gas these past few years.

Indeed, Oil and Gas Exports rebounded faster than any category in 2021, when the world demand picked up and economies began to reopen, growing by a staggering 66% (Figure 30). Petroleum exports have also recovered fast, rising by almost 50% after collapsing by nearly a third in 2020 when the world shut down. By far, the best performing sectors over the past two years have been Agricultural Products and Processed Foods. These two sectors (as well as Primary Metal Manufacturing) were the only sectors that actually grew in 2020, when other sectors collapsed. The increase in Agricultural products is largely due to the "Phase-One" trade deal with China. In it, China promised to increase purchases of agricultural products to $40 billion, which by and large it has nearly accomplished, purchasing $38 billion in 2021.

Figure 30
Top Ten Exporting Sectors
(y-o-y, percent change)

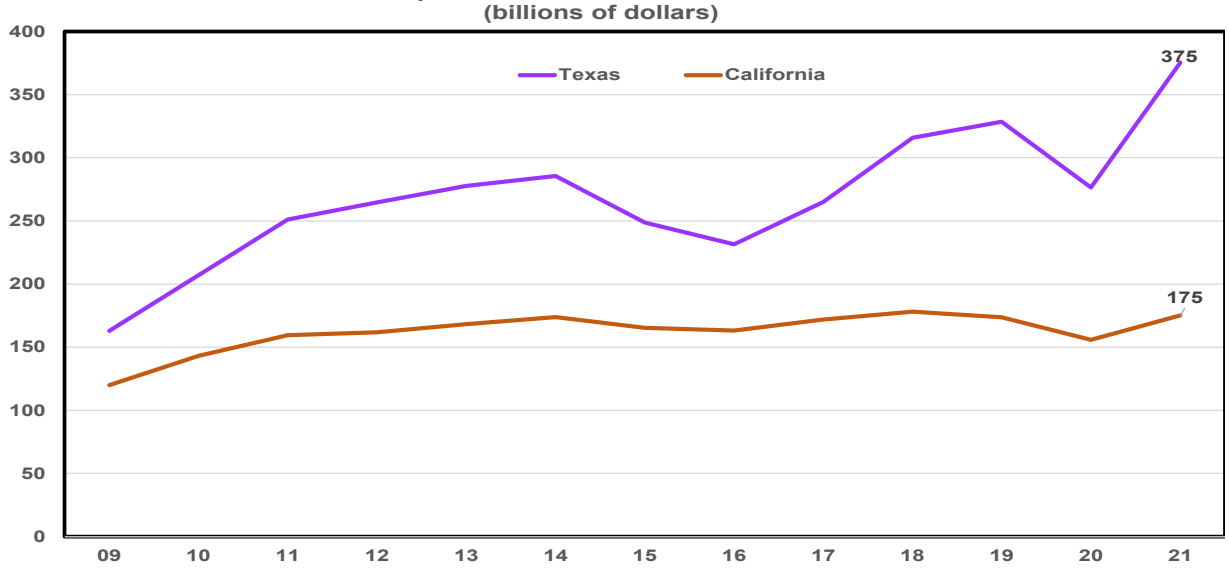


Source: ITA and Woods Center

3. CALIFORNIA EXPORTS: RECENT TRENDS AND OUTLOOK

The pandemic and its aftermath have taken a toll on California exports. Though it continues to rank second in the nation in merchandise exports (behind Texas), it has struggled to recover its pre-pandemic export levels: in 2021, California exports came to $175 billion, a hair short of the $178 billion recorded in its peak of 2018. In contrast, merchandise exports from Texas have risen from $315 billion in 2018 to a current $375 billion (Figure 31). Worse, the gap between the largest two exporting states has grown dramatically over the past few years, with Texas now accounting for more than one fifth of the nation's exports and California for less than one tenth.

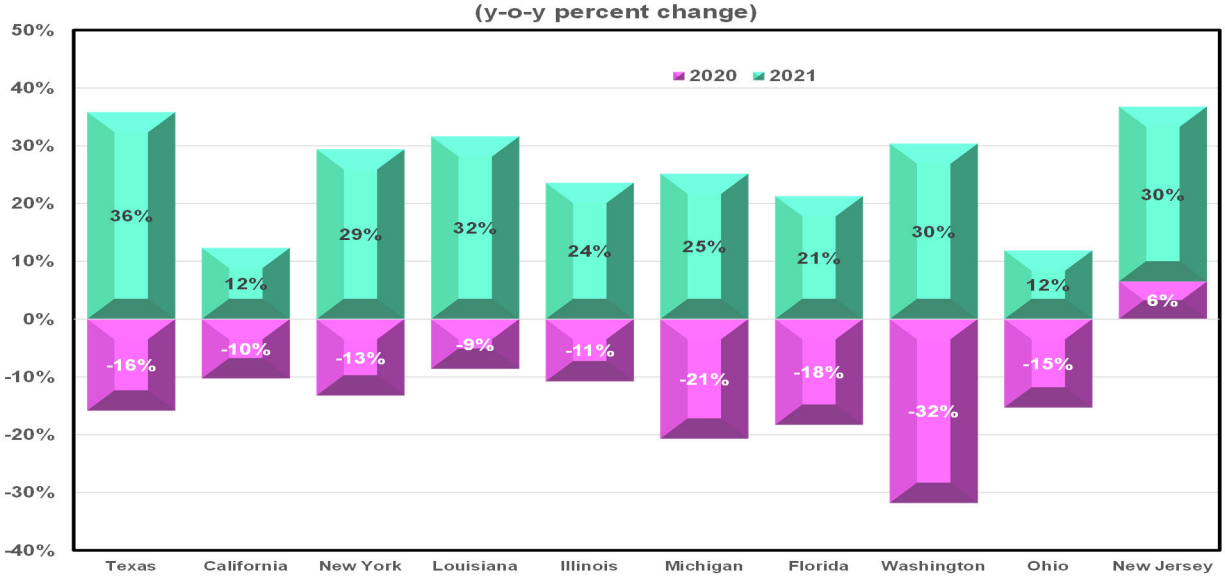
Figure 31
CA Exports Have Fallen Far Behind Texas
(billions of dollars)



Source: ITA and Woods Center

Indeed, though California exports rose by 12.6% in 2021, the growth was the second lowest amongst the top ten exporting states in the nation (behind Ohio's). Exports from Texas skyrocketed by 36% in 2021 -- the most in any state -- after falling by 16% in 2020. Exports from the rest of top exporting states rose by more than 23% (Figure 32). However, despite this impressive turnaround for most states, it is important to note that only three out of the top ten, Texas, Louisiana and New Jersey, have set fresh new highs. Most other states are still struggling to catch up with the record exports of the mid-2010s: exports from the state of Washington are down a jaw-dropping 40% from the peak in 2014; Florida's exports are 16% below record-levels in 2012; Michigan and Ohio's are 7.3% below the highs of 2013 and 2014, respectively. By comparison, California exports fall short of their 2018 peak only by a miniscule 1.7%, and given recent trends we expect the state to set a new high this year in merchandise exports.

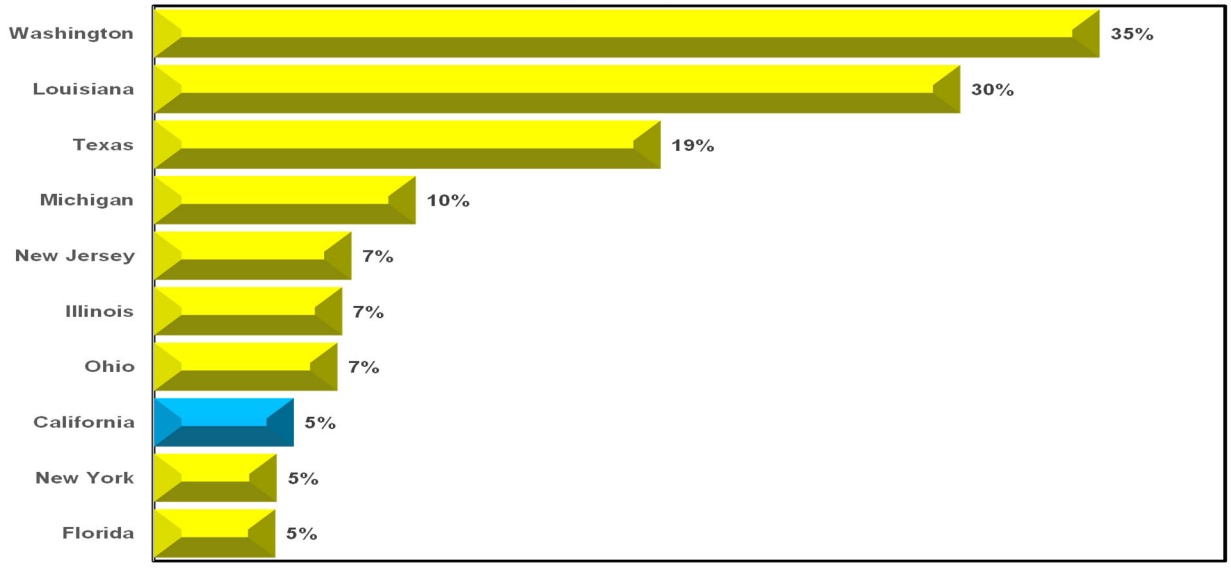
Figure 32
Exports from Top Ten States
(y-o-y percent change)



Source: ITA and Woods Center

Exports have never accounted for much of the state's GDP, unlike other top exporters, and with a tepid recovery from the recession, the share of merchandise exports in state's GDP has slid even further: Exports now account for 5.2% of California's GDP, down from 6.2% in 2016. This is far behind some of the top exporting states: exports account for a full 35% of Washington's GDP, 30% of Louisiana's economy and nearly 19% of Texas' GDP (Figure 33). This speaks to the diversity of the state's economy, which tends to insulate the state from the booms and busts of global trade.

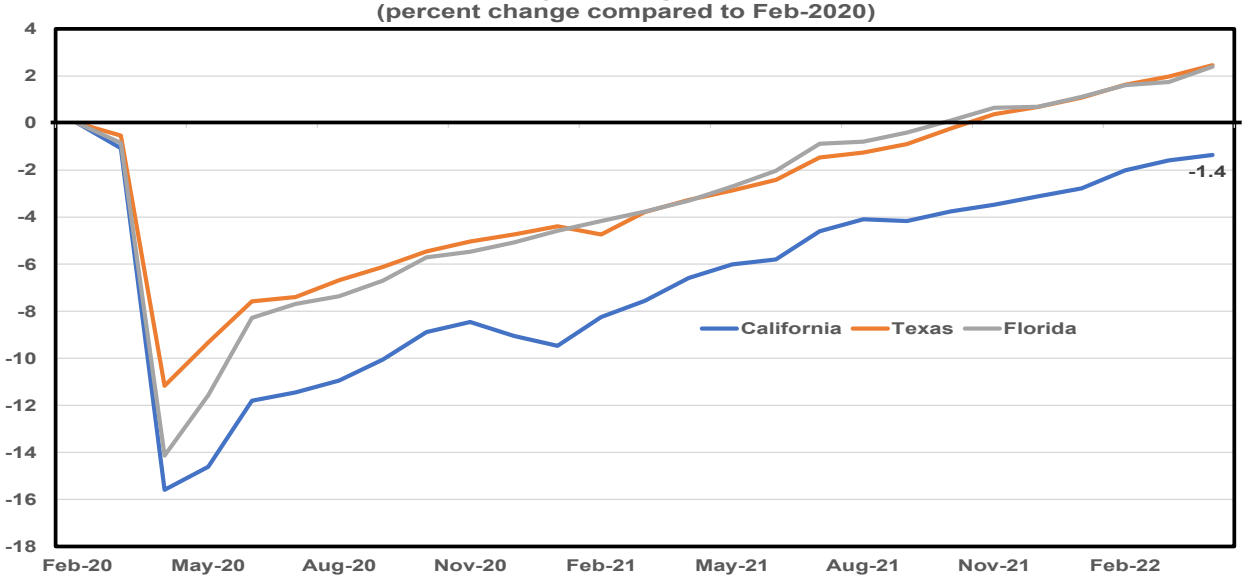
Figure 33
State Exports as Share of State GDP
(percent)



Source: ITA, BEA and Woods Center

Some of the slow rebound from the pandemic can be attributed to California's more stringent lockdown restrictions during the pandemic and a slower pace of normalization compared to other states. For example, when the first lockdown was implemented, California lost a full 16% of its workforce, while Florida and Texas lost around 14% and 12%, respectively (Figure 34). More importantly, California implemented more stringent criteria throughout the pandemic than other states, adopting a second lockdown in summer 2020 and a third one in the winter of 2020/2021. Though the labor market has improved over the past year and a half, it has fallen behind a few states: currently payroll employment in California is down -1.4% compared to February 2020 levels, while Texas and Florida's are up 2.4% compared to pre-pandemic levels.

Figure 34
California Employment Lags Texas and Florida
(percent change compared to Feb-2020)



Source: BLS and Woods Center

But perhaps the main reason why California exports have rebounded less buoyantly than other states, has to do with the types of products exported by the state. The largest export product category from California is Computer & Electronic Products ($39.7 billion in 2021), which accounts for slightly more than a fifth of all exports from the state. Machinery ($20.3 billion) is the second largest (accounting for 11.6% of total exports), followed by Chemical Manufacturing with $17.5 billion (10% of total exports). However, with the exception of Chemical Manufacturing exports which grew nationally at a galloping 28% in 2021, exports in high demand were Oil and Gas, Petroleum and Agricultural Products. The states that outperformed California in 2021, were those that relied extensively on these sectors. Texas and Louisiana rely primarily on exports from Oil & Gas and Petroleum products; New York and New Jersey on Chemical exports, and Washington on agricultural products. We expect California exports to grow by 13.5% in 2022 – a bit faster than national average – and then rise at a more moderate pace over the forecast horizon: by 3.8% in 2023 and 2.7% in 2024.

4. LOS ANGELES–LONG BEACH–ANAHEIM EXPORTS

The Los Angeles-Long Beach-Anaheim MSA is a large economy with a gross metropolitan product of $1 trillion in 2020, the second largest behind the New York-Newark-Jersey City MSA. The two-county region's population reached 13.2 million in 2020, the second highest in the U.S. The pandemic hit Southern California quite hard, with LA county losing nearly 16% of its employment in the span of two months, from April-May 2020 when the lockdown went into effect. The recovery for both OC and LA counties has lagged the state's and Inland Empire's, with current employment languishing below pre-pandemic levels by 2.3% and 2.7%, respectively. The state has also not quite regained its pre-pandemic employment rolls, but it is only a mere 1.4% below the February 2020 peak. In contrast, Inland Empire has fully recovered and then some with employment levels currently 3.6% above its February 2020 levels. Nonetheless, despite a more tepid recovery, the Los Angeles-Long Beach-Anaheim MSA has continued to recover with unemployment rates dropping from a high of 12.3% in May 2020, to a current 4.5%.

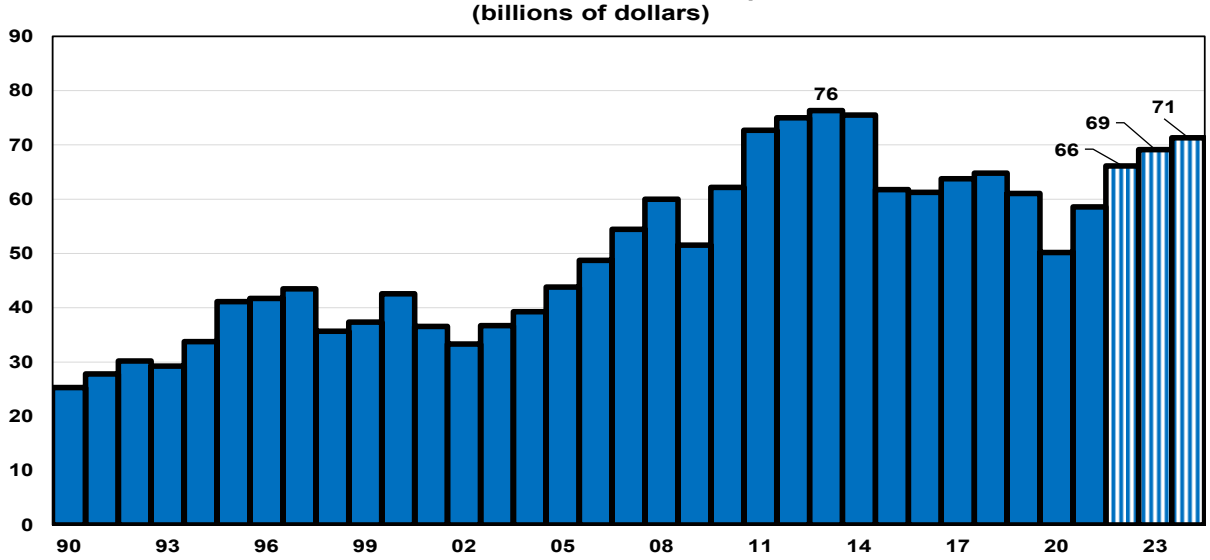
Merchandise exports from the Los Angeles-Long Beach-Anaheim MSA account for about 5.0% of the Los Angeles-Long Beach-Anaheim MSA Gross Metropolitan Product. A major advantage for the region is its direct access to the nation's two main ports, extensive infrastructure, strong manufacturing base, and massive distribution and warehousing centers. The next section analyzes Orange County separately even though it is part of the larger Los Angeles-Long Beach-Anaheim MSA and contributes significantly to the area's economic growth and development.

The International Trade Administration (ITA) provides total merchandise exports for the Los Angeles-Long Beach-Anaheim MSA only from 2005 through 2020. The U.S. Census Bureau provides total merchandise exports for the Los Angeles MSA for 2021. While the ITA provides detailed data from 2005 through 2020 (by region, country (top 50), and sector (top 30)), considerably fewer details are available for 2005, 2006, 2007, and 2021. No export data are available for the period preceding 2005. The Woods Center provides historical estimates prior to 2005 and for 2021 which are derived from an econometric model that accounts for trends in regional, state, national and international trade patterns. These estimates are consistent with the new methodology adopted by the U.S. Census Bureau for tracking merchandise exports (see Appendix A2 and A3). Forecasts for 2022-2024 are based on statistical and econometric models using historical estimates for the region's exports, state and national export volumes, trade-weighted exchange rates, labor productivity in export-related industries, as well as U.S. and foreign real GDP growth rates.

4.1 Los Angeles-Long Beach-Anaheim MSA Merchandise Exports

Exports from the Los Angeles – Long Beach – Anaheim MSA surged by 16.7% to $58.6 billion in 2021 (Figure 35 and Table 2) as the economy reopened and the world reawakened from the pandemic slumber. The 2021 figure is a full $8.4 billion higher than the $50.2 billion recorded in 2020. Merchandise exports had already declined by -5.8% in 2019, as trade wars escalated across the world, but they collapsed by 17.8% in 2020 as the pandemic shut down the world. Despite the strong rebound in 2021, exports from the area are still below the $61 billion recorded in 2019 and well below the record high of $76.3 billion in 2013.

Figure 35
LA MSA Total Merchandise Exports
(billions of dollars)



Source: *Woods Center, California State University Fullerton and International Trade Administration*

Merchandise exports from the region are projected to increase by 12.9% in 2022 to $66.1 billion. As discussed earlier in the report, we anticipate global growth to take a meaningful step back in 2023 and 2024, which will result in moderate growth in the demand for merchandise exports from the region. Exports from the area are projected to grow by 4.5% in 2023 reaching $69.1 billion. By 2024, we expect them to reach $71.3 billion, which is a further 3.2% increase. While the relatively strong recovery in merchandise exports from the Los Angeles-Long Beach-Anaheim MSA over the forecast horizon is impressive, the $71.3 billion projected in 2024 is $5.0 billion less than the record high of $76.3 billion in 2013.

Table 2
LA-LB-AN Total Merchandise Exports
(millions of dollars)

Year	Total Export Volume	Growth Rate
1990	25,290	n/a
1991	27,824	10.0%
1992	30,208	8.6%
1993	29,229	-3.2%
1994	33,757	15.5%
1995	41,113	21.8%
1996	41,739	1.5%
1997	43,480	4.2%
1998	35,669	-18.0%
1999	37,372	4.8%
2000	42,573	13.9%
2001	36,538	-14.2%
2002	33,324	-8.8%
2003	36,725	10.2%
2004	39,279	7.0%
2005	43,814	11.5%
2006	48,718	11.2%
2007	54,433	11.7%
2008	59,986	10.2%
2009	51,528	-14.1%
2010	62,168	20.6%
2011	72,689	16.9%
2012	75,008	3.2%
2013	76,306	1.7%
2014	75,471	-1.1%
2015	61,759	-18.2%
2016	61,246	-0.8%
2017	63,753	4.1%
2018	64,815	1.7%
2019	61,041	-5.8%
2020	50,185	-17.8%
2021	58,588	16.7%
	Forecast	
2022	66,129	12.9%
2023	69,123	4.5%

2024	71,316	3.2%

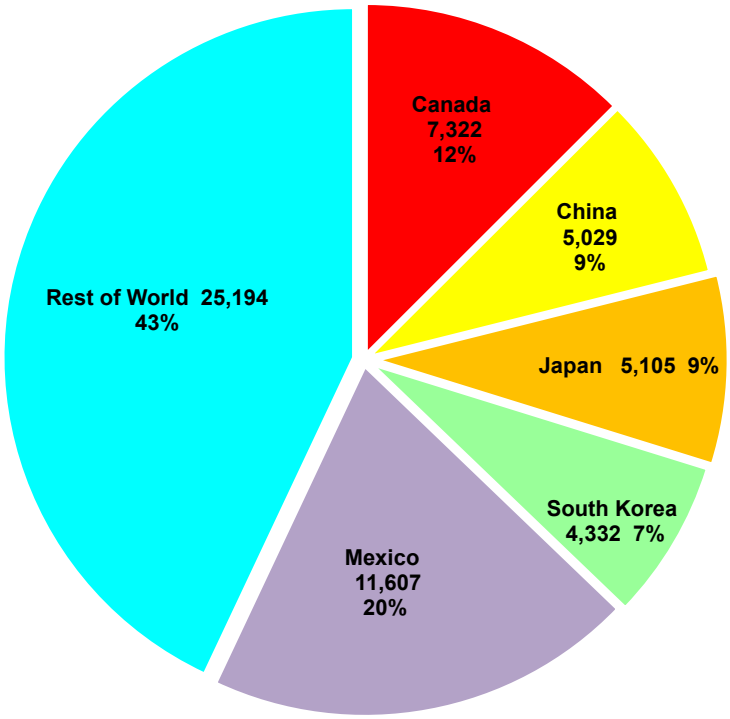
Source: *Woods Center, California State University Fullerton and International Trade Administration*

4.2 Los Angeles-Long Beach-Anaheim MSA Merchandise Exports by Country

Estimates for the five largest trading partners for the Los Angeles-Long Beach-Anaheim MSA in 2021 were: Mexico ($11.6 billion), Canada ($7.3 billion), China ($5.0 billion), Japan ($5.1 billion), and South Korea ($4.3 billion) as shown in Figure 36 and Table 3. The large decline in merchandise exports to Mexico in 2019 of -$2.3 billion was followed by a fall of -$0.7 billion in 2020. However, exports to Mexico increased by a significant 31.1% to $11.6 billion in 2021. Mexico remains the leading country for Los Angeles MSA exports, exceeding the second largest trading partner, Canada, by a hefty $4.8 billion. It is interesting to note that exports to Mexico fell by a jaw-dropping -19.4% in 2019, as trade wars heated up, but by a more muted 7.4% in 2020 during the height of the pandemic. The share of merchandise exports to Mexico has increased from 17.6% in 2020 to 19.8% in 2021.

Merchandise exports to Canada declined by -6.3% to $7.3 billion in 2019 followed by a large -16.2% decline to $6.1 billion in 2020 with an increase of 20.0% back to $7.3 billion in 2021. Canada's share of merchandise exports rose to 12.2% in 2020 compared to 11.9% in 2019, with another increase to 12.5% in 2021. Japan is the third largest destination of merchandise exports from the Los Angeles MSA with an estimated $5.1 billion in 2021, just edging out China's $5.0 billion. Japan's share of merchandise exports is 8.7% -- slightly higher than China's share of 8.6%. South Korea rounds up the fifth spot with exports rising by 2.4% in 2019, but declining by a much more modest -0.7% in 2020. By 2021, exports to South Korea are estimated to have reached $4.3 billion, the highest recorded figure. We expect this trend to continue with exports from the region to South Korea increasing over the forecast horizon. Merchandise exports to the top three trading partners (Mexico, Canada, and Japan) accounted for an estimated 21.8% of total exports from the region in 2021.

Figure 36
LA MSA Exports by Country
(millions of dollars, 2021)



Exports to all of the five top countries are projected to increase over the forecast horizon, at a relatively robust pace in 2022 and a much more moderate rate in 2023 and 2024. For Mexico, we expect growth of 15.5% to $13.4 billion in 2022 followed 6.2% to $14.2 billion in 2023 and another 3.4% to $14.7 billion in 2024. This will still be below the record high of $19.4 billion in 2013. For Canada, merchandise exports are projected to increase by 14.4% in 2022 to $8.4 billion followed by a 5.4% growth to $8.8 billion in 2023 and a further 3.8% to $9.2 billion in 2024, very close to the record high way back in 2008. The share of merchandise exports is projected to rise slightly for Canada from 12.7% in 2022 to 12.9% by end-2024. While repeated lockdowns in an effort to contain covid have had a meaningfully negative outlook on China's growth, as least for the current year, merchandise exports over the forecast horizon are projected to increase by 9.9% in 2022 to $5.5, followed by 2.6% growth in 2023 and 3.5% in 2024. Exports to China are expected to reach $5.9 billion in 2024, well below the record high of $7.9 billion in 2011. The share of China's exports is projected to decline moderately from 8.4% in 2022 down to 8.2% in 2024, significantly below the 11% figure recorded in 2011. Exports to Japan are projected to rise by 15.8% to $5.9 billion in 2022 and by a more moderate 5.4% and 3.6% for the remainder of the forecast horizon. This will boost merchandise exports to $6.5 billion by then end of 2024. Exports to South Korea are projected to grow around 7% over the forecast horizon and reach a record high of nearly $5 billion by 2024.

Table 3
LA-LB-AN Exports by Country
(millions of dollars)

Year	Canada	China	Japan	South Korea	Mexico	Rest of World	Total Exports
1999	5,096	860	4,933	1,568	4,815	20,101	37,372
2000	5,949	1,322	6,700	2,293	6,196	20,114	42,573
2001	5,125	1,816	6,203	1,783	6,003	15,609	36,538
2002	4,323	1,814	4,414	1,586	5,934	15,254	33,324
2003	4,849	2,302	4,599	1,708	5,418	17,849	36,725
2004	5,600	3,041	5,452	2,186	5,970	17,030	39,279
2005	6,397	3,649	5,777	2,412	6,115	19,463	43,814
2006	6,895	5,068	5,791	2,577	7,847	20,539	48,718
2007	8,871	6,005	5,869	3,155	6,559	23,974	54,433
2008	9,246	5,988	6,070	3,436	7,945	27,300	59,986
2009	7,127	4,964	5,049	2,695	8,936	22,757	51,528
2010	8,061	6,506	5,558	3,038	14,205	24,800	62,168
2011	8,630	7,985	6,226	3,074	17,681	29,044	72,689
2012	8,904	7,244	5,970	3,089	18,340	31,461	75,008
2013	8,287	7,329	5,707	3,187	19,415	32,381	76,306
2014	8,251	7,221	5,580	3,149	16,845	34,425	75,471
2015	7,585	6,266	4,712	2,932	11,125	29,139	61,759
2016	7,121	5,507	5,126	2,890	9,881	30,720	61,246
2017	7,567	6,134	5,026	3,307	10,899	30,820	63,753
2018	7,774	5,866	5,621	3,463	11,853	30,239	64,815
2019	7,280	4,949	5,420	3,548	9,559	30,285	61,041
2020	6,101	4,134	4,332	3,522	8,853	23,243	50,185
2021	7,322	5,029	5,105	4,332	11,607	25,194	58,588
				Forecast			
2022	8,379	5,526	5,914	4,782	13,402	28,126	66,129
2023	8,831	5,672	6,231	4,828	14,233	29,328	69,123
2024	9,168	5,872	6,454	4,922	14,714	30,187	71,316

Source: *Woods Center, California State University Fullerton and International Trade Administration*

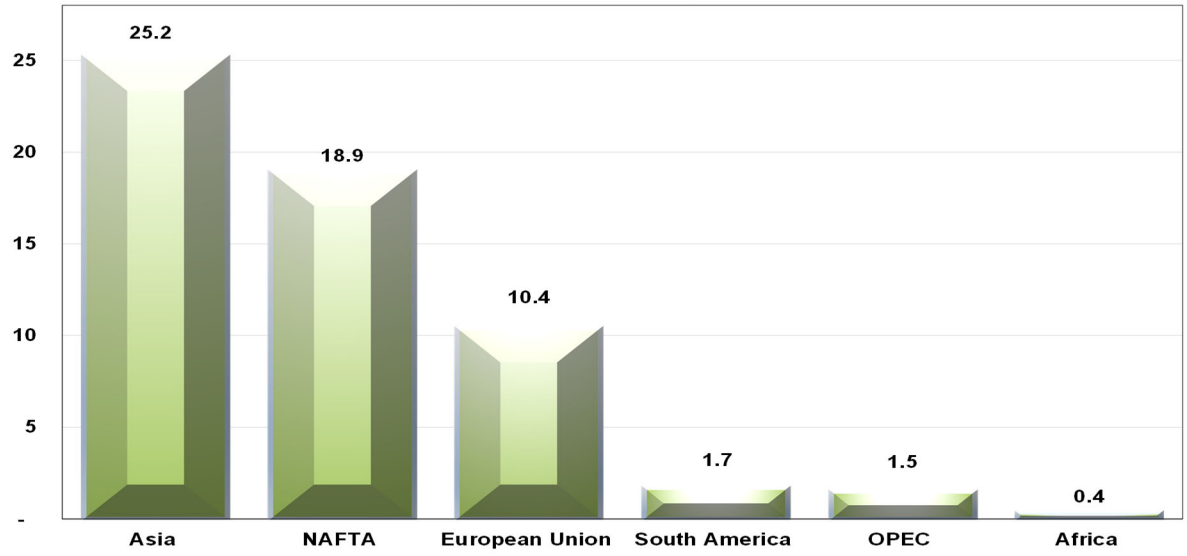
4.3 Los Angeles-Long Beach-Anaheim MSA Merchandise Exports by Region

The three largest trading regions for the Los Angeles-Long Beach-Anaheim MSA in 2021 were Asia ($25.2 billion or 43.0% of merchandise exports), NAFTA ($18.9 billion or 32.3% of merchandise exports), and the European Union ($10.4 billion or 17.8% of merchandise exports) which are shown in Figure 37 and Table 4. Merchandise exports to Asia declined by -3.2% in 2019 and a massive -21.5% in 2020 falling from $27.5 billion in 2018 to $20.9 billion by end-2020. A robust increase of 20.5% boosted exports to Asia to $25.2 billion in 2021, though despite this skyrocketing jump, exports were still around $4.6 billion below the record high of $29.8 billion recorded in 2014.

Merchandise exports to NAFTA declined by -14.2% in 2019 and a further -11.2% in 2020 to $15.0 billion. This was reversed swiftly as trade resumed after the pandemic shock, with exports to the region rising by 26.6% in 2021 reaching $18.9 billion. Nonetheless, even with this impressive growth, exports to NAFTA remain significantly below their 2013 record of $27.7 billion. Merchandise exports to Asia and NAFTA still account for a hefty 75.3% of all of the merchandise exports in 2021.

Merchandise exports to the European Union increased by 12.2% in 2021, reaching $10.4 billion, below its record high of $11.2 billion in 2017. Merchandise exports to Africa increased by 9.3% to 0.3 billion, while those to OPEC rose by 15.9% reaching $1.5 billion. South America, OPEC and Africa together account for only 6.1% of merchandise exports in 2021.

Figure 37
LA MSA Exports by Region
(billions of dollars)



Source: Woods Center California State University Fullerton and International Trade

Over the forecast horizon, merchandise exports to Asia are projected to increase by 11.4% in 2022 reaching $28.1 billion. Less robust growth is projected over the remainder of the forecast horizon of 3.4% in 2023 and 3.0% in 2024, with merchandise exports reaching a record high of nearly $30 billion in 2024. Exports to NAFTA are projected to have another strong growth of 15.1% in 2022 reaching $21.8 billion, while increasing by a further 5.9% in 2023 and by 3.5% in 2024. At the end of the forecast horizon, exports to NAFTA are projected to reach nearly $24 billion, which is lower than the record high of $27.7 billion in

2013. Merchandise exports to the European Union are projected to grow by 13.3% in 2022, followed by moderate growth over the forecast horizon to reach a record high of $12.5 billion by 2024. Merchandise exports to OPEC are projected to grow by 33.2% in 2022 and reach $2.0 billion by 2024. Exports to South America are projected to remain around $1.9 billion over the forecast horizon, while exports to Africa, are projected to be around $0.4 billion over the forecast horizon.

Table 4
LA-LB-AN Exports by Region
(millions of dollars)

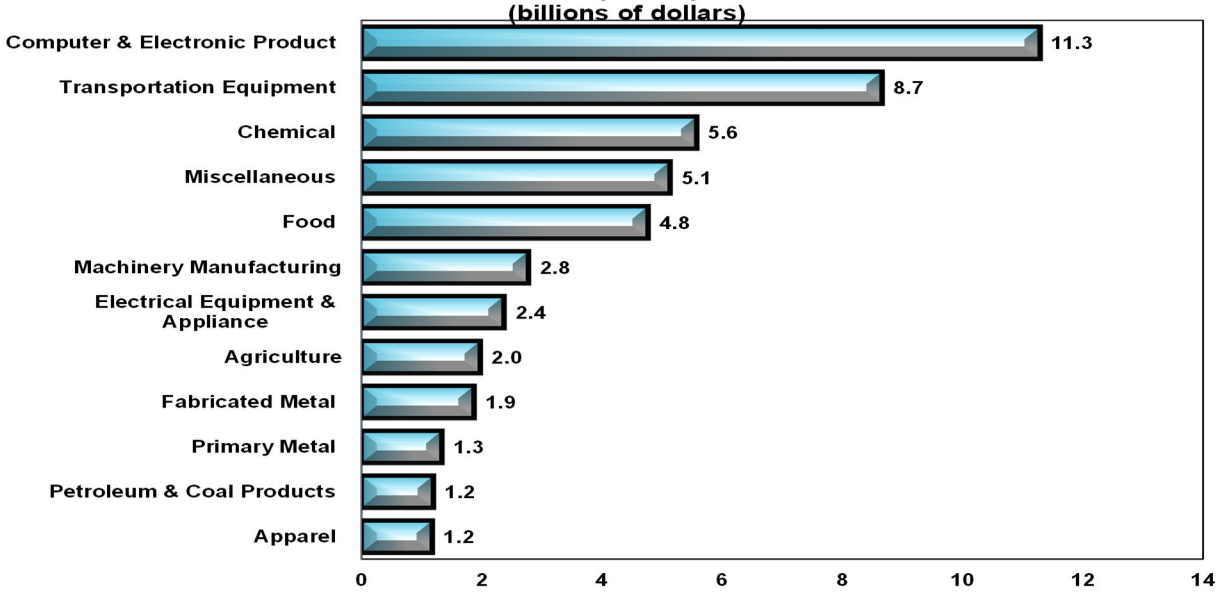
Year	Africa	Asia	European Union	NAFTA	OPEC	South America
1999	266	11,919	6,736	9,490	729	1,099
2000	233	16,035	8,137	11,886	684	1,054
2001	238	14,496	7,293	10,709	556	1,012
2002	238	12,002	5,900	9,691	523	722
2003	267	12,681	6,107	9,757	557	684
2004	352	16,052	7,351	11,439	773	1,013
2005	406	17,684	7,827	12,512	1,342	1,221
2006	520	19,508	8,049	14,742	1,136	1,477
2007	456	21,982	9,401	15,430	1,598	1,798
2008	617	22,727	10,226	17,191	1,827	2,434
2009	613	19,212	8,188	16,062	1,519	1,806
2010	511	22,803	8,234	22,266	1,866	2,274
2011	525	26,630	9,429	26,311	2,218	2,912
2012	641	25,169	9,771	27,244	4,499	3,055
2013	511	25,550	10,417	27,702	3,578	3,123
2014	432	29,763	11,122	25,096	3,663	3,392
2015	388	25,732	9,978	18,710	3,098	2,413
2016	421	26,857	10,316	17,002	3,481	2,118
2017	314	27,293	11,224	18,466	1,973	2,155
2018	401	27,528	10,907	19,626	2,000	2,021
2019	375	26,640	11,152	16,839	1,878	1,794
2020	322	20,913	9,279	14,954	1,294	1,420
2021	352	25,199	10,408	18,928	1,500	1,694
2022	410	28,072	11,790	21,781	1,997	1,903
2023	445	29,014	12,222	23,064	2,060	1,989
2024	464	29,870	12,478	23,881	2,033	2,053

Source: *Woods Center, California State University Fullerton and International Trade Administration*

4.4 Los Angeles-Long Beach-Anaheim MSA Merchandise Exports by Sector

The two largest exporting sectors from the region continue to remain Computer & Electronic Products and Transportation Equipment. In 2021, Computer & Electronic Products exports ($11.3 billion) exceeded Transportation Equipment ($8.7 billion) by $2.6 billion (Figure 38 and Table 5). These two industries account for 34.1% of all merchandise exports in 2021, rising by $2.4 billion (13.9%) compared to 2020. Chemical Manufacturing with a share of 9.5% ($5.6 billion) is the third most important sector followed by Miscellaneous Manufacturing with 8.8% ($5.1 billion). The two categories of Chemical Manufacturing and Miscellaneous Manufacturing account for 18.3% of merchandise exports in 2021. Food Manufacturing is now the fifth largest sector with $4.8 billion in 2021. Other important industries in 2021 are Machinery, Petroleum & Coal Products, Electrical Equipment & Appliances, Fabricated Metal Products, Primary Metal, Petroleum & Coal Products, and Apparel, all of which combine for $12.7 billion of merchandise exports from the LA MSA.

Figure 38
LA MSA Exports by Sector
(billions of dollars)



Source: Woods Center, California State University Fullerton and International Trade Administration

Computer & Electronic exports are projected to increase over the forecast horizon reaching $13.2 billion by the end of 2024, which is considerably below the record of $21.8 billion in 2013. For Transportation Equipment, merchandise exports are projected to increase to $9.2 billion by the end of 2024, which is far below the record high of $15.5 billion in 2013. Relatively strong growth rates are projected for Miscellaneous Manufacturing over the forecast horizon with merchandise exports reaching $6.8 billion by the end of 2024, slightly below the record high of $7.0 billion in 2019. Chemical Manufacturing and Miscellaneous Manufacturing merchandise exports are projected to reach a total of $13.9 billion by 2024. Merchandise exports of Food are projected to reach a record high of $6.1 billion by the end of 2024. Exports from Machinery, Petroleum & Coal Products, Electrical Equipment & Appliances, Fabricated Metal Products, Primary Metal, Petroleum & Coal Products, and Apparel are projected to total $15.0 billion by the end of 2024.

Table 5
LA-LB-AN Exports by Sector
(millions of dollars)

Year	Transportation Equipment	Computer& Electronic	Miscellaneous	Chemical	Machinery	Petroleum & Coal Products	Food
1998	8,327	10,271	1,542	1,640	1,836	470	1,091
1999	7,145	11,038	1,629	1,579	1,933	453	1,101
2000	6,689	13,725	1,826	1,923	3,116	610	1,232
2001	7,091	11,740	1,988	2,137	2,390	675	1,445
2002	5,858	9,657	2,022	2,228	2,180	544	1,312
2003	6,802	8,902	2,087	2,354	2,133	556	1,511
2004	9,213	10,252	2,351	2,515	2,757	575	1,495
2005	10,273	10,233	2,628	2,691	2,800	939	1,649
2006	10,049	11,714	3,119	3,056	2,895	1,038	1,864
2007	11,917	11,761	3,594	3,652	3,141	1,494	2,088
2008	13,465	11,653	4,186	4,068	3,638	3,141	2,552
2009	10,566	11,965	3,910	3,698	2,892	1,953	2,312
2010	11,064	17,946	4,325	4,268	3,208	2,094	2,911
2011	12,215	21,160	5,117	5,046	3,554	3,372	3,590
2012	14,109	21,561	5,662	4,954	3,707	2,790	3,600
2013	15,505	21,793	5,120	5,134	3,584	2,499	3,336
2014	15,305	18,562	5,396	5,635	3,432	2,843	3,449
2015	11,780	12,728	5,172	5,338	3,254	1,552	3,148
2016	12,776	11,825	6,007	4,807	2,833	1,117	3,455
2017	13,142	11,676	5,806	4,527	2,824	1,617	3,681
2018	11,903	12,099	6,556	4,553	2,868	2,300	3,717
2019	11,254	10,240	6,996	4,646	2,808	1,513	3,886
2020	7,426	10,103	4,053	4,542	2,307	915	3,961
2021	8,664	11,293	5,138	5,579	2,779	1,199	4,772
			Forecast				
2022	9,387	12,380	6,173	6,441	3,247	1,447	5,510
2023	9,446	12,814	6,594	6,719	3,468	1,509	6,037
2024	9,199	13,194	6,797	7,101	3,654	1,523	6,131

LA-LB-AN Exports by Sector (continued)

Year	Fabricated Metal Product	Electrical Equipment	Apparel	Total Farm	Primary Metal	Other Sectors	Total Export
1998	1,098	1,037	837	536	607	6,377	35,669
1999	962	1,056	825	431	439	8,782	37,372
2000	1,065	1,454	949	572	598	8,815	42,573
2001	1,297	1,270	979	700	549	4,276	36,538
2002	1,155	1,156	977	696	497	5,042	33,324
2003	1,192	1,130	893	814	554	7,797	36,725
2004	1,307	1,309	892	859	621	5,133	39,279
2005	1,535	1,395	1,052	987	744	6,886	43,814
2006	1,791	1,706	1,092	1,061	878	8,454	48,718
2007	1,818	1,799	1,074	1,082	922	10,091	54,433
2008	1,764	1,640	1,199	1,159	1,081	10,438	59,986
2009	1,544	1,375	1,208	1,055	829	8,222	51,528
2010	1,768	1,519	1,349	1,031	1,012	9,673	62,168
2011	1,762	1,671	1,383	1,367	1,259	11,191	72,689
2012	1,839	1,825	1,433	1,447	1,344	10,736	75,008
2013	2,079	1,943	1,436	1,552	1,482	10,844	76,306
2014	2,039	2,530	1,507	1,503	1,577	11,692	75,471
2015	1,944	2,492	1,449	1,330	1,431	10,140	61,759
2016	1,885	2,370	1,225	1,597	1,906	9,441	61,246
2017	2,011	2,549	1,260	1,528	2,442	10,689	63,753
2018	2,070	2,544	1,456	1,529	1,916	11,304	64,815
2019	2,136	2,554	1,339	1,642	1,636	10,390	61,041
2020	1,632	1,995	1,053	1,698	1,092	9,409	50,185
2021	1,875	2,375	1,181	1,980	1,341	10,413	58,588
				Forecast			
2022	2,016	2,737	1,308	2,266	1,506	11,711	66,129
2023	1,987	2,724	1,341	2,364	1,554	12,565	69,123
2024	1,836	2,633	1,313	2,517	1,568	13,851	71,316

Source: *Woods Center, California State University Fullerton and International Trade Administration*

5. ORANGE COUNTY EXPORTS

Orange County's economy and trade has progressed in line with the national and regional recovery, though the rebound has been slower here than in the state and in Inland Empire. Gross Product for the county in 2020 was $259.5 billion, representing a 2.5% decline compared to 2019. Nonetheless, despite the slower progress from the recession, the labor market has come a long way: the unemployment rate fell from 9.0% in 2020 to 6.0% in 2021 down to a current 2.4%. Nonfarm employment grew by 3.1% in 2021, which has picked up to 4.8% in May 2022 compared to year-ago levels.

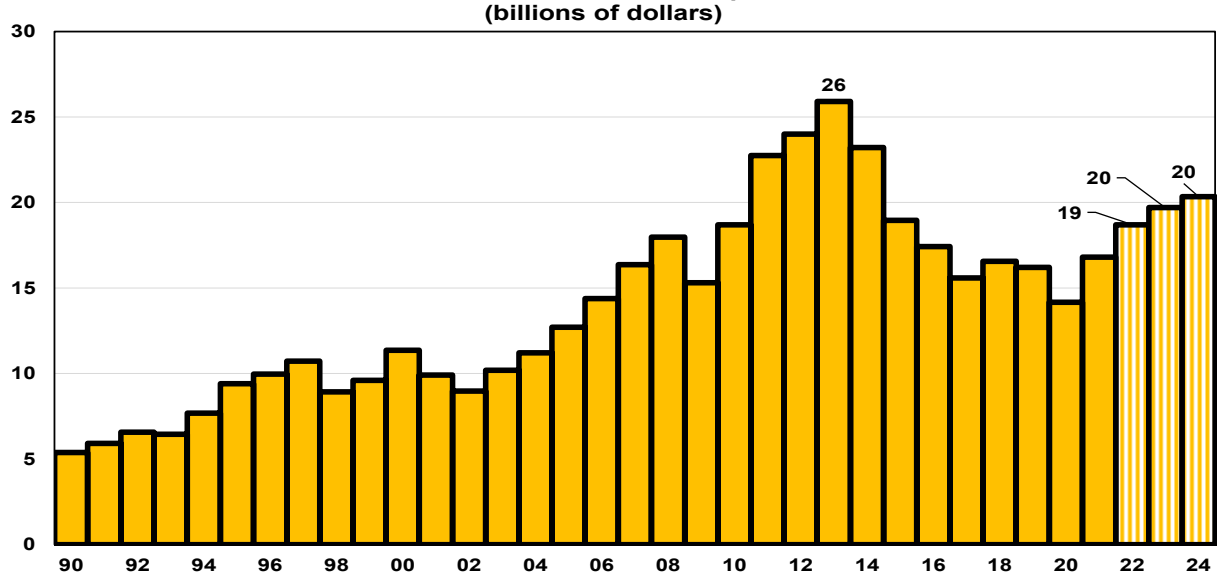
Merchandise exports are an important part of Orange County's economy, accounting for 6.7% of Gross County Product in 2021. The estimated total volume of merchandise exports from Orange County in 2021 is $18.6 billion, ranking 20th in the nation, right behind San Diego-Carlsbad MSA but exceeding exports from Minneapolis-St. Paul-Bloomington MSA, and San Juan-Bayamon-Caguas MSA.

The International Trade Administration (ITA) provides data on total merchandise exports for Orange County only for the period from 2012-2020. The ITA does not provide any breakdown for Orange County exports by region, country or sector. The Woods Center has developed models that provide historical estimates and projections for Orange County merchandise exports by volume, region, country and sector which are derived from an econometric model that accounts for trends in regional, state, national and international trade patterns.

5.1. Orange County Merchandise Exports

Merchandise exports from Orange County declined in both 2019 and 2020 before registering a strong growth rate in 2021 (Figure 39 and Table 6). Specifically, a smaller 2.1% drop in 2019 was followed by another 12.6% decline in 2020, with exports from the county ending the decade at $14.1 billion, the lowest since 2006. Orange County merchandise grew by a robust 18.7% in 2021 reaching $16.8 billon. Nonetheless, exports from the county remain a staggering $9.1 billion below the record high of $25.9 billion posted in 2013. It should be noted that the spectacular growth in 2021 (18.7%), while higher than Los Angeles MSA's growth of 16.7%, is still less than the national rate of 23.1%.

Figure 39
OC Total Merchandise Exports
(billions of dollars)



Source: *Woods Center, California State University Fullerton and International Trade*

Exports from Orange County are projected to increase over the forecast horizon. In 2022, we anticipate they will grow by 11.2% reaching $18.7 billion, bringing them slightly below the 2015 levels. The growth for the rest of the forecast horizon is less robust, given the anticipated slowdown in global growth. We expect exports from the county to grow by 5.4% in 2023 reaching $19.7 billion, and by a more modest 3.2% in 2024 reaching $20.3 billion. By the end of 2024, Orange County's merchandise exports would be at their highest level in almost a decade but still remain $5.6 billion below the record high of $25.9 billion in 2013.

Table 6
OC Total Merchandise Exports
(millions of dollars)

Year	OC Total Export Volume	Growth Rate
1990	5,385	n/a
1991	5,923	10.0%
1992	6,568	10.9%
1993	6,457	-1.7%
1994	7,688	19.1%
1995	9,401	22.3%
1996	9,973	6.1%
1997	10,717	7.5%
1998	8,932	-16.7%
1999	9,597	7.5%
2000	11,353	18.3%
2001	9,910	-12.7%
2002	8,973	-9.5%
2003	10,192	13.6%
2004	11,212	10.0%
2005	12,707	13.3%
2006	14,381	13.2%
2007	16,360	13.8%
2008	17,979	9.9%
2009	15,302	-14.9%
2010	18,694	22.2%
2011	22,746	21.7%
2012	23,995	5.5%
2013	25,902	7.9%
2014	23,208	-10.4%
2015	18,948	-18.4%
2016	17,418	-8.1%
2017	15,588	-10.5%
2018	16,554	6.2%
2019	16,205	-2.1%
2020	14,159	-12.6%
2021	16,806	18.7%
	Forecasts	
2022	18,695	11.2%
2023	19,699	5.4%

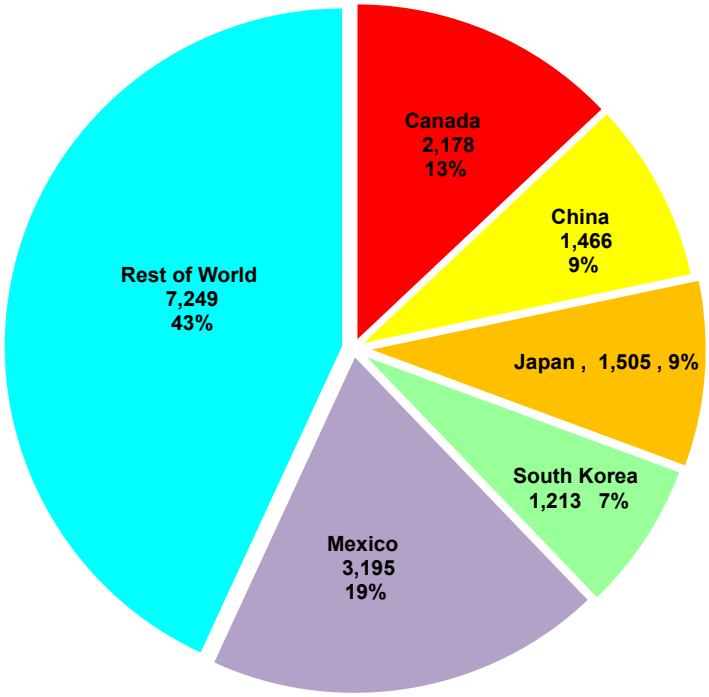
2024	20,339	3.2%

Source: *Woods Center, California State University Fullerton*

5.2 Orange County Merchandise Exports by Country

Orange County's five largest trading partners in 2021 were: Mexico ($3.2 billion), Canada ($2.2 billion), China ($1.5 billion), Japan ($1.5 billion) and South Korea ($1.2 billion) as shown in Figure 40 and Table 7. Exports to these five largest trading partners rose by a hefty $1.7 billion in 2021 (a 21.7% increase) reaching $9.6 billion compared to 2020. Mexico and Canada remain the most popular destination for merchandise exports from Orange County growing by over 21.5% for each country in 2021. Exports to Mexico grew to $3.2 billion in 2021, but they are still less than half the record highs of $7.2 billion in 2013. Exports to the second largest trading partner, Canada, rose to $2.2 billion, but still remain below its record high of $3.1 billion in 2012. Exports to China reached $1.5 billion in 2021, which is close to 2018 but well below the record high of $2.7 billion in 2011. While merchandise exports to Japan decreased considerably in 2020, they rebounded to $1.5 billion in 2021, though remain still below the record high of $2.1 billion in 2011. In contrast, exports to South Korea have risen for four straight years, reaching a record high of $1.2 billion in 2021.

Figure 40
OC Exports by Country
(millions of dollars, 2021)



Exports to Mexico are projected to grow by 13.7% in 2022, reaching $3.6 billion. Another healthy 7.7% is expected in 2023 and a more muted 5.5% in 2024. By end-2024, exports to Mexico are expected to reach $4.1 billion, which is still far below the record high of $7.2 billion in 2013. Mexico will account for around 20% of all merchandise exports from Orange County in 2024. Merchandise exports to Canada are also projected to grow over the forecast horizon, but at a slightly slower rate compared to Mexico. For Canada, the robust 11.7% growth in 2022 will be followed by a smaller 6.4% rate in 2023 and an additional 4.6% in 2024. By the end of 2024, merchandise exports to Canada are projected to grow to $2.7 billion, below the peak of $3.1 billion in 2012. China's economy is expected to grow over the forecast horizon but relatively slowly compared to recent historical averages and merchandise exports to the country are projected to experience moderate growth. A projected 8.8% increase in 2022 will raise Chinese merchandise exports to $1.6. Exports to China are project to remain at just over $1.6 billion in both 2023 and 2024, below record high of $2.7 billion in 2011. Merchandise exports from Orange County to Japan are projected to increase over the forecast horizon, reaching $1.8 billion in 2024, which is still a bit below the record high of $2.1 billion in 2011. Merchandise exports to Japan are projected to continue to exceed those to China. For South Korea, merchandise exports are projected to reach $1.3 billion in 2024.

Table 7
OC Merchandise Exports by Country
(millions of dollars)

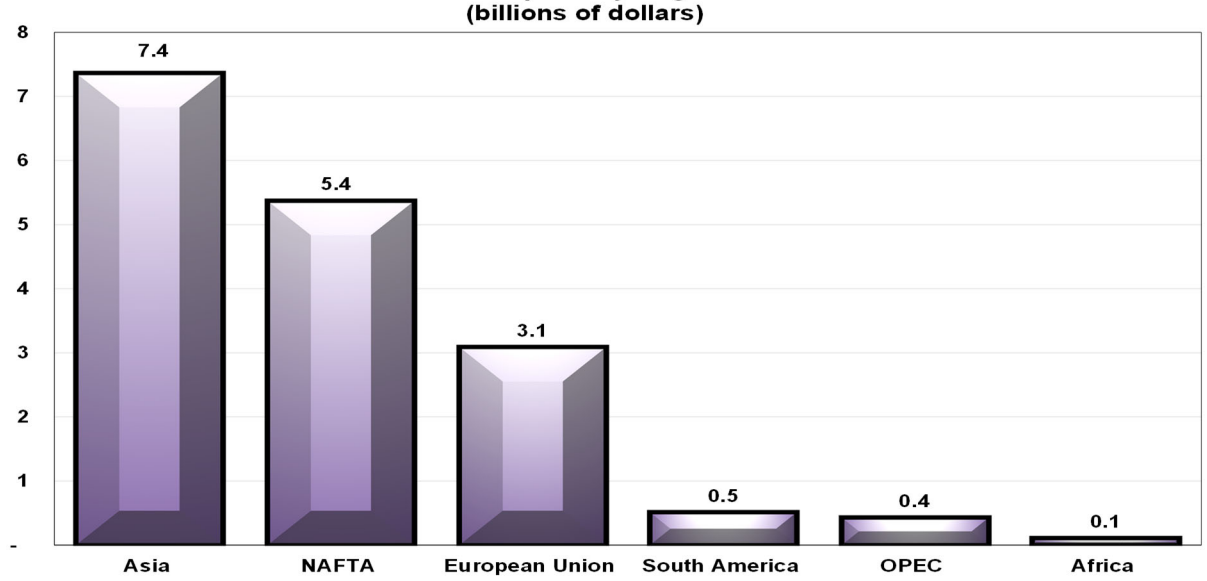
Year	Canada	China	Japan	South Korea	Mexico	Rest of World	Total Exports
1999	1,360	229	1,316	418	1,285	5,364	9,597
2000	1,657	368	1,867	639	1,726	5,604	11,353
2001	1,452	515	1,758	505	1,701	4,423	9,910
2002	1,212	508	1,237	445	1,663	4,276	8,973
2003	1,403	666	1,331	494	1,568	5,165	10,192
2004	1,675	909	1,630	654	1,785	5,093	11,212
2005	1,945	1,110	1,757	734	1,860	5,918	12,707
2006	2,146	1,578	1,803	802	2,443	6,394	14,381
2007	2,838	1,921	1,878	1,009	2,098	7,670	16,360
2008	2,957	1,915	1,941	1,099	2,541	8,732	17,979
2009	2,264	1,577	1,604	856	2,839	7,231	15,302
2010	2,601	2,099	1,793	980	4,583	8,001	18,694
2011	2,931	2,712	2,115	1,044	6,005	9,864	22,746
2012	3,111	2,531	2,086	1,079	6,408	10,993	23,995
2013	3,059	2,705	2,107	1,176	7,166	11,952	25,902
2014	2,763	2,418	1,868	1,054	5,640	11,527	23,208
2015	2,529	2,089	1,571	978	3,709	9,716	18,948
2016	2,215	1,713	1,595	899	3,074	9,556	17,418
2017	1,935	1,569	1,285	846	2,787	7,882	15,588
2018	2,042	1,541	1,477	910	3,114	7,945	16,554
2019	1,981	1,346	1,475	965	2,601	8,240	16,205
2020	1,778	1,205	1,263	1,027	2,581	6,776	14,159
2021	2,178	1,466	1,505	1,213	3,195	7,249	16,806
				Forecasts			
2022	2,433	1,595	1,671	1,319	3,632	8,045	18,695
2023	2,588	1,629	1,723	1,346	3,912	8,502	19,699
2024	2,706	1,644	1,773	1,339	4,127	8,749	20,339

Source: *Woods Center, California State University Fullerton*

5.3 Orange County Merchandise Exports by Region

The leading region for merchandise exports from Orange County is Asia, which accounted for 43.8% of exports in 2021, In 2021, merchandise exports to Asia totaled $7.4 billion, growing by a jaw-dropping 20.8% (Figure 41 and Table 8). Export to Asia are currently slightly higher than the 2018 levels but well below the record high of $9.5 billion in 2013. Merchandise exports to NAFTA increased by a sizeable 23.3% to $5.4 billion in 2021, after declining for the two previous years. Despite growth, current $6.1 billion in exports is still a bit more than half of the record high of $10.3 billion in 2013. Merchandise exports to the European Union were $3.1 billion in 2021 which represents a 10.2% increase compared to 2020. Nonetheless, exports to the European Union are still below the record high of $3.9 billion in 2013. Merchandise exports to OPEC increased by 13.6% in 2021 to $0.4 billion. Merchandise exports to Africa remained around $0.1 billion.

Figure 41
OC Exports by Region
(billions of dollars)



Source: Woods Center, California State University Fullerton

Table 8
OC Merchandise Exports by Region
(millions of dollars)

Year	Africa	Asia	European Union	NAFTA	OPEC	South America
1999	71	3,183	1,799	2,647	195	294
2000	65	4,473	2,270	3,388	191	294
2001	67	4,115	2,070	3,159	158	287
2002	67	3,370	1,656	2,880	147	203
2003	77	3,676	1,770	2,976	161	198
2004	105	4,810	2,203	3,467	231	304
2005	124	5,392	2,387	3,815	409	372
2006	162	6,090	2,513	4,602	355	461
2007	146	7,058	3,018	4,954	513	577
2008	198	7,299	3,284	5,521	587	782
2009	196	6,133	2,614	5,127	485	577
2010	166	7,396	2,671	7,221	605	738
2011	179	9,099	3,222	8,991	758	995
2012	225	8,853	3,437	9,583	1,582	1,075
2013	190	9,496	3,872	10,296	1,330	1,161
2014	145	9,190	3,637	8,458	1,234	1,143
2015	130	7,977	3,051	6,277	1,039	810
2016	138	7,826	3,084	5,289	1,053	658
2017	80	6,980	2,871	4,723	505	551
2018	105	7,233	2,866	5,157	525	531
2019	102	7,248	3,034	4,582	511	488
2020	94	6,096	2,705	4,359	377	414
2021	108	7,365	3,089	5,373	429	512
			Forecasts			
2022	116	8,164	3,402	6,065	565	560
2023	118	8,534	3,566	6,500	587	581
2024	120	8,746	3,661	6,834	563	586

Source: *WCEAF, California State University Fullerton*

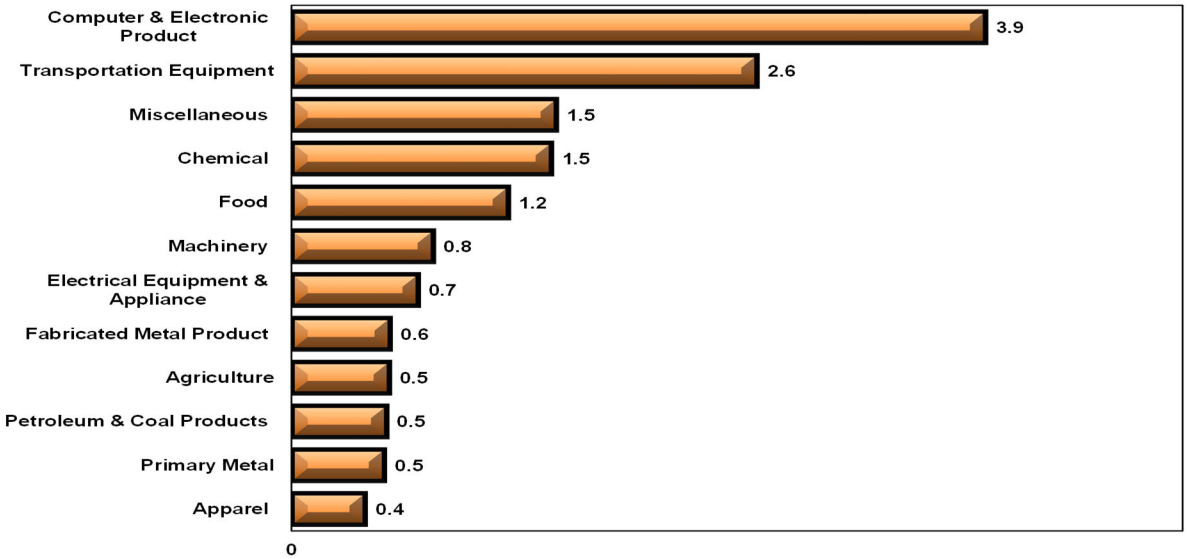
In 2022, merchandise exports to Asia are projected to increase by a hefty 10.8% to $8.1 billion and then grow moderately over the remainder for the forecast horizon, topping out at $8.8 billion in 2024, just under the volume in 2014 and below the peak of $9.5 billion in 2013. Merchandise exports to NAFTA are projected to increase considerably by 12.9% in 2022 followed by more moderate growth of 7.2% in 2023

and a further 5.1% in 2024. By the end of 2024, exports to NAFTA are expected to reach $6.8 billion which exceeds the 2015 level but is nowhere near the peak of $10.3 billion in 2013. In 2022, we project a strong 10.2% surge in merchandise exports to the European Union to $3.4 billion. Slow economic growth in the European Union over the remainder of the forecast horizon should lead to weaker demand for OC exports for the remainder of the forecast horizon, growing by 4.8% in 2023 and 2.7% in 2024. Merchandise exports to the European Union are projected to reach $3.7 billion by the end of 2024, which is close to the record high of $3.9 billion in 2013. Merchandise exports from Orange County to OPEC and South America are projected to remain around $0.6 billion over the forecast years. For Africa, merchandise exports are projected to be about $0.1 billion over the forecast horizon.

5.4 Orange County Merchandise Exports by Sector

The high-tech industry remains a major sector in Orange County accounting for a considerable amount of merchandise exports from the county (Figure 42 and Table 9). The two main sectors of Computer & Electronic Products and Transportation Equipment accounted for a combined $6.5 billion (38.7%) of merchandise exports out of Orange County in 2021. Computers & Electronic Products made up 23.2% ($3.9 billion) of Orange County's total exports in 2021, which is below the peak of $7.2 billion in 2012. The second most important sector of Transportation Equipment accounts for 15.5% ($2.6 billion) of the county's total exports in 2021, less than the high in 2013 of $5.3 billion. The next three largest exporting industries in 2021 combine for $4.1 billion (24.7% of total exports) and are in the following sectors: Miscellaneous Manufacturing ($1.5 billion), Chemical ($1.5 billion), and Food ($1.2 billion). Another 17.8% ($3.0 billion) of Orange County merchandise exports in 2021 are from Petroleum & Coal Products, Machinery, Fabricated Metal Products, Electrical Equipment & Appliances and Apparel.

Figure 42
OC Exports by Sector
(billions of dollars, 2021)



Source: Woods Center, California State University Fullerton and International Trade Administration

Merchandise exports from the largest sector of Computer and Electronics are projected to increase by 6.9% to $4.2 billion in 2022. Over the remainder of the forecast horizon, exports in Computer & Electronics are projected to grow by 7.6% to $4.8 billion in 2023 and by another 3.2% in 2024 to $4.6. Merchandise exports of Transportation Equipment are projected to increase substantially by 21.6% to $4.3 billion in 2022. Transportation Equipment merchandise exports are projected to reach $3.3 billion in 2024, below the 2013 high of $5.2 billion. By the end of 2024, merchandise exports are projected to grow for to $1.8 billion for Miscellaneous Manufacturing, to $1.7 billion for Chemicals and to $1.4 billion for Food Manufacturing. Merchandise exports from Petroleum & Coal Products, Machinery, Fabricated Metal Products, Electrical Equipment & Appliances and Apparel are projected to increase by 20.8% compared to 2021 and reach a total of $3.6 by the end of 2024. Orange County remains well equipped to take advantage of an expected increase in the demand for high-technology and capital-intensive products.

Table 9
OC Merchandise Exports by Sector
(millions of dollars)

Year	Transportation Equipment	Computer& Electronic	Miscellaneous	Chemical	Machinery	Petroleum & Coal Products	Food
1998	2,032	2,749	383	391	470	120	258
1999	1,914	2,877	408	405	466	124	276
2000	1,907	3,822	481	499	754	171	318
2001	1,923	3,148	532	557	664	181	369
2002	1,627	2,526	536	590	588	157	343
2003	1,942	2,438	579	663	613	152	400
2004	2,614	2,907	674	722	790	175	417
2005	2,936	2,891	793	747	867	286	464
2006	2,935	3,438	919	888	870	318	546
2007	3,276	3,587	1,058	1,130	930	415	613
2008	4,127	3,303	1,273	1,156	1,061	897	748
2009	3,049	3,512	1,099	1,081	892	519	638
2010	3,142	5,710	1,312	1,237	970	597	849
2011	3,764	6,775	1,778	1,488	1,033	1,005	1,072
2012	4,461	7,222	1,870	1,509	1,144	825	1,137
2013	5,280	5,280	1,704	1,688	1,284	817	1,133
2014	5,004	5,778	1,634	1,653	1,072	864	1,027
2015	4,172	4,920	1,335	1,354	838	734	849
2016	3,908	4,360	1,200	1,273	766	624	772
2017	3,421	3,529	1,248	1,161	694	630	814
2018	3,372	3,931	1,508	1,291	736	653	835
2019	3,176	3,380	1,725	1,339	701	643	929
2020	2,236	3,216	1,174	1,190	648	442	982
2021	2,608	3,891	1,482	1,454	792	530	1,212
			Forecast				
2022	3,173	4,158	1,729	1,578	844	638	1,323
2023	3,170	4,472	1,753	1,674	893	636	1,394
2024	3,294	4,617	1,769	1,735	932	664	1,448

OC Merchandise Exports by Sector (continued)

Year	Fabricated Metal Product	Electrical Equipment	Apparel	Total Farm	Primary Metal	Other Sectors	Total Export
1998	276	257	212	115	156	1,516	8,932
1999	248	274	219	120	116	2,152	9,597
2000	276	387	252	151	157	2,180	11,353
2001	364	314	287	159	145	1,267	9,910
2002	307	308	276	209	133	1,374	8,973
2003	335	311	251	216	154	2,139	10,192
2004	389	373	257	227	173	1,494	11,212
2005	440	419	313	242	222	2,089	12,707
2006	524	494	329	284	260	2,579	14,381
2007	562	513	331	307	281	3,357	16,360
2008	539	505	351	348	328	3,343	17,979
2009	463	411	371	291	263	2,714	15,302
2010	533	456	388	360	319	2,820	18,694
2011	527	571	428	419	397	3,487	22,746
2012	587	593	454	428	397	3,368	23,995
2013	726	679	472	538	527	5,774	25,902
2014	618	787	468	457	492	3,354	23,208
2015	495	678	369	377	421	2,406	18,948
2016	470	643	343	343	413	2,302	17,418
2017	458	616	364	337	423	1,894	15,588
2018	513	685	399	383	414	1,833	16,554
2019	567	733	384	401	439	1,788	16,205
2020	471	637	347	447	444	1,926	14,159
2021	550	707	409	545	518	2,107	16,806
			Forecast				
2022	617	811	428	598	557	2,241	18,695
2023	660	865	445	604	604	2,528	19,699
2024	674	886	454	644	619	2,602	20,339

Source: *WCEAF, California State University Fullerton*

6. CONCLUSION

This unique report of the Woods Center provides detailed analysis, estimates and forecasts for exports from Orange County and the broader region of Los Angeles-Long Beach-Anaheim MSA (which includes Orange County). The ports of Los Angeles and Long Beach are vital to the region's economy, but supply chain issues which have plagued the world since the recovery from the pandemic began, have left their own imprint in the region.

While merchandise exports contribute meaningfully to many sectors across Southern California, there is limited data available about merchandise exports for the Southern California region. The International Trade Administration provides some details on merchandise exports for the broader Los Angeles-Long Beach-Anaheim MSA. A recent development is that the International Trade Administration has provided data on the total value of merchandise exports for Orange County through 2020. The International Trade Administration does not provide any data or other details across countries, regions or sectors. Merchandise export volumes are available from the U.S. Census Bureau for 2021. This report is important because it is the only available source that fills in this gap by providing detailed historical data through 2021 and forecasts over the period 2022 through 2024 for exports from Orange County and the broader Los Angeles-Long Beach-Anaheim Metro.

The recovery in the global economy should have an overall positive impact on the demand for merchandise exports across Southern California and specifically in 2022. As growth in the global economy slows down in 2023 and 2024, export growth from Southern California will also decelerate. Merchandise exports are an important part of the economy in Southern California and vital for future economic growth in the region.

Merchandise exports from the Los Angeles-Long Beach-Anaheim are projected to increase in 2022 to $66.1 billion and reach $71.3 billion by the end of 2024, which is below the record high of $76.3 billion in 2013. The five main destination countries for merchandise exports from the Los Angeles-Long Beach-Anaheim MSA in 2021 are: Mexico ($11.6 billion), Canada ($7.3 billion), China ($5.0 billion), Japan ($5.1 billion), and South Korea ($4.3 billion). By 2024, merchandise exports are projected to rise to $14.7 billion for Mexico, $9.2 billion for Canada, $6.5 billion for Japan, $5.9 billion for China and $4.9 billion for South Korea. Merchandise exports by the end of 2024 to the largest trading region of Asia are projected to increase to $29.9 billion with $23.9 billion to NAFTA and $12.5 billion to the European Union. Exports from the largest two exporting sectors are projected to grow over the forecast horizon reaching $13.1 billion by 2024 for Computer & Electronic products and $9.2 billion for Transportation Equipment.

For Orange County, merchandise exports are forecasted to increase from $18.7 billion in 2022 to $20.3 billion by 2024, which is still below the record high of $25.9 billion in 2013. The five largest trading partners in 2021 were Mexico ($3.2 billion), Canada ($2.2 billion), China ($1.5 billion), Japan ($1.5 billion) and South Korea ($1.2 billion. By 2024, merchandise exports are projected to increase to $4.2 billion for Mexico, $2.7 billion for Canada, $1.8 billion for Japan and $1.6 billion for China. Exports from Orange County's top exporting sectors, Computers & Electronic Products and Transportation Equipment, are projected to reach $4.6 billion and $3.3 billion, respectively, by the end of 2024.

7. APPENDIX

APPENDIX

A1. DATA SOURCES

"Annual Survey of Manufactures: Geographic Area Statistics," *U.S. Census Bureau*, http://www.census.gov/prod/www/abs/manu-asm-geo.

"California International Trade Register," *Database Publishing Company*, (1992), out-of-print.

"Census Bureau," www.census.gov.

"Current Establishment Survey," *Bureau of Labor Statistics, http://www.bls.gov*.

"Exchange Rates," Wharton Research Data Services database, http://wrds.wharton.upenn.edu, 2016-2021.

"Exports from US Metropolitan Areas," *International Trade Administration*, http://www.trade.gov/mas/ian/Metro/index.html, 2016-2021.

"Foreign Trade Statistics," *U.S. Census Bureau*, http://www.census.gov/foreign-trade.

"International Financial Statistics," International Monetary Fund, 1990-date, www.imfstatistics.org/imf/

"Labor Market Information," *State of California, Employment Development Department,* http://www.edd.ca.gov.

"Metro Business Patterns," *U.S. Census Bureau,* http://www.census.gov/econ/cbp/index.html.

"National Income and Products Account," *Bureau of Economic Analysis*, http://www.bea.gov.

"Orange County and Regional Economic Outlook," *Center for Economic Analysis and Forecasting*, *California State University Fullerton*, 1999-2017.

"Regional Multipliers," *Bureau of Economic Analysis*, http://www.bea.gov, (1997-2021).

"State and regional exports of merchandise," *International Trade Administration*, http://tse.export.gov, 2016-2021.

"State export data series," *WISERtrade*, http://www.wisertrade.org, 2012-2016.

"Statistical Abstract, Foreign Commerce & Aid," *U.S. Census Bureau*, http://www.census.gov/prod/www/abs/statab.htmlhttp://www.census.gov/foreign-trade.

"Trade Statistics," *International Trade Administration,* http://www.ita.doc.gov/, 2016-2021.

"U.S. merchandise exports," *International Trade Administration*, http://tse.export.gov, 2016-2021.

"U.S. District and Port Exports," *WISERtrade*, http://www.wisertrade.org, 2016.

"World Economic Outlook Database," *International Monetary Fund*, http://www.imf.org, 2016-2021.

APPENDIX

A2. EXPORT DATA

The following is a summary of the export data sources. Parts of the summary are cited directly from the respective data source.

National Trade Data

TradeStats Express, International Trade Administration, U.S. Department of Commerce

The *International Trade Administration*, U.S. Department of Commerce, provides trade data for merchandise exports for the nation. This data is currently available annually (total for the year) from 1989 through 2021. Data are available for individual countries, trade/economic groups, and geographic regions by product type and industry. The data are available in the three product classification systems: North American Industry Classification System (NAICS) up to the four-digit level, Harmonized System (HS) at two- and four-digit levels, or Standard International Trade Classification (SITC) up to the three-digit level.

State Export Data

TradeStats Express, International Trade Administration, U.S. Department of Commerce

State export data are available annually (total for the year) from 1999 through 2021. Data are available for individual countries, trade/economic groups, and geographic regions by product type and industry. The data are available by NAICS product classification (up to the three-digit level). The data captures origin-of-movement (OM) based on Origin State which differs from an earlier series based on Exporter Location (EL) (1993-2002). The OM series provides export statistics based on the state from which the merchandise starts its journey to the port of export. In contrast, the EL series was based on the zip code of the exporter and unlike the OM series it tended to capture company headquarters, wholesalers, brokers, and freight forwarders. Although OM data are not defined as the state of production origin, it is the closest approximation to state of production for manufactured goods for which it may also capture the state of consolidation or the state of a broker or wholesaler.

U.S. Metropolitan Areas Export Data

International Trade Administration, U.S. Department of Commerce

The U.S. Metro Area Export data are available annually (total for the year) from 2006-2020 and are updated semi-annually from the International Trade Administration. Total export volumes for some metros, including the Los Angeles-Long Beach-Anaheim MSA Merchandise Exports, are available for 2021 from the Census Bureau. The top five export product profiles to a selected market are available for 2008 and 2020 and are limited to only the top 5 countries for the top 50 metropolitan areas. The export series for Metro Areas are computed by matching the five-digit zip codes entered on U.S. export declarations with the five-digit zip codes specified for each metropolitan area using concordance files from the Census Bureau's Geography Division and the U.S. Postal Service. The metropolitan export data series measures only the dollar value of merchandise exports (goods that can physically be transported across the border) and does not include exports of services. The metropolitan export data are only available in nominal U.S. dollars and are not adjusted for inflation or any other factors. Metropolitan areas referenced in the 2005 to 2021 data are based on the 2000 Census.

The export series for Metro Areas is based on the origin of movement by the zip code of the U.S. Principle Party of Interest (USPPI) of record. In 2004 the zip code of the USPPI, the party in the United States that receives the primary benefit (monetary or otherwise) from the shipment, was redefined to indicate the origin of movement of goods. Initially it did not necessarily represent the location of the USPPI. However, due to increased electronic reporting in the Automated Export System (AES), the validity of the reported ZIP Code has improved significantly since 2004. The USPPI of record is not necessarily the entity that produced the merchandise; hence, the series does not furnish complete and reliable data on the production origin of U.S. exports.

The existing Metro Area Export data differs from an earlier series produced by the U.S. International Trade Administration which were available from 1993-2002. The earlier series were based on the Exporter Location (EL) Series collected by the Census Bureau from shipper's export declarations. With the introduction of the Automated Export System (AES) by the U.S. Customs Bureau and the Census Bureau, the accuracy of the Exporter Location Series became, according to the U.S. Census Bureau, highly suspect, and the series was

discontinued. Measurement of exports by metropolitan area was not reported until the introduction of the zip-based Origin of Movement series in 2005. The Census Bureau states that the 2001 and 2005 export series cannot be compared because the 2001 data are based on Exporter Location Series and the 2005 data are based on the Origin of Movement (OM) series.

The OM zip-code series used to measure metropolitan exports differs from the OM data based on origin-state used for state exports. The OM series based on origin of state provides export statistics based on the state from which merchandise began its journey (as listed on the shipper's export declaration). The OM zip-code based series captures the origin of movement by the zip code of the U.S Principle Party of Interest. The collection of this new zip-based series makes it possible to determine exports by metropolitan area. The metropolitan series should only be compared to other sources that also use the Origin of Movement zip code based series and cannot be compared to other data sources that provide state exports (such as TradeStats and USA Trade Online) which publish their export data on an Origin of Movement state-basis.

Customs District Data

U.S. Census Bureau

Customs District and port data measure goods that leave out of a particular district or port (regardless of where the good originated in the United States). The metropolitan export data differs from the Customs District or port data. Since the metropolitan export data are based on the Origin of Movement series, this data attempts to track the export back to its origin of export, regardless of where the good actually leaves the country.

APPENDIX

A3. METHODOLOGY

Estimation of Exports for the Los Angeles – Long Beach – Anaheim Region

Total export volume before year 2005 for the Los Angeles–Long Beach–Anaheim Region (LA-LB-SA) was extrapolated from regional, state, national and international trade trends as well as estimates from an econometric model. To estimate the historical data, regional, state, national and international merchandise exports volumes were used in conjunction with exchange rates, labor productivity in export industries, U.S. and foreign growth measured by real gross domestic product and exports by industry. Forecasts for year 2022 onwards are based on statistical and econometric modeling methodology.

Estimation of Orange County Exports

Orange County's total export volume was extrapolated from regional, state, national and international trade trends as well as estimates from an econometric model. An annual survey, the *California International Trade Register* from Database Publishing Company was also used to estimate historical export volume for Orange County using 401 companies involved in export activities from Orange County. However, this publication is no longer available. The original estimated exports for Orange County have been revised because the newly released 2005-2020 MSA export data has some new important differences concerning the various sectors and export-tracking based on zip-codes. To estimate the historical data, regional, state, national and international merchandise exports volumes were used in conjunction with exchange rates, labor productivity in export industries, and U.S. and foreign growth measured by real gross domestic product. Historical estimates for Orange County exports are also based on exports from the LA-LB-SA region because Orange County is part of the region. Forecasts are based on statistical and econometric modeling methodology.

APPENDIX

A4. EXPORT REGIONS

Africa
Algeria, Angola, Benin, Botswana, British Indian Ocean Territories, Burkina, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Brazzaville), Congo (Kinshasa), Cote d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, French Southern and Antarctic Lands, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Morocco, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, St. Helena, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Western Sahara, Zambia, Zimbabwe.

Asia
Afghanistan, Bangladesh, Bhutan, Brunei, Burma, Cambodia, China, East Timor, Hong Kong, India, Indonesia, Japan, Laos, Macau, Malaysia, Maldives, Mongolia, Nepal, North Korea, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Thailand, Vietnam.

European Union
Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Federal Republic of Germany, Finland, France, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom.

North American Free Trade Agreement (NAFTA)
Canada, Mexico

Organization of the Petroleum Exporting Countries (OPEC)
Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Venezuela.

South America
Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Falkland Islands, French Guiana, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela

Source: *U.S. Census Bureau, Foreign Trade Statistics*

A5. LOS ANGELES–LONG BEACH -ANAHEIM EXPORTS

Table A1
LA-LB-AN Exports by Country: Growth Rate

Year	Canada	China	Japan	South Korea	Mexico	Rest of World	Total Exports
2000	16.7%	53.7%	35.8%	46.3%	28.7%	0.1%	13.9%
2001	-13.9%	37.4%	-7.4%	-22.2%	-3.1%	-22.4%	-14.2%
2002	-15.7%	-0.1%	-28.8%	-11.0%	-1.1%	-2.3%	-8.8%
2003	12.2%	26.9%	4.2%	7.7%	-8.7%	17.0%	10.2%
2004	15.5%	32.1%	18.6%	28.0%	10.2%	-4.6%	7.0%
2005	14.2%	20.0%	6.0%	10.3%	2.4%	14.3%	11.5%
2006	7.8%	38.9%	0.2%	6.8%	28.3%	5.5%	11.2%
2007	28.7%	18.5%	1.3%	22.4%	-16.4%	16.7%	11.7%
2008	4.2%	-0.3%	3.4%	8.9%	21.1%	13.9%	10.2%
2009	-22.9%	-17.1%	-16.8%	-21.6%	12.5%	-16.6%	-14.1%
2010	13.1%	31.1%	10.1%	12.7%	59.0%	9.0%	20.6%
2011	7.1%	22.7%	12.0%	1.2%	24.5%	17.1%	16.9%
2012	3.2%	-9.3%	-4.1%	0.5%	3.7%	8.3%	3.2%
2013	-6.9%	1.2%	-4.4%	3.2%	5.9%	2.9%	1.7%
2014	-0.4%	-1.5%	-2.2%	-1.2%	-13.2%	6.3%	-1.1%
2015	-8.1%	-13.2%	-15.6%	-6.9%	-34.0%	-15.4%	-18.2%
2016	-6.1%	-12.1%	8.8%	-1.5%	-11.2%	5.4%	-0.8%
2017	6.3%	11.4%	-1.9%	14.5%	10.3%	0.3%	4.1%
2018	2.7%	-4.4%	11.8%	4.7%	8.8%	-1.9%	1.7%
2019	-6.3%	-15.6%	-3.6%	2.4%	-19.4%	0.2%	-5.8%
2020	-16.2%	-16.5%	-20.1%	-0.7%	-7.4%	-23.3%	-17.8%
2021	20.0%	21.6%	17.9%	23.0%	31.1%	8.4%	16.7%
				Forecasts			
2022	14.4%	9.9%	15.8%	10.4%	15.5%	11.6%	12.9%
2023	5.4%	2.6%	5.4%	1.0%	6.2%	4.3%	4.5%
2024	3.8%	3.5%	3.6%	1.9%	3.4%	2.9%	3.2%

Source: *WCEAF, California State University Fullerton and International Trade Administration*

Table A2
LA-LB-AN Exports by Country: Shares of Total Volume

Year	Canada	China	Japan	South Korea	Mexico	Rest of World
1999	13.6%	2.3%	13.2%	4.2%	12.9%	53.8%
2000	14.0%	3.1%	15.7%	5.4%	14.6%	47.2%
2001	14.0%	5.0%	17.0%	4.9%	16.4%	42.7%
2002	13.0%	5.4%	13.2%	4.8%	17.8%	45.8%
2003	13.2%	6.3%	12.5%	4.6%	14.8%	48.6%
2004	14.3%	7.7%	13.9%	5.6%	15.2%	43.4%
2005	14.6%	8.3%	13.2%	5.5%	14.0%	44.4%
2006	14.2%	10.4%	11.9%	5.3%	16.1%	42.2%
2007	16.3%	11.0%	10.8%	5.8%	12.1%	44.0%
2008	15.4%	10.0%	10.1%	5.7%	13.2%	45.5%
2009	13.8%	9.6%	9.8%	5.2%	17.3%	44.2%
2010	13.0%	10.5%	8.9%	4.9%	22.8%	39.9%
2011	11.9%	11.0%	8.6%	4.2%	24.3%	40.0%
2012	11.9%	9.7%	8.0%	4.1%	24.5%	41.9%
2013	10.9%	9.6%	7.5%	4.2%	25.4%	42.4%
2014	10.9%	9.6%	7.4%	4.2%	22.3%	45.6%
2015	12.3%	10.1%	7.6%	4.7%	18.0%	47.2%
2016	11.6%	9.0%	8.4%	4.7%	16.1%	50.2%
2017	11.9%	9.6%	7.9%	5.2%	17.1%	48.3%
2018	12.0%	9.1%	8.7%	5.3%	18.3%	46.7%
2019	11.9%	8.1%	8.9%	5.8%	15.7%	49.6%
2020	12.2%	8.2%	8.6%	7.0%	17.6%	46.3%
2021	12.5%	8.6%	8.7%	7.4%	19.8%	43.0%
			Forecasts			
2022	12.7%	8.4%	8.9%	7.2%	20.3%	42.5%
2023	12.8%	8.2%	9.0%	7.0%	20.6%	42.4%
2024	12.9%	8.2%	9.1%	6.9%	20.6%	42.3%

Source: *WCEAF, California State University Fullerton and International Trade Administration*

Table A3
LA-LB-AN Exports by Region: Growth Rate

Year	Africa	Asia	European Union	NAFTA	OPEC	South America
2000	-12.3%	34.5%	20.8%	25.2%	-6.3%	-4.1%
2001	2.0%	-9.6%	-10.4%	-9.9%	-18.7%	-4.0%
2002	-0.1%	-17.2%	-19.1%	-9.5%	-5.9%	-28.6%
2003	12.3%	5.7%	3.5%	0.7%	6.4%	-5.3%
2004	32.0%	26.6%	20.4%	17.2%	38.8%	48.1%
2005	15.2%	10.2%	6.5%	9.4%	73.7%	20.5%
2006	28.1%	10.3%	2.8%	17.8%	-15.3%	21.0%
2007	-12.2%	12.7%	16.8%	4.7%	40.6%	21.7%
2008	35.3%	3.4%	8.8%	11.4%	14.3%	35.4%
2009	-0.7%	-15.5%	-19.9%	-6.6%	-16.8%	-25.8%
2010	-16.6%	18.7%	0.6%	38.6%	22.9%	25.9%
2011	2.7%	16.8%	14.5%	18.2%	18.9%	28.0%
2012	22.0%	-5.5%	3.6%	3.5%	102.8%	4.9%
2013	-20.2%	1.5%	6.6%	1.7%	-20.5%	2.2%
2014	-15.5%	16.5%	6.8%	-9.4%	2.4%	8.6%
2015	-10.1%	-13.5%	-10.3%	-25.4%	-15.4%	-28.9%
2016	8.3%	4.4%	3.4%	-9.1%	12.4%	-12.2%
2017	-25.2%	1.6%	8.8%	8.6%	-43.3%	1.7%
2018	27.5%	0.9%	-2.8%	6.3%	1.3%	-6.2%
2019	-6.3%	-3.2%	2.3%	-14.2%	-6.1%	-11.2%
2020	-14.3%	-21.5%	-16.8%	-11.2%	-31.1%	-20.9%
2021	9.3%	20.5%	12.2%	26.6%	15.9%	19.3%
			Forecasts			
2022	16.6%	11.4%	13.3%	15.1%	33.2%	12.3%
2023	8.4%	3.4%	3.7%	5.9%	3.1%	4.5%
2024	4.3%	3.0%	2.1%	3.5%	-1.3%	3.2%

Source: *WCEAF, California State University Fullerton and International Trade Administration*

Table A4
LA-LB-AN Exports by Sector: Growth Rates

Industry	Transportation Equipment	Computer Electronic Product	Miscellaneous	Chemical	Machinery	Petroleum & Coal Products	Food
1999	-14.2%	7.5%	5.6%	-3.7%	5.3%	-3.5%	0.9%
2000	-6.4%	24.3%	12.1%	21.8%	61.2%	34.6%	12.0%
2001	6.0%	-14.5%	8.9%	11.1%	-23.3%	10.7%	17.3%
2002	-17.4%	-17.7%	1.7%	4.2%	-8.8%	-19.5%	-9.2%
2003	16.1%	-7.8%	3.2%	5.6%	-2.2%	2.3%	15.2%
2004	35.4%	15.2%	12.7%	6.9%	29.2%	3.4%	-1.1%
2005	11.5%	-0.2%	11.8%	7.0%	1.6%	63.4%	10.3%
2006	-2.2%	14.5%	18.7%	13.5%	3.4%	10.5%	13.0%
2007	18.6%	0.4%	15.2%	19.5%	8.5%	43.9%	12.0%
2008	13.0%	-0.9%	16.5%	11.4%	15.8%	110.3%	22.3%
2009	-21.5%	2.7%	-6.6%	-9.1%	-20.5%	-37.8%	-9.4%
2010	4.7%	50.0%	10.6%	15.4%	10.9%	7.2%	25.9%
2011	10.4%	17.9%	18.3%	18.2%	10.8%	61.1%	23.3%
2012	15.5%	1.9%	10.6%	-1.8%	4.3%	-17.3%	0.3%
2013	9.9%	1.1%	-9.6%	3.6%	-3.3%	-10.4%	-7.3%
2014	-1.3%	-14.8%	5.4%	9.8%	-4.3%	13.8%	3.4%
2015	-23.0%	-31.4%	-4.1%	-5.3%	-5.2%	-45.4%	-8.7%
2016	8.5%	-7.1%	16.1%	-9.9%	-12.9%	-28.0%	9.8%
2017	2.9%	-1.3%	-3.3%	-5.8%	-0.3%	44.7%	6.5%
2018	-9.4%	3.6%	12.9%	0.6%	1.6%	42.2%	1.0%
2019	-5.5%	-15.4%	6.7%	2.0%	-2.1%	-34.2%	4.6%
2020	-34.0%	-1.3%	-42.1%	-2.2%	-17.9%	-39.5%	1.9%
2021	16.7%	11.8%	26.8%	22.8%	20.5%	31.0%	20.5%
			Forecasts				
2022	8.3%	9.6%	20.2%	15.5%	16.8%	20.7%	15.5%
2023	0.6%	3.5%	6.8%	4.3%	6.8%	4.3%	9.6%
2024	-2.6%	3.0%	3.1%	5.7%	5.3%	0.9%	1.6%

LA-LB-AN Exports by Sector: Growth Rates (continued)

Industry	Fabricated Metal Product	Electrical Equipment Appliance	Apparel	Total Farm	Primary Metal	Other Sectors	Total port Volume
1999	-12.4%	1.8%	-1.4%	-19.6%	-27.7%	37.7%	4.8%
2000	10.7%	37.6%	15.1%	32.8%	36.3%	0.4%	13.9%
2001	21.8%	-12.7%	3.1%	22.5%	-8.1%	-51.5%	-14.2%
2002	-10.9%	-8.9%	-0.2%	-0.6%	-9.5%	17.9%	-8.8%
2003	3.2%	-2.3%	-8.5%	17.0%	11.4%	54.6%	10.2%
2004	9.7%	15.8%	-0.2%	5.5%	12.0%	-34.2%	7.0%
2005	17.4%	6.6%	18.0%	14.9%	19.9%	34.1%	11.5%
2006	16.7%	22.3%	3.8%	7.4%	18.0%	22.8%	11.2%
2007	1.5%	5.4%	-1.7%	2.1%	4.9%	19.4%	11.7%
2008	-3.0%	-8.8%	11.6%	7.1%	17.3%	3.4%	10.2%
2009	-12.5%	-16.2%	0.8%	-9.0%	-23.3%	-21.2%	-14.1%
2010	14.5%	10.5%	11.6%	-2.2%	22.1%	17.6%	20.6%
2011	-0.3%	10.0%	2.6%	32.6%	24.4%	15.7%	16.9%
2012	4.4%	9.2%	3.6%	5.9%	6.7%	-4.1%	3.2%
2013	13.0%	6.4%	0.2%	7.2%	10.3%	1.0%	1.7%
2014	-1.9%	30.3%	4.9%	-3.2%	6.4%	7.8%	-1.1%
2015	-4.7%	-1.5%	-3.9%	-11.5%	-9.3%	-13.3%	-18.2%
2016	-3.0%	-4.9%	-15.5%	20.1%	33.2%	-6.9%	-0.8%
2017	6.7%	7.5%	2.9%	-4.3%	28.1%	13.2%	4.1%
2018	2.9%	-0.2%	15.6%	0.1%	-21.6%	5.8%	1.7%
2019	3.2%	0.4%	-8.0%	7.4%	-14.6%	-8.1%	-5.8%
2020	-23.6%	-21.9%	-21.3%	3.4%	-33.3%	-9.4%	-17.8%
2021	14.9%	19.1%	12.1%	16.6%	22.8%	10.7%	16.7%
			Forecasts				
2022	7.5%	15.2%	10.8%	14.5%	12.3%	12.5%	12.9%
2023	-1.4%	-0.5%	2.5%	4.3%	3.2%	7.3%	4.5%
2024	-7.6%	-3.3%	-2.1%	6.5%	0.9%	10.2%	3.2%

Source: *WCEAF, California State University Fullerton and International Trade Administration*

Table A5
LA-LB-AN Exports by Sector: Shares of Total Volume

Industry	Transportation Equipment	Computer & Electronic	Miscellaneous	Chemical	Machinery	Petroleum & Coal	Food
1998	23.3%	28.8%	4.3%	4.6%	5.1%	1.3%	3.1%
1999	19.1%	29.5%	4.4%	4.2%	5.2%	1.2%	2.9%
2000	15.7%	32.2%	4.3%	4.5%	7.3%	1.4%	2.9%
2001	19.4%	32.1%	5.4%	5.8%	6.5%	1.8%	4.0%
2002	17.6%	29.0%	6.1%	6.7%	6.5%	1.6%	3.9%
2003	18.5%	24.2%	5.7%	6.4%	5.8%	1.5%	4.1%
2004	23.5%	26.1%	6.0%	6.4%	7.0%	1.5%	3.8%
2005	23.4%	23.4%	6.0%	6.1%	6.4%	2.1%	3.8%
2006	20.6%	24.0%	6.4%	6.3%	5.9%	2.1%	3.8%
2007	21.9%	21.6%	6.6%	6.7%	5.8%	2.7%	3.8%
2008	22.4%	19.4%	7.0%	6.8%	6.1%	5.2%	4.3%
2009	20.5%	23.2%	7.6%	7.2%	5.6%	3.8%	4.5%
2010	17.8%	28.9%	7.0%	6.9%	5.2%	3.4%	4.7%
2011	16.8%	29.1%	7.0%	6.9%	4.9%	4.6%	4.9%
2012	18.8%	28.7%	7.5%	6.6%	4.9%	3.7%	4.8%
2013	20.3%	28.6%	6.7%	6.7%	4.7%	3.3%	4.4%
2014	20.3%	24.6%	7.1%	7.5%	4.5%	3.8%	4.6%
2015	19.1%	20.6%	8.4%	8.6%	5.3%	2.5%	5.1%
2016	20.9%	19.3%	9.8%	7.8%	4.6%	1.8%	5.6%
2017	20.6%	18.3%	9.1%	7.1%	4.4%	2.5%	5.8%
2018	18.4%	18.7%	10.1%	7.0%	4.4%	3.5%	5.7%
2019	18.4%	16.8%	11.5%	7.6%	4.6%	2.5%	6.4%
2020	14.8%	20.1%	8.1%	9.1%	4.6%	1.8%	7.9%
2021	14.8%	19.3%	8.8%	9.5%	4.7%	2.0%	8.1%
			Forecasts				
2022	14.2%	18.7%	9.3%	9.7%	4.9%	2.2%	8.3%
2023	13.7%	18.5%	9.5%	9.7%	5.0%	2.2%	8.7%
2024	12.9%	18.5%	9.5%	10.0%	5.1%	2.1%	8.6%

LA-LB-AN Exports by Sector: Shares of Total Volume (continued)

Industry	Fabricated Metal	Electrical Equipment	Apparel	Total Farm	Primary Metal	Other Sectors
1998	3.1%	2.9%	2.3%	1.5%	1.7%	17.9%
1999	2.6%	2.8%	2.2%	1.2%	1.2%	23.5%
2000	2.5%	3.4%	2.2%	1.3%	1.4%	20.7%
2001	3.5%	3.5%	2.7%	1.9%	1.5%	11.7%
2002	3.5%	3.5%	2.9%	2.1%	1.5%	15.1%
2003	3.2%	3.1%	2.4%	2.2%	1.5%	21.2%
2004	3.3%	3.3%	2.3%	2.2%	1.6%	13.1%
2005	3.5%	3.2%	2.4%	2.3%	1.7%	15.7%
2006	3.7%	3.5%	2.2%	2.2%	1.8%	17.4%
2007	3.3%	3.3%	2.0%	2.0%	1.7%	18.5%
2008	2.9%	2.7%	2.0%	1.9%	1.8%	17.4%
2009	3.0%	2.7%	2.3%	2.0%	1.6%	16.0%
2010	2.8%	2.4%	2.2%	1.7%	1.6%	15.6%
2011	2.4%	2.3%	1.9%	1.9%	1.7%	15.4%
2012	2.5%	2.4%	1.9%	1.9%	1.8%	14.3%
2013	2.7%	2.5%	1.9%	2.0%	1.9%	14.2%
2014	2.7%	3.4%	2.0%	2.0%	2.1%	15.5%
2015	3.1%	4.0%	2.3%	2.2%	2.3%	16.4%
2016	3.1%	3.9%	2.0%	2.6%	3.1%	15.4%
2017	3.2%	4.0%	2.0%	2.4%	3.8%	16.8%
2018	3.2%	3.9%	2.2%	2.4%	3.0%	17.4%
2019	3.5%	4.2%	2.2%	2.7%	2.7%	17.0%
2020	3.3%	4.0%	2.1%	3.4%	2.2%	18.7%
2021	3.2%	4.1%	2.0%	3.4%	2.3%	17.8%
			Forecasts			
2022	3.0%	4.1%	2.0%	3.4%	2.3%	17.7%
2023	2.9%	3.9%	1.9%	3.4%	2.2%	18.2%
2024	2.6%	3.7%	1.8%	3.5%	2.2%	19.4%

Source: *WCEAF, California State University Fullerton and International Trade Administration*

A6. ORANGE COUNTY EXPORTS

Table A6
OC Exports by Country: Growth Rate

Year	Canada	China	Japan	South Korea	Mexico	Rest of World	Total Exports
2000	21.9%	60.5%	41.8%	52.7%	34.4%	4.5%	18.3%
2001	-12.4%	39.8%	-5.8%	-20.9%	-1.5%	-21.1%	-12.7%
2002	-16.6%	-1.2%	-29.6%	-12.0%	-2.2%	-3.3%	-9.5%
2003	15.8%	31.1%	7.6%	11.2%	-5.7%	20.8%	13.6%
2004	19.3%	36.5%	22.5%	32.3%	13.9%	-1.4%	10.0%
2005	16.2%	22.0%	7.7%	12.2%	4.2%	16.2%	13.3%
2006	10.3%	42.2%	2.6%	9.4%	31.4%	8.0%	13.2%
2007	32.2%	21.8%	4.1%	25.8%	-14.1%	20.0%	13.8%
2008	4.2%	-0.3%	3.4%	8.9%	21.1%	13.8%	9.9%
2009	-23.4%	-17.6%	-17.4%	-22.1%	11.7%	-17.2%	-14.9%
2010	14.8%	33.1%	11.8%	14.4%	61.4%	10.6%	22.2%
2011	12.7%	29.2%	17.9%	6.5%	31.0%	23.3%	21.7%
2012	6.1%	-6.7%	-1.4%	3.4%	6.7%	11.4%	5.5%
2013	-1.7%	6.9%	1.0%	9.0%	11.8%	8.7%	7.9%
2014	-9.7%	-10.6%	-11.3%	-10.4%	-21.3%	-3.6%	-10.4%
2015	-8.5%	-13.6%	-15.9%	-7.3%	-34.2%	-15.7%	-18.4%
2016	-12.4%	-18.0%	1.5%	-8.1%	-17.1%	-1.6%	-8.1%
2017	-12.6%	-8.4%	-19.4%	-5.9%	-9.3%	-17.5%	-10.5%
2018	5.5%	-1.8%	14.9%	7.6%	11.7%	0.8%	6.2%
2019	-3.0%	-12.6%	-0.1%	6.1%	-16.5%	3.7%	-2.1%
2020	-10.2%	-10.5%	-14.4%	6.4%	-0.8%	-17.8%	-12.6%
2021	22.5%	21.7%	19.2%	18.1%	23.8%	7.0%	18.7%
				Forecasts			
2022	11.7%	8.8%	11.0%	8.8%	13.7%	11.0%	11.2%
2023	6.4%	2.1%	3.2%	2.0%	7.7%	5.7%	5.4%
2024	4.6%	0.9%	2.9%	-0.5%	5.5%	2.9%	3.2%

Source: *WCEAF, California State University Fullerton*

Table A7
OC Exports by Country: Shares of Total Volumes

Year	Canada	China	Japan	South Korea	Mexico	Rest of World
1999	14.2%	2.4%	13.7%	4.4%	13.4%	55.9%
2000	14.6%	3.2%	16.4%	5.6%	15.2%	49.4%
2001	14.7%	5.2%	17.7%	5.1%	17.2%	44.6%
2002	13.5%	5.7%	13.8%	5.0%	18.5%	47.7%
2003	13.8%	6.5%	13.1%	4.8%	15.4%	50.7%
2004	14.9%	8.1%	14.5%	5.8%	15.9%	45.4%
2005	15.3%	8.7%	13.8%	5.8%	14.6%	46.6%
2006	14.9%	11.0%	12.5%	5.6%	17.0%	44.5%
2007	17.3%	11.7%	11.5%	6.2%	12.8%	46.9%
2008	16.4%	10.7%	10.8%	6.1%	14.1%	48.6%
2009	14.8%	10.3%	10.5%	5.6%	18.6%	47.3%
2010	13.9%	11.2%	9.6%	5.2%	24.5%	42.8%
2011	12.9%	11.9%	9.3%	4.6%	26.4%	43.4%
2012	13.0%	10.5%	8.7%	4.5%	26.7%	45.8%
2013	11.8%	10.4%	8.1%	4.5%	27.7%	46.1%
2014	11.9%	10.4%	8.1%	4.5%	24.3%	49.7%
2015	13.3%	11.0%	8.3%	5.2%	19.6%	51.3%
2016	12.7%	9.8%	9.2%	5.2%	17.6%	54.9%
2017	12.4%	10.1%	8.2%	5.4%	17.9%	50.6%
2018	12.3%	9.3%	8.9%	5.5%	18.8%	48.0%
2019	12.2%	8.3%	9.1%	6.0%	16.0%	50.8%
2020	12.6%	8.5%	8.9%	7.3%	18.2%	47.9%
2021	13.0%	8.7%	9.0%	7.2%	19.0%	43.1%
			Forecasts			
2022	13.0%	8.5%	8.9%	7.1%	19.4%	43.0%
2023	13.1%	8.3%	8.7%	6.8%	19.9%	43.2%
2024	13.3%	8.1%	8.7%	6.6%	20.3%	43.0%

Source: *WCEAF, California State University Fullerton*

Table A8
OC Exports by Region: Growth Rate

Year	Africa	Asia	European Union	NAFTA	OPEC	South America
2000	-8.5%	40.5%	26.2%	28.0%	-2.1%	0.2%
2001	3.8%	-8.0%	-8.8%	-6.8%	-17.2%	-2.3%
2002	-1.2%	-18.1%	-20.0%	-8.8%	-7.0%	-29.4%
2003	15.9%	9.1%	6.9%	3.4%	9.9%	-2.2%
2004	36.5%	30.8%	24.4%	16.5%	43.5%	53.1%
2005	17.3%	12.1%	8.4%	10.1%	76.7%	22.6%
2006	31.2%	12.9%	5.3%	20.6%	-13.3%	23.8%
2007	-9.8%	15.9%	20.1%	7.6%	44.6%	25.2%
2008	35.4%	3.4%	8.8%	11.4%	14.4%	35.4%
2009	-1.3%	-16.0%	-20.4%	-7.1%	-17.3%	-26.2%
2010	-15.3%	20.6%	2.2%	40.8%	24.8%	27.9%
2011	8.2%	23.0%	20.6%	24.5%	25.2%	34.9%
2012	25.6%	-2.7%	6.7%	6.6%	108.8%	8.0%
2013	-15.7%	7.3%	12.6%	7.4%	-16.0%	8.0%
2014	-23.4%	-3.2%	-6.1%	-17.9%	-7.2%	-1.5%
2015	-10.5%	-13.2%	-16.1%	-25.8%	-15.8%	-29.2%
2016	5.6%	-1.9%	1.1%	-15.7%	1.3%	-18.7%
2017	-41.5%	-10.8%	-6.9%	-10.7%	-52.1%	-16.2%
2018	30.9%	3.6%	-0.2%	9.2%	4.1%	-3.6%
2019	-3.0%	0.2%	5.9%	-11.2%	-2.7%	-8.1%
2020	-8.2%	-15.9%	-10.9%	-4.9%	-26.2%	-15.2%
2021	15.2%	20.8%	14.2%	23.3%	13.6%	23.8%
			Forecasts			
2022	7.3%	10.8%	10.2%	12.9%	31.7%	9.3%
2023	2.0%	4.5%	4.8%	7.2%	4.0%	3.8%
2024	1.5%	2.5%	2.7%	5.1%	-4.0%	0.8%

Source: *WCEAF, California State University Fullerton*

Table A9
OC Exports by Sector: Growth Rate

Industry	Transportation Equipment	Computer Electronic Product	Miscellaneous	Chemical	Machinery	Petroleum & Coal Products	Food
2000	-0.4%	32.8%	17.9%	23.3%	61.8%	37.6%	15.2%
2001	0.8%	-17.6%	10.7%	11.5%	-11.9%	6.4%	16.1%
2002	-15.4%	-19.8%	0.8%	5.9%	-11.5%	-13.4%	-7.1%
2003	19.4%	-3.5%	8.0%	12.4%	4.2%	-3.4%	16.9%
2004	34.6%	19.3%	16.3%	8.9%	28.9%	15.1%	4.2%
2005	12.3%	-0.6%	17.6%	3.5%	9.7%	63.5%	11.2%
2006	-0.1%	18.9%	15.9%	18.8%	0.4%	11.2%	17.6%
2007	11.6%	4.3%	15.2%	27.3%	6.8%	30.6%	12.4%
2008	26.0%	-7.9%	20.4%	2.4%	14.1%	116.1%	22.0%
2009	-26.1%	6.3%	-13.7%	-6.5%	-15.9%	-42.1%	-14.7%
2010	3.1%	62.6%	19.4%	14.4%	8.8%	15.0%	33.2%
2011	19.8%	18.7%	35.5%	20.3%	6.5%	68.2%	26.3%
2012	18.5%	6.6%	5.2%	1.4%	10.7%	-17.9%	6.0%
2013	18.4%	-26.9%	-8.9%	11.8%	12.2%	-1.0%	-0.3%
2014	-5.2%	9.4%	-4.1%	-2.1%	-16.5%	5.8%	-9.4%
2015	-16.6%	-14.8%	-18.3%	-18.1%	-21.8%	-15.1%	-17.3%
2016	-6.3%	-11.4%	-10.1%	-5.9%	-8.6%	-15.0%	-9.2%
2017	-12.5%	-19.1%	4.0%	-8.8%	-9.5%	0.9%	5.5%
2018	-1.4%	11.4%	20.8%	11.2%	6.0%	3.6%	2.6%
2019	-5.8%	-14.0%	14.4%	3.7%	-4.7%	-1.4%	11.2%
2020	-29.6%	-4.8%	-32.0%	-11.1%	-7.6%	-31.3%	5.7%
2021	16.6%	21.0%	26.2%	22.2%	22.2%	19.9%	23.4%
			Forecasts				
2022	21.6%	6.9%	16.7%	8.5%	6.6%	20.5%	9.1%
2023	-0.1%	7.6%	1.4%	6.1%	5.8%	-0.3%	5.4%
2024	3.9%	3.2%	0.9%	3.6%	4.4%	4.4%	3.9%

OC Exports by Sector: Growth Rate (continued)

Industry	Fabricated Metal Product	Electrical Equipment Appliance	Apparel	Total Farm	Primary Metal	Other Sectors	Total Exports
2000	11.2%	41.3%	15.1%	25.3%	36.1%	1.3%	18.3%
2001	32.1%	-18.8%	13.8%	5.4%	-7.9%	-41.9%	-12.7%
2002	-15.8%	-2.1%	-3.9%	31.3%	-7.9%	8.4%	-9.5%
2003	9.2%	1.1%	-9.1%	3.5%	15.2%	55.7%	13.6%
2004	16.2%	19.9%	2.5%	5.3%	13.0%	-30.2%	10.0%
2005	13.0%	12.2%	21.7%	6.3%	28.0%	39.8%	13.3%
2006	19.2%	17.9%	5.4%	17.3%	16.9%	23.5%	13.2%
2007	7.1%	3.9%	0.6%	8.2%	8.4%	30.2%	13.8%
2008	-4.1%	-1.6%	5.9%	13.6%	16.7%	-0.4%	9.9%
2009	-14.1%	-18.7%	5.7%	-16.6%	-19.9%	-18.8%	-14.9%
2010	15.2%	11.0%	4.6%	23.7%	21.3%	3.9%	22.2%
2011	-1.2%	25.3%	10.4%	16.4%	24.5%	23.6%	21.7%
2012	11.3%	3.9%	5.9%	2.2%	-0.1%	-3.4%	5.5%
2013	23.8%	14.4%	4.1%	25.6%	32.7%	71.4%	7.9%
2014	-14.9%	16.0%	-0.9%	-15.1%	-6.6%	-41.9%	-10.4%
2015	-19.9%	-13.8%	-21.0%	-17.5%	-14.5%	-28.3%	-18.4%
2016	-5.0%	-5.1%	-7.1%	-8.9%	-1.9%	-4.3%	-8.1%
2017	-2.7%	-4.2%	6.0%	-1.7%	2.4%	-17.7%	-10.5%
2018	12.2%	11.1%	9.6%	13.6%	-2.0%	-3.2%	6.2%
2019	10.4%	7.1%	-3.8%	4.5%	5.9%	-2.5%	-2.1%
2020	-17.0%	-13.1%	-9.6%	11.5%	1.2%	7.7%	-12.6%
2021	16.9%	11.0%	18.0%	22.0%	16.6%	9.4%	18.7%
			Forecasts				
2022	12.1%	14.8%	4.6%	9.7%	7.4%	6.4%	11.2%
2023	7.0%	6.6%	4.0%	1.0%	8.5%	12.8%	5.4%
2024	2.1%	2.5%	2.0%	6.6%	2.4%	2.9%	3.2%

Source: *WCEAF, California State University Fullerton*

Table A10
OC Exports by Sector: Shares of Total Volume

Industry	Transportation Equipment	Computer & Electronic	Miscellaneous	Chemical	Machinery	Petroleum & Coal	Food
1999	19.9%	30.0%	4.2%	4.2%	4.9%	1.3%	2.9%
2000	16.8%	33.7%	4.2%	4.4%	6.6%	1.5%	2.8%
2001	19.4%	31.8%	5.4%	5.6%	6.7%	1.8%	3.7%
2002	18.1%	28.2%	6.0%	6.6%	6.6%	1.8%	3.8%
2003	19.1%	23.9%	5.7%	6.5%	6.0%	1.5%	3.9%
2004	23.3%	25.9%	6.0%	6.4%	7.0%	1.6%	3.7%
2005	23.1%	22.8%	6.2%	5.9%	6.8%	2.2%	3.7%
2006	20.4%	23.9%	6.4%	6.2%	6.1%	2.2%	3.8%
2007	20.0%	21.9%	6.5%	6.9%	5.7%	2.5%	3.7%
2008	23.0%	18.4%	7.1%	6.4%	5.9%	5.0%	4.2%
2009	19.9%	23.0%	7.2%	7.1%	5.8%	3.4%	4.2%
2010	16.8%	30.5%	7.0%	6.6%	5.2%	3.2%	4.5%
2011	16.5%	29.8%	7.8%	6.5%	4.5%	4.4%	4.7%
2012	18.6%	30.1%	7.8%	6.3%	4.8%	3.4%	4.7%
2013	20.4%	20.4%	6.6%	6.5%	5.0%	3.2%	4.4%
2014	21.6%	24.9%	7.0%	7.1%	4.6%	3.7%	4.4%
2015	22.0%	26.0%	7.0%	7.1%	4.4%	3.9%	4.5%
2016	22.4%	25.0%	6.9%	7.3%	4.4%	3.6%	4.4%
2017	21.9%	22.6%	8.0%	7.4%	4.5%	4.0%	5.2%
2018	20.4%	23.7%	9.1%	7.8%	4.4%	3.9%	5.0%
2019	19.6%	20.9%	10.6%	8.3%	4.3%	4.0%	5.7%
2020	15.8%	22.7%	8.3%	8.4%	4.6%	3.1%	6.9%
2021	15.5%	23.2%	8.8%	8.7%	4.7%	3.2%	7.2%
			Forecasts				
2022	17.0%	22.2%	9.3%	8.4%	4.5%	3.4%	7.1%
2023	16.1%	22.7%	8.9%	8.5%	4.5%	3.2%	7.1%
2024	16.2%	22.7%	8.7%	8.5%	4.6%	3.3%	7.1%

OC Exports by Sector: Shares of Total Volume (continued)

Industry	Fabricated Metal	Electrical Equipment	Apparel	Total Farm	Primary Metal	Other Sectors
1999	2.6%	2.9%	2.3%	1.3%	1.2%	22.4%
2000	2.4%	3.4%	2.2%	1.3%	1.4%	19.2%
2001	3.7%	3.2%	2.9%	1.6%	1.5%	12.8%
2002	3.4%	3.4%	3.1%	2.3%	1.5%	15.3%
2003	3.3%	3.1%	2.5%	2.1%	1.5%	21.0%
2004	3.5%	3.3%	2.3%	2.0%	1.5%	13.3%
2005	3.5%	3.3%	2.5%	1.9%	1.7%	16.4%
2006	3.6%	3.4%	2.3%	2.0%	1.8%	17.9%
2007	3.4%	3.1%	2.0%	1.9%	1.7%	20.5%
2008	3.0%	2.8%	2.0%	1.9%	1.8%	18.6%
2009	3.0%	2.7%	2.4%	1.9%	1.7%	17.7%
2010	2.9%	2.4%	2.1%	1.9%	1.7%	15.1%
2011	2.3%	2.5%	1.9%	1.8%	1.7%	15.3%
2012	2.4%	2.5%	1.9%	1.8%	1.7%	14.0%
2013	2.8%	2.6%	1.8%	2.1%	2.0%	22.3%
2014	2.7%	3.4%	2.0%	2.0%	2.1%	14.5%
2015	2.6%	3.6%	1.9%	2.0%	2.2%	12.7%
2016	2.7%	3.7%	2.0%	2.0%	2.4%	13.2%
2017	2.9%	4.0%	2.3%	2.2%	2.7%	12.2%
2018	3.1%	4.1%	2.4%	2.3%	2.5%	11.1%
2019	3.5%	4.5%	2.4%	2.5%	2.7%	11.0%
2020	3.3%	4.5%	2.4%	3.2%	3.1%	13.6%
2021	3.3%	4.2%	2.4%	3.2%	3.1%	12.5%
			Forecasts			
2022	3.3%	4.3%	2.3%	3.2%	3.0%	12.0%
2023	3.3%	4.4%	2.3%	3.1%	3.1%	12.8%
2024	3.3%	4.4%	2.2%	3.2%	3.0%	12.8%

Source: *WCEAF, California State University Fullerton*

International Trade Economic Forecasts
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