

2019-20 TRENDS

Industry Outlook & Market Data Research



Published on July 24, 2019

The 2019 Trends Industry Outlook and Market Data Report is a compilation and analysis of industry data prepared exclusively for Paperboard Packaging Council members by Fastmarkets RISI, an independent economic consulting firm. The forecasts and outlook analyses contained in the Report are prepared solely and exclusively by Fastmarkets RISI without input from Paperboard Packaging Council.

© 2019 Copyright Paperboard Packaging Council. All Rights Reserved. North American Packaging Association™

Table of contents

A message from Fastmarkets RISI	1
Executive summary	2
Business conditions	5
Introduction	5
Forecast summary	6
Demand-side indicators	8
Supply-side indicators	12
Canada	15
Folding carton industry outlook	20
Folding carton industry outlook: Canada	32
Beverages	40
Non-perishable dry foods	47
Dry food products (crackers, biscuits, pasta and pet food)	47
Cereals and milled grains	51
Confectionery	55
Frozen and perishable food markets	60
Frozen foods	61
Retail carry-out	65
Perishable bakery goods	69
Meat and meat by-products	72
Dairy products	77
Health and beauty care	82
Cosmetics & toiletries	82
Pharmaceuticals	86
Other non-food products	91
Hardware and household supplies	91
Converted paper products	96
Recreational and sporting	99
Soap and detergent	102
Tobacco	104
Miscellaneous markets	108
Appendix A: End-use methodology	110
Appendix B: End-use market definitions	112
Appendix C: Percentage changes in forecasts, 2011-2023	113
Appendix D: End-use summary	116
Appendix E: Analysis of changes in forecasts	120

A message from Fastmarkets RISI

Specializing in the paperboard packaging industry and recognized worldwide as the premier source for economic analysis in all segments of the international forest products industry, Fastmarkets RISI prepared the outlook and forecast sections of this report.

Our forecasts are based on a solid foundation of data and industry knowledge. Drawing upon the experience of professional economists utilizing datasets developed over the last 30+ years, we maintain state-of-the-art models to generate forecasts for each sector: pulp, paper, solid wood products, timber and recovered paper. These models are then dynamically linked to provide a fully integrated analysis that is consistent across markets and geographical areas. The forecasts capture complex interactions and substitution effects across the industry in response to shifts in technology, government regulations, economic growth and consumer preferences.

Price forecasts are an integral part of Fastmarkets RISI's models for each segment of the pulp and paper market, reflecting demand and supply balances for each segment as well as changes in production costs due to increases or decreases in raw material prices. Additionally, the price forecasts are directly tied into the demand forecasts, since changing real prices for the various paper grades have a clear impact on long-term demand. This is especially true for the cartonboard markets, which have exhibited extreme price sensitivity over time. Because of this, to build the five-year forecasts for the individual segments of the carton market, Fastmarkets RISI has projected changes in real folding carton values per ton, formulated from Fastmarkets RISI databases and industry knowledge. Forecasts have not been commented upon or revised by the staff or members of the Paperboard Packaging Council (PPC). For a more complete description of our methodology, see Appendix A.

We welcome comments or suggestions on the methodology and content used to generate this report. Please direct your remarks to the PPC, who will compile recommendations for our consideration.



Ken Waghorne
Vice President, Global Packaging Paper and Board
Fastmarkets RISI



Abdulla Zaid
Economist, Paper Packaging Fastmarkets RISI

Executive summary

Overview

Following two years of negative growth in 2015 and 2016 and flat growth in 2017, shipments recorded another decline of 2.1% year-over-year in 2018. Growth suffered 2.0% and 0.7% declines in 2015 and 2016, largely due to the ongoing headwinds facing major processed food and consumer product companies. In the past ten years, folding carton shipments have seen persistent downward pressure, declining at an average annual rate of 1.6%. Since the recession, this trend was broken only twice, in 2014 and 2017. In aggregate, folding carton shipments are now about 1 million tons lower than their pre-recession peak from 2007 and have declined by 0.9% on average annually over the last five years. Folding carton shipments are on pace for another poor year-over-year performance in 2019 of -0.7%. However, the outlook for the latter years of the forecast is slightly more positive, with shipments anticipated to increase at a flat 0.1% average annual rate over the next five years.

Broad macroeconomic indicators suggest that demand for folding cartons should continue its rebound after years of declining. Output in nondurables, which comprise many carton-packaged goods, including processed foods, turned in another strong performance in 2018, following robust growth in 2017 that had not been seen since the initial rebound from the recession in 2010. General economic fundamentals in the US economy, such as job growth and consumer spending, recorded robust gains, indicating the general economy remains healthy.

The outlook for the macroeconomic environment appears generally favorable for folding carton producers over the horizon. However, technological and industry-related factors will place further pressures on converters. Overseas competition will continue to challenge domestic competition during the next five years, especially with the slightly stronger US dollar compared to most global currencies. In addition, competition

from alternative packaging methods and materials is expected to remain in place, especially with increasing prices of boxboard substrates. Furthermore, e-commerce is a growing force in the dry foods and household supplies sectors that is expected to negatively impact folding carton shipments growth, allowing corrugated boxes to gain share. On the flip side, recent decisions by some of the largest fast food companies and municipalities across the country seem to be providing some hope that paperboard packaging materials could finally be poised to benefit from their environmentally friendly profile.

Shipments of folding cartons from Canada have hovered around 450,000 tons for the better part of the last ten years, reflecting tepid demand from the nondurables side of the market. Fastmarkets RISI expects moderate growth in Canadian carton shipments of 0.5% over the forecast horizon, which reflects the moderately improving nondurables production and broader growth outlook for the North American economy over the same period.

End-use market summary

The US folding carton end-use markets can be grouped into three broad categories: growth, mature and declining. Growth markets are classified by average annual growth of 1.0% or more. According to our analysis, five end-use markets are poised to grow by more than 1% a year: retail carry-out, frozen food, confectionery, beverages, and pharmaceuticals. These five markets should all experience some combination of solid growth in consumer spending and/or a moderation in the merchandise trade deficit. Folding carton shipments to a couple of these markets are also expected to increase their market share from packaging materials such as plastics during the next five years thanks to growing environmental concerns.

The mature, or stagnant, markets are those that can expect virtually no growth in tonnage shipments during the next five years, with

growth rates that range from just under a 1.0% average annual increase to just under a 1.0% annual decline. Six markets fall into this category this year: cosmetics, meat products, recreational & sporting goods, perishable baked goods, miscellaneous, and converted paper products. These markets share challenging combinations of losses in consumer demand, problems on the manufacturing front due to the threat of imports and limited export opportunities.

Six market segments are classified as declining based on this latest forecast:

cereals and milled grains, dairy, dry food products, hardware and household supplies, soap, and tobacco. The average annual decline forecast for these markets ranges from 1.0% to 3.7%. These segments face significant challenges from shifts in consumer spending patterns, rising imports and losses in market share. Many of these markets are also expected to face increased competition for market share from the growth in e-commerce and digital retail, which rely on corrugated boxes, putting further pressure on folding cartons during the next five years.

Table 1

North American folding carton shipments

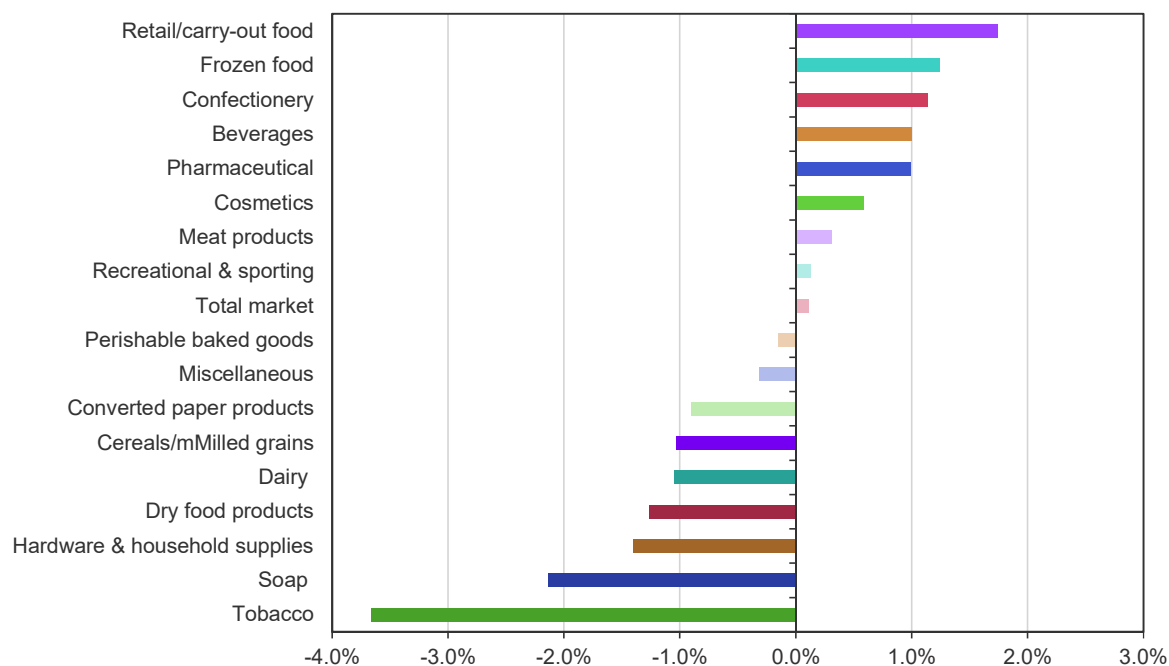
	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Thousand tons										
USA	5,034	4,935	4,903	4,904	4,803	4,769	4,789	4,735	4,773	4,831
Canada	450	444	435	441	431	443	436	431	435	443
Total	5,484	5,380	5,338	5,345	5,234	5,212	5,225	5,166	5,209	5,274
% change	0.1%	-1.9%	-0.8%	0.1%	-2.1%	-0.4%	0.3%	-1.1%	0.8%	1.2%
Millions of US dollars										
USA	\$8,940	\$8,712	\$8,595	\$8,393	\$8,500	\$8,871	\$9,253	\$9,283	\$9,193	\$9,311
Canada	\$879	\$747	\$739	\$772	\$775	\$827	\$836	\$820	\$822	\$842
Total	\$9,818	\$9,459	\$9,334	\$9,165	\$9,275	\$9,697	\$10,088	\$10,104	\$10,016	\$10,153
% change	1.9%	-3.7%	-1.3%	-1.8%	1.2%	4.6%	4.0%	0.2%	-0.9%	1.4%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Figure 1**A wide range of growth potential exists between the various markets**

Five-year average annual growth in carton shipments, 2019-2023



Market	AAGR
Tobacco	-3.7%
Soap	-2.1%
Hardware & household supplies	-1.4%
Dry food products	-1.3%
Dairy	-1.0%
Cereals/milled grains	-1.0%
Converted paper products	-0.9%
Miscellaneous	-0.3%
Perishable baked goods	-0.2%
Total market	0.1%
Recreational & sporting	0.1%
Meat products	0.3%
Cosmetics	0.6%
Pharmaceutical	1.0%
Beverages	1.0%
Confectionery	1.1%
Frozen food	1.2%
Retail/carry-out food	1.7%

Business conditions

Introduction

The US economy showed a strong performance in 2018. While the first quarter was slower, similar to the last couple of years, second-quarter growth was the highest in nearly four years and the third quarter registered very good growth, followed by a slower final quarter. Annualized growth for the first quarter was 2.2% but jumped in the second quarter to 4.2%, returned to 3.4% in the third quarter and slowed back to 2.2% in the final quarter. The economy has been supported not only by exports and nonresidential fixed investments, but also and most importantly by the stimulus provided by the tax reform along with some repatriation of manufacturing. The continuing employment gains and unemployment sitting at a multi-decade lows of less than 4% are indications of a well-performing economy. The dollar remained strong throughout 2016, appreciating further after the presidential election, but lost some of its strength during 2017, which supported exports. In 2018, however, the dollar regained its strength, and while this is once again restraining exports, the global economy and domestic demand are supporting industries, which have gotten an additional boost from increased domestic demand due to the trade tariffs. Already elevated external risks continue to rise for both emerging and developed economies, especially in the political sphere. Europe's economy continues to grow, although it slowed significantly in 2018 from 2017, and the shaky banking system and some fundamental flaws in the euro system are still presenting significant risks. Japan's economy has been moribund for years, but policymakers' efforts with further monetary accommodation and fiscal stimulus accompanied with global growth seem to finally be boosting the economy, at least while growth lasts. China's economy was relatively strong in 2017 thanks to global economic growth. During 2018, the industrial side of the economy continuously slowed, restraining the pace of growth along with it. The services and consumer sides of the

Chinese economy have been performing well, but a general slowdown took place at the end of 2018, which expanded into the beginning of 2019, and Chinese government has responded with significant stimulus. At the same time, it seems that the worst was behind most markets in Latin America. Brazil is slowly emerging from its deepest recession in a century, but Argentina slipped back into recession again.

The first two years of President Donald Trump's administration have changed the outlook for the US economy somewhat and certainly increased risks to the forecast on both the upside and the downside. The most meaningful changes to the economy will come in the areas of regulation, taxation and trade. At this point, outside of the tax reform that was finally passed in late 2017, a great deal of uncertainty regarding the administration's policies remains. This is noteworthy, as the nation is already starting to prepare for the next presidential run. In the area of trade policy, the introduction of protective tariffs has significantly increased uncertainty in the business environment as the initial tariffs escalated to a sort of a tit-for-tat trade war. While tariffs provide support for US industries in the short term, the increased costs are likely to hurt them later on. In the medium term, certain policy changes could be positive for the US economy, especially coming from a lighter regulatory regime that would reduce compliance costs. The corporate tax reform and fiscal stimulus have boosted the economy to its current speed. Overall for the US economy, the changes put in place by the Trump administration will produce slightly higher GDP growth, inflation and interest rates, with the risks on both the upside and the downside and for quicker end to the current economic cycle greatly increased.

The US economy grew by just 1.6% in 2016 due to the weak first half of the year, but rebounded to 2.3% in 2017. The annual growth for 2018 was higher at 2.9%. In our forecast from February 2019, we expected the US economy to grow by 2.4% in 2019. Over our

forecast period ending in 2023, we project real GDP growth will average 1.6% per year. With healthy job growth continuing, we anticipate that the unemployment rate will remain below 4% until the end of 2020.

In addition to the usual focus on key demand- and supply-side indicators, this chapter will delve into some details of the potential risks to the forecast. Overall, risks to the US and global economies have increased significantly.

Forecast summary

Like the last few years, the US consumer continues to be in the driver's seat of the US economy, as ongoing gains in employment drove the unemployment rate to a multi-decade low of less than 4% in the second half of 2018 and the first quarter of 2019. Household net worth is at all-time highs and rising, as increases in housing prices are driving up the asset side of the consumer balance sheet, and the debt service ratio continues to remain near multi-decade lows. Wage growth, which had been stagnant for most of the current recovery, is now gradually, although very slowly, trending higher, and numerous data points suggest that it should continue to improve. Revolving

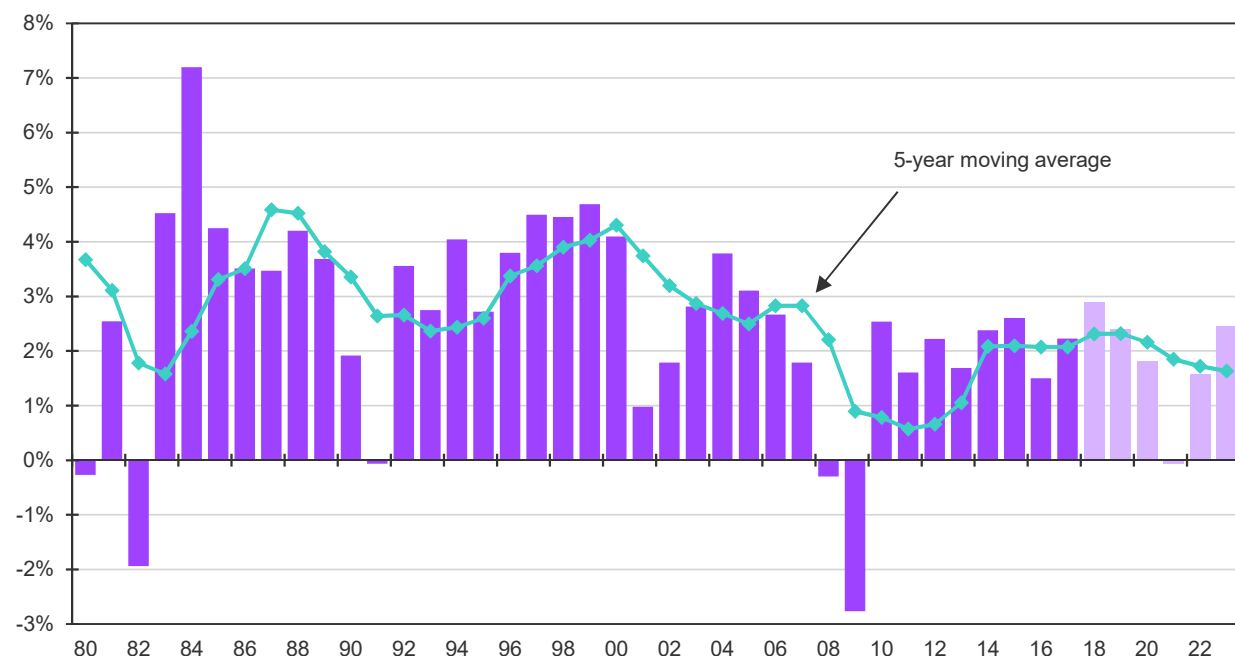
credit was growing at its fastest annual pace since mid-2008 until the first Federal Reserve rate hike in early 2016 and began to slow in early 2017. However, while the Federal Reserve continued to increase interest rates, revolving credit still showed year-over-year growth of around 3.5% in mid-2018. It then slowed to just 3% growth at the end of 2018 but picked up somewhat in the first months of 2019. This still indicates consumers are increasing their credit card usage, pointing to ongoing, albeit slowing, support for higher spending. Monetary policy, which was becoming less accommodative has now encountered a somewhat unexpected change with the Federal Reserve halting interest rate increases in late 2018 after four hikes during that year. Predictions of the pace of future rate increases were elevated during 2018, but the forward guidance shifted gears at the end of the year, with the Fed apparently seeing the economy's response to previous policy as too strong and now seemingly inclined toward more accommodative policy to keep the economy running.

The US economy grew by just 1.6% in 2016 due to the weak first half of the year but rebounded to 2.3% in 2017. The annual growth for 2018 was higher at 2.9%. With healthy job growth continuing, we

Figure 1

US real GDP growth

Annual percentage change



anticipate that the unemployment rate will remain below 4% until the end of 2020.

Our forecast shows consumption growth decelerating a bit to 2.3% for 2019 and slowing further to 1.7% in 2020. Continued improvement in the labor markets should help consumption, with support from relatively moderate energy prices, but inflation will restrict it. In our forecast from February 2019, we expected the US economy to grow by 2.4% in 2019. Over our forecast period ending in 2023, we project real GDP growth will average 1.6% per year (Figure 1).

The Federal Reserve raised the federal funds rate for the first time in nine years in December 2015 and performed nine rate increases by the end of 2018. The Fed instituted four rate hikes in 2018, but the outlook for 2019 has changed significantly, and the Fed may hold off on increases this year or even possibly lower rates. This is a complete change from earlier expectations of a continuation of the pace seen in 2018. Inflation remained lower than the Fed's target of 2% for long time but has registered above that level since October 2017, hitting 2.9% year-over-year in June and July 2018 and then slowed toward the end of the year to 2.2% in November. Since December 2018, inflation measured as the consumer price index has again been below 2% level, ticking 1.9% in March 2019. At the end of 2018, speculation started that Fed policy might turn toward rate decreases as the economy seemed to take a hit from the hikes. But this speculation has so far not turned into action, although rate hikes are essentially on hold. The US economy has in practice reached full employment, with the unemployment rate having dipped below 4%, and this has been expected to put upward pressure on wages, which could and should lead to higher inflation. However, the emergence of wage-prompted inflation has taken longer than anticipated. Additionally, headline inflation was boosted by the steep increase in oil prices seen from mid-2017 until 2018, but slowed with lowering energy prices toward the end of last year. During the first months of 2019, oil prices were again on the rise, as seen, at least to some extent, in increasing inflation. The trade war initiated by the Trump administration's tariffs has all the elements to be inflationary due to increased domestic demand and higher prices for imported goods. Lower oil prices, however, have helped offset

this and given the Fed more options to institute more accommodative monetary policy.

The strong hiring trends and improving quality of jobs have supported consumer spending, and we see that continuing over the near to medium term, albeit with some potential slowing in job growth. Additionally, wages have been trending higher, although slowly, and while gasoline prices increased inflation until oil prices peaked in October 2018, overall inflation is still relatively low, which contributes to increases in consumers' discretionary income. For full-year 2017, the US economy added 2.2 million jobs, an average of 182,000 jobs per month, down from 2.3 million in 2016 and 2.7 million in 2015. For the full year of 2018, the data show the economy gained 2.7 million jobs, an average of 223,000 jobs per month. We believe that the jobs market will remain rather robust and this will allow consumption to grow by 2.3% in 2019.

For full-year 2017, consumption rose by 2.5% and another 2.6% in 2018. Our forecast shows consumption growth decelerating a bit to 2.3% for 2019 and further to 1.7% in 2020. Continued improvement in the labor markets should help consumption, with support from relatively moderate energy prices, but inflation will restrict it.

