2022

THE YEAR AHEAD:

Forces That Will Shape the U.S. Rural Economy

COBANK
KNOWLEDGE EXCHANGE

DECEMBER 2021

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Forces That Will Shape the U.S. Rural Economy

CoBANK KNOWLEDGE EXCHANGE

To Our Customers and Business Partners

By Tom Halverson

A YEAR AGO, when the Federal Open Market Committee convened for its December 2020 meeting, participants offered their considered opinions about the likely performance of the U.S. economy for the year ahead. With COVID-19 still largely out of control and vaccines not yet available, the Federal Reserve Board members and bank presidents were understandably subdued about the uncertain outlook for 2021. Their median projection for U.S. GDP growth was 4.2%. They predicted a year-end unemployment rate of 5.0% and 1.8% annual inflation.

In hindsight, of course, those projections were significantly off the mark. U.S. economic output is now estimated to approach 6% for 2021 thanks to the rollout of vaccines and the unleashing of pent-up demand from consumers. U.S. unemployment currently stands at 4.2%, with many businesses struggling to find workers and fill open positions. Inflation, meanwhile, now exceeds 4% and is emerging as a significant source of concern for the economy.

My point here is not to cast aspersions on the Fed's forecasting abilities. It's to underscore how difficult it is for anyone, even the experts at the Federal Reserve, to accurately predict economic performance over the course of a coming year, especially at a time of a once-in-one-hundred-years pandemic. Any exercise in forecasting must begin with a recognition that it will be wrong more often than right. The standard deviation of possible outcomes in the current context is simply too wide – especially in this period of unprecedented marketplace conditions.

Nonetheless, I believe there is important value and discipline in looking forward at the end of each year and making the effort to declare views about where the economy is headed and the key factors that will shape markets and our economic future. Boards and executive teams that employ such discipline in their businesses are better informed about themselves

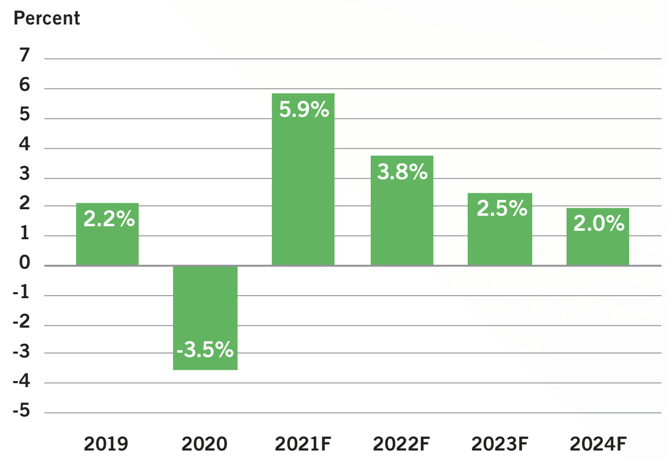
Any exercise in forecasting must begin with a recognition that it will be wrong more often than right.

and the operating environment — and better able to adapt to disruption when it comes, thereby mitigating risks and capitalizing on opportunities.

In that spirit, it is our privilege to provide our customers and business partners with CoBank's year-ahead report for 2022. Our Knowledge Exchange team of economists and industry analysts has once again assembled a collection of essays about key trends in the rural industries we finance. We hope that our customers and other partners find the report useful as they devise strategies and business plans for the year ahead and position their businesses for future growth and success.

In addition to the insights on the pages that follow, I would ask readers to consider a handful of additional key themes that I personally am thinking about as I reflect on the set of opportunities and challenges that CoBank and its customers face moving forward. They are as follows:

EXHIBIT 1: U.S. GDP - Annual Growth Rate



Source: Federal Open Market Committee, September 2021 median projections

- **The U.S. economy must wean itself from government stimulus.** The response to COVID-19 has necessitated repeated massive doses of fiscal and monetary stimulus over the past two years, both from the U.S. Treasury and the Federal Reserve. It's impossible to precisely determine how much of the economy's robust 2021 performance was due to extraordinary support in the form of emergency government spending and near-zero interest rates, rather than organic growth and innate strength. What seems virtually certain is that stimulus will continue to recede and pressures will reappear on policymakers to reduce fiscal deficits and on the central bank to raise rates in response to inflation trends. As a result, U.S. economic growth will inevitably moderate and revert toward more normalized growth rates over the next several years.

- **Divided government has already returned.** One of the most unfortunate effects of COVID-19 is the exacerbation of political discord in our country. Government policies and actions to address the pandemic have broadened and deepened cultural and ideological fault lines across the populace —

U.S. economic growth will inevitably moderate and revert toward more normalized growth rates over the next couple of years.

fault lines that manifest in our democratic system and that can be disabling at the very moment when concerted, thoughtful governance is most needed. As noted in the section below on federal policy, we are likely to see a change in control in at least one house in Congress as a result of the 2022 midterm elections. We can expect political gridlock will be a dominant feature of federal policymaking as a result.

- **Climate policy will continue to drive private sector economic activity.** Another fairly certain bet is that the private sector in advanced economies, including here in the U.S., will continue to align around the policy goal of reducing global carbon emissions and addressing climate change. Reasonable people can disagree as to the wisdom of this current policy emphasis on addressing climate change. What is beyond doubt is that climate concerns are reshaping global capital markets and the behavior of private businesses across sectors and geography, and that they will continue to do so in the years ahead. There is a convergence occurring right now along multiple vectors, including government policy and regulation, institutional investment practices and priorities, consumer preferences and behavior, and technological change. This convergence is inexorably powerful and will influence how companies and capital providers make business decisions and engage with each other going forward. CoBank is watching this trend carefully so we can be positioned to assist our customers in successfully navigating it, including those CoBank customers that operate in carbon-intensive businesses.

I'll close this introduction by reiterating once again how grateful and honored we at CoBank are for the relationship we have with our customers. Collectively, our borrowers form the backbone of the U.S. rural economy, delivering food, fiber, energy and other vital services to people throughout the country and around the world. It is a privilege for all of us at CoBank to serve you and stand by you as your financial partner.

With best wishes for the year ahead,

Tom Halverson

Tom Halverson
President and Chief Executive Officer

THE GLOBAL ECONOMY:

Fragile Growth

By Dan Kowalski

IF THE GLOBAL ECONOMY is to perform well in 2022, it will do so despite three significant headwinds: a persistent pandemic, monetary tightening in the U.S., and slowing growth in China. As we enter the third year of the pandemic, the COVID-19 virus is still in control of the world economy, and it will likely remain so through much of the first half of the year. The ongoing threat of virus mutations that could evade vaccines will keep economic uncertainty unusually high. Nevertheless, strong consumer demand throughout much of the developed world will keep the economy humming. We project 4.5% global GDP growth, but the omicron variant, now expected to overtake delta as the dominant strain, tilts the outlook risk to the downside.

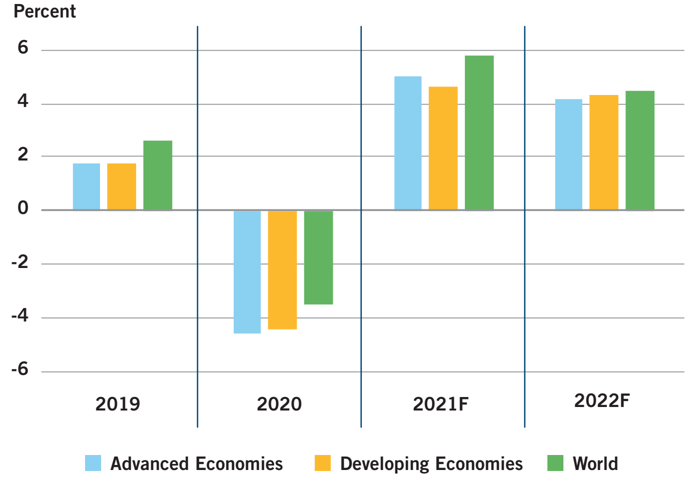
China, always the leader among emerging market economies, will navigate multiple conflicting challenges. Beijing will maintain its zero-tolerance approach toward COVID through the end of the Olympic Games in February, but its policy stance thereafter will partially determine its economic path for the year. It will also attempt to steer the domestic real estate market away from a major downturn while maintaining a focus on long-term reforms. Altogether, it will be a tricky balance, and China's GDP growth is expected to fall from about 8% in 2021 to about 5.5% in 2022.

Elsewhere in emerging economies, Brazil will contend with tightening financial conditions and a potentially bitter presidential election in October. India, after being dealt the worst impact from the delta variant, has considerable catch-up potential. And Russia will benefit from the resurgent oil and gas markets.

Eurozone residents endured challenging COVID conditions in 2021, and are now poised and ready to spend. However, the severity of COVID restrictions in early 2022 will determine how much of that will be possible. Inflation is on the rise in several EU countries, but excess savings in 2021 should lead to a boost in spending by roughly 6% to 7% in 2022. The EU economy will have to muscle forward with much less fiscal help compared to 2021. And supply chain issues will be a dominant theme in the first half of the year. European consumers will be crucial to the region's economic health, and they should power growth to reach nearly 4%.

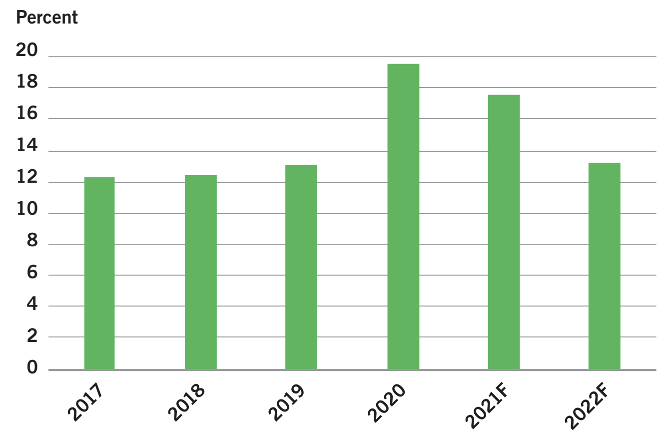
Embedded in our global outlook is an expectation that the omicron variant (and any subsequent COVID-19 variant) will have a modest impact on the world economy. Lengthy government-imposed shutdowns are unlikely, and the delta variant demonstrated in 2021 that the economy can advance resiliently despite a new wave of cases from a new strain. If omicron or a successive variant proves to be much more damaging than currently expected, the global economy could suffer from both supply and demand impacts. Labor shortages and supply chain disruptions could worsen, potentially exacerbating inflation woes, while also dragging down demand for services as consumers cancel plans. We consider this a worst-case scenario, in which global GDP growth could be cut in half from our baseline 4.5% to less than 2.5%. ■

EXHIBIT 2: Real Annual GDP Growth



Source: Oxford Economics

EXHIBIT 3: Eurozone Personal Savings Rate



Source: Statistical Office of the European Communities

THE U.S. ECONOMY:

Labor and Supply Chains to Improve, Inflation Might Not

By Dan Kowalski

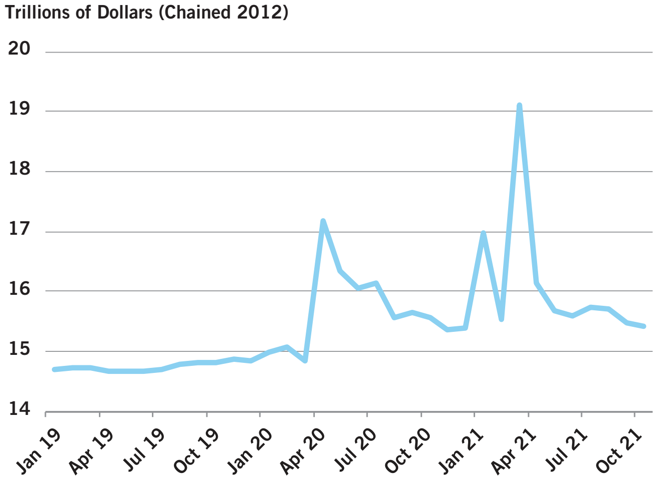
THE U.S. ECONOMY IS POISED TO SLOW in 2022 relative to 2021, but it will still grow at a well above average rate. Consumers have powered the recovery since mid-2020 and that will remain the case in the coming year. Households accumulated more than $2.5 trillion of excess savings in the COVID-19 pandemic, and that sum is enabling many to delay returning to the labor force, but still spend. However, the average personal saving rate is now back to pre-pandemic levels, and as cash set-asides dwindle, we expect that the majority of prime age workers will re-enter the workforce in 2022. More than 2 million workers retired early, though, and most are unlikely to return. The omicron variant is shaping up to be the wild card of early 2022 – it could impact the pace of workers' return, and delay the rebalancing of the U.S. economy.

The pandemic has seriously altered how our economy functions, with the greatest impact coming from what we consume. Through October, in 2021 Americans spent 18% more on goods than they did in 2019, but spent about 1% less than in 2019 on services. Compounded by a labor shortage, it's easy to see why supply chains have become one of the biggest economic challenges of the pandemic: Demand has significantly exceeded the capacity of our existing system. Fortunately, we have likely experienced the worst of the bottlenecks, and they should diminish in the coming year. Note, however, that consumer spending is expected to rise another 4% to 5% in 2022, and if omicron disrupts the services industry, the majority of spending will again go to goods, compounding supply chain and inflation problems. This is not our base case, but it is a real risk to the outlook.

Instead, at this early stage, we expect omicron to have only a modest impact on the economy. A relatively weak Q1 could trim full-year GDP by 0.2 to 0.5 percentage points, but much of the lost economic activity should be deferred to later months, similar to 2021. In total, we project GDP to grow by roughly 4.5% on the year. Business investment will remain strong (4% growth) as companies catch up on inventory and transition their focus to increasing productive capacity for the future.

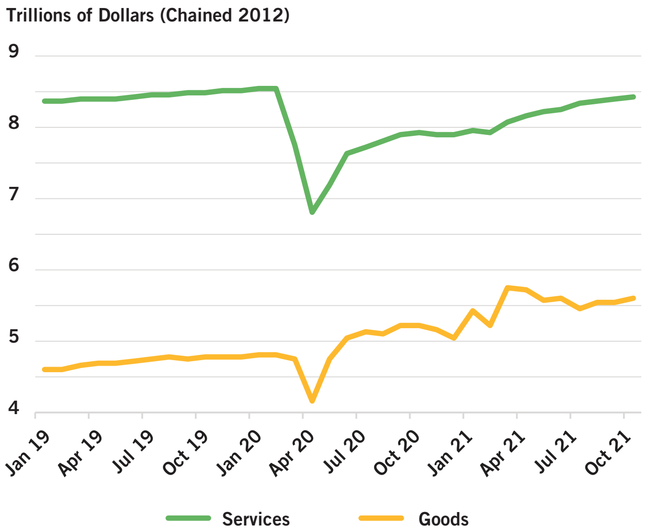
For most consumers and businesses, a key focus in 2022 will be tackling the effects of inflation. Operating and input costs will remain high for businesses in early 2022, and they will continue to look for ways to pass on those costs to consumers. Core consumer prices (excluding food and energy) have risen about 3.5% in 2021, and there is little evidence of relief coming in the year ahead. After decades of steady, roughly 2% annual inflation, Americans may have to get used to inflation being closer to 3% for the foreseeable future. ■

EXHIBIT 4: Real U.S. Personal Disposable Income



Source: St. Louis Federal Reserve

EXHIBIT 5: Real U.S. Consumer Expenditures



Source: St. Louis Federal Reserve

MONETARY POLICY:

Tough Fed Decisions Approaching

By Dan Kowalski

THE COMING YEAR WILL HOLD perhaps some of the most challenging monetary decisions that the Federal Reserve has faced in over a decade. Chair Powell has acknowledged that inflation could remain elevated well into 2022, and comments from several Fed officials have turned more hawkish. Accordingly, the Fed is now expected to accelerate the tapering of its monthly securities purchases, ending them altogether by March or April 2022. This will buy the Fed time to observe several more months of price and employment data, and to assess the economic damage done by the spread of the omicron variant.

The U.S. labor market is already tightening, with jobless claims recently hitting a 52-year low, while job openings and quit rates have set successive all-time highs. Still, there are well over a million prime-age adults (ages 25-54) who left the workforce during the pandemic and have yet to return. How many of them do return, and when, will weigh heavily on Fed decision makers. A slow return would keep the job market tight for longer, applying upward pressure on wages and, indirectly, on prices. The Fed will try to thread the needle of getting the workforce back to full capacity without overheating the economy, which would induce even higher inflation.

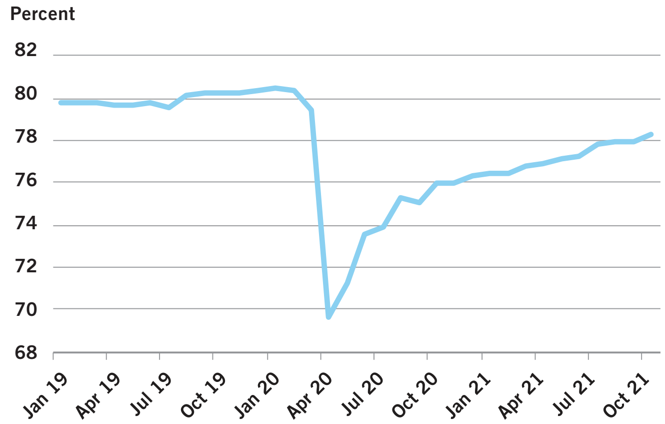
Right now, we expect the Fed to first raise interest rates in late summer or early fall 2022. Of course, this decision will be dependent on virus impacts that none of us can now predict, so financial markets will function amidst a high level of monetary uncertainty in the first half of 2022. One thing the market will expect from the Fed in coming months is more clarity on its approach to inflation. In August 2020, the Fed shifted from targeting an annual rate of 2% inflation to targeting an *average long-run* 2% inflation rate. The old directive was clear; the new directive is ambiguous. Until mid-2021, few people raised major concerns about the policy change. But now that inflation is at 30-year highs, market participants will demand greater specificity in the reigning policy. At what inflation level above 2% will the Fed be comfortable, and for what duration of time? The Fed has purposely avoided addressing this question, but will have a more difficult time dodging it in 2022.

We don't expect that the Fed will have unequivocal and uncontroversial signals to raise rates in mid-2022. It's likely that by then supply chain bottlenecks will be improving and inflation could still be well above 2% but declining. The Fed will want to extend the economic recovery as long as possible before raising rates. But it will also be cognizant that the longer inflation remains elevated, the higher the likelihood that it leads to a perpetuating cycle of higher prices and higher wages. Both Chair Powell and President Biden will be keen to prevent that from happening. ■

EXHIBIT 6: U.S. Job Openings and Quit Rate

Source: U.S. Bureau of Labor Statistics

EXHIBIT 7: U.S. Prime-Age Employment-to-Population Ratio



Source: U.S. Bureau of Labor Statistics

U.S. GOVERNMENT:

Spending, Partisan Control Will Dominate 2022

By Brian Cavey

AS 2021 ENDS AND THE NATION LOOKS TO THE NEW YEAR, the federal policy machinery is very focused on a few key factors that will impact the ability of the administration to lead and the ability of the Congress to legislate.

First of all, COVID-19 has been hanging around far longer than everyone hoped and continues to cast a shadow on Capitol Hill. While the House has passed the Build Back Better bill, the Senate has not moved the bill — a key piece of the President's agenda. Concerns over inflation, tax increases, and spending have led Senators Joe Manchin (D-WV) and Kyrsten Sinema (D-AZ) to insist on shrinking the package before House passage and to delay Senate consideration. In addition, other Senate Democrats want to increase the cap on individual income tax deductions for state and local taxes paid in high-tax (typically Democrat-led) states.

Federal spending is also pressing for Congress. First off, the debt ceiling will be reached by mid-December. Increasing the debt ceiling is increasingly a partisan exercise, but at this writing it appears Congress has found a creative way to navigate the challenge and increase the debt limit in the coming days. The 12 fiscal 2022 appropriations bills are temporarily funded through a continuing resolution lasting through Feb.18, 2022. Congress must pass one or more omnibus spending bills or a continuing resolution to fund the government for the remainder of the year as it starts the fiscal 2023 process in February.

Both the House and Senate agriculture committees plan oversight hearings in 2022 to begin the farm bill planning for 2023. While that is important and timely work, the widely expected change in partisan control of Congress following the 2022 elections may render much of that work perfunctory.

Eighteen states have completed redistricting and the rest are actively engaged in the decennial partisan undertaking. Republicans are projected to gain as many as five seats just through redistricting changes. In addition, the historic pattern of the president's party losing seats in midterm elections has the GOP resisting compromise on most legislation while Democrats are working to sell their legislative accomplishments as a justification to retain their narrow control of the House and Senate.

USDA and the entire administration will move as quickly as possible to get the infrastructure legislation implemented. That could see resources deployed in rural America, particularly on broadband, as the administration works to roll this accomplishment out to support its candidates in November.

Legislative expectations should be modest for 2022. Agriculture will be well-served to renew coalitions from past farm bills in advance of the work ahead on this important policy work in 2023. ■

U.S. FARM ECONOMY:

Increased Costs and Trade Battle with China to Tighten Farm Margins in 2022

By Rob Fox

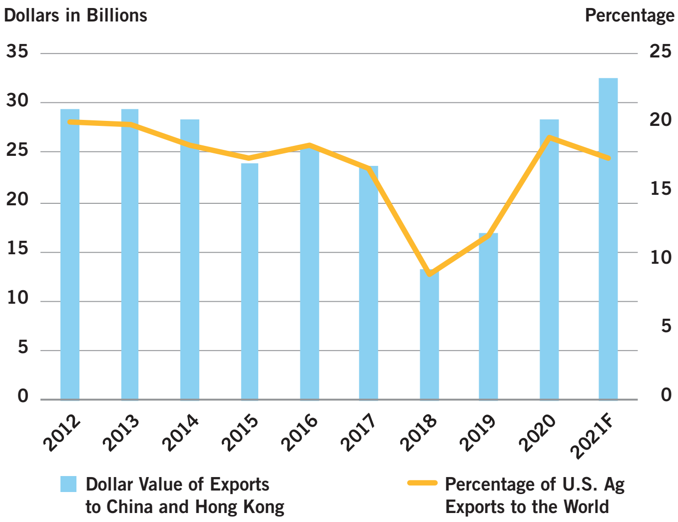
IN THE COMING YEAR, the U.S. farm economy will continue to struggle with the ongoing supply chain dysfunction and cost inflation issues that burst to the fore in summer 2021.

For crop producers, fertilizer prices have recently spiked to record highs and are currently double the 10-year average. Meanwhile some crop protection chemicals, which are often imported, have become nearly impossible to source at any price due to ocean transport congestion. To give some economic perspective, the recent cost increases alone on just those two inputs equates to about $0.70/bushel for a corn producer – a roughly 15% increase in the total cost of production. Additional cost increases for labor, machinery, fuel, and seed must be factored in as well. So, while corn futures prices in the $5.50/bushel range for late 2022 delivery seem to be attractive at first glance, a deeper analysis projects modest profit margins for next year. The same general story of historically strong prices being more than offset by increases in cost structure holds for nearly all crop production including row crops, fruits and vegetables, and hay.

Livestock producer margins should continue to be generally favorable overall, with the effect of shrinking beef cattle supplies finally showing up in higher prices at the producer levels. Hog and poultry producers should both enjoy another good year, though perhaps not like the exceptional 2021. After a very difficult year, dairy producers will benefit from tighter global milk supplies and lower protein feed costs.

Unfortunately, we do not see any significant pullback in farm-level costs until Q3, at the soonest, by which time most crop costs will be booked. Looking at logistics, West Coast port

EXHIBIT 8: **U.S. Agricultural Exports to China and Hong Kong**



Source: USDA-FAS

gridlock and the shortage of containers and drivers will continue into the second half of 2022. This will particularly impact U.S. animal protein and dairy exports headed to Asia. South America and Oceania will continue to capture a larger market share in Asian markets as U.S. exports move to less congested Gulf and eastern ports, which better serve European and Middle East and North Africa markets.

The single biggest wildcard for U.S. agriculture is export sales to China, today the largest export market for U.S. farm products. Recall that U.S. agricultural exports to China plummeted in 2018 and 2019 after the Trump administration instituted a series of import tariffs on solar panels, washing machines, steel, and other products which are exported from China. After the Phase One agreement in January 2020, U.S. agricultural exports to China quickly recovered to earlier levels. However, other aspects of the Phase One agreement have not come close to being met, leading to some strong words from U.S. Trade Representative Katherine Tai.

Likely realizing a bilateral approach will continue to be difficult, particularly in regard to intellectual property protection and forced technology transfer, the administration is turning to other global partners to help engage China in meaningful trade reforms. President Biden recently announced joint plans with the EU to form a multilateral trade agreement that would place tariffs on high carbon-emitting steel producers (read: China). As a background to trade negotiations, both the U.S. and China are currently ramping up military operations in the South China Sea. Given the political sensitivity of U.S. agricultural exports, market participants may have vastly underestimated the risk that China will use this leverage after the Phase One agreement expires at year end 2021.

Finally, a decline in direct government payments in 2022 will further squeeze farm income statements. Accounting for about 10% of net farm income from 2010 to 2018, government payments ballooned to nearly 28% in 2019-21 due to an assortment of ad hoc pandemic and trade dispute-related support programs. Although the Build Back Better plan dedicates $27 billion in additional climate-related conservation provisions, only a portion of that would be available for 2022. Given that production agriculture is one of the few areas with support in Congress from both blue and red states, another round of the Market Facilitation Program is not out of the question, particularly if U.S.-China trade relations continue to deteriorate. ■

GRAIN, FARM SUPPLY, BIOFUELS:

Inflation, Volatility Create Mixed Outlook

By Kenneth Scott Zuckerberg

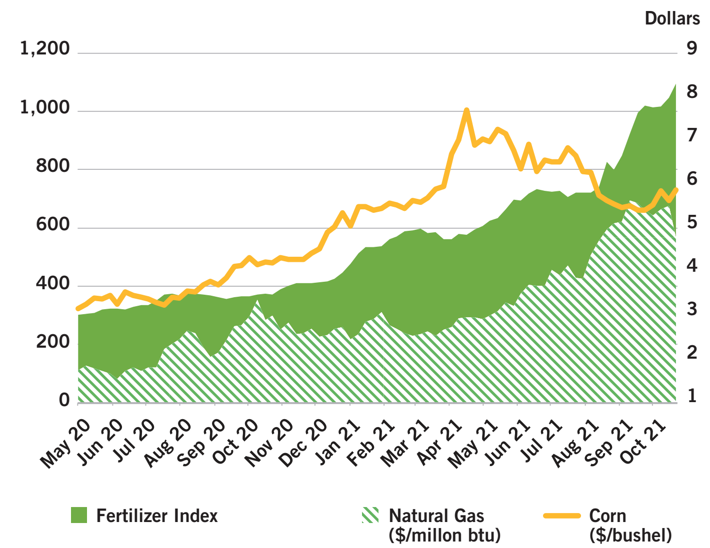
THE GRAIN, FARM SUPPLY, AND BIOFUEL SECTORS enter 2022 facing a mixture of inflationary headwinds, supply chain bottlenecks and high-energy prices that present headwinds but also a few opportunities. We view the short-term outlook as mixed for grain, challenging for farm supply and positive for biofuels.

Grain elevators and merchandizers face a mixed picture for the year ahead. On the positive side, ethanol-led corn demand has been ramping up and export activity should pick up in 2022 as Gulf of Mexico operations normalize post Hurricane Ida. That said, export sales to China are still running well below the 2021 Phase One levels and may disappoint. Another positive we see for elevators in 2022 is lower financing costs – smaller credit lines for operating liquidity and margin calls – as opposed to the case during the grain run May 2020 to May 2021. Partly offsetting these positives, opportunities to capture positive market carry appear limited given inverted forward prices for corn, soybeans, and wheat after mid-2022.

Ag retailers will face continued operational anxiety in 2022 due to input inflation and product shortages due to COVID-related supply chain bottlenecks and production disruptions in China and India. Three issues are at play: One, the recent parabolic rise in fertilizer prices creates basis and write-down risk should nutrient prices suddenly fall in the spring. Two, cooperatives operating outside of large regional systems may have trouble sourcing crop protection chemicals and thus could see protection sales come under significant pressure for the spring agronomy season. Three, the labor situation is worsening in rural America. While recruiting and retaining skilled staff has been an ongoing problem, wage inflation and lower workforce participation have emerged into the "post-COVID" economy recovery. To counter the labor issues, agriculture may enter a golden age for automation and robotics, which is unlikely to reverse course.

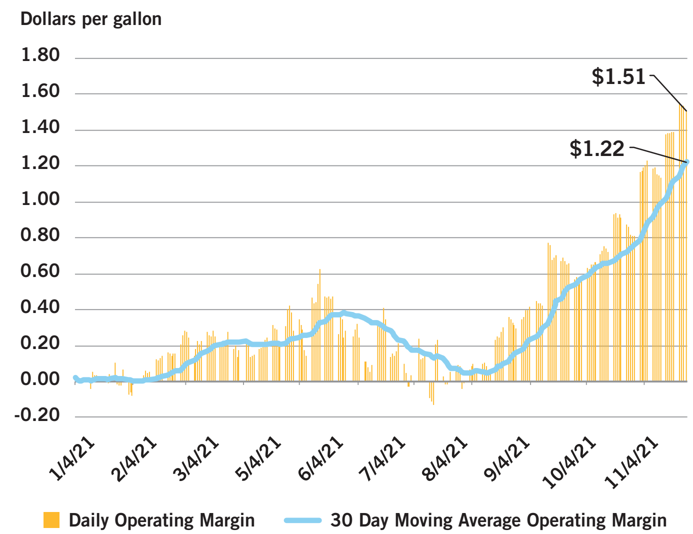
Biofuels, in contrast to a year ago, enter 2022 with considerable momentum and a positive short-term outlook. The fuel ethanol complex is revving on all cylinders driven by strong consumer demand and higher gasoline and fuel ethanol prices, which are offsetting increased corn and natural gas costs. Production is running on parity with pre-COVID levels (of 16.0 billion to 16.5 billion gallons annualized), and daily operating margins are near $1.51/gallon — four times the 2021 YTD average of $0.36. Operating margins on a 30-day moving average approximate $1.22 and are at record levels. Looking to mid-year 2022, we see a risk of overproduction especially if the U.S. economy experiences a pull back or temporary pause in activity as was the case in 3Q 2021. Beyond ethanol, 2022 should see the continued build-out of soybean crushing and soy oil refining capacity to support the expected growth in renewable diesel, as well as more activity geared towards development of the sustainable aviation fuel (SAF) market. ■

EXHIBIT 9: Fertilizer vs. Natural Gas and Corn Prices



Source: BarChart.com and Green Markets, FertilizerPricing.com © Bloomberg L.P.

EXHIBIT 10: Iowa Ethanol Plant Daily Operating Margin Comparison



Source: Iowa State University, Center for Agriculture and Rural Development (ISU-CARD)

ANIMAL PROTEIN:

Lean Supplies, Strong Demand Bolster Prices Despite Export Unknowns

By Brian Earnest

INCREDIBLY STRONG CONSUMER DEMAND for meat products negated fears this year that a higher feed cost environment would limit processor margins. The story for 2022 is consumer-level meat inflation. The Bureau of Labor and Statistics' CPI for all meats, poultry, fish, and eggs hit an all-time high in October, up 12% YoY. As restaurant menus and grocery prices adjust, consumer-level meat inflation is likely to continue well into the new year.

While higher retail prices could limit consumption growth, tighter cattle supplies, ongoing broiler breeder issues, and sow herd reductions should support favorable processor margins through at least the first half of 2022. The supply outlook implies that per capita U.S. meat consumption likely peaked at 225 pounds annually in 2020 and will edge lower through at least 2023.

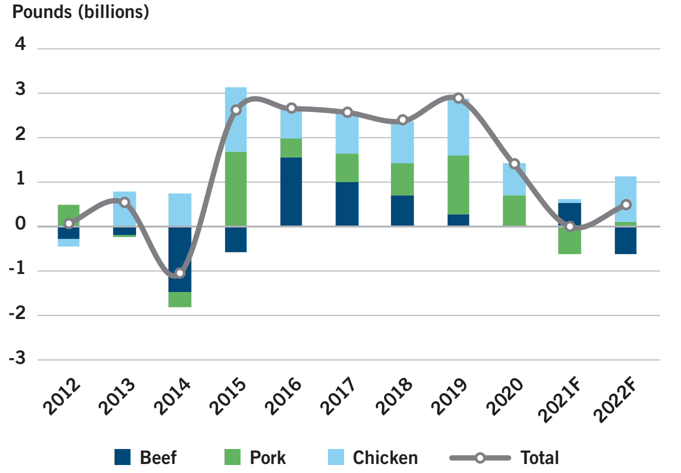
The early 2021 tailwind of record profitability for beef packers would typically bring significant slaughter capacity expansion, but this is not the case. Low farm-level cattle prices from 2019 through mid-2021, combined with the extreme drought in the Western U.S., have set the stage for lower feeder cattle supplies for at least the next 2-3 years. Expect the major packers and smaller independents to fiercely battle for fed cattle supplies, which in turn, will raise cattle prices and moderate packer margins.

Wage rates and overall labor costs are expected to remain firmly higher in 2022 as the industry seeks solutions to reduced labor availability. Automation capital expenditures at the plant level will continue in earnest despite the rapidly rising costs of machinery and equipment. Most processors view this as a necessary cost of doing business moving forward. The U.S. broiler sector, which has been highly successful in expanding capacity in recent years, is probably best suited to benefit from expanding automation.

The U.S. pork sector faces a challenge in managing hog production and product supplies to accommodate the upcoming implementation of California's ballot measure, Prop 12. It mandates that pork sold in the state must be raised under compliant sow housing standards. Estimates suggest that only about 4% of sow operations were compliant through mid-2021, but California currently consumes 14% of all U.S. pork production. With the industry having exhausted most of its legal options, it appears that Prop 12 will indeed become law, with the full impact expected in the second quarter of 2022. Expect much higher pork prices in California, at least until the appropriate supply chains are developed.

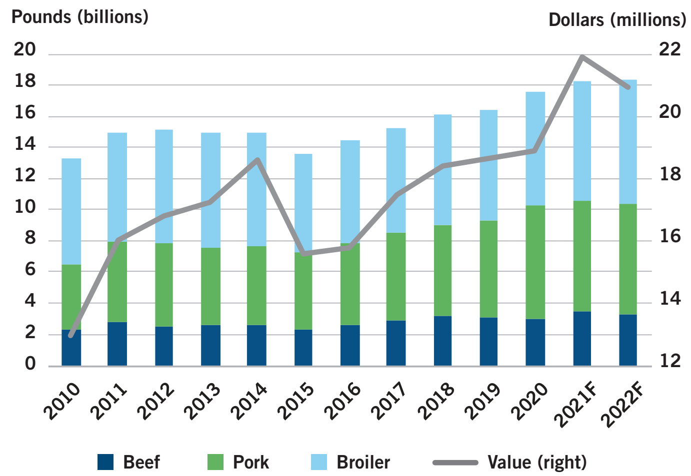
U.S. meat exports have been growing steadily since 2016, but as the Phase One trade agreement with China sunsets in 2021, it is unclear if the U.S. will remain a primary source for China's protein needs. China has rapidly rebuilt its domestic hog supplies after the African Swine Fever outbreak of 2018-19, and domestic hog and pork prices have dropped sharply in recent months, corresponding with notable declines in pork and poultry shipments. Although beef exports have been robust during the second half of 2021, the collective U.S. protein opportunity in China may have already peaked. Ongoing port delays and container shortages are likely partially to blame, but those will persist throughout 2022. Mexico will remain a top destination for pork and poultry exports in 2022, but it is unlikely that it would be able to absorb the entire deficit from reduced opportunities in China. ■

EXHIBIT 11: U.S. Animal Protein Production Growth



Source: USDA, CoBank

EXHIBIT 12: U.S. Beef, Veal, Pork and Broiler Exports



Source: USDA ERS, LMIC, CoBank

DAIRY:

Producer Margins to Improve, but Logistics Hinder Exports

By Tanner Ehmke

MILK SUPPLIES IN THE U.S. and around the world will tighten in 2022 as dairy farmers reduce herd sizes in response to declining margins. European and New Zealand milk production in particular will continue to face headwinds with stricter environmental regulations discouraging any growth in cow numbers.

With the global economy widely expected to continue its recovery from COVID-19 and global consumers adding more protein to their diets, demand for dairy products around the world will continue to grow, particularly in high-growth regions like Southeast Asia. However, the U.S. Phase One trade deal with China is set to expire at year end, and China could steer its purchases toward our main export competitors – New Zealand and the EU. Ongoing port congestion and a continuation of the strengthening dollar would also hinder U.S. dairy exports in 2022.

Domestic consumption for dairy products, though, will be more resilient as consumer demand increases both at and away from home. Consumers armed with ample savings accounts and improved job prospects from a growing U.S. economy will drive further increases in dairy consumption in 2022.

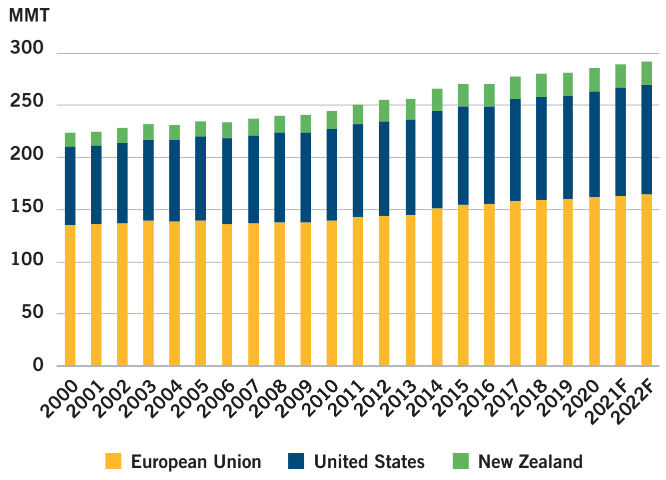
The cross current of resilient domestic and global demand for dairy products with the slowing growth in milk supplies should give additional upward lift to milk prices in 2022. Combined with softer feed costs following big corn and soybean harvests, producer margins will finally improve.

However, high costs for labor, construction, and freight will limit upside margin potential and dampen milk production growth. Faced with tightness in farm labor, U.S. dairy producers increasingly will be evaluating robotics and automation on the farm. The potential for continuing drought in the Western U.S., made more likely by the current La Niña conditions, will tighten feed availability for producers in the West – an additional incentive for dairies in the region to relocate further inland, specifically to the Midwest and Plains states.

For dairy processors, increasing milk costs, inflation driving up operating costs, and labor availability will mean some processors get squeezed, particularly those manufacturing commodity dairy products. The significant expansion of capacity in cheese production in the last year – with more capacity coming online in 2022 – will reduce milk supplies available for other categories, particularly for Class II (ice cream and yogurt) and Class IV (butter and powder) users.

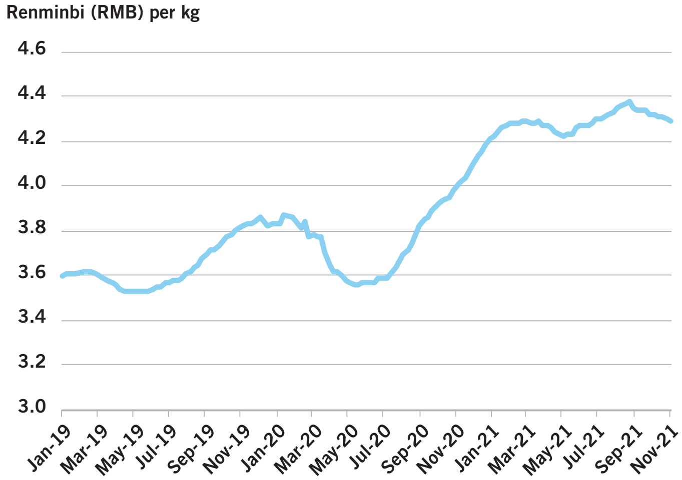
Port congestion and a shortage of available outbound containers will remain as headwinds for U.S. dairy exporters for much of 2022. Ongoing logistical snarls, resulting in higher detention and demurrage costs and declining market share in Asian markets, will pressure U.S. dairy companies. International customers are already switching dairy purchases to Europe and New Zealand origin – a trend that is likely to accelerate in 2022. ■

EXHIBIT 13: Milk Production of Major Dairy Exporters



Source: USDA-FAS, CoBank

EXHIBIT 14: Chinese Raw Milk Weekly Average Prices



Source: Highpoint Dairy

SPECIALTY CROPS:

Sector Squeezed by Labor, Drought, Transportation

By Tanner Ehmke

RISING LABOR AND TRANSPORTATION COSTS, compounded by ongoing drought and water restrictions in the Western U.S., will dominate the specialty crops sector in 2022.

Agricultural labor has not been immune to the "Great Resignation" resulting from the pandemic. U.S. farm workers have been reluctant to return to the physically demanding jobs despite the increases in pay offered by growers. H-2A visa issuances are also down as more workers from Mexico – comprising more than 90% of H-2A visas in the U.S. – increasingly choose local employment, as Mexican wages are also rising.

Nationally, the Adverse Effect Wage Rates (AEWR) for foreign farmworkers working in U.S. on an H-2A visa rose 4.5% YoY in 2021, with another increase expected in 2022. In California, the biggest farmworker employer in the U.S., the AEWR jumped 8.7% YoY in 2021, to $16.05/hour.

The ongoing labor tightness for growers in the U.S. will continue to ripple through the supply chain. U.S. fruit and vegetable acreage will continue to shift toward mechanically harvested crops that require less manual labor. Processors and distributors of fruit and vegetable produce, meanwhile, will be incentivized to expand supply networks outside of the U.S., particularly to countries like Mexico and Chile.

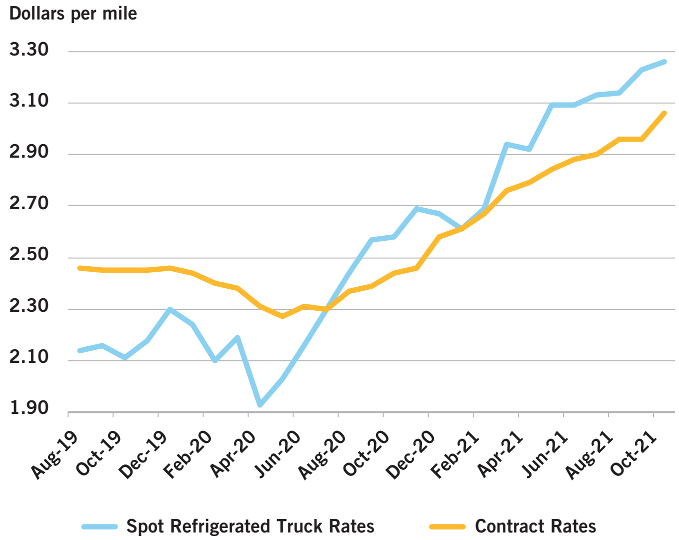
Prices of fruits, nuts and vegetables will also be driven higher by smaller harvests caused by ongoing drought conditions in the Western U.S. compounded by the current La Niña conditions that typically bring dry conditions to the West. Prices of some crops like almonds are forecast to rise more than 50% YoY. Lower volumes will pressure processor margins, depending on their ability to pass higher costs on to next-level buyers.

Record high transportation rates amid a shortage of trucks and truck drivers, meanwhile, will drive retail costs higher for fruits, nuts, and vegetables through 2022. While the acute driver shortage may be tempered by higher wages attracting new drivers, any significant price relief is unlikely to be seen until late 2022 at the soonest.

Exports of specialty crops will also be problematic through much of the year amid the shortage of shipping containers. Potential strength in the value of the U.S. dollar as the Fed pursues a tighter monetary policy will add further headwinds to U.S. exporters. Importers of some specialty crops like citrus, though, will benefit.

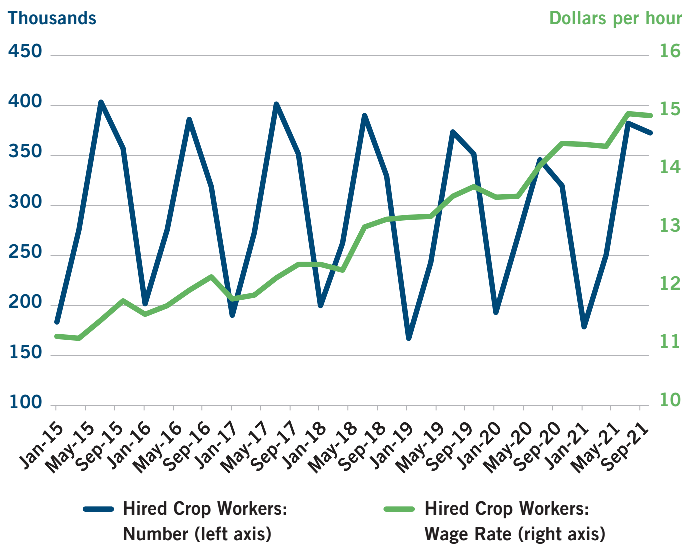
High transportation and labor costs and the resulting elevated retail costs to consumers for fresh produce will accelerate the ROI for food grown closer to consumer and in new technologies that reduce reliance on manual labor and transportation. Interest will continue in controlled environment agriculture (CEA) investments like greenhouses, hydroponics, aeroponics, and indoor vertical agriculture. While CEAs may benefit from reduced usage of water, labor, and pesticides, and less transportation, investments in CEAs will encounter increasing scrutiny on sustainability claims due to their higher energy needs. This, in turn, should encourage investment into alternative sources of energy for heating and cooling of controlled-environment agriculture facilities. ■

EXHIBIT 15: National Refrigerated Truck Rates



Source: DAT Freight & Analytics

EXHIBIT 16: Crop Workers and Wage Rates



Source: USDA NASS Farm Labor Survey

RURAL ELECTRICITY:

Managing on the Grid-Edge

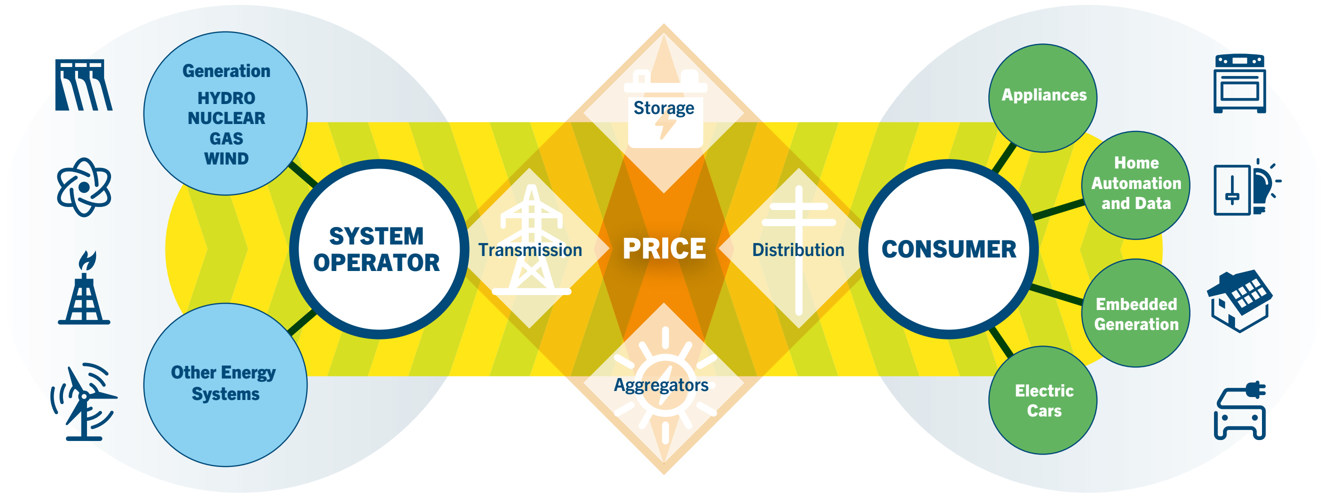
By Teri Viswanath

AS ELECTRICITY CONSUMERS' requirements rapidly change and redefine the very relationship between buyers and sellers, all eyes will be on grid-edge technologies. These consumer-accessible resources have already been disrupting the century-old, one-way centralized flow of power from suppliers.

The term "grid-edge" was coined by Greentech Media about five years ago and is now in general circulation, as a result of rapid market transformation and the need to better understand the interaction amongst participants. The electricity grid by definition is the interconnected network that delivers electricity from producers to consumers; technologies from the "edge" of the grid change that relationship. Devices that are seemingly popping up overnight include advanced metering, other customer energy management tools such as smart thermostat and programmable appliances, as well as distributed generation and storage. And because electric vehicles potentially expand the definition of onsite electricity storage, they too fall into this category.

The challenge with grid-edge technologies is that they not only create a two-way flow between suppliers and consumers, they also disrupt the predictable amount of demand that these consumers might require. Real-time load forecasting variation has typically been a factor of changing weather, but is now subject to the choices that consumers make behind the meter but are unknown to the supplier. Such elections create tremendous uncertainty about the relationship between consumers and suppliers. At one end of the spectrum, growing interest in distributed generation, storage and micro-grids could mean that going "off-grid" will become mainstream. Yet, the accelerated push toward greater electrification – including electric vehicles but also the digitalization of all things including currency – could bring about rapid growth. This competing scenario could reinforce the traditional role for suppliers as alternative distributed resources fall short in satisfying rampant demand.

EXHIBIT 17: Coordination Across the Interactive Grid



Source: CoBank

The more likely scenario is something in between: an acceleration in the rise of grid-edge technology and a steady rise in consumer demand. And, to be fair, this future state might prove the most difficult for suppliers to respond to, requiring significant vertical coordination. The silver lining is that the foundation for this coordination is mostly in place across the emerging interactive grid and could conceivably unlock greater benefits for both consumer and supplier.

Smart meters and automated control technologies enable consumers to shift electricity demand to take advantage of cleaner and cheaper supplies without sacrificing service. At present, wind and solar generation is intermittent, dependent upon climate and weather. And while consumer electricity demand is not yet well aligned with this resource, it could conceivably be optimized for maximum use. Consumers can preschedule an array of energy-intensive appliances, from electric vehicles to water heaters, to better utilize these clean resources. To be sure, demand response provides an opportunity for consumers to play a significant role in the operation of the electric grid by reducing or shifting their electricity usage during peak periods in response to time-based rates or other forms of financial incentives.

Another reason for optimism for electric cooperatives is that these organizations have a proven track record for being agile in their response to shifting with member requirements. Indeed, given their unique governance structure based on member alignment, electric cooperatives are possibly better positioned to work with consumers on the last mile of vertical coordination required to beneficially manage the proliferation of grid-edge technology. ■

RURAL COMMUNICATIONS:

As Government Money Flows, Competition Heats Up the Cable Market

By Jeff Johnston

WITH BIPARTISAN SUPPORT to bridge the digital divide, the government funding flood gates are expected to open in 2022. The Infrastructure Investment and Jobs Act includes $65 billion in broadband funding of which $42.5 billion will be allocated to the states to build networks in unserved and underserved areas. To put this into perspective, $65 billion is more than three times larger than the Rural Digital Opportunity Fund (RDOF), which is the largest program the FCC has ever launched. Despite its impressive size, critics argue that it still won't be enough to bridge the digital divide and provide the necessary subsidies for rural households to adopt broadband.

It is widely understood that the Universal Service Fund (USF), designed to be the support mechanism to bring service to high cost and low income areas, is fundamentally broken and unable to meet the needs of future FCC broadband programs. In short, the USF is funded via fees applied to telecom bills, which is problematic for two reasons:

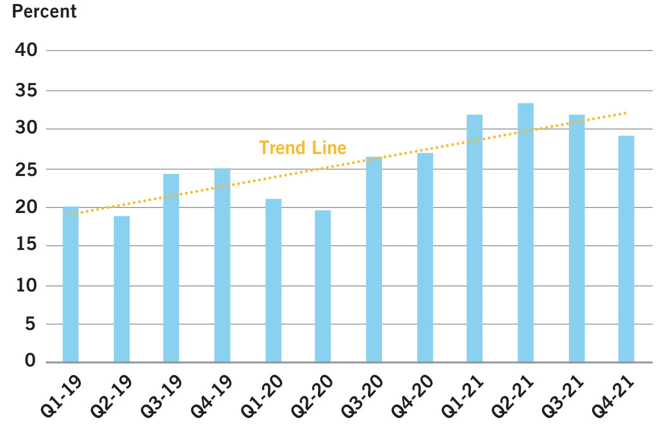
1. Consumers have been cancelling their landline service in droves; and
2. The average wireless phone bill has been in a perpetual decline over the last several years.

The net effect of these shrinking telecom revenues has been an increase in the fee charged against telecom bills. 2022 may finally bring much needed reform to this program. Proponents of USF reform argue that edge users such as Facebook, Google, and Amazon should pay into the USF as they benefit greatly from Americans having access to high-speed broadband networks, despite not having to fund any network builds.

Cable Operators Face Competition

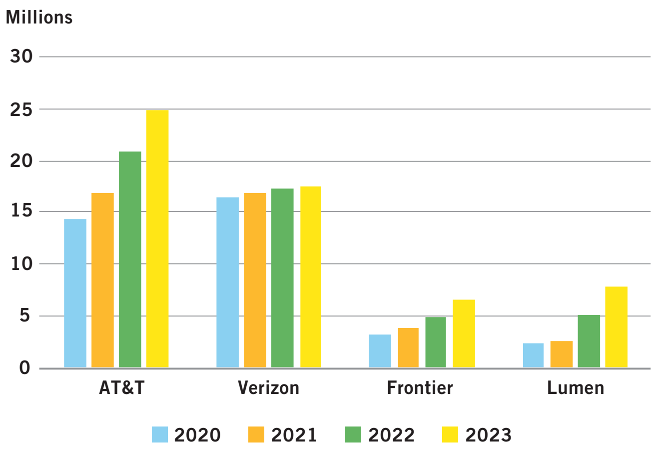
Cable operators have enjoyed robust broadband subscriber growth over the last several years thanks to consumer trends and weak competition from the telcos. Looking ahead to 2022, competition from the telcos should start to heat up. Some telcos are emerging from bankruptcy and are now able to upgrade their legacy DSL networks with fiber while others (namely AT&T) have jettisoned non-core assets and are using those proceeds to upgrade their broadband network. To be clear, we think telco competition will only start to heat up in 2022, and it will be several years before wide-spread telco competition becomes problematic. However, as these new telco fiber networks are built, we will start to see pockets of increased competition emerge in 2022 that could portend the future for cable operators. ■

EXHIBIT 18: **USF Contribution Factor**



Source: usac.org

EXHIBIT 19: **Telco Fiber Passings**



Source: S&P Global

Contributors

KNOWLEDGE EXCHANGE is an innovative knowledge-sharing initiative that is designed to provide strategic insights about trends, structural change, and policy directives within the key rural industries served by CoBank. It draws upon the expertise within CoBank and the rest of the Farm Credit System, the broad perspective of outside consultants and academics, and the first-hand knowledge and experience of our customers to enhance our collective understanding of emerging business opportunities and risks.

DAN KOWALSKI

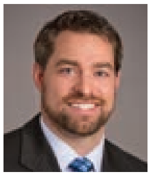
Vice President
Knowledge Exchange Division

ROB FOX

Director
Knowledge Exchange Division

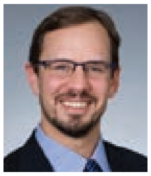
BRIAN CAVEY

Senior Vice President
Government Affairs



BRIAN EARNEST

Lead Industry Analyst
Knowledge Exchange Division



TANNER EHMKE

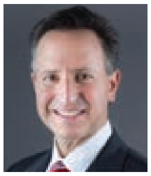
Lead Industry Analyst
Knowledge Exchange Division

JEFF JOHNSTON

Lead Industry Analyst
Knowledge Exchange Division

TERI VISWANATH

Lead Industry Analyst
Knowledge Exchange Division



KENNETH SCOTT ZUCKERBERG

Lead Industry Analyst
Knowledge Exchange Division

About CoBank

COBANK IS a $155 billion cooperative bank serving vital industries across rural America. The bank provides loans, leases, export financing and other financial services to agribusinesses and rural power, water and communications providers in all 50 states. The bank also provides wholesale loans and other financial services to affiliated Farm Credit associations serving more than 70,000 farmers, ranchers and other rural borrowers in 23 states around the country.

CoBank is a member of the Farm Credit System, a nationwide network of banks and retail lending associations chartered to support the borrowing needs of U.S. agriculture, rural infrastructure and rural communities. Headquartered outside Denver, Colorado, CoBank serves customers from regional banking centers across the U.S. and also maintains an international representative office in Singapore.

CoBank's Knowledge Exchange Division welcomes readers' comments and suggestions. Please send them to KEDRESEARCH@cobank.com.

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