The industrial sector has been a key support for the US economy throughout the recovery, but industrial production weakened at the start of 2015 and slowed to negative territory in 2016. Stronger growth returned in 2017, registering 1.6%, and improved significantly to 3.8% in 2018. Our estimate for industrial production growth in 2019 is 2.8%. The housing market recovery has lagged expectations since the recession. We expect the US housing market to strengthen a bit and production of other durable goods to increase, supporting headline industrial production growth, although it will not provide the same type of support for the US economy that it did in the early part of the recovery. Industrial production growth has also been hampered to some extent by a strong dollar, which is putting pressure on export orders. On the other hand, the trade war has boosted domestic demand. Industrial production growth contracted by 1.9% in 2016, rebounded to 1.6% in 2017 and improved to 3.8% in 2018. It is expected to decelerate to 2.8% in 2019 and 2.0% in 2020.

Oil prices stabilized in 2016 at around \$53/barrel, but after a slight dip in mid-2017 started to rise again, peaking in October 2018 at slightly more than \$75/barrel. However, there was a rapid change in the market toward the end of 2018, and the WTI price fell to around \$45/barrel, although prices have started to rise again in 2019. Prices were pushed up by increasing global demand for oil, decreasing reserves, continued economic growth, better-than-expected Chinese growth and speculation of an embargo on Iranian oil. However, despite OPEC and Russia curtailing production, oversupply returned due to the gradually slowing world economy thanks in part to the slowing in China and the USA becoming one of the largest oil producers in the world; the USA has the potential to be a net exporter of oil in 2019. In this forecast from February 2019, we estimate that oil prices will be above their late December 2018 level through 2019, although due to the high levels of uncertainty in the markets at the moment, the risk of volatility is higher. West Texas Intermediate crude prices averaged \$51/barrel in 2017 and \$65/barrel in 2018. Our forecast shows prices averaging \$59/barrel in 2019 and \$65/barrel in 2020. Natural gas prices, meanwhile, averaged \$3.17/MMBtu in 2018 and are expected to rise slightly to \$3.30/MMBtu in 2019 and \$3.36/MMBtu in 2020.

Demand-side indicators

Consumption

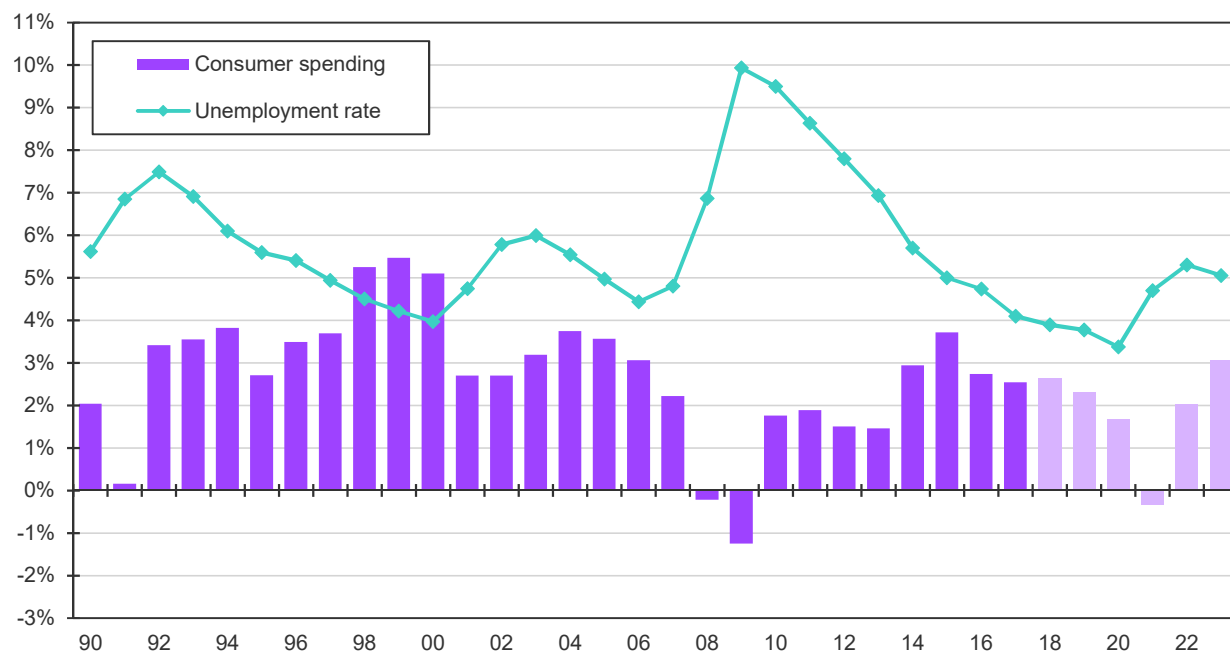
Real consumption grew by 2.6% in 2018 after rising by 2.5% in 2017, 2.7% in 2016 and 3.7% in 2015. Employment growth remains strong, and real income growth is gradually trending higher.

As of March 2019, the US economy has added jobs for 102 consecutive months, lowering the unemployment rate to 3.8% in that month. Unemployment increased slightly at the end of 2018 from the multi-decade low of 3.7% recorded in September and November as more people entered the well-performing job market. More than 2.3 million and 2.2 million jobs were added in 2016 and 2017, respectively. As the US economy has in practice reached full employment, it was expected that monthly job growth would slow from the 200,000+ per month pace that we have seen over the past few years, but the figures for 2018 resulted in 2.7 million added jobs. Most indicators continue to show strength in the jobs market. Weekly claims for unemployment insurance are at their lowest levels since late 1969, at around 200,000, implying a healthy employment situation. The level increased somewhat at

Figure 2

Consumer spending supporting US economy

Annual consumer spending and unemployment rate



the final weeks of 2018 to around 230,000 due to new entrants to the job market and again during the government shutdown, but was at just 192,000 in mid-April 2019. Wage growth has been very gradually trending higher but remains comparably slow at just around 3.2% as of March 2019. We believe that the jobs market will continue to perform well, maintaining support for consumer spending and helping to drive the US economy (Figure 2).

Consumer finances remained strong through 2017 and 2018. Household balance sheets have fully recovered and continue to improve as asset prices, both real and financial, have continued to rise. The household debt service ratio remains near multi-decade lows at around 10% as consumers seem to have fully deleveraged. Although rising, the still very low interest rates have also helped reduce consumers' debt service ratios. Consumers have begun to re-leverage, with the revolving part of consumer credit, credit cards, growing at rates above 5% year-over-year starting in early 2017, although this level has been decelerating.

Consumption grew by 2.7% in 2016, decreased a bit to 2.5% in 2017 and improved again to 2.6% in 2018. Our forecast shows spending will grow by 2.3% in 2019 and 1.7% in 2020. Over the five-year period ending in 2023, we project consumption will average 1.8% due to an assumed downcycle in 2021.

Industrial production

Industrial production has been an important driver of the economy over the course of the recovery, but it weakened significantly in 2015-2016 due to several factors, including the stronger dollar and the slowdown in the oil sector, and was not expected to regain its supportive role. However, industrial output recovered to 1.6% growth in 2017 and provided even stronger support for the US economy over 2018 by growing at 3.8%. We expect it to continue supporting the economy, although it will decelerate in 2019 and 2020.

The Institute of Supply Management® PMI® has remained in expansion territory at or above 50 since February 2016, holding at around 60 from August 2017 until it strengthened to its highest rating in over 15 years of 61.3 in August 2018. In March 2019, the PMI stood at 55.3, up somewhat from the previous month's low of

54.2. For full-year 2015, industrial production decreased by 1.0%, then contracted further by 1.9% in 2016, but recovered to 1.6% growth in 2017 and improved further to 3.8% in 2018. Our forecast shows it gaining 2.8% in 2019 and slowing further to 2.0% in 2020. Over the five-year period ending in 2023, we project industrial production will average 1.3% due to an assumed downcycle in 2021.

Trade

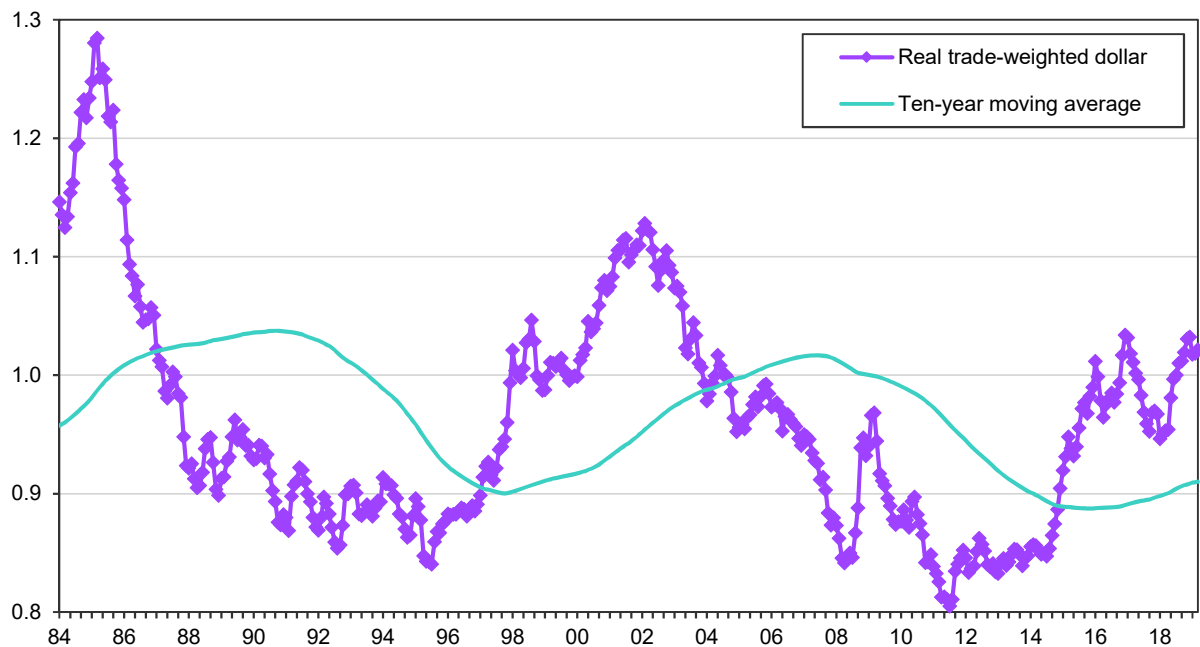
Trade was seen as one of the biggest risks with the Trump administration, and at the moment significant portions of this risk seem to have materialized. Trump campaigned on renegotiating existing trade agreements and imposing additional restrictions on trade. While the negotiations on what was formerly known as NAFTA into the new deal called USMCA have been completed and the deal signed, the trade war with China is a completely different story. The introduction of tariffs on imports of certain products has initiated the first stages of a trade war in the format of international tit-for-tat tariffs and counter-tariffs between the two countries. While there have been moments of escalation and others of détente, it is still not yet clear what the final extent of the tariffs or the results from the trade negotiations will be. The initial consequences of the new policy are already visible as increased costs to imported goods processors and households, lower export income and bottleneck problems in supply chains.

In the near term, the problematic international landscape and a strong dollar will put pressure on exports. In the medium term, gains in exports will depend on global demand and the impacts of the nation's trade policy should the trade war continue.

The strength of the dollar is one of the key headwinds for exports. In the fall of 2014, the dollar began to appreciate against other major currencies on a trade-weighted basis, gaining more than 20% over the next two years, but lost some of that strength during the first months of the Trump administration. However, the recent trade policy turmoil, worries about emerging market currencies and tightening monetary policy by the Fed have once again strengthened the dollar against other currencies (Figure 3).

Figure 3**US dollar strengthening on divergent monetary policies and growth prospects**

Real trade-weighted exchange rate index, 1973 = 1.00



At the end of the final quarter of 2018, the US trade deficit stood at around 3.3% of GDP, close to the level in the prior quarter. In previous growth periods, the US economy has typically had a larger trade deficit, but we expect that there will be some improvement in the trade balance in the medium term, due to the different political approaches to trade. The trade balance should initially improve from its 2018 level over the course of our five-year forecast but settle at 3.1% of GDP by 2023.

Housing

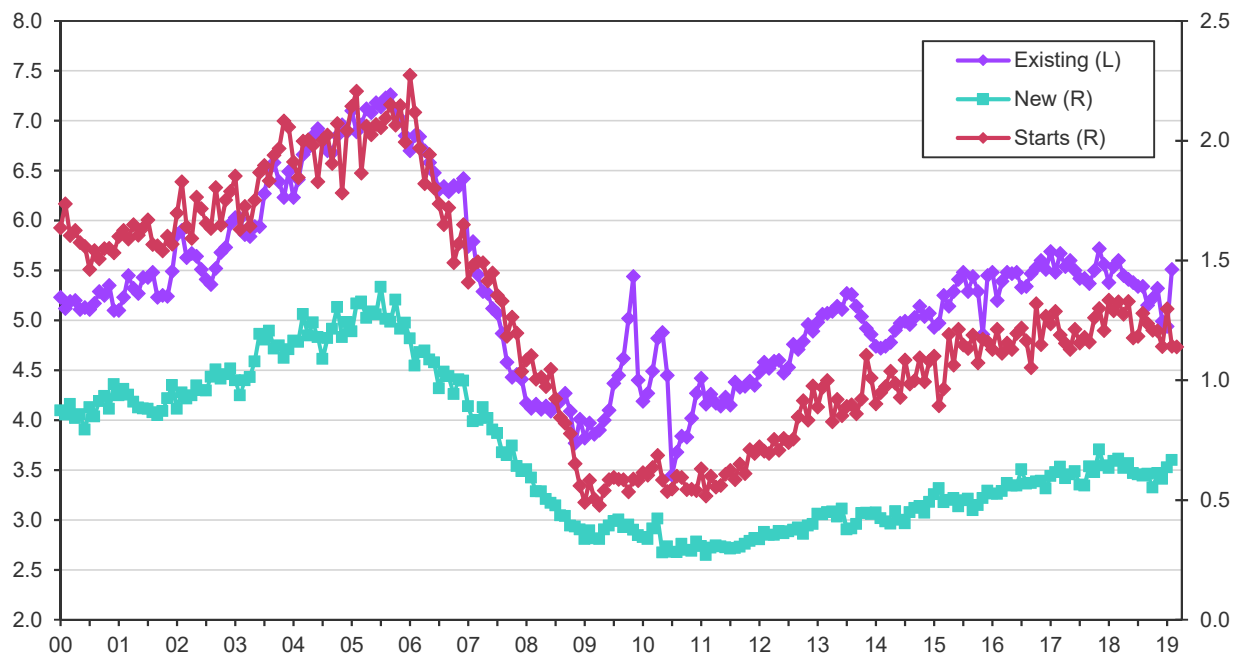
The housing market has continued to improve, although growth has slowed since 2016. Acceleration had been expected for 2017, but was delayed until 2018 and was still seen only during the first half of the year. During the second half of 2018, housing starts and both new and existing home sales figures turned down, driven by increased mortgage interest rates due to the higher Fed rate. Nevertheless, demand continues to outstrip

the available supply of shelter. Affordability of housing is still on the decline due to the continuous increase in housing prices thanks to strong demand and increasing mortgage rates; however, the rates are still at historically favorable levels and some improvement was seen at the end of 2018 as the interest rate shock seemed to be absorbed by the market. The main issue holding the market back has continued to be supply-side constraints, specifically land and labor availability. Residential investment has now added to GDP for the last five years, and we believe it will continue to provide support for overall growth, although 2018 was a slower year.

Housing starts continued to trend higher in early 2018, but slowed later in the year. As of March 2019, housing starts have been over the 1 million mark for 48 consecutive months (Figure 4). We believe that starts will rise to 1.31 million units in 2019 and 1.36 million units in 2020. Through 2023, starts are forecast to average 1.36 million units per year.

Figure 4**Housing market recovery slowing with higher interest rates**

Millions of existing and new single-family home sales and housing starts, SAAR



Source: NAR, Census.

Business investment

Business investment has been one of the major drags on headline economic growth, and it again negatively contributed to economic growth in the second quarter of 2018. And although business investment showed significant growth in the third quarter of 2018, it slowed again in the final quarter of the year. In 2016, investment was down by 1.3% compared to the same time period in 2015 but grew by 4.8% in 2017 compared to 2016. During the first quarter of 2018, quarter-over-quarter growth was at its highest since the first quarter of 2015, but the second quarter was again negative. The third quarter of 2018, however, resulted in quarter-over-quarter growth of 15.2%. In the final quarter of 2018, quarter-over-quarter growth was again just 3.7%. For full year 2018, the figure was 7.0%. Investment in structures and intellectual property products performed comparably well during the first two quarters of 2018, partly because of repatriation of money due to the tax breaks and investing that money into business in the USA, but structures saw negative growth in the third and fourth quarters. Our forecast shows business investment growth

reaching 3.9% in 2019 and averaging 1.5% over our forecast period through 2023.

Government spending and policy

Fiscal policy has become more expansive under President Trump. Trump campaigned on a fiscal stimulus package, increasing spending on defense and infrastructure, but so far the key stimulus has come from the tax reform. It started contributing in 2018 and will have the effect of increasing the budget deficit, which, after declining for the past few years, has started rising again and is expected to continue rising throughout our forecast period.

Federal government spending grew by 0.0% in 2016 and just 0.2% in 2017 but climbed by 2.6% in 2018. It is expected to increase another 1.7% in 2019. State spending, the second-largest component of GDP after consumption, has been rising faster than federal spending in recent years, although it was also very low in 2017. Many states continue to see increasing tax revenues, and spending on the state and local level grew by 1.2% in 2016, 0.1% in 2017 and 0.9% in 2018. The forecast shows increases of 0.8% and 1.0% in 2019 and 2020, respectively.

Supply-side indicators

Labor market

The labor market added 2.3 million jobs in 2016, 2.2 million jobs in 2017 and 2.7 million jobs in 2018, all less than in 2014-2015 but still definitely strong enough to continue to support consumption (Figure 5).

The unemployment rate fell from 5.0% to 4.7% in 2016, dropped further in 2017 to 4.1% and was at 3.7% in October 2018. When this forecast was completed in February 2019, unemployment was at 3.8%, a figure that held for March, the latest data available at the time of this writing. The labor force grew by 1.7 million in 2016, 900,000 in 2017 and 2.6 million in 2018, which indicates a rush of people returning to or entering the jobs market because of the improved prospects of finding a job. This level of job market growth was last seen in 2006 when 2.7 million people were added to the labor force. However, for the first three months of 2019, growth was negative. The increase in the labor force has also driven the labor participation rate higher, to 63.2% in January and February 2019 and 63.0% in March 2019. It is still significantly below where it was

before the recession, at around 66%, but it has been rising. Nevertheless, the participation rate is unlikely to rebound to its previous levels as about half of the decline was due to structural rather than cyclical factors, e.g., baby boomers retiring and leaving the labor force. We do, however, expect that the unemployment rate will continue on its downward trend, albeit at a very gradual and much slower pace. Wages, which had been growing slowly over the past few years, have been trending higher, although slower than anticipated, and many indicators point to an acceleration during 2019.

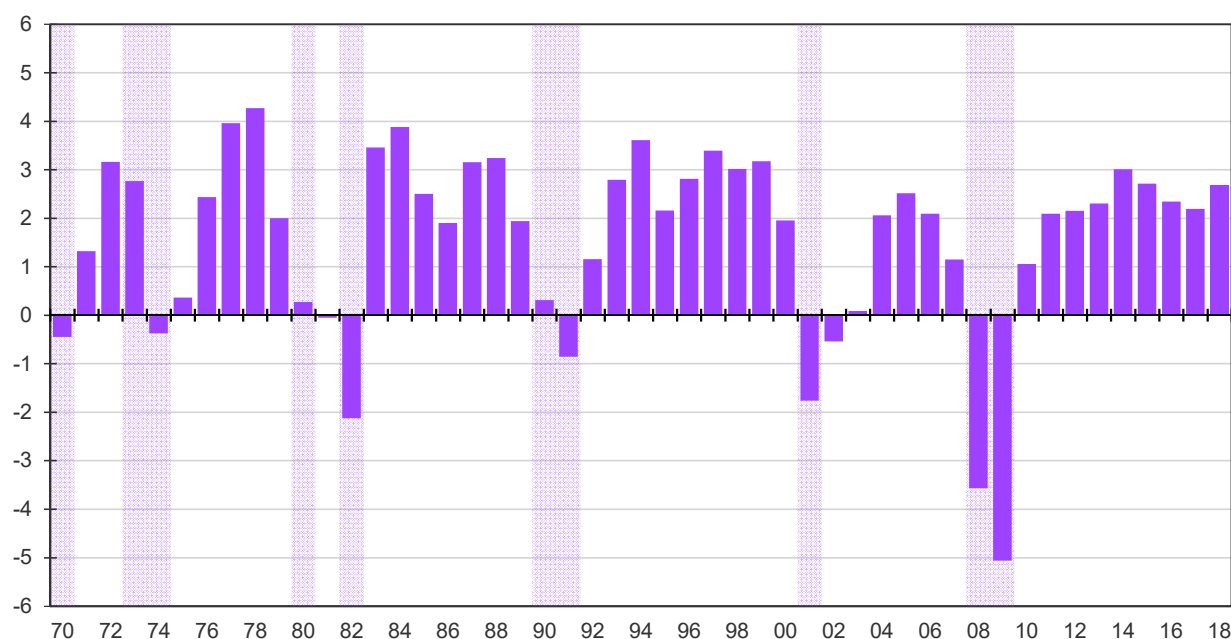
While the private sector has been consistently adding jobs since the recovery began, the federal government was still shedding jobs until early 2014. However, from that point, government employment grew strongly until August 2015, when it started weakening again, albeit only slightly. For state and local governments, meanwhile, rising home prices have provided a boost to tax revenues, allowing some relaxing of the previous fiscal restraint and a stabilization in employment.

Total working hours came in at 34.4 hours in 2016 and 2017 and 34.5 hours in 2018. Hours in manufacturing were at 41.9 hours

Figure 5

Job growth slowing, but still supporting consumer spending

Change in non-farm payroll employment, millions



Shaded areas = recessions.

in 2017 and 42.1 hours in 2018. Weekly claims for unemployment insurance were at their lowest levels since late 1969 at around 210,000 for most of 2018, with the last few months a bit higher due to new entrants.

Our forecast shows the unemployment rate falling to 3.7% in the final quarter of 2019 and then slightly further during 2020. The rate will move higher again in late 2020 and 2021.

Interest rates

By December 2018, the Federal Reserve had raised short-term rates nine times since the Great Recession. The federal funds upper limit rate has gradually increased from 0.25% in November 2015 to 2.5% in December 2018. After four hikes in 2018, the Fed's projections showed it increasing rates two to three times in 2019, but it decided to alter this plan as the economy seemed to hit the brakes. This forecast from February 2019 includes one rate hike for 2019, although the news since this forecast was done suggests that even this might not go through. The Fed's mandate is to both maximize employment and stabilize prices. Employment has been growing well, and the Fed now considers the US economy to be at full employment. The Fed's target of 2.0% inflation has also been reached or exceeded, at least when measured by the headline consumer price index, although the bank's preferred measure, the core personal consumption expenditures price index, has remained below that level, registering just 1.4% for January 2019. We expect that the Fed will balance its policy targets, and that the federal funds rate will reach 2.75% by the end of 2019 and remain at that level until late 2020 when it will slip to 2.5%.

Long-term interest rates continued to be low throughout most of 2016, spending most of the year below 2%, but jumping after the presidential election and climbing to nearly 2.4% at the end of 2017. During 2018, the 10-year rate rose above 3%, reaching 3.03% for the final quarter. Some aspects of the Trump administration's economic agenda have been quite inflationary, and bond yields rose to reflect that. Additionally, the outlook for US growth has been raised, justifying higher yields. However, yields on government bonds in other advanced economies are significantly lower than in the USA, making

US treasury bonds even more attractive and thereby keeping yields somewhat contained. We project the 10-year bond yield will rise gradually over the course of our forecast period, reaching a high of 3.6% in mid-2020. It should be noted that after this forecast was completed in February, the 3-month/10-year yield ratio inverted in late March 2019, meaning short-term bonds provided higher yields than long-term bonds, which may change the bond yield scenery overall.

Inflation

US headline consumer inflation rose by 1.3% in 2016 and 2.1% in 2017, due to the rally in oil prices, and 2.4% in 2018 as the rally continued for most of the year. For the first three months of 2019, inflation recorded an average of 1.6%, with increasing oil prices pushing the index up again in March 2019. The core rate, meanwhile, which excludes the volatile food and energy components, remained below the Fed's target of 2% for most of 2017, but exceeded it in March 2018 and has stayed above it since. In March 2019, the core rate was at 2.0%.

Although we do not anticipate high inflation at any time over the course of our forecast, some of the Trump administration's policies are indeed inflationary, and we have raised our forecast accordingly, although we have also adjusted for lower oil prices, which are a major driver in consumer prices. We expect consumer inflation to decelerate to 1.9% in 2019, due to anticipated lower oil prices compared to last year. Over the five-year forecast period, we forecast consumer inflation will average 1.8%.

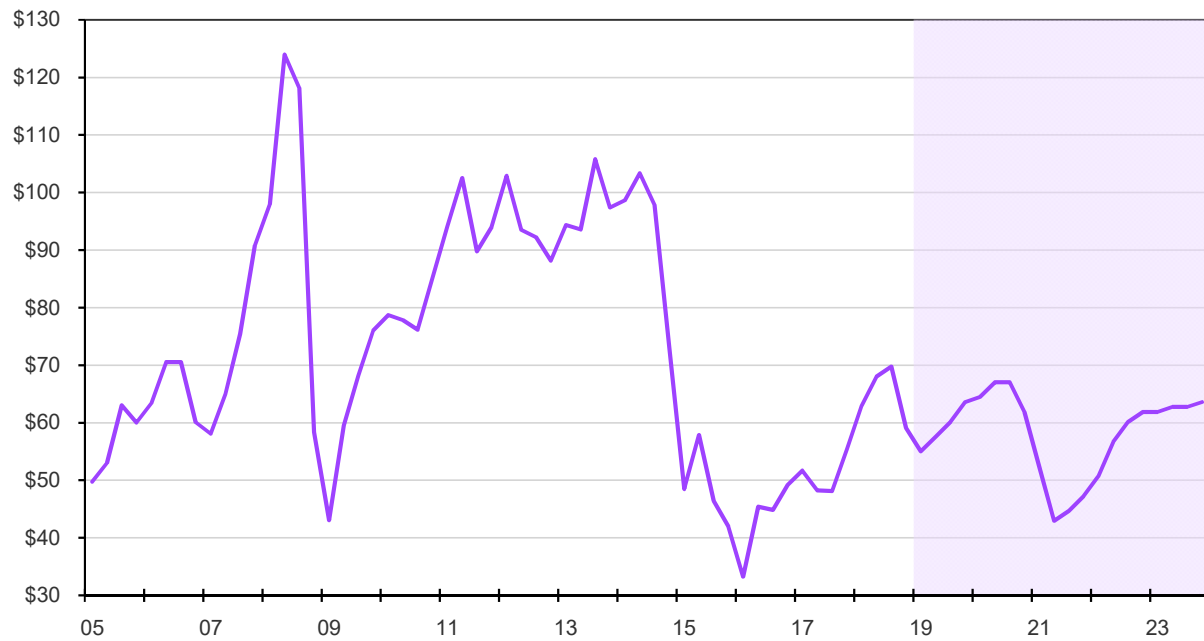
Oil prices

Oil prices stabilized at around \$50/barrel in 2016, following a big decline in 2014 and 2015. The scenery changed after a slight dip in mid-2017 and oil prices started to rise again, peaking in early October 2018 at slightly more than \$75/barrel (WTI). Prices fell significantly to \$45/barrel at the end of the year, but began moving higher again during first months of 2019 and ticked \$63/barrel in mid-April 2019.

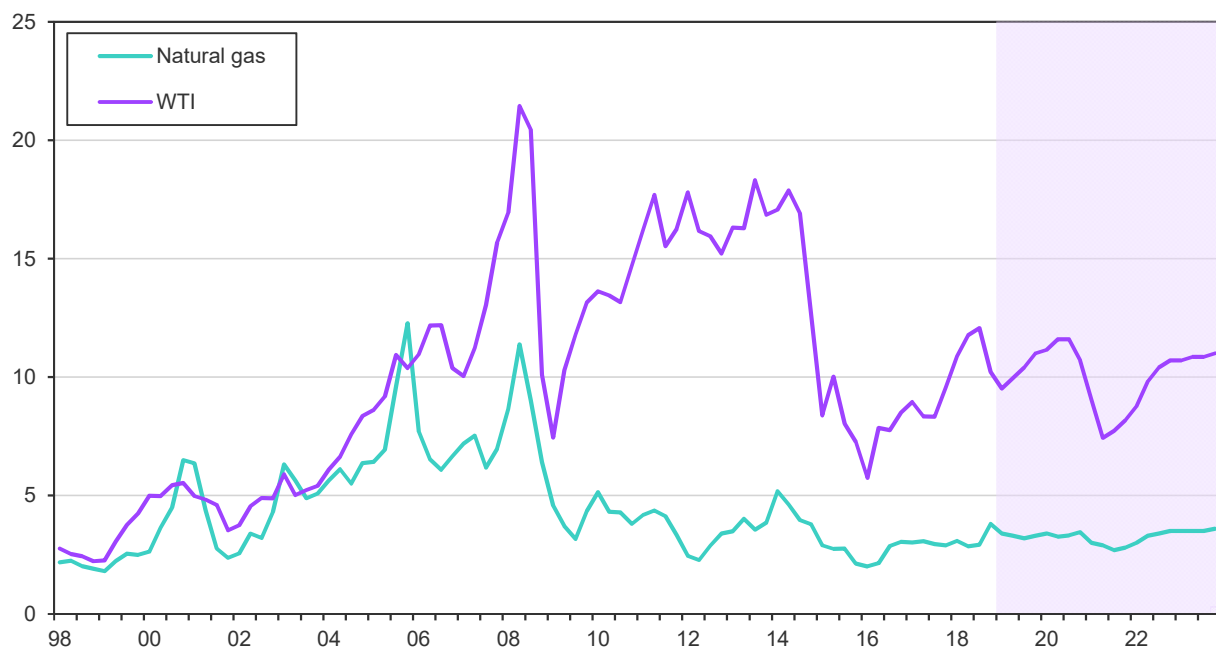
Oil prices were pushed up by increasing global demand and decreasing reserves, continued economic growth and better-than-expected Chinese growth along with speculation of an embargo on Iranian oil. However, despite OPEC

Figure 6**Oil price to maintain current level in near term**

West Texas Intermediate crude, US dollars per barrel

**Figure 7****Natural gas and oil on energy equivalent basis**

WTI, Henry Hub natural gas, US dollars per MMBtu



and Russia curtailing production, oversupply returned due to the gradually slowing Chinese and world economies, along with the USA becoming one of the largest oil producers in the world; the USA could be a net exporter of oil in 2019. On the demand side, China and India have been the main drivers of oil prices for quite a few years now. However, as the slowdown in China's economy that continued into 2016 changed back to growth, its oil demand also rose, but the current rather rapid slowdown in China is also being seen in its demand for oil. And while India's economy should accelerate somewhat over the next few years, the Chinese economy is expected to decelerate further. West Texas Intermediate crude prices averaged \$51/barrel in 2017 and \$65/barrel in 2018. Our forecast from February 2019 shows prices averaging \$59/barrel in 2019 and \$65/barrel in 2020. Over our five-year forecast horizon, we see crude oil prices averaging \$58/barrel (Figure 6).

For North America, the tremendous increase in the supply of natural gas due to the shale revolution has decreased the importance of oil. Natural gas prices continue to be at very low levels and should remain so compared to crude oil on an energy equivalent basis

(Figure 7). Prices for natural gas were at \$3.17/MMBtu in 2018, and in this forecast from February 2019 prices are expected to rise slightly to \$3.30/MMBtu in 2019 and average \$3.27/MMBtu through 2023.

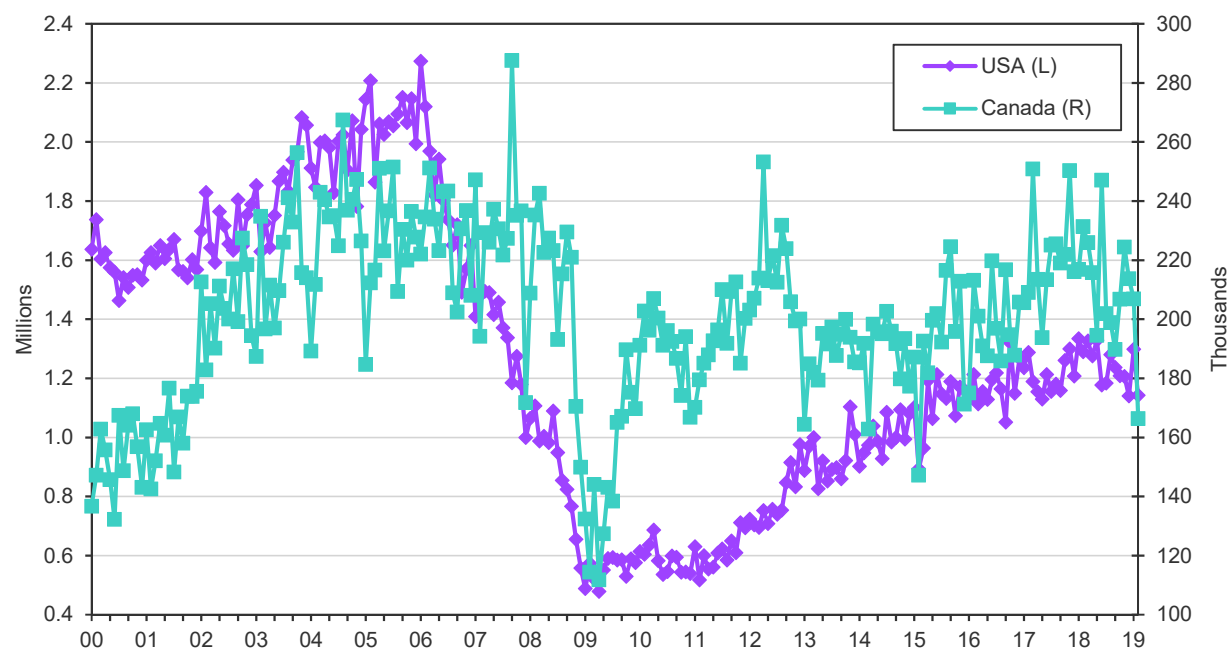
Canada

After disappointing growth in 2015, pulled lower by sectors linked to oil and other commodities, results for 2016 improved to 1.4% growth and doubled to 3.1% growth in 2017. But in 2018, Canadian economic growth slowed again to 2.1%. Canada's economy remains a two-speed one, with sectors linked to oil and other commodities speeding up and slowing down with oil prices, while the rest of the economy performs at more consistent rates above or below the oil and commodities sector. Consumers have been leading growth, but they have been overleveraged and not able to provide as much support as in the past. However, this situation has been improving. Housing is also in a somewhat precarious position as affordability has declined due to rapidly rising prices, at least in the major cities, and new regulations have been slowing the real estate market (Figure 8).

Figure 8

Canadian housing market slow due to increased regulation, falling affordability and higher interest rates

Housing starts at seasonally adjusted annual rates



Although non-oil exports were providing some support for the Canadian economy, especially with a weaker Canadian dollar, the trade environment became more uncertain due to President Trump's protectionist policies. The tariffs on Canadian aluminum and steel, along with other products, hurt the Canadian economy in 2018, but the renegotiation of NAFTA to USMCA should have removed this uncertainty.

Overall, real GDP grew by 1.4% in 2016 and picked up to 3.1% in 2017, but slowed to 2.1% in 2018. Over the course of our five-year forecast period going out to 2023, we project the Canadian economy will grow 1.8% per year on average (Figure 9).

Canadian dollar

The Canadian dollar has been and, to some extent, continues to be highly correlated to crude oil. But while the currency tracked oil prices closely in the first half of 2016, the tight relationship between oil and the loonie has since broken down somewhat, with monetary policy divergences with the USA becoming more important.

The Canadian dollar reached a low of 0.69 USD/CAD in late January 2016, as crude oil

was falling to its lows. Over the next three months, it rallied back up to 0.80 USD/CAD as oil prices rebounded. For the rest of the year, the loonie was in a slight downtrend, reaching 0.75 USD/CAD by the end of December. It then gained a bit strength in 2017, averaging 0.77 USD/CAD for the year, where it remained in 2018. Despite the increase in energy prices, we still see the Canadian dollar maintaining more or less this same level in the near term.

At this point, the Canadian dollar is well below its fair value on a purchasing power parity basis. Our forecast shows it staying undervalued through the end of our five-year forecast horizon. Nevertheless, Canada's healthy balance sheet, with low levels of debt and a strong fiscal position relative to the USA, should provide some support to the currency.

Interest rate differentials will play a part in the weakness of the loonie. The Bank of Canada (BoC) surprised markets by lowering interest rates from 1% to 0.75% in January 2015 and then to 0.5% in July of that year. It maintained them there until July 2017, when it raised them back up to 0.75% and then further to 1.0% in September. Another interest rate hike followed in January 2018 to 1.25%, in July to 1.5% and in October to

Figure 9

Canadian real GDP growth

Annual percentage change

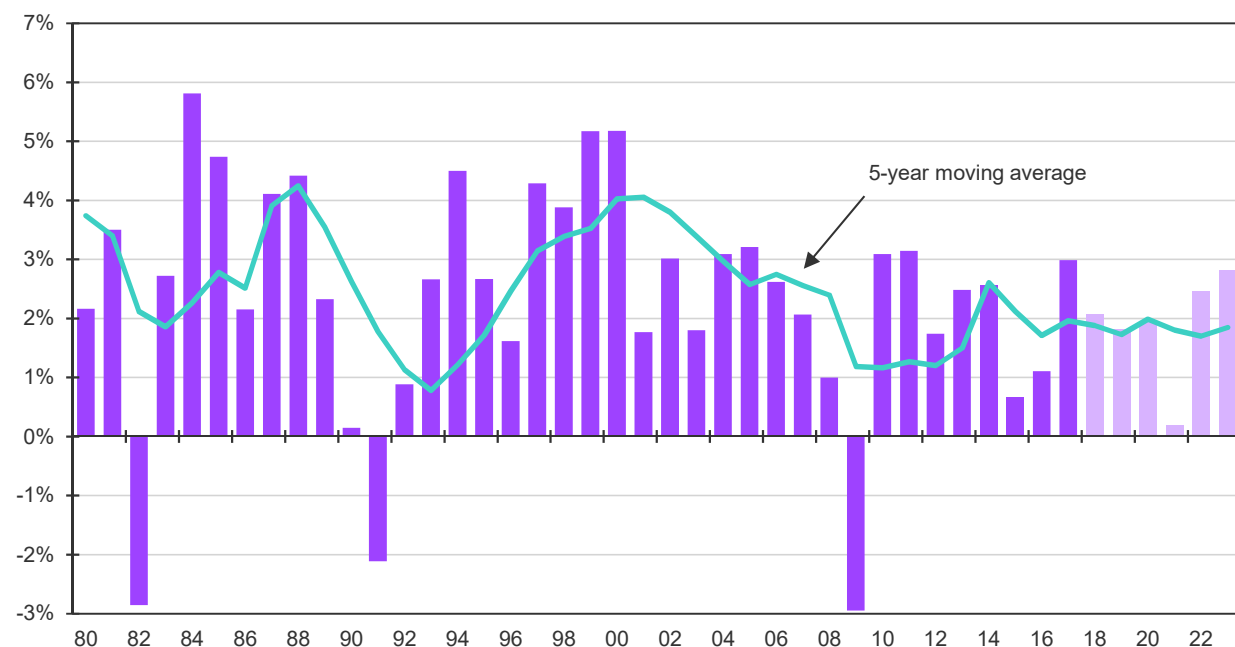
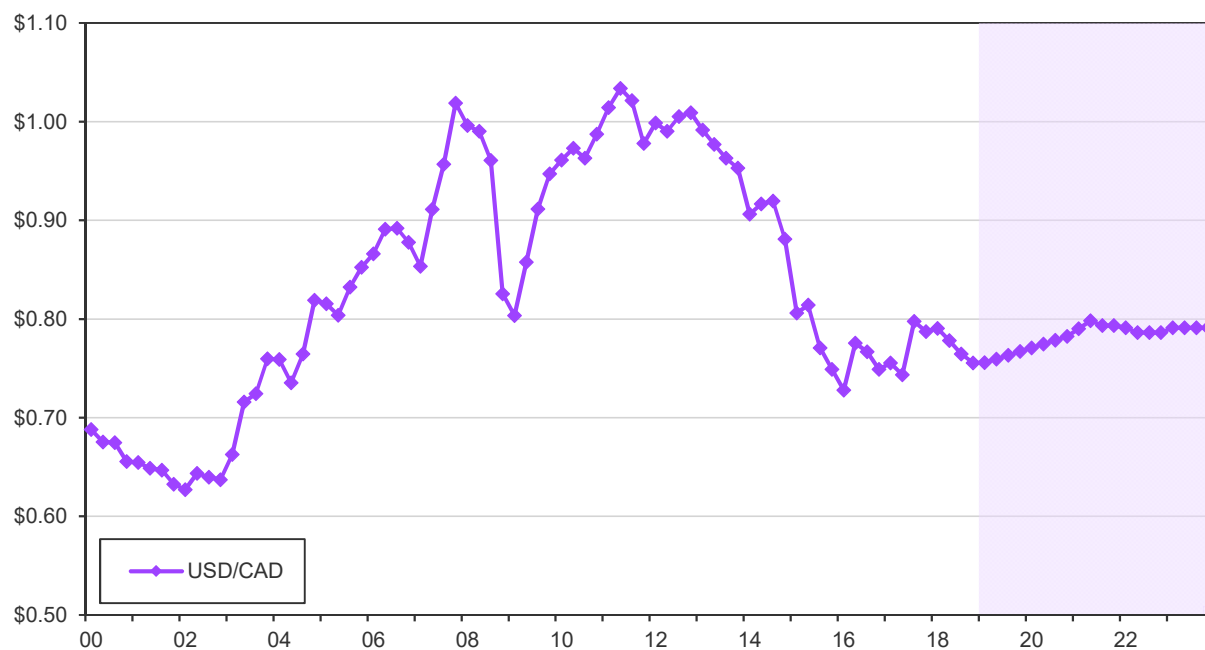


Figure 10**Canadian dollar maintaining current level**

Nominal exchange rate



1.75%. The rate has since been left unchanged (at the time of this writing in April 2019).

The Canadian dollar averaged 0.75 USD/CAD for 2016, 0.77 USD/CAD for 2017 and 0.77 USD/CAD for 2018. Our forecast shows it averaging 0.76 USD/CAD for 2019, then rising slightly to 0.78 USD/CAD for 2020. Over our five-year forecast horizon, we believe that the loonie will average 0.78 USD/CAD (Figure 10). However, the relatively small size of the Canadian dollar market and its strong connection to commodity prices make it a very volatile currency, so we acknowledge that there are major risks to this forecast.

The domestic economy

Canada's economy had a good year in 2017, with headline growth at 3.0%. Household consumption held up pretty well, despite the gyrations of the overall economy, growing by an average of 3.5% in 2017. However, household debt recently reached an all-time high, reducing the possibility for credit-fueled consumption. Housing has been providing support for the economy, but with high valuations and tighter borrowing

rules, affordability has taken a hit, and this should continue to translate to some moderation in Canada's housing market.

The Canadian labor market has shown significant improvement since unemployment peaked at 7.2% in early 2016, with the rate falling to 5.6% at the end of 2018, but increasing to 5.8% for the first quarter of 2019.

Consumer spending grew by 2.4% in 2016, 3.5% in 2017 and 2.2% in 2018. Consumption growth is expected to decelerate further to 1.8% in 2019 and 1.7% in 2020. Over our five-year forecast horizon, we expect consumption growth to average 1.8%.

The Canadian housing market has been in much better shape than its US counterpart. The prior high affordability and continuing low interest rates have caused excess inventory in the new home sector and overvaluation in the existing home sector, implying that housing starts will grow slowly in the near to medium term. We see starts achieving 200,000 per year for 2019 and falling to somewhat less for the next few years.

Risk assessment

Political risk has become the chief uncertainty around the world and will likely remain so for the near to medium term. For the USA, the Donald Trump presidency has increased the amount of uncertainty related to trade and economic policies and their continuity, and also to a certain extent the administration's ability to conduct its function. Despite this, the administration is already over halfway through its term and continuing in the second half with the same spirit. The President has challenged the Fed's support of his administration's policies and asked for more stimulus to encourage growth in the US economy. However, this political rhetoric has not dramatically changed our base case forecast, although we see a boost in the US economy in the short term due to fiscal stimulus and that moving the timing of the next recession closer. While tax reform, regulatory reform and fiscal stimulus will be positives for the US economy, other aspects of President Trump's agenda carry significant downside risk. Trade is the biggest concern, and the aggressive tariff-setting of the administration is a sign of a major change in policy-making. In the near term, such restraints on free trade may actually be positive for the US economy as domestic production and investment increase. However, over the medium to longer term, trade restrictions will hurt the US economy as other countries respond to US tariffs. A trade war, the initial battles of which have already taken place, is a big risk, and would be negative for virtually everyone and move the global economy rapidly toward a recession. At the time of this writing, it seemed likely that US and China could find a solution to their conflict during the first half of 2019, but the results of the negotiations have yet to be seen.

Geopolitical risks remain high as well, with ongoing and increasing conflicts in the Middle East, tensions in the South China Sea, an unpredictable North Korea, despite the talks and current calm, and continued Russian adventurism and opportunism in Europe. While the flow of refugees to Europe from Syria and other parts of the Middle East has lessened, it has increased domestic political tensions for all of Europe, with the rise of extreme political parties. These parties have strengthened to the point of being able to seriously contest elections in Europe's biggest countries and

the election campaigns have been accused of having been influenced by foreign operators for the purpose of destabilizing political structures such as the EU and NATO. German elections resulted in a rather long negotiation stalemate, although it was resolved in the end, and the Italian elections provided another new coalition government. Additionally, some of Europe's banks remain in poor health, especially in Italy. A banking crisis there could reignite yet another financial crisis in Europe. The euro celebrated its 20th birthday at the start of the year, but structural flaws continue to be a cyclical headache for politicians and central bankers in Europe. The elections for the European Parliament will take place in May 2019, and while they are not as relevant in policy decision-wise as national elections, they are an opportunity for the various protest movements to raise their voice and guide European policies to eccentricities.

China remains a risk to the global economy as it continues to slowly transition its economy from investment-led growth to a greater reliance on the consumer. While generally growth in the Chinese economy is expected to decelerate in the next few years, the situation at the end of 2018 and in early 2019 seems to have exceeded that level, with PMIs slipping into decline and various indices showing very small to almost non-existent growth. The Chinese government has responded with massive stimulus programs to reinvigorate the economy. Weakness in Chinese economic growth will be negative for the USA and Canada, as well as many emerging market economies, although some transfer of manufacturing to lower-cost countries in the region may occur. The high levels of debt that have been accumulated during the investment boom in China are now posing a risk to China's financial system. Dealing improperly with the bad loans and stressed financial system could lead to China getting stuck in the middle-income trap. The Chinese government has recently announced extensive stimulus in the form of infrastructure investment such as railways, as well as fiscal stimulus to maintain the momentum in the economy.

The strength of the US dollar presents a risk to emerging markets, especially ones that rely on commodity exports, as a stronger dollar means lower prices for commodities priced in dollars and therefore less revenue.

It would also present a problem to countries or companies who borrow in dollars but whose revenues are in their local currency. Furthermore, a stronger US dollar makes American exports more expensive for receiving parties. A rising dollar was one of the causes of the 1998 Asian financial crisis, and while this is unlikely to repeat as most of those governments learned their lesson and stopped borrowing in dollars, moving instead to floating exchange rates, many companies in emerging Asia have borrowed in dollars. If they are not exporters, i.e., are not also receiving revenue in dollars, or if investments made with the borrowed dollars were natural resources projects, they could face serious problems. One warning of this came in August and September 2018, when the rapid weakening of several emerging market currencies, e.g., the Turkish lira, the Argentine peso and the South African rand, caused concern of further

implications to their economies and, to some extent, to the global economy as well.

Low oil prices support oil consumers, but can cause instability in oil producing countries. This can then lead to increased uncertainty and higher volatility in the oil market, at least from a global perspective. The US oil supply is expected to possibly gain self-sufficiency in 2019, at least temporarily, which again reduces global demand for oil, but can also affect Canada, where some oil producing regions might not be able to export their oil at the prices seen earlier.

Domestically, a large near-term risk for the US economy, on both the upside and the downside, is the housing market. Growth there will be one of the main drivers of overall US economic growth over the next few years, if the hurdles can be overcome.

Folding carton industry outlook

Overview

Following two years of negative growth in 2015 and 2016 and flat growth in 2017, shipments recorded another decline of 2.1% year-over-year in 2018. Growth suffered 2.0% and 0.7% declines in 2015 and 2016, largely the result of continued headwinds facing major processed food and consumer product companies. In the past ten years, folding carton shipments have seen persistent downward pressure, declining at an average annual rate of 1.6%. Since the recession, this trend was broken only twice, in 2014 and 2017. In aggregate, folding carton demand has eroded by 17.2% from its pre-recession peak in 2007.

The Great Recession had an obvious direct impact on folding carton demand; household spending was squeezed due to high unemployment and burdensome debt loads, which ultimately translated to poor performances for most of the manufacturing sector. The effects of the recession also appeared to have a lasting effect on consumer psychology, resulting in restrained spending and a shift in product preferences years after the downturn. For many industry segments linked to the folding carton market, the recovery from the recession has been anemic, creating difficult conditions for anyone supplying these markets.

Broad macroeconomic indicators suggest that demand for folding cartons should continue its rebound after years of declining. Output growth in nondurables, which comprise many carton-packaged goods including processed foods, maintained strong growth in 2018, following robust growth in 2017, not seen since the initial rebound from the recession in 2010. General economic fundamentals in the US economy, such as job growth and consumer spending, recorded robust gains, indicating the general economy remains healthy. In addition to the overall economic performance, there are other factors that play an essential role in folding carton growth dynamics, such as shifting consumer spending habits, substitution away

from plastic packaging and efforts to reduce packaging waste at retail establishments. Also, the rise of e-commerce is contributing to the shifts in folding carton demand, especially the trend of folding carton shipments growth lagging significantly behind growth in corrugated box shipments, which appear to be moving more in line with the general recovery of the broader economy.

Year-to-date shipment data suggest that 2019 is on pace for a slightly slower performance than it had in 2018. The year-over-year comparison of the first four months of shipments shows a decline of 0.44% compared to 2018. Fastmarkets RISI is forecasting shipment volume growth will experience another down year, declining 0.7% year-over-year by the end of 2019. Despite the potential gains in folding carton demand due to the accelerating war on plastic packaging, especially in the food service and retail carry-out sector, the effect will be partially offset by increasing competition with e-commerce and corrugated packaging taking share. Additional headwinds include weakening demand in several markets with carton-intensive products, such as dry foods and tobacco.

Despite the deterioration in carton output for the better part of a decade, Fastmarkets RISI expects that folding carton shipments will return to nearly flat growth over the forecast period. Our macroeconomic outlook anticipates further improvement across most of the economy, as rising wages, which have begun to show broader expansion, lead to higher levels of consumer spending. Households have maintained higher saving rates in recent years compared with historical averages and debt levels have come down. However, discretionary household spending is still clearly improving from the income and wealth effects described, if somewhat muted by a more conservative consumer psychology following the Great Recession.

Carton shipments are expected to decrease by 0.7% in 2019 and show some growth of 0.4% in 2020, before deteriorating by 1.1% in

2021 due to the anticipated downturn in that year. While more favorable macroeconomic factors will result in slightly higher carton demand in 2020, the carton pricing environment will limit carton demand relative to other packaging alternatives mainly in the sectors that use recycled boxboard. Over the forecast period of 2019-2023, we estimate that folding carton demand growth will average a flat 0.1% annually. Following the anticipated macroeconomic slowdown in 2021, folding carton shipment growth is forecast to rebound by 0.8% in 2022 before it accelerates to 1.2% year-over-year in 2023, thanks to the expected recovery in consumer spending and industrial production.

Table 1**Growth of folding carton shipments**

Percentage

	2008-2013	2013-2018	2019-2023
Thousand tons	-2.2%	-0.9%	0.1%
Million dollars	-0.8%	-0.6%	1.8%
Average value per ton	1.4%	0.3%	1.7%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Folding carton outlook

The past decade has been a challenging one for converters in the folding carton industry; looking at shipment trends over the last ten years, average annual growth has declined by 1.6% annually on a tonnage basis. In total dollar value terms, total carton spending declined by a modest rate of 0.7% between 2009 and 2018. The market was fairly healthy for a brief period leading up to the recession years; shipments (in tons) increased at a 2.7% average annual rate between 2004 and 2006 due to exceptionally strong growth in consumer spending, which in hindsight proved to be unsustainable. The dollar value of shipments increased at a slightly more robust 3.3% during this period. Even so, average carton values per ton did not increase as fast as boxboard costs, indicating that margins for carton converters suffered during this period. Folding carton demand recorded declining to no growth over the past ten years.

Due to the deteriorating economic circumstances in 2008 and 2009, folding carton shipments plummeted by more than 3% each year, leading to a drop of almost 380,000 tons over the two-year period. These losses eased somewhat in 2010, with shipments declining 0.8%; however, demand only held up this well due in large part to inventory restocking throughout the consumer product supply chain during the year. Shipments fell by roughly 3% a year in 2011 and 2012, despite the improvement in consumer spending and/or industrial production in a number of key end-use markets during these two years. However, shipments stabilized in the following two years, echoing the further improvements in demand in many crucial spending categories, which translated, albeit slowly, into improved demand for folding cartons, as reflected in the less drastic decline of 0.5% in 2013, and finally crossed over into marginal growth in 2014 for the first time since the recession years.

However, just as the folding carton market appeared to be mending and at least establishing some sort of stability in output, carton shipments logged another rough performance in 2015, declining by 2.0% year-over-year. The drastic change in the exchange rate and the stronger US dollar created an unfavorable environment for US producers and lowered their competitiveness in the international market. As a result, industrial production contracted in 2015 by 1.0% year-over-year, prompting less demand for folding cartons for the year. Carton shipments saw another, albeit smaller, decline in 2016 of 0.7%. Carton shipments were finally set to stabilize in 2017 with a flat growth rate and no further declines. However, the recovery did not go further as the demand side was weakened, particularly on the recycled carton side, lowering shipments by 2.1% year-over-year in 2018 and reaching levels not seen since mid-1990s.

Many consumer product companies are still reporting challenging conditions for processed foods and other consumer goods that are critical to the folding carton industry. Non-perishable dry foods face notable pressures from plastic packaging substitution, especially given the increasing prices of boxboard and the drop in input costs for plastic resins as oil prices were basically cut in half in 2015 compared to 2014 levels and remain

relatively low. However, with the recent shifts in the oil market and upward pressure in a volatile price environment, the smaller price differential could reduce the substitution risk. Additionally, e-commerce is a growing force in the dry foods and household supplies sectors. The emerging digital retail model has gained momentum with the acquisition of Whole Foods Market by Amazon. The rise of e-commerce in the cereal and household supplies markets will limit the growth of folding carton shipments in these sectors, allowing corrugated boxes to gain share in the long run.

The challenging conditions for folding cartons in several markets are being increasingly offset by the growing pressure to substitute plastic packaging with folding carton, mainly in food services. Plastic's nature-unfriendly image and its non-biodegradable qualities, as well as its long-term impact on the environment, have led a growing number of restaurants and fast food establishments to set scheduled transitional plans from plastic to other renewable sources, such as paper packaging. Negative sentiment toward polystyrene foam and plastic bags has also led to legislation banning the use of such products in several cities and municipalities across the country.

On top of the shifts in the packaging materials affecting some key end-use markets, consumer preferences are playing a pivotal role in the folding carton shipments outlook. During the past five years, consumer spending patterns showed that expenditures on food consumed away from home (i.e., at restaurants) has been growing strongly, while spending on food consumed at home (i.e., bought at grocery stores) has advanced at a slightly slower pace. Shifts of this degree are quite rare; we have seen just three in the last 45 years. Additionally, during the past five of years, the demand for frozen food has been noticeably growing again. One explanation is the improving labor market and employment environment, which imposed time constraints on the working population, pushing them toward greater consumption of frozen food. Additionally, millennials have significantly contributed to the recent rebound in the frozen food market, which offers convenient, less expensive options for young and single consumers. Improvements in the retail carryout and frozen food sectors are expected to boost folding carton shipments to

these areas, which will offset the stagnation and declines in other end-use markets.

On the pricing front, the situation is somewhat challenging, particularly for independent converters, mainly due to cartonboard prices consistently outpacing actual folding carton prices for a number of years. To provide some perspective, market prices for cartonboard grades increased at a 2.5% average annual rate from 2009-2018; over that same ten-year span, folding carton average values per ton increased by an average of 0.9% annually. Coming out of the recession, average carton values were relatively stable in 2009 and 2010, but average boxboard prices in 2010 rose 5.4% higher than 2008 levels. After boxboard costs increased another 7.3% in 2011, converters were forced to raise folding carton prices to prevent any further margin erosion. Market conditions at this time were still fairly weak, meaning these price increases likely generated some additional substitution pressure from alternative packaging products such as plastics, magnifying already poor demand fundamentals on the consumer side.

The average value per ton for folding cartons eased modestly in 2013, reflecting the softness that had developed in boxboard prices in late 2012. Paperboard price increases that were pushed through late in 2013 catalyzed into a folding carton price increase of 1.9% in 2014. However, the full effect of the 2013 boxboard price increase really only came through in 2014, given how late it materialized, pushing 2014 average cartonboard prices up roughly 5.1% year-over-year. In 2015, carton prices dipped 0.6%, indicating further margin erosion for converters exposed to the market price of cartonboard. A silver lining for converters, however, was that the average boxboard price increases remained relatively minimal, growing 0.7% in 2015, although stories varied across the three primary boxboard subgrades. Both boxboard and folding carton prices declined in 2016, sliding 0.9% and 0.7%, respectively. Further declines came in 2017, when folding carton prices fell by 2.4%, while boxboard prices rose 1.3%. The recent price hikes in the boxboard grades of 6.9% in 2018 have been partially reflected in the converters' carton value increase of 3.4% year-over-year.

Prices for the folding cartonboard grades came under downward pressure during 2015

and 2016, due to the combined effects of weak demand from the processed foods sector, a persistent threat from imports and gradual declines in production costs for all grades. Boxboard prices turned upward in 2017 by 1.3% year-over-year. Boxboard prices rose again in 2018, but the movement was not uniform across the different substrates. SBS continued to face competitive pressure from virgin boxboard imports from Europe and Asia during much of the year. Clay coated bleached folding boxboard prices increased from \$1,030/ton at the end of 2017 to \$1,080/ton at the end of 2018, and gave up \$20/ton of those gains in early 2019. This was by far the weakest performance of any folding cartonboard substrate.

The coated recycled boxboard (CRB) market was much tighter than the SBS market last year, since unmade orders spent much of the year setting new record peaks. Some converting operations shifted over to CUK following the Santa Clara closure, creating exceptionally tight conditions for this grade. Prices for coated recycled boxboard increased from \$730/ton at the end of 2017 to \$830/ton at the end of 2018. Coated unbleached kraft (CUK) prices also increased \$100/ton during 2018. In August, CUK prices rose above SBS prices for the first time ever, and the gap has since widened. This is expected to eventually push some folding cartonboard demand over to SBS, although this has not happened yet. Prices for both CUK and CRB increased another \$50/ton during the first quarter of 2019. The gap between CUK and SBS stood at \$80/ton in February.

Our forecast shows the price gap between CUK and SBS narrowing in 2019, despite the competitive pressures some SBS producers are experiencing. It is simply unfathomable that CUK can sell at a premium to SBS for very long. We project that SBS prices will increase from \$1,060/ton in the second quarter of 2019 to \$1,150/ton by the end of the year, which would be \$10/ton higher than the present level of CUK prices. Our current forecast shows no additional price increases for CRB or CUK during the remainder of 2019. However, the recently announced closure of the Crossett mill in October 2019 could be enough of a shock to the system to trigger another round of price increases in late 2019 or early 2020, unless economic growth comes in much

weaker than we currently expect during this period. There is increasing uncertainty on the economic front given the disruption in the trade talks between the US and China in May.

The flood of folding boxboard coming into the global market has temporarily provided some added leverage to independent converters in pricing negotiations with suppliers, alleviating part of the margin compression the market has seen for some time now. However, the recent mill closures and reduced capacity have stabilized prices, swaying the market back in favor of integrated producers and sellers of boxboard to the open market. Capacity reductions primarily occurred in the recycled market. Paperworks Industries decided to shutter its Philadelphia, Pennsylvania, mill in April 2017, removing another 135,000 tons of capacity from the coated recycled market. Graphic Packaging followed by closing its Santa Clara, California, mill in December 2017. The recent closures resulted in an 11% reduction in coated recycled boxboard (CRB) capacity, illustrating the degree of demand losses that this grade has suffered during the last two years.

In the next five years, folding carton shipments will record an average growth rate of 0.1% annually. Shipments growth in tons will show an uneven performance over the forecast, reflecting the changing impact of the driving factors. We expect a better, albeit still weak, performance in shipments of -0.7% in 2019, which will lag the expected weak growth in nondurables production and spending of 0.8% and 0.9%, respectively. Shipments are forecast to return to mild growth of 0.4% in 2020, reflecting improvements in the output of nondurables. A number of exogenous factors, such as consumer preference shifts (primarily the millennials) and environmental pressure to substitute plastic with paper packaging, will enhance demand. However, these factors will be partially offset by a stronger dollar, which will undermine exports and place downward pressure on carton shipment growth. Fastmarkets RISI anticipates strong labor market fundamentals will persist and translate into improved and more sustained spending in categories such as food, beverages and other discretionary spending over the first half of the forecast. Rising personal incomes and increased consumer confidence will likely lead to shifts in spending patterns that will support growth in

some of the premium or luxury products that have performed so poorly during the last several years. Shipments are expected to decline slightly in 2021 by 1.1% due to the expected economic slowdown, before recovering in 2022 and 2023 by 0.8% and 1.2%, respectively. The

total value of US carton shipments should climb from an estimated \$8.5 billion in 2018 to \$9.3 billion in 2023, and while average values per ton, which dipped from 2015-2017 before recovering in 2018, are expected to grow by 1.7% over the forecast period.

Table 2

US folding carton shipments

	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Thousand tons	4,903	4,904	4,803	4,769	4,789	4,735	4,773	4,831
%	-0.7%	0.0%	-2.1%	-0.7%	0.4%	-1.1%	0.8%	1.2%
Million dollars	8,595	8,393	8,500	8,871	9,253	9,283	9,193	9,311
%	-1.3%	-2.4%	1.3%	4.4%	4.3%	0.3%	-1.0%	1.3%
Average value per ton	1,753	1,711	1,770	1,860	1,932	1,961	1,926	1,928
%	-0.7%	-2.4%	3.4%	5.1%	3.9%	1.5%	-1.8%	0.1%
Real carton value per ton (2015\$)	1,771	1,675	1,681	1,724	1,743	1,757	1,705	1,671
%	0.3%	-5.4%	0.4%	2.5%	1.1%	0.8%	-3.0%	-2.0%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Table 3

US folding carton market

Million US dollars

	2011	2012	2013	2014	2015	2016r	2017r	2018e
Shipments	\$8,626.4	\$8,844.8	\$8,760.3	\$8,939.7	\$8,712.2	\$8,595.4	\$8,393.0	\$8,499.9
Imports	\$675.4	\$690.1	\$752.4	\$782.0	\$827.4	\$850.5	\$877.9	\$942.9
Exports	\$409.2	\$425.6	\$446.9	\$455.2	\$471.3	\$483.5	\$475.3	\$486.7
Consumption	\$8,893	\$9,109	\$9,066	\$9,267	\$9,068	\$8,962	\$8,796	\$8,956
Import penetration (imports percentage of consumption)	7.6%	7.6%	8.3%	8.4%	9.1%	9.5%	10.0%	10.5%
Exports as a percentage of shipments	4.7%	4.8%	5.1%	5.1%	5.4%	5.6%	5.7%	5.7%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Table 4

Total folding carton and cartonboard

Thousand tons

	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Folding carton shipments	4,903	4,904	4,803	4,769	4,789	4,735	4,773	4,831
% Change	-0.7%	0.0%	-2.1%	-0.7%	0.4%	-1.1%	0.8%	1.2%
Converting loss at carton plants	575	575	563	558	559	551	554	559
Board consumption at carton plants	5,478	5,480	5,366	5,327	5,347	5,286	5,328	5,390
Board consumption, all other uses	984	1,046	1,261	1,236	1,334	1,395	1,475	1,504
Domestic cartonboard demand	6,463	6,525	6,627	6,563	6,681	6,681	6,803	6,894
Cartonboard net exports	230	263	150	242	335	342	339	313
Cartonboard production	6,693	6,788	6,777	6,805	7,017	7,023	7,142	7,207
% Folding carton shipments/domestic demand	75.9%	75.2%	72.5%	72.7%	71.7%	70.9%	70.2%	70.1%

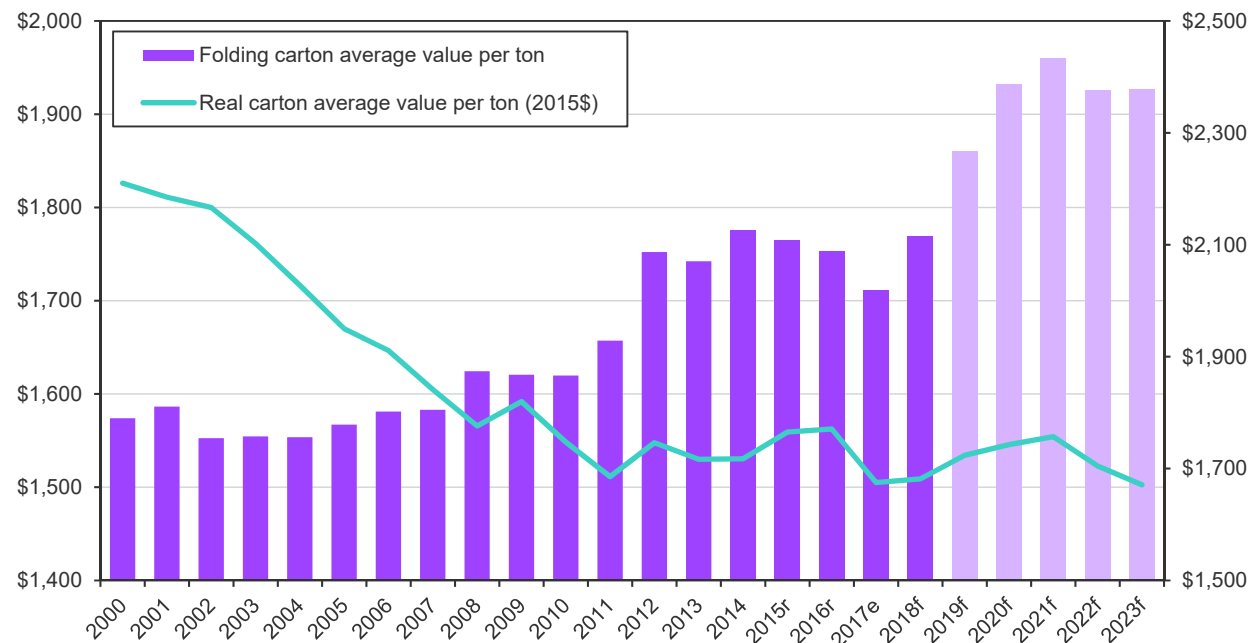
All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Figure 1

Real folding carton average values have been falling for decades

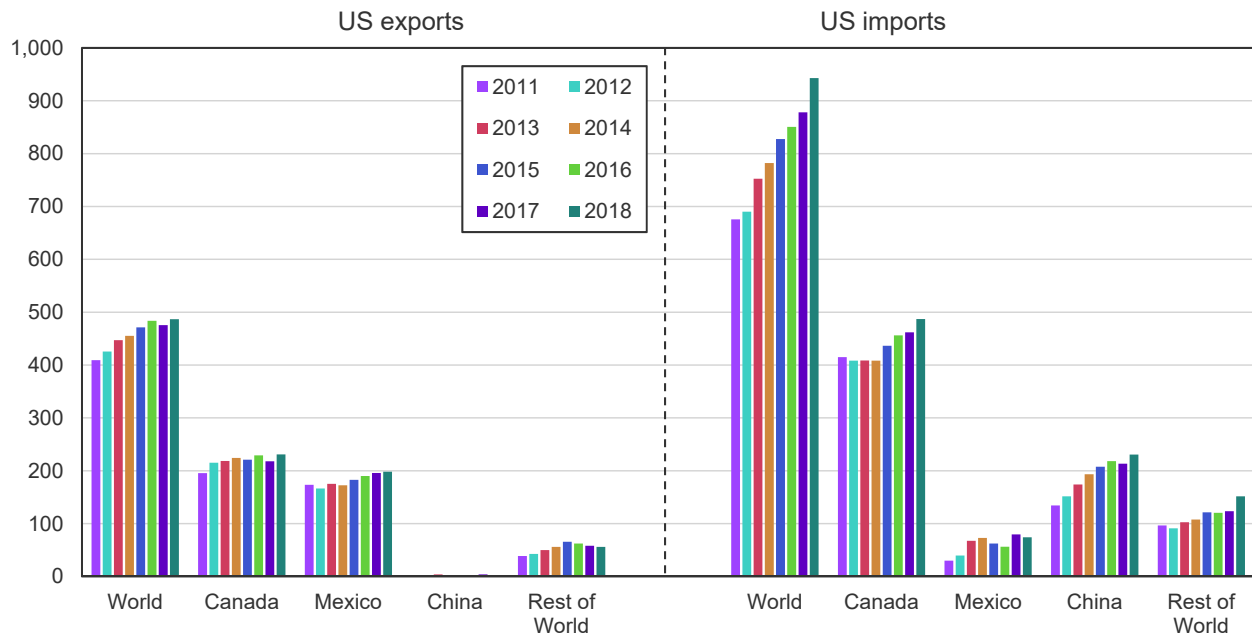
Dollars per ton



Source: Fastmarkets RISI, Inc.

Figure 2**US folding carton exports and imports**

Millions of US dollars



Source: Fastmarkets RISI, Inc., US Customs trade data.

Folding boxboard outlook

Apparent consumption of US folding boxboard fluctuated between 6.3 million tons and 6.5 million tons per year from 2009 through 2017. Demand pushed up toward 6.6 million tons in 2018, fueled by exceptionally strong growth in industrial production of processed foods. Growing resistance to the use of single-use plastic packaging was likely another factor supporting cartonboard demand, since this presented some opportunities for cartons to make some inroads into the away-from-home segment that had been supplied by blown polystyrene products. Processed foods production retreated in late 2018, leading to modest erosion in cartonboard demand at the tail end of the year. Total apparent consumption of folding cartonboard is expected to decline slightly in 2019, then rise toward 6.7 million tons in 2020. We anticipate demand will falter in 2021 as the US economy works through a mild recession, then climb to 6.9 million tons in 2023.

Although overall demand is forecast to grow at a 1.2% average annual pace during the next five years, the performance of the various substrates will be uneven. The away-from-

home sector is providing some support for the virgin grades, but the opportunities for recycled folding boxboard appear to be much more limited; domestic production of this grade fell 5.7% during 2018. In large part, the sector's poor performance during the last year was the result of the 11% reduction in capacity following the closure of two mills. Graphic Packaging shifted some carton customers over to coated unbleached boxboard following the closure of its Santa Clara, California, CRB mill.

Recycled folding boxboard production is expected to decline 0.6% in 2019. This board is mostly used to package processed foods and other nondurable goods delivered via traditional retail channels. The shift in consumer spending patterns toward fresh foods and the delivery of products to consumers via the e-commerce channel are likely to lead to further declines in CRB demand over time. We project that domestic production of coated recycled will decline at a 1.6% average annual rate during the next five years. Meanwhile, domestic production of unbleached kraft folding cartonboard is expected to grow at a 1.7% average annual rate, with SBS increasing at a 3.0% average annual rate. Demand for these two virgin

cartonboard products should benefit from continuing shifts away from single-use plastics in the fresh foods market. The current unprecedented gap between CUK and SBS prices is expected to lead to some demand shifts over to SBS, even though there is little evidence that this sort of shift has begun yet.

Imports of folding cartonboard increased from 714,000 tons in 2013 to 899,000 tons in 2017. This represented almost 14% of total US demand. The rate of import penetration slowed for much of 2018, as the world markets adjusted to the fiber shortage that developed in China. However, the economic slowdown that hit many overseas markets in late 2018 led to excess boxboard production in several regions, and some of that excess made its way to the US market. Total imports of folding cartonboard increased to 922,000 tons in 2018. We anticipate that imports will remain in the 900,000-930,000 ton range between 2019 and 2021, before picking up again from 2022 onward as overseas capacity expansion accelerates again.

Chinese producers began to pull back from the export market in 2017, when it became apparent that the government was serious about prohibiting imports of mixed wastepaper. Chinese net exports declined from 1.5 million metric tons (tonnes) in 2016 to 1.1 million tonnes in 2018, opening the door for exporters in other parts of the world to sell more to the regions that are supplied primarily by imports. North American exports increased from 2.68 million (short) tons in 2016 to 2.90 million tons in 2018. We anticipate that North American exports will continue to expand for the next five years, hitting 3.35 million tons in 2023.

Demand growth for liquid packaging and food service board has not lived up to expectations during the last few years. Apparent consumption jumped to 2.22 million tons in 2014, when blown polystyrene hot cups first fell out of favor. However, demand had only increased to 2.28 million tons by 2018. Constrictions in converting capacity were one factor that limited demand growth during this period. But difficulties in recycling poly-coated cups and the composite SBS-aluminum-poly liquid packaging products appear to be another issue, since consumer product companies do not want to jump from using one

product that is viewed as being unsustainable to another. We project that demand for liquid packaging and food service board will remain close to 2.3 million tons for the next five years.

The health of the gypsum wallboard facing paper market is directly related to conditions in the construction industry. Production of this grade plummeted to 865,000 tons in 2010, which was just half of the 2005 level and the lowest absolute level since 1982. However, construction activity emerged from the lows of the Great Recession in 2011, and wallboard paper production averaged 1.27 million tons per year in 2017-2018. Construction is expected to continue growing during the next five years, even with the brief downturn during the recession year, since there is quite a bit of pent-up demand for shelter (self-owned or rental) in the wake of the housing bust. Demand for wallboard facing is expected to grow at a 1.1% average annual rate between 2019 and 2023. Domestic production is forecast to climb from 1.27 million tons in 2018 to 1.35 million tons in 2023.

Boxboard producers adopted an aggressive capacity management stance during the last decade, when they recognized that they were facing difficult conditions in both the domestic and export markets. Total industry capacity fell from 17.4 million tons in 2005 to 15.4 million tons in 2016. The total capacity withdrawn from the market during this period was even larger than this, but these closures were partially offset by incremental expansions on the remaining machines.

Capacity closures continued in 2017. Paperworks Industries decided to shutter its Philadelphia, Pennsylvania, mill in April, removing another 135,000 tons of capacity from the coated recycled market. Graphic Packaging followed by closing its Santa Clara, California, mill in December. By the end of 2017, capacity for coated recycled boxboard (CRB) was roughly 11% lower than the year-ago level, illustrating the degree of demand losses that this grade suffered during the last two years.

Our capacity figures include 376,000 tons of capacity entering the SBS market in 2018, when Sappi began to convert its Skowhegan mill in Maine to bleached packaging grades. The precise grade mix for this mill is still uncertain, but we believe that it is prudent

to include most of the capacity in our SBS estimates. Our bleached board capacity figures had some room to absorb this tonnage, since we had assumed that some graphic paper tonnage would eventually make its way into the packaging markets, given the drastically different growth profiles for these two segments. However, after this forecast was set, Georgia-Pacific announced its intention to close the Crossett, Arkansas, mill in October 2019, which will reduce US SBS capacity roughly 6% from the levels shown in this forecast.

Operating rates for North American boxboard ranged from 92.0% to 92.5% between 2012 and 2016. The combination of the closure of the two CRB mills in 2017 with the modest increase in demand pushed average operating rates for the year up above 94%. Operating rates for this grade approached 96% during the second quarter of 2018, and remained elevated during the second half of the year. Overall boxboard operating rates are on pace to retreat to 92% during the middle of 2019, which is close to the average level that was recorded during the last 15 years. Our current forecast shows operating rates climbing back toward 94% during 2020, easing back down to 92% in 2021, then rebounding in 2021-2023. However, this was before the Crossett closure was announced. The net reduction in North American capacity following the closure suggests that operating rates could come in about 200 basis points higher than this, before factoring in any shifts in pricing patterns and eventual demand destruction due to the potential for higher price escalation than currently forecast.

Boxboard prices trended upward in 2018, but the movement was not uniform across the different substrates. SBS continued to face competitive pressure from virgin boxboard imports from Europe and Asia during much of the year. Clay coated bleached folding boxboard prices increased from \$1,030/ton at the end of 2017 to \$1,080/ton at the end of 2018, and

gave up \$20/ton of those gains in early 2019. This was by far the weakest performance of any folding cartonboard substrate.

The coated recycled boxboard (CRB) market was much tighter than the SBS market during the last year, since unmade orders spent much of the year setting new record peaks. Some converting operations shifted over to CUK following the Santa Clara closure, creating exceptionally tight conditions for this grade. Prices for coated recycled boxboard increased from \$730/ton at the end of 2017 to \$830/ton at the end of 2018. Coated unbleached kraft prices also increased \$100/ton during 2018. In August, CUK prices rose above SBS prices for the first time ever, and the gap has since widened. This is expected to eventually push some folding cartonboard demand over to SBS, although this has not happened yet. Prices for both CUK and CRB increased another \$50/ton during the first quarter of 2019. The gap between CUK and SBS stood at \$80/ton in February.

Our forecast shows the price gap between CUK and SBS narrowing in 2019, despite the competitive pressures some SBS producers are experiencing. It is simply unfathomable that CUK can sell at a premium to SBS for very long. We project that SBS prices will increase from \$1,060/ton in the second quarter of 2019 to \$1,150/ton by the end of the year, which would be \$10/ton higher than the present level of CUK prices. Our current forecast shows no additional price increases for CRB or CUK during the remainder of 2019. However, the recently announced closure of the Crossett mill in October 2019 could be enough of a shock to the system to trigger another round of price increases in late 2019 or early 2020, unless economic growth comes in much weaker than we currently expect during this period. There is increasing uncertainty on the economic front given the disruption in the trade talks between the US and China in May.

Table 5

Boxboard data by board grade

Thousand tons

	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Apparent consumption								
Total	6,463	6,525	6,627	6,563	6,681	6,681	6,803	6,894
%	2.8%	1.0%	1.6%	-1.0%	1.8%	0.0%	1.8%	1.3%
Bleached	1,509	1,468	1,654	1,723	1,805	1,810	1,872	1,944
Recycled (including multi-ply)	2,730	2,818	2,700	2,688	2,709	2,660	2,648	2,640
Unbleached	2,224	2,240	2,273	2,152	2,168	2,210	2,284	2,311
Imports								
Total	813	899	922	895	929	939	967	992
%	6.7%	10.5%	2.6%	-3.0%	3.8%	1.1%	3.0%	2.6%
Bleached	12	18	18	12	14	15	16	16
Recycled (including multi-ply)	623	715	718	717	739	747	769	790
Unbleached	179	165	187	166	176	177	182	186
Exports								
Total	1,044	1,161	1,072	1,137	1,264	1,281	1,306	1,305
%	-21.8%	11.3%	-7.7%	6.1%	11.1%	1.3%	2.0%	-0.1%
Bleached	508	568	410	411	448	449	478	488
Recycled	81	62	81	85	100	103	111	113
Unbleached	455	531	581	641	716	729	717	704
Production								
Total	6,693	6,788	6,777	6,805	7,017	7,023	7,142	7,207
%	-2.4%	1.4%	-0.2%	0.4%	3.1%	0.1%	1.7%	0.9%
Bleached	2,005	2,018	2,046	2,121	2,238	2,244	2,334	2,416
Recycled	2,188	2,165	2,064	2,057	2,071	2,016	1,989	1,963
Unbleached	2,500	2,605	2,667	2,628	2,708	2,762	2,819	2,828
Capacity								
Total	7,200	7,222	7,147	7,310	7,489	7,569	7,609	7,649
%	-1.1%	0.3%	-1.0%	2.3%	2.5%	1.1%	0.5%	0.5%
Bleached	2,115	2,144	2,155	2,300	2,440	2,510	2,590	2,670
Recycled	2,417	2,314	2,182	2,184	2,184	2,154	2,074	1,994
Unbleached	2,668	2,764	2,810	2,826	2,865	2,905	2,945	2,985
Operating rate								
Total	93.0%	94.0%	94.8%	93.1%	93.7%	92.8%	93.9%	94.2%
Bleached	94.8%	94.1%	95.0%	92.2%	91.7%	89.4%	90.1%	90.5%
Recycled	90.5%	93.5%	94.6%	94.2%	94.8%	93.6%	95.9%	98.5%
Unbleached	93.7%	94.3%	94.9%	93.0%	94.5%	95.1%	95.7%	94.7%

Source: Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Table 6**Boxboard prices by board grade**

US dollars per ton

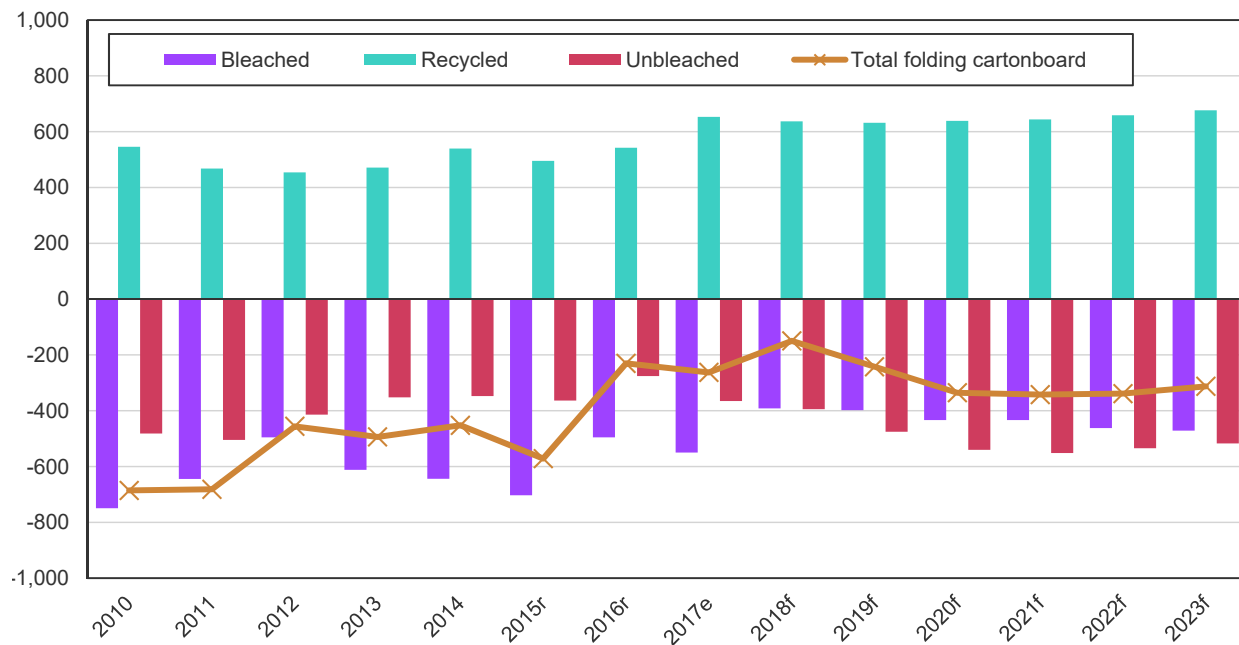
	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Bleached board	\$1,015	\$1,025	\$1,062	\$1,067	\$1,127	\$1,143	\$1,114	\$1,111
%	-1.6%	1.0%	3.6%	0.5%	5.7%	1.4%	-2.5%	-0.2%
Unbleached	\$960	\$982	\$1,054	\$1,136	\$1,140	\$1,102	\$1,076	\$1,074
%	-0.1%	2.3%	7.4%	7.7%	0.4%	-3.3%	-2.4%	-0.2%
Coated recycled	\$743	\$753	\$808	\$880	\$880	\$864	\$848	\$953
%	-1.8%	1.4%	7.2%	9.0%	0.0%	-1.9%	-1.8%	12.5%
All grades, weighted by demand	\$878	\$890	\$951	\$1,001	\$1,025	\$1,019	\$1,000	\$1,042
%	-0.9%	1.3%	6.9%	5.2%	2.5%	-0.6%	-1.9%	4.2%

Source: Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Figure 3**US folding cartonboard net imports on the decline**

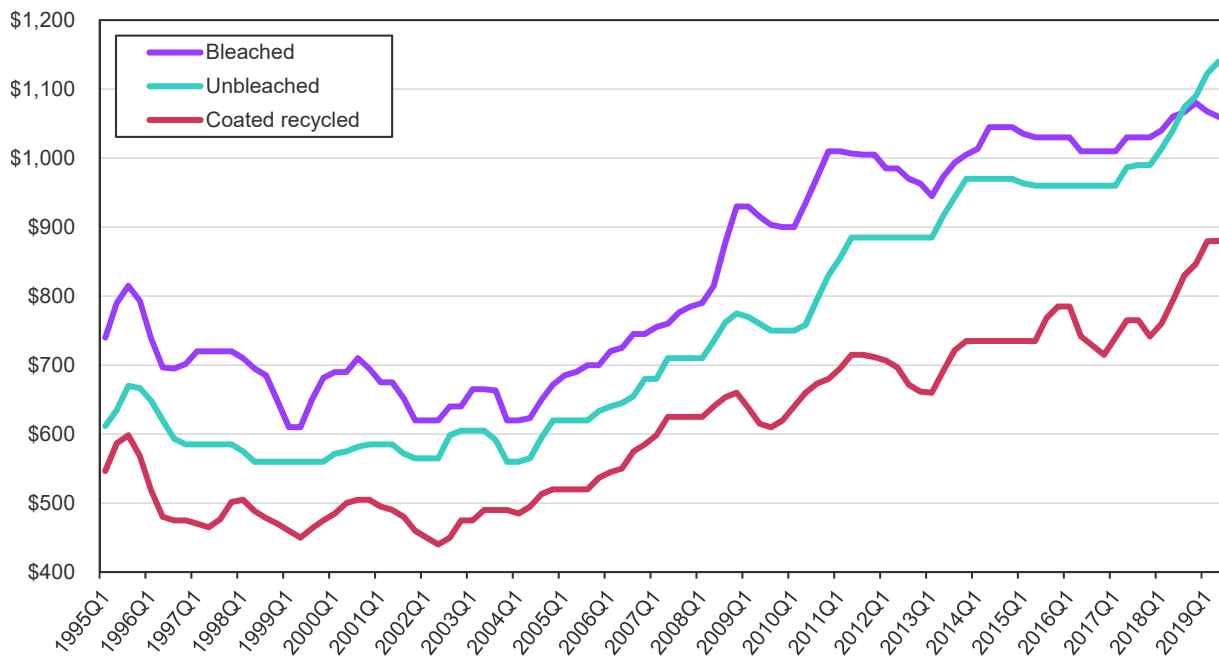
Thousand tons



Source: Fastmarkets RISI, Inc.

Figure 4**Boxboard prices by board grade**

Dollars per ton



source: Fastmarkets RISI, Inc.

Fastmarkets RISI's forecast methodology ensures that the growth and decline in folding carton apparent consumption is estimated using underlying boxboard demand. Full details of the methodology used to balance the two forecasts can be found in Appendix A. This year's analysis shows the range of board consumption at various carton plants and boxboard apparent consumption growing to over 1 million tons in 2018. The projected increase in imports is one factor suggesting

that non-carton uses will rise over time, since the import data for folding boxboard includes a growing amount of clay coated white top linerboard that is consumed outside of the folding carton system. However, we also believe there could be an inherent disconnect in the data in 2018 given that carton and cartonboard trends are moving in distinctly opposite directions. Otherwise, this implies a significant inventory build in cartonboard or a spike in non-carton end-use demand.

Folding carton industry outlook: Canada

Overview

The folding carton market in Canada has experienced flat to declining shipments for the better part of a decade. As of 2018, shipment volumes were estimated at 431,300 tons, which translates to a market size of slightly more than C\$1 billion. Canadian industrial production struggled in the first few years following the recession, largely due to an appreciating loonie against the US dollar, which contributed to stagnant folding carton shipments. However, in recent years, currency moves have seen the Canadian dollar weaken by nearly 30% from its 2012 levels, when it was effectively at parity with the US dollar. This has provided a significant shot in the arm for manufacturers competing with their peers in the USA and offshore, translating into steadier growth in industrial output.

The outlook for carton shipments is a bit better than the recent downward trend in its history thanks to healthier manufacturing growth along with better demand prospects from Canada's largest trade partner, the USA. As a result, folding carton shipments are expected to grow by 0.5% on average over the next five years and reach 443,100 tons by 2023. The flat to slightly strengthening loonie over the next five years should limit folding carton exports to the USA. We expect the total value of folding carton shipments to grow on net through 2023 to C\$1.06 billion, reflecting the increase in folding carton shipments and the improving average carton values per ton in Canada. The price outlook is primarily driven by the market

dynamics in the USA and the exchange rate environment, which shows a slightly stronger Canadian dollar by the end of the forecast.

End-use markets

Canada's folding carton market has been fairly flat over the years, which is not only a function of challenges in end-use markets critical to important folding carton demand, but also likely due to a large amount of incremental carton demand and finished products coming from the USA. Manufacturing in general has been somewhat challenged in Canada over the past decade, between the Great Recession in the USA spilling over the border and a strengthening currency making domestic producers' goods less competitive. In 2017, nondurables production in Canada was able to finally recover from the Great Recession, climbing slightly above the production level observed ten years prior in 2007. Nondurables production continued its upward trend in 2018, growing 1.5% year-over-year. However, even before the recession years, nondurables output was being battered by the ever-strengthening value of the Canadian dollar, which began its extended run of appreciation in 2000. However, production has been on a sustained path of slow growth since 2012, due to some overall improvement in the North American economy and a sharp reversal in the value of the loonie versus the US dollar starting in 2013. Nondurables production in Canada saw a notable recovery in the past five years, recording a 2.7% annual average growth rate.

Table 1

Canadian folding carton shipments growth
Percentage

	2008-13	2013-18	2018-23
Thousand tons	2.0%	-0.6%	0.5%
Million dollars	2.6%	2.5%	1.2%
Average value per ton	0.6%	3.1%	0.6%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Looking at the breakdown of manufacturing sales in Canada, nondurable goods accounted for about C\$325 million in output in 2018, which as a share of total manufacturing sales in Canada was 47.5%. Looking deeper into the breakdown, food manufacturing, which makes up a sizable portion of folding carton demand, accounted for 31.8% of nondurables manufacturing sales, or C\$103.4 million. Beverage and tobacco production, which are bundled together in much of the Canadian government data, accounted for

another 4.2% (C\$13.7 million) of nondurables manufacturing sales in 2018. To put these figures into perspective, paper manufacturing, which has been a significant, albeit declining, industry in Canada's economy for many years, accounted for about 9.4% of total nondurables sales. Food production is thus a major contributor to Canada's manufacturing sector.

On the demand side of the equation, household spending figures available from the Canadian government show that real spending on nondurable goods was C\$281.7 billion (2012, chained dollars) in 2018. This category of goods, which is critical to the paper packaging industry, especially folding cartons, has grown by 1.5% annually over the last ten years. Spending did surprisingly well considering the economic turmoil during the period, but interestingly has been a bit more robust over the last five years. Examining some of the more granular subcomponents of household spending that tie into folding carton demand, overall food and non-alcoholic beverage spending in 2018 was C\$103.7 billion (2012, chained dollars) and has grown by about 1.5% annually over the last ten years. Food accounts for nearly 89% of the category and has increased by about 2.2% over the last five years, reflecting stronger spending growth by consumers, which was also the case in the US. Non-alcoholic beverages such as sodas, bottled water and juices have slightly weighed down the category's growth over the same period, advancing by 2.0% annually. Canadian consumers seem to be shunning carbonated beverages and other sugary drinks due to shifts to more health-conscious eating patterns. On the other hand, alcoholic beverages, which accounted for \$21.9 billion (2012, chained dollars) in household spending, advanced at a much healthier pace of growth over the last five years of 2.5% annually. Like the

US, overall challenges and shifting spending patterns in Canada have not been nearly as detrimental to alcohol purchases as other foods and non-alcoholic beverage options.

A few other household spending categories of relevance to folding carton producers also stood out in the data. Unsurprisingly, tobacco spending, which accounts for about C\$12.7 billion (2012, chained dollars), has been shrinking by about 1.3% since 2008, as younger generations are less inclined to smoke, and the broader population is better aware of the adverse health effects of the habit. Spending on tools and equipment for the home have grown by a moderate 1.4% over the last ten years, reflecting steady gains in the Canadian housing market since the recession. Personal care products have also grown at a respectable rate of 1.5% annually over the last decade, and account for a sizable portion of spending at nearly C\$26 billion (2012, chained dollars). Finally, food and beverage services spending has accelerated to a healthy 2.5% annually over the last five years after slowing somewhat due to the recession. The pickup in food services spending in Canada is quite similar to what is underway in the US.

The outlook for the major end-use markets for folding cartons in Canada appears respectable based on Fastmarkets RISI's expectations. First, nondurables production in Canada is expected to improve given the growth potential in consumer spending, despite some strengthening of the Canadian dollar, albeit weaker than its levels in 2012, over the majority of the forecast horizon. We expect 1.5% growth in nondurables production over the period, which should provide a bit of relief to Canadian folding carton producers. Real consumer spending in Canada will advance by 1.8% annually between 2019 and 2023, falling slightly slower than the broader spending trends over the last ten years.

Table 2

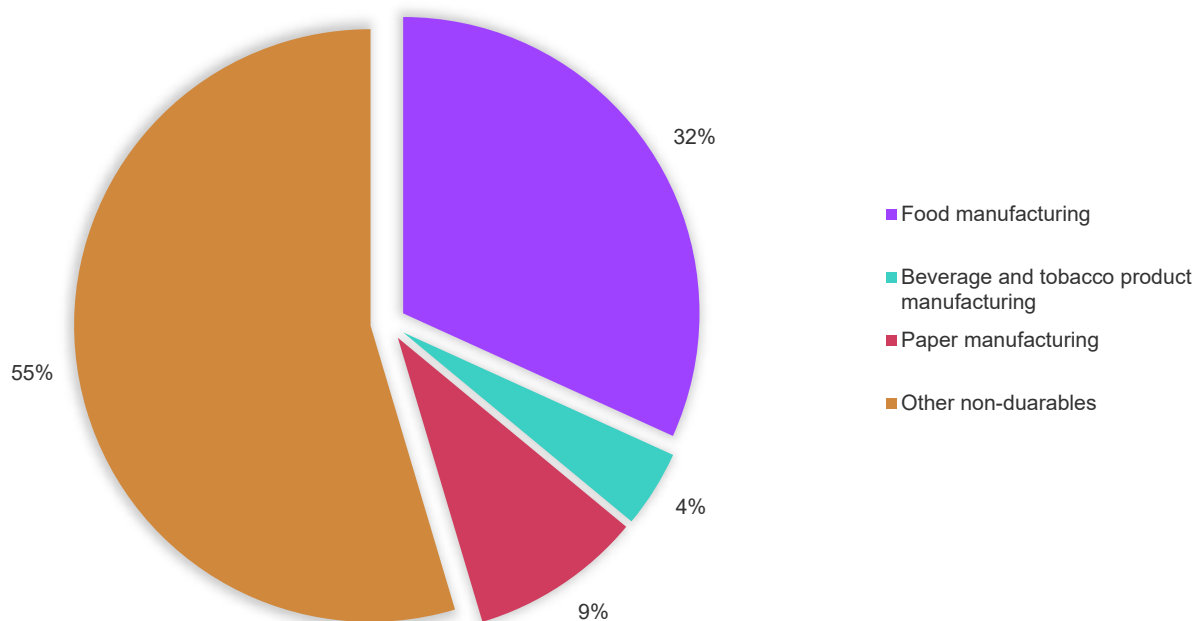
Canadian macroeconomic outlook

	2014	2015r	2016r	2017e	2018f	2019f	2020f	2021f	2022f	2023f
GDP (billion 2012 CAD)	1,918	1,931	1,953	2,011	2,053	2,090	2,131	2,135	2,187	2,249
%	2.9%	0.7%	1.1%	3.0%	2.1%	1.8%	2.0%	0.2%	2.5%	2.8%
Consumer spending (billion 2012 CAD)	1,048	1,071	1,094	1,134	1,159	1,180	1,200	1,206	1,232	1,270
	2.7%	2.2%	2.1%	3.6%	2.2%	1.8%	1.7%	0.5%	2.1%	3.1%
Industrial production index (2012=1.00)										
Total	1.08	1.08	1.07	1.13	1.17	1.21	1.26	1.27	1.32	1.37
%	4.9%	-0.4%	-0.1%	5.5%	3.4%	3.2%	4.0%	0.9%	4.1%	3.8%
Nondurable goods	1.10	1.14	1.16	1.21	1.22	1.25	1.27	1.27	1.30	1.31
%	2.8%	3.0%	2.5%	3.5%	1.5%	2.0%	1.7%	0.3%	1.8%	1.4%

Figure 1

Canadian nondurable manufacturing sales by major category

Share of sales



Source: Statistics Canada.

Table 3

Canadian household spending

Million Canadian dollars (2012, chained)

	2010	2011	2012	2013	2014	2015	2016r	2017r	2018e
Total non-durable goods	\$248,001	\$250,278	\$251,538	\$257,266	\$261,815	\$265,726	\$269,952	\$277,165	\$281,657
%	1.7%	0.9%	0.5%	2.3%	1.8%	1.5%	1.6%	2.7%	1.6%
Food and non-alcoholic beverages									
Total	\$91,065	\$90,923	\$91,453	\$93,160	\$94,751	\$95,833	\$98,003	\$101,857	\$103,741
%	1.3%	-0.2%	0.6%	1.9%	1.7%	1.1%	2.3%	3.9%	1.9%
Food	\$80,687	\$80,524	\$81,138	\$82,790	\$84,130	\$85,143	\$87,270	\$90,792	\$92,298
%	1.5%	-0.2%	0.8%	2.0%	1.6%	1.2%	2.5%	4.0%	1.7%
Non-alcoholic beverages	\$10,378	\$10,399	\$10,315	\$10,368	\$10,622	\$10,688	\$10,717	\$11,044	\$11,435
%	0.2%	0.2%	-0.8%	0.5%	2.4%	0.6%	0.3%	3.1%	3.5%
Alcoholic beverage and tobacco									
Total	\$38,430	\$38,762	\$39,468	\$39,567	\$39,760	\$40,158	\$40,100	\$40,275	\$40,597
%	3.0%	0.9%	1.8%	0.2%	0.5%	1.0%	-0.1%	0.4%	0.8%
Alcoholic beverages	\$18,426	\$18,858	\$19,351	\$19,404	\$19,866	\$20,300	\$20,701	\$21,301	\$21,908
%	1.6%	2.3%	2.6%	0.3%	2.4%	2.2%	2.0%	2.9%	2.8%
Tobacco	\$14,900	\$14,604	\$14,600	\$14,410	\$13,932	\$13,722	\$13,314	\$13,053	\$12,680
%	4.8%	-2.0%	0.0%	-1.3%	-3.3%	-1.5%	-3.0%	-2.0%	-2.9%
Other categories									
Tools and equipment for house and garden	\$4,877	\$4,946	\$4,943	\$5,109	\$5,259	\$5,203	\$5,358	\$5,720	\$5,821
%	1.3%	1.4%	-0.1%	3.4%	2.9%	-1.1%	3.0%	6.8%	1.8%
Personal care products	\$22,261	\$22,477	\$22,568	\$23,116	\$23,798	\$24,355	\$25,029	\$25,794	\$25,976
%	0.5%	1.0%	0.4%	2.4%	3.0%	2.3%	2.8%	3.1%	0.7%
Food and beverage service spending	\$55,758	\$56,287	\$57,474	\$58,708	\$60,858	\$62,188	\$63,935	\$65,719	\$66,284
%	1.1%	0.9%	2.1%	2.1%	3.7%	2.2%	2.8%	2.8%	0.9%

Folding carton outlook

The size of the Canadian folding carton market is much smaller than in the USA, although this is not surprising since the US economy is about ten times the size of Canada's. In 2018, Canadian shipments of folding cartons were 431,300 tons based on Fastmarkets RISI's sizing of the market, which is nearly 9% of the size of the US folding carton market. Shipment volumes in 2018 were just shy of the recent historical range, which over the last ten years averaged 439,400 tons annually. Readers should note that the estimate for the folding carton market size in Canada largely relies on Fastmarkets RISI's estimate of folding cartonboard grades consumed in Canada, which in theory should translate to an estimate for folding carton shipments after factoring loss rates during converting.

In 2007, shipment levels stood at 462,000 tons, but eroded significantly with the arrival of the recession. By 2009, folding carton shipments had dipped below 400,000 tons. Volumes rebounded in 2010 as inventory restocking took place and carton demand recovered, raising shipments by 14.2% for the year. Between 2011 and 2015, shipments hovered around 442,000-451,000 tons per year, reflecting some softness in nondurables production that was affecting Canada's manufacturing and food processing industries. In 2017, demand recorded a noticeable recovery of 1.4% from the dip seen in 2016, echoing the improvement in nondurables production (3.5%) and consumer spending (3.6%) reported for the year. Growth in nondurables production slowed significantly to 1.5% in 2018, prompting a decline in folding carton shipments for the year of 2.1%. We suspect

that the overall relatively weakening folding carton shipments since 2015 had to do with a major shift in production during 2015 and 2016 following a paper mill closure in Canada, which pulled down apparent consumption of cartonboard and folding carton shipments more than is actually reflected in folding carton demand in the market.

Based on shipments in tons and average reported prices, the folding carton market in Canada in 2018 was slightly more than C\$1 billion, or about US\$775 million using USD/CAD exchange rates from last year. The total value of the folding carton market has been on a slight upward trend since the recession years, when values reached a low of C\$790 million. The growth in market size is largely due to the recovery in the average value per ton of folding cartons during the period as shipment volumes have held fairly steady since the rebound in 2010.

Over the five-year forecast horizon, Fastmarkets RISI believes folding carton shipments by Canadian producers will be on a steady to slightly upward trend, an improvement compared to the flat to eroding shipment growth seen over the last five years. The performance in 2019 will be stronger than the rate recorded in 2018, growing by a robust

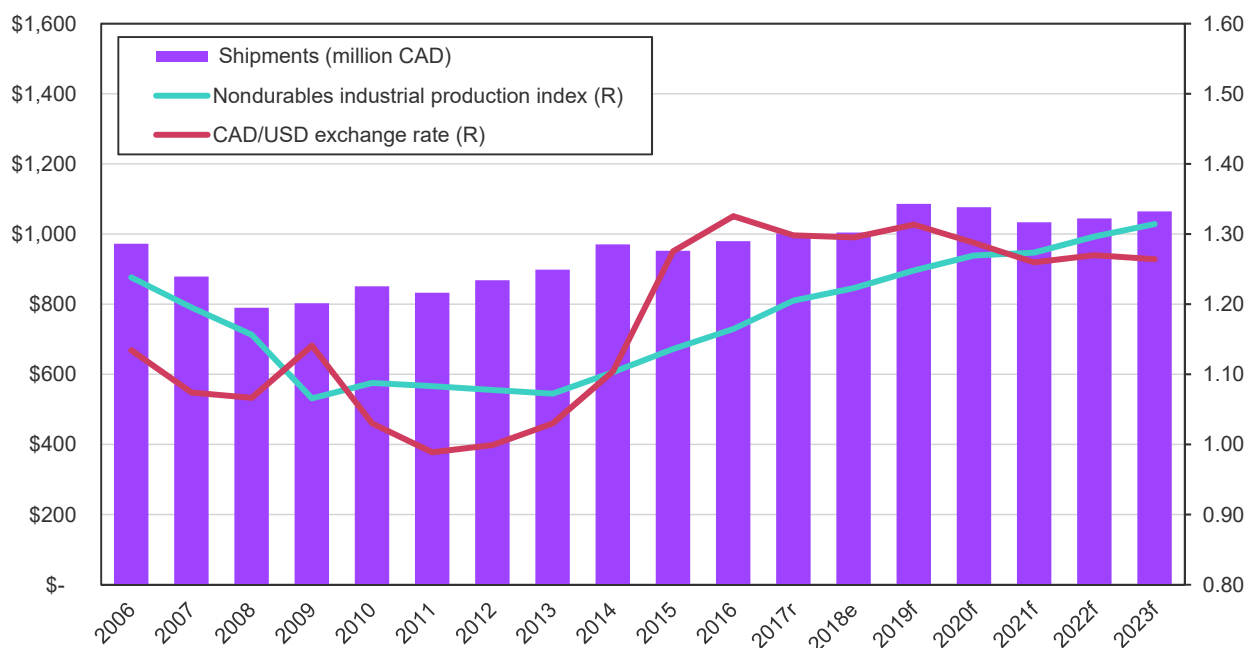
2.6% year-over-year. However, shipments will register slower average demand growth of 0.5% annually from 2019-2023, although levels will be more volatile on an annual basis.

Fastmarkets RISI expects the total value of carton shipments to average at about C\$1.06 billion over the five-year forecast, largely affected by broader shifts in folding carton pricing in the much larger US market as well as anticipated exchange rate moves. The total value of the Canadian folding carton market should rise to about C\$1.09 billion in 2019, thanks to an increase in carton prices in Canada and stronger folding carton consumption. In 2019, the Canadian dollar will likely depreciate slightly from its 2018 level, meaning these US dollar sales will be worth more in Canadian currency. We expect the loonie to change course and appreciate over the forecast period, which should put downward pressure on Canadian dollar pricing of folding cartons. Additionally, we anticipate stabilizing carton prices in the USA from 2019-2020 will contribute to pricing pressures in Canada as well. We forecast further recovery in Canadian folding carton average values per ton by 2023, which will leave the Canadian market at C\$1.06 billion, or about C\$60 million above the 2018 levels.

Figure 2

Canadian folding carton shipments

Millions of Canadian dollars



Source: Fastmarkets RISI, Inc.

Table 4**Canadian folding carton market**

Million US dollars

	2011	2012	2013	2014	2015	2016r	2017r	2018e
Shipments	\$842.1	\$868.6	\$872.1	\$878.8	\$746.6	\$738.9	\$782.2	\$785.7
Imports	\$222.0	\$243.5	\$255.5	\$261.3	\$267.9	\$273.0	\$266.4	\$266.4
Exports	\$428.0	\$422.9	\$428.0	\$426.1	\$457.2	\$476.1	\$492.7	\$492.7
Apparent consumption	\$636	\$689	\$700	\$714	\$557	\$536	\$556	\$559
Import penetration ¹	34.9%	35.3%	36.5%	36.6%	48.1%	51.0%	47.9%	47.6%
Exports as a percentage of shipments	50.8%	48.7%	49.1%	48.5%	61.2%	64.4%	63.0%	62.7%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

1. Imports as a percent of consumption.

Table 5**Canadian folding carton shipments**

	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Thousand tons	450	444	435	447	437	449	442	437	441	449
%	0.0%	-1.3%	-2.1%	2.7%	-2.1%	2.6%	-1.4%	-1.2%	1.1%	1.7%
Million Canadian dollars	970	952	979	1,015	1,018	1,100	1,091	1,047	1,059	1,079
%	8.0%	-1.9%	2.9%	3.7%	0.2%	8.1%	-0.9%	-4.0%	1.1%	1.9%
Average value per ton (CAD)	2,156	2,143	2,253	2,274	2,328	2,453	2,466	2,398	2,398	2,402
%	8.0%	-0.6%	5.1%	0.9%	2.4%	5.4%	0.5%	-2.8%	0.0%	0.2%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Folding boxboard outlook

Folding boxboard apparent consumption estimates were generated by looking at the data for the clay coated grades of boxboard produced in Canada. Fastmarkets RISI's knowledge of the capacity base for the boxboard industry as well as trade flows for such grades were used to size of the folding cartonboard market in Canada. Based on Fastmarkets RISI estimates, folding cartonboard apparent consumption in Canada stood at 537,000 tons in 2018, 3.9% lower than its ten-year peak in 2017. However, this is still higher than the ten-year average of about 513,000 tons. Similar to the analysis of the folding carton market, Fastmarkets RISI expects demand for cartonboard to increase gradually on net over the forecast horizon,

but annual demand growth will be a bit choppy year to year for a number of reasons.

The supply side of the folding cartonboard market in Canada has experienced few changes in capacity, but the events that have occurred have significantly impacted the market. Between 2000 and 2015, there were two folding cartonboard mill closures. The first was the termination of the Edmundston Mill's recycled cartonboard production in 2005. The facility, then owned by Fraser Papers, could only produce a relatively small amount of board, about 55,000 tons annually, which ultimately hampered the facility's ability to compete in the North American boxboard markets and led to its closure. Despite the machine's small size compared to total Canadian folding cartonboard capacity at the

time, this translated to almost 10% of total Canadian capacity. The second closure was the shuttering of Cascades Toronto mill in 2008. The 180,000 ton per year facility was closed due to high labor costs, high fiber costs and rising energy expenses, which became unsustainable during the slower economy at that time.

Heading into the end of 2014, Canada's identified folding cartonboard capacity was approximately 430,000 tons, with a mix of both coated virgin and recycled substrates produced between the five remaining mills. In 2015, the available folding cartonboard capacity changed hands and reduced further. First, PaperWorks acquired CanAmPak from Atlas Holdings in June 2015, which included the Strathcona Paper mill, a folding carton plant and digital printing and design firm in Ontario, Canada. Not long after, WestRock and MeadWestvaco's merger was also completed, and although this did not directly lead to any existing mills changing hands, the move was critical to further consolidation of the North American market. The biggest move was Graphic Packaging's closure of the Jonquière paperboard mill in Quebec. Graphic Packaging had purchased the mill, along with several other assets from Cascades, including the East Angus boxboard mill and three folding carton converters, several months earlier for a total of C\$44.9 million. The shut of Jonquière removed about 155,000 tons of boxboard capacity, split between recycled and virgin grades, from the market. This was a significant closure, which once fully realized in 2016, reduced Canadian folding carton capacity to about 300,000 tons annually and left only four major mills supplying folding cartonboard to the country.

On the trade front, folding cartonboard imports have notably risen over time as US suppliers have become more integrated with the Canadian market. In 2006, imports of cartonboard totaled 341,000 tons. Heading into the recession years, imports deteriorated, dropping as low as 289,000 tons in 2008, but rebounded substantially through 2010 to almost 450,000 tons in the span of two years. Part of this can be explained by a normal

bounce-back in demand following a recession, but the closure of the Toronto mill and the strengthening of the Canadian dollar relative to the US dollar forced further sourcing of boxboard from outside of Canada. Imports of folding cartonboard hovered between 427,000 tons and 470,000 tons from 2010-2018, with imports in 2018 reaching 448,000 tons, representing about 83% of apparent consumption in Canada. The overall increase in imports from 2016-2018, which averaged 456,000 tons annually, compensated for losses in output from Jonquière. Exports, meanwhile, declined over the ten-year period, largely due to the challenging exchange rate environment and mill closures. Since 2006, exports of cartonboard have dropped by almost 150,000 tons. The closure of the Jonquière mill had a clear effect on 2016 exports, which reduced by 51,000 tons and fell below 250,000 tons for the first time in recent history. Exports recorded a steady recovery in 2017 and 2018, rising 6% to 261,000 tons in 2017 and 262,000 tons in 2018.

As noted, the outlook for folding cartonboard demand is a path of modest growth over the horizon despite advances in nondurables production and consumer spending, battered under a stronger loonie. We expect no capacity growth from 2019 onward and are currently assuming no closures now that Jonquière's idling has been fully realized in our numbers. Consequently, production will also be relatively flat, with some marginal gains in operating rates as demand grows over the five-year forecast. In addition to mill closures, pressure from European boxboard suppliers could also contribute to import growth over the forecast horizon, a trend that will also be seen in the US market. The strengthening of the loonie should support this trend, allowing imports to grow at an average rate of 1.6% annually over the forecast. Exports will maintain slightly higher levels than the recent low recorded in 2016 due to the production drop, coming in at 262,000 tons again in 2023, although levels will be more volatile on an annual basis. Trade should remain quite unbalanced throughout the forecast period, with net imports reaching 222,000 tons by 2023.

Table 6**Canadian cartonboard data**

Thousand tons

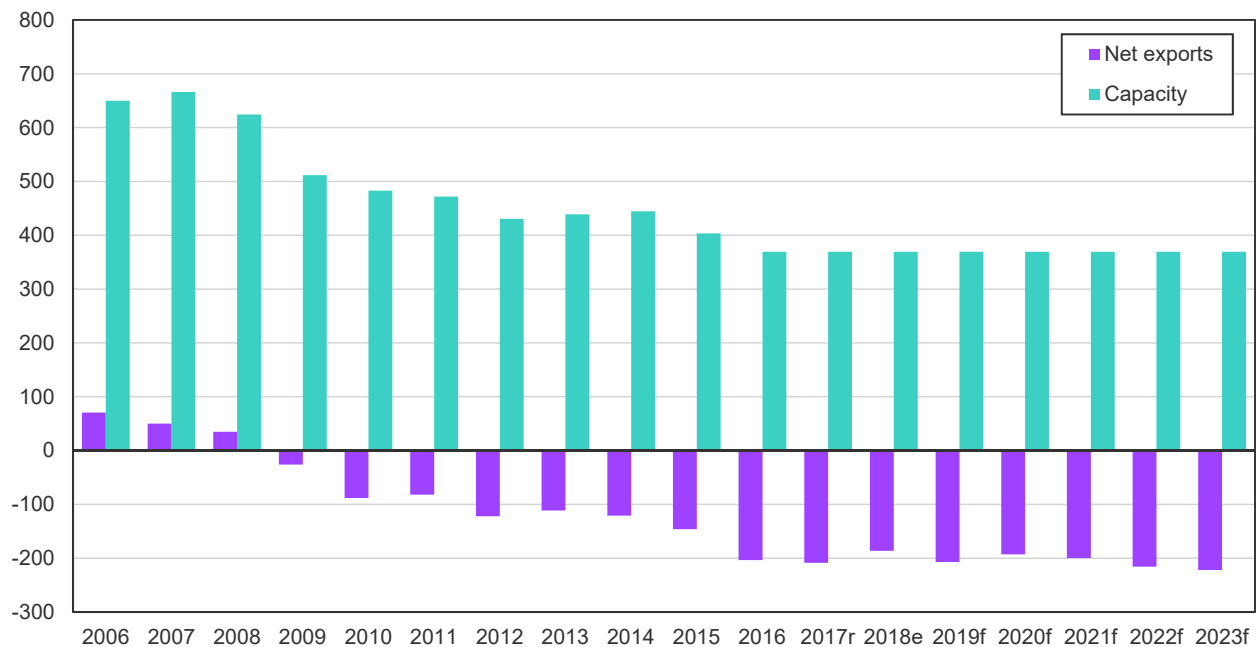
	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Apparent consumption	517	485	554	559	537	557	549	548	564	568
%	10.8%	-6.3%	14.3%	0.9%	-3.9%	3.7%	-1.4%	-0.1%	2.9%	0.8%
Imports	441	444	450	470	448	460	461	459	477	484
%	3.2%	0.7%	1.4%	4.4%	-4.7%	2.8%	0.2%	-0.4%	3.9%	1.4%
Exports	320	298	246	261	262	253	268	259	261	262
%	1.3%	-7.0%	-17.2%	6.0%	0.1%	-3.2%	5.9%	-3.2%	0.7%	0.3%
Production	396	338	350	350	350	350	356	348	348	346
%	11.5%	-14.7%	3.5%	0.0%	0.1%	-0.2%	1.8%	-2.1%	-0.1%	-0.5%
Capacity	444	403	369	369	369	369	369	369	369	369
%	1.3%	-9.2%	-8.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Operating rate	89.2%	83.8%	94.8%	94.8%	94.9%	94.7%	96.4%	94.3%	94.3%	93.8%

All forecasts and analysis presented by Fastmarkets RISI, Inc.

Note: r = revised, e = estimate, f = forecast.

Figure 3**Canadian folding cartonboard net trade and capacity**

Thousand tons



Source: Fastmarkets RISI, Inc., Statistics Canada.

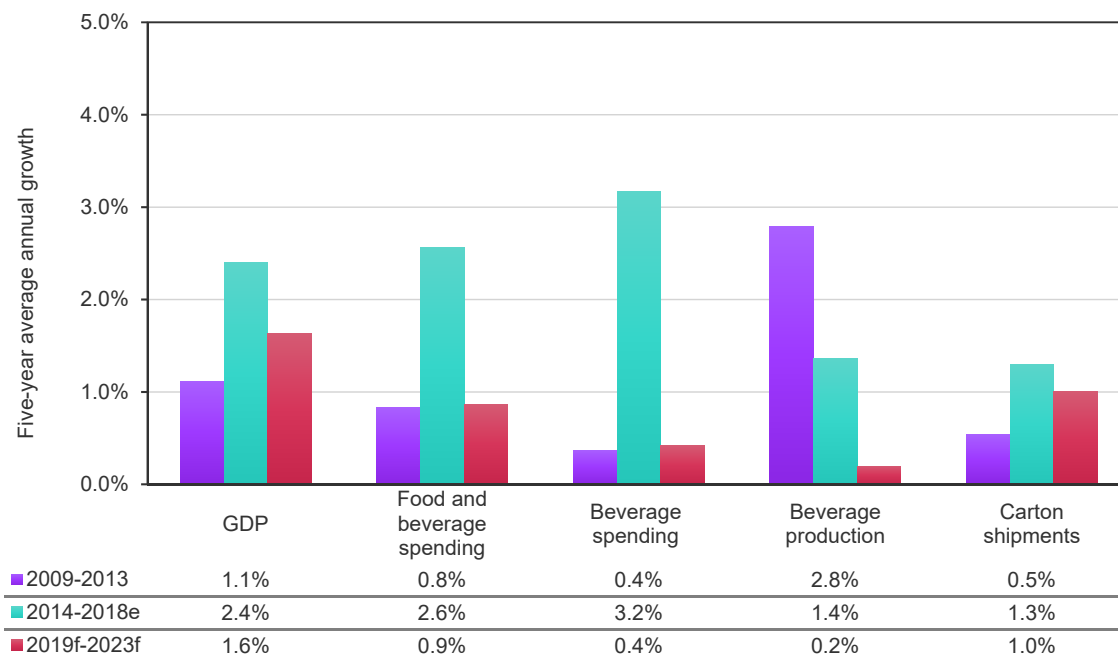
Beverages

The beverage market is still by far the largest end user of folding cartons in the USA, with an estimated 1.11 million tons (23.0%) of total carton shipments in 2018. This is about 381,000 tons more than dry foods, the next largest end-use segment. Because of its substantial share of total folding carton demand, the beverage sector plays a critical role in determining the overall growth profile of the folding carton industry for the USA. Shipments of folding cartons to the beverage segment expanded by 1.3% annually over the last five years despite anemic economic growth in the years following the Great Recession of 2008/2009. This contrasts substantially with overall carton shipments, which shrank by 0.9% annually during the same period, indicating the beverage segment helped buoy carton demand despite more serious challenges in other end-use markets.

Spending on alcohol for off-premises consumption will be the main driver for folding carton demand growth in beverages over the forecast horizon as carbonated beverage demand struggles to grow with heightened health awareness. Wine and spirits will experience modest positive growth, while beer spending will be relatively soft despite accounting for the lion's share of carton demand in the alcohol segment. Anticipated slower economic growth in the forecast and its impact on the US consumer will translate to slower growth in folding carton shipments to the beverage segment of 1.0% on average over the next five years. Shipments on a value basis will increase by a higher rate, as the average value per ton for folding cartons in the beverage segment will rise on net through the next five years thanks to the expected upturn in virgin cartonboard prices. The increasing value per ton will be largely

Figure 1
Beverage end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

fueled by rising prices of coated unbleached board, which is for the first time selling at premium to coated bleached board.

Spending trends

Beverage spending continued along an upward trajectory in 2018, mostly in line with overall nondurables spending. According to the Bureau of Economic Analysis (BEA), beverage spending in 2018 was about \$309 billion (2012\$), representing a 3.0% increase over 2017 levels. In comparison, real beverage spending has risen by 1.8% annually on average since 2008. The industry was growing at a fairly rapid clip prior to the Great Recession, by roughly 3% annually, until spending reversed course in 2008, bringing beverage spending down by a total of 5.8% by the end of 2009. However, beverage spending recovered in 2010 and has maintained solid growth since, averaging 1.1% between 2010 and 2013, and 3.2% annually between 2014 and 2018. Beverage spending has grown nearly in line with overall food spending and will likely continue to do so; beverages as a share of non-service related food and beverage spending was nearly 32% in 2018. As a share of US total nondurables spending, beverages accounted for 10.6% in 2018.

The BEA tracks spending on beverages for off-premises consumption in two major categories: (1) mineral waters, soft drinks and juices, and (2) alcoholic beverages including spirits, wine and beer. Spending on mineral waters, soft drinks and juices have had more difficulty recovering from the depths of the 2008/2009 recession than alcoholic beverages. After dropping 5.3% in 2009, spending showed a mixed performance until 2014, leaving the average growth rate between 2009 and 2013 at 1.2% and steadily losing share to alcoholic beverages. Since 2014, spending has turned in a better performance, growing at 2.3% annually between 2014 and 2018. Total spending on mineral waters, soft drinks and juices as a category reached \$78.6 billion (2012\$) in 2018, reflecting some growth, albeit relatively slow compared with other beverage categories. The main culprit for the weakness in the category is crashing per capita consumption of carbonated soft drinks (CSD) as health awareness rises; in 2018 *IBISWorld* estimated that US soft drink consumption per capita has fallen by 8.6% since 2000.

The major players in the beverage industry continue to cope with the struggling demand for CSD and have reoriented their focus toward growth markets and healthier beverage options. Coke and PepsiCo provide anecdotal evidence of the segment's challenges as a growing share of consumers shun key ingredients like aspartame and corn syrup. Concerns on overall sugar intake have also been in vogue recently, driving consumers toward alternative beverage choices and smaller portion sizes. Rollouts of products with natural sweeteners (e.g., stevia or cane sugar) and shifting sales focuses to alternative segments like bottled water have been a major strategy as well. Despite some bright spots, such as the growing demand for energy drinks, health awareness campaigns encouraging lower soda consumption and government policies targeting sugary drinks continue to ratchet up pressure on the major producers of CSD. We anticipate real spending on mineral waters, soft drinks and juices will record slow growth of around 0.3% annually through 2023 as overall consumer spending on beverages will decelerate as the economy heads toward a downturn in 2021. This spending will clearly lag behind spending on alcohol for at-home consumption.

Spending on alcohol has been a strong driver of the robust beverage spending over the past decade. Even during 2008-2009, spending on alcohol for at-home consumption was relatively resistant to the effects of the recession, declining just 2.2% during those two years. Demand for spirits and wine held stable in 2009 at \$23 billion and \$30 billion (2012\$), respectively, and accelerated strongly in 2010 as growth in overall spending returned to normal. Beer consumption was hit the hardest during the recession, falling 8.1% below its 2006 peak by 2009. The economic downturn meant further market share gains by spirits and wine sales over beer, which seems to have been happening for well over a decade and appears to be continuing. This is likely due to shifting perceptions on the health benefits for moderate consumption of wine and spirits compared to beer (e.g., lower calorie intake, heart benefits, etc.). Ten years ago, spending on beer accounted for just over half of total alcohol spending (off-premises consumption) but has since slid to just under 45% in recent years. Meanwhile, the share of consumer spending on wine increased from 27% of the

total in 2005 to 33% in 2018 and spirits from 21% to 23% over the same time frame.

The strong growth in alcohol spending also appears to have translated over to restaurant spending as well, although spending on alcohol in purchased meals during the recession was not nearly as resilient compared to at-home spending. During the downturn, consumers were forced to cut back on dining out and cook at home, causing spending on alcohol in purchased meals to fall from the 2007 peak of \$78 billion to \$75 billion (2012\$) by 2010, a 3.7% decline. Spending on alcohol at restaurants returned to growth in 2011 and exhibited real strength in the last couple of years. In 2016, alcohol spending purchased in meals grew 3.5%, but slowed to 0.8% in 2017, before accelerating again in 2018 by 3.5%, a reflection of some level of normalization post-recession and upward pressure on real wages driving consumers to opt to dine out more. However, this trend is expected to slow in the forecast due to a sluggish economic growth stance heading to a slowdown in 2021. Fastmarkets RISI is forecasting alcohol sales in the away-from-home segment to grow by a modest 0.6% annually through 2023.

Fastmarkets RISI forecasts overall beverage spending will grow by a nearly flat 0.4%

average annual rate over the next five years, reaching \$315.4 billion (2012\$) by 2023. Drags on spending will persist particularly as per capita consumption of sodas and other sugary drinks continues to decline and due to the expected economic deceleration in the forecast. Shifting spending patterns also indicate consumers are trading up to more premium alcoholic beverages (craft beers and select wine and spirits). The major implication for carton producers is that beer revenue will grow faster than beer volumes, both for restaurant and off-premises consumption.

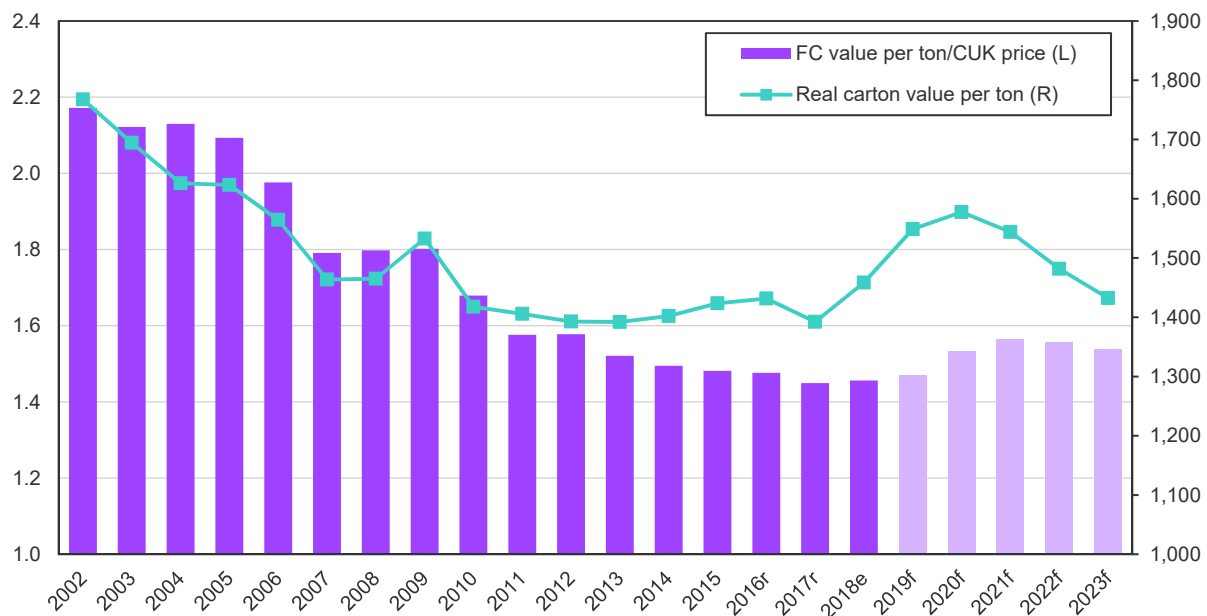
Trade trends

The overall trend in the beverage sector has been a ballooning trade deficit as American appetites for foreign products continue to grow, mainly as more sophisticated food preferences have taken hold. Looking back prior to the recession, the trade deficit in the beverage market was growing by nearly double-digit rates on average from 2000-2007 as consumer spending on imported alcohol boomed. The trade deficit peaked at over \$14.8 billion (2012\$) in 2007, but quickly reversed in 2008 as consumption was undermined by the recession, pushing the trade deficit down to \$11.4 billion (2012\$) by 2009. With the improving economic outlook

Figure 2

Beverage: Folding carton value per ton relative to unbleached board price

Real carton value per ton in 2015 dollars



Source: Fastmarkets RISI, Inc.

after the recession, net imports accelerated, reaching \$19.1 billion (2012\$) by 2018.

Despite the global slump worldwide, US exports of beverage products experienced solid growth in 2008, although the effects of the recession caught up and resulted in declines the following year. In the past decade, exports have played a more significant role in the market, doubling from \$3.3 billion (2009\$) in 2005 to \$6.7 billion (2009\$) in 2018, ultimately increasing the export share of total beverage production. A weakening US dollar also provided a boost for domestic producers competing abroad for many years, although major shifts in monetary policy in 2015 and 2016 have caused the US dollar to strengthen dramatically more recently. Unsurprisingly, beverage export growth in 2015 slowed significantly to just 1.9%, far lower than the double-digit growth rates experienced in previous years, and had a negative rate on growth in 2016, declining 4.1%. The slightly weaker dollar in 2017 and 2018 allowed beverage exports to increase by 2.4% and 1.5%, respectively. Exports are expected to continue their overall growth trajectory in the forecast, despite some headwinds due to slow growth in the export markets.

American appetites for foreign and exotic goods continue to expand, which helps explain

the strong growth in beverage imports since 2010 when the US economy started moving out of crisis mode. Average import growth from 2011-2018 was 4.5%, which on a percentage basis was a slightly stronger pace than US beverage exports (2.0%). But on a volume basis, import growth was vastly larger than export growth, ballooning the trade deficit back above \$19.1 billion (2012\$) by 2018. The import share of consumer spending for beverages rose from 8.1% in 2017 to 8.4% in 2018 as real income growth gained traction and household tastes for foreign alcoholic beverages continued to flourish. Due to the expectation for imports of beverages to grow slightly faster than exports, the trade deficit will continue to widen through 2023, hitting \$20.5 billion (2012\$) by the end of the forecast.

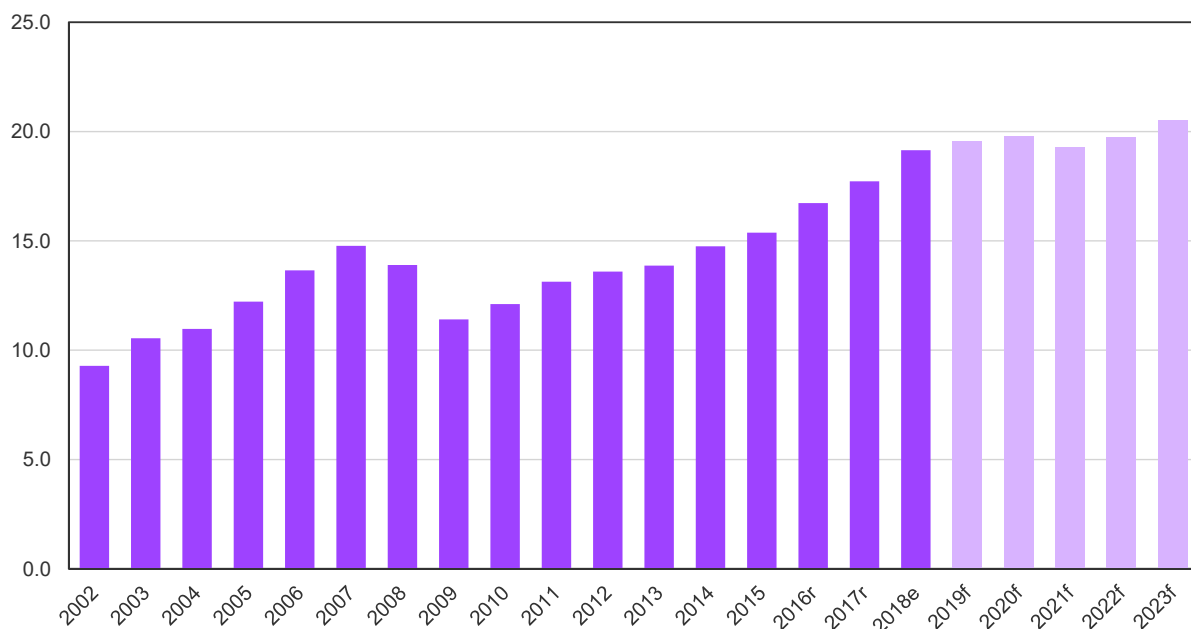
Production trends

Beverage production as measured by the Federal Reserve's industrial production index has remained fairly robust compared to other manufacturing categories plagued by the recession. Beverage production has grown on average by 2.1% annually over the last ten years (2009-2018), which is far better than overall nondurables production, which has struggled to recover past pre-recession highs. Beverage production has been robust for

Figure 3

Beverage market trade deficit

Net imports in billions of 2012 US dollars



Source: Fastmarkets RISI, Inc.

the last five years, averaging 1.4% annually, although 2016 saw a decline of 1.1% followed by a strong increases of 1.7% in 2017 and 1.3% in 2018. The 2016 data point seems to conflict with the consumer spending data, which indicated another steady year of growth. It is possible that some of the weakness is driven by a more challenging export environment with a strong dollar factoring in, reflected in the 4.1% decline in exports and the 4.9% growth in imports in that year. However, this is a relatively small proportion of the market. Last year saw consumer spending and industrial production numbers for beverages in the USA grow 3.0% and 1.3%, respectively.

We expect production to contract in 2019 by 3.2% year-over-year. Part of this decline is attributed to the expected weak economic environment in the export markets, highlighted by the potential 0.8% decline in exports. This decline is also associated with estimated softness in beverage spending at 0.1% year-over-year. Production will continue its weak performance through 2023 as some of the negative pressures on beverage production emerge later in the forecast, thanks to more unfavorable spending numbers and a tepid

export market. The five-year output forecast will average 0.2% annually from 2019-2023.

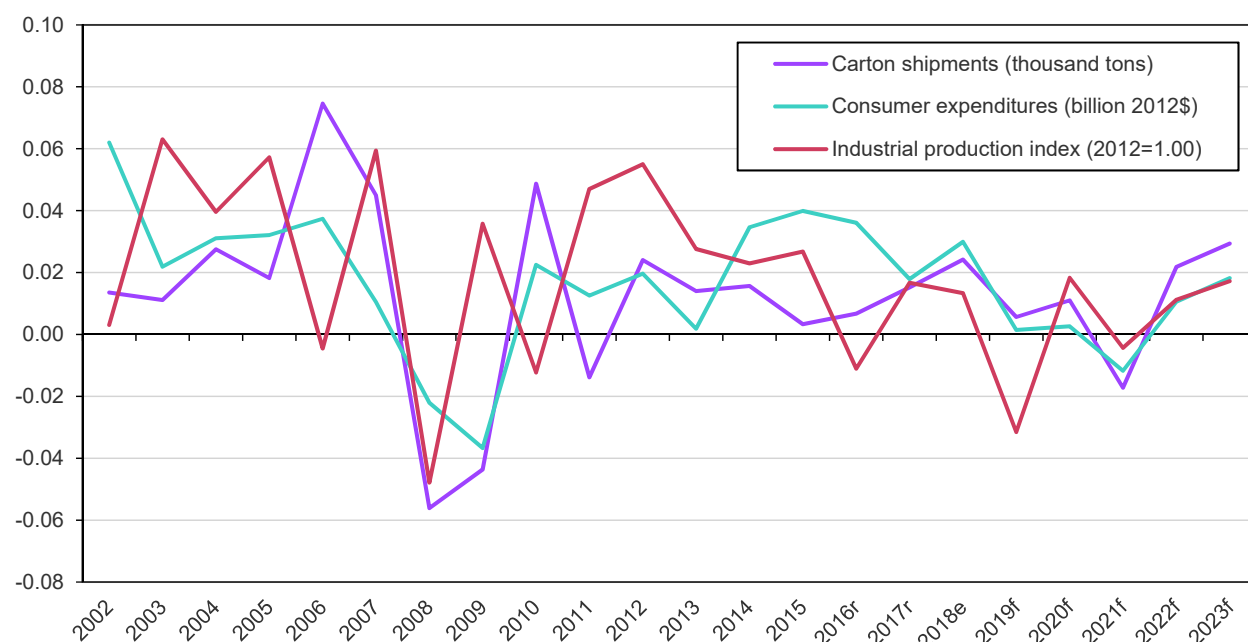
Folding carton trends

The beverage market is the single largest end-use channel for the folding carton market and was one of the fastest growing segments for the industry during the last decade. Shipments to the beverage industry grew from 16% of total folding carton shipments in 2001 to 23.0% in 2018. Prior to the recession, folding carton shipments in the beverage segment grew at a swift pace, averaging close to 4% annually in the years leading up to 2008. However, carton shipments were significantly impacted by the recessionary drag on spending and declined 9.7% during 2008-2009. Half of these losses were recovered in 2010, but growth in this segment was tepid between 2009 and 2013 at 0.5%. This weak trend reversed over the last five years, growing on average by 1.3% between 2014 and 2018.

Shipments of beverage cartons rose to almost 1.11 million tons in 2018, which we estimate is about 26,000 tons above the levels in 2017 when shipments peaked. Based on Fastmarkets RISI's macroeconomic outlook, we expect

Figure 4

Beverage growth in shipments, consumer spending and industrial production



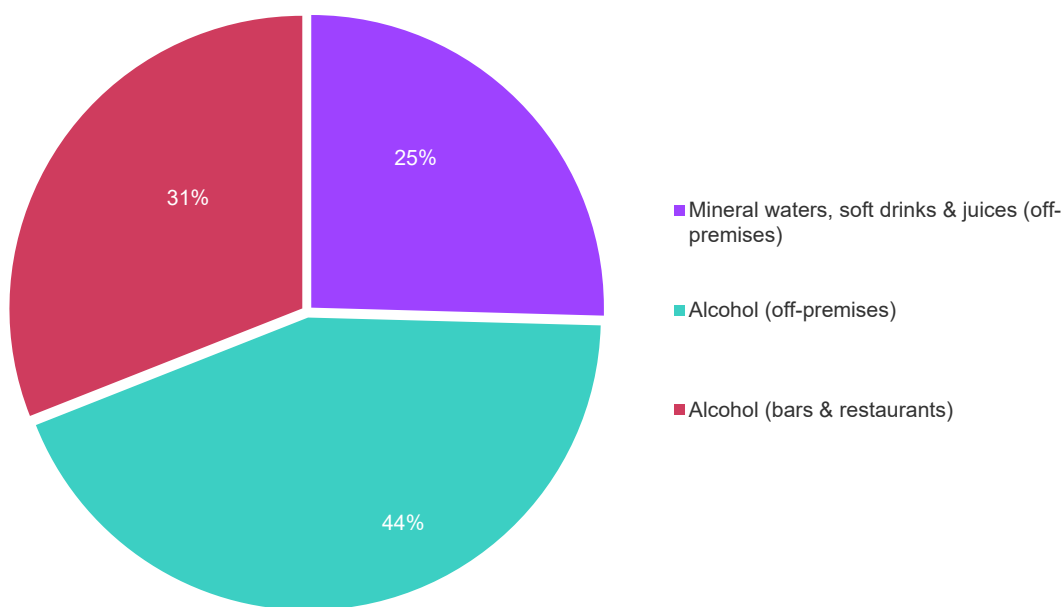
Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

beverage shipments to grow modestly at a 1.0% average annual rate over the forecast period, reaching 1.16 million tons by 2023. As previously mentioned, the lack of growth in the non-alcoholic segments (soda, juices, etc.) within the broader beverage category as well as the overall economic outlook in the forecast are the main headwinds holding back more robust growth prospects. Additionally, some of the relatively stronger spending growth is coming from the less carton-intensive categories such as wines and spirits, which does not bode favorably for beverage carrier producers heavily dependent on the beer and CSD segments for growth. On the other hand, if it persists, this trend could favor "luxury" folding carton or rigid box producers for the wine and spirits industry. The pattern of "trading up" to premium beverage products, particularly in the alcohol segment, could also undermine volumes if people are still somewhat budget constrained when going out to eat or heading into the grocery store.

Despite the outlined challenges and risks to the forecast, broad spending across all

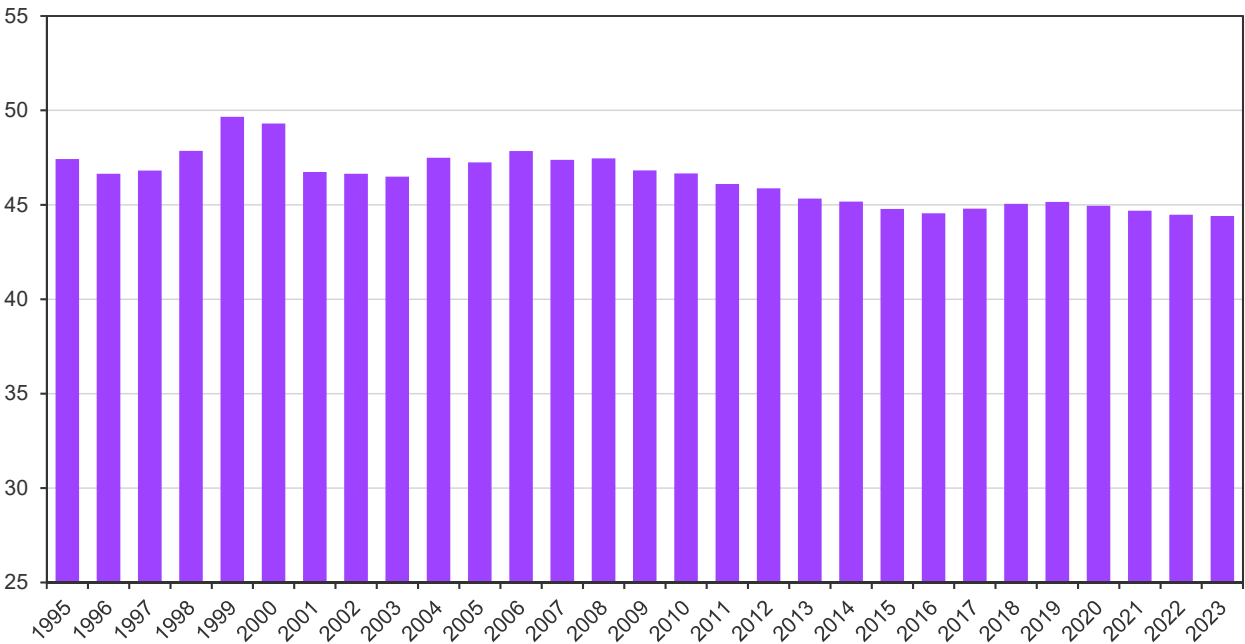
beverage categories will translate to beverage carton shipments growing faster than the majority of end-use categories in this report, accounting for 24.0% of total shipments by 2023. Real carton values are forecast to grow by 2.5% annually over the next five years and reach \$1.92 billion by 2023 due to volume growth and value gains. Coated unbleached board (CUK) has witnessed a series of price increases after the shift of converting operations from coated recycled board (CRB) to CUK due to the closure of Santa Clara and Philadelphia mills in 2017. This shift has created exceptionally tight conditions for CUK. In August 2018, CUK prices rose above SBS prices for the first time ever, and the gap has since widened. This is expected to eventually push some folding cartonboard demand over to SBS. Our forecast shows the price gap between the two grades narrowing in 2019, despite the competitive pressures that some SBS producers are experiencing. Folding carton average values per ton in the beverage segment will see growth of 1.5% over the forecast period.

Figure 5
Beverage spending by major category, 2018
Percentage of total



Source: US BEA Real Personal Income Expenditures.

Figure 6
US carbonated beverage consumption per capita
Gallons per person



Source: IBISWorld.

Non-perishable dry foods (dry food including dry food products, cereals/milled grain and confectionery)

The non-perishable food group comprises the Dry Food, Cereal & Confectionery end-use markets. This segment includes key products such as cereal, crackers, cookies, candy and other processed foods that are heavy users of folding cartons. Below are a few key points regarding the category as whole.

- Non-perishable carton shipments accounted for 35.6% of total food and beverage folding carton shipments, at 1.2 million tons in 2018. Shipments declined over 2008-2018, falling 5.9% below the 2008 levels, as the segment is facing longer-term challenges with changing consumer trends. Fastmarkets RISI's forecast for nonperishables assumes shipments will decline marginally at a 0.9% average annual rate during the next five years.
- Consumer spending on these products held up relatively well during the 2008-2009 downturn, owing to the increased consumption of some recession-resistant products and spending shifts to greater value-oriented goods to help alleviate strained budgets. However, carton shipments have generally lagged 1-2% behind growth in spending, meaning improving spending has only translated into flat to moderately declining shipment numbers in the last five years.
- Imports are a significant source of demand for nonperishables, accounting for 9.7% of total spending in 2018. For a number of years, imports as a share of nonperishables spending were growing at a steady pace; from 2002-2011, for example, imports as a share of spending increased from 5.6% to 10.5%. Since then, the import share has remained fairly steady. Fastmarkets RISI projects that imports will resume its sizeable demand share given the rising demand for premium products and consumer tastes becoming more global.
- Strong upward pressure on boxboard pricing over the years has forced costs to outpace revenue for many folding carton producers,

compressing margins. Moreover, the recent price hikes in recycled cartonboard, driven by a tight supply environment, will provide further pressure on converters, who are already facing ongoing margin erosion.

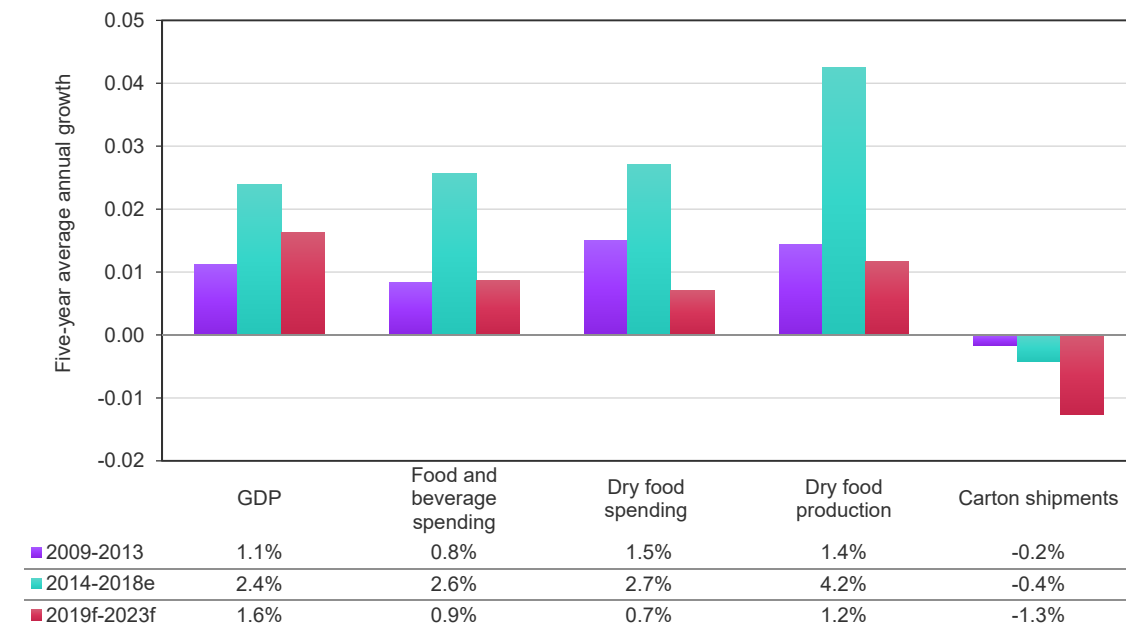
- Processed foods in general are encountering challenging times as consumers are more likely to shun foods that are not locally sourced, organic or do not use natural additives. Fresh, unpackaged foods are becoming a bigger part of the typical shopper's grocery bill. Away-from-home spending on food also appears to be where some of the growth is going, particularly among younger consumers, undermining some traditional foods that depend on sit-down meals, such as breakfast cereals.

Dry food products (crackers, biscuits, pasta and pet food)

Dry food products include a wide variety of packaged foods, such as crackers, biscuits, snack food, pet food, drink mixes, coffee, tea and pasta, many of which have been critical to the growth in folding carton shipments over the past decade. In 2018, 15.1% of folding carton shipments (724,000 tons) went to dry foods end uses, ranking second only to beverages in our defined end-use categories. Given that many dry goods are basic consumer staples, it is no surprise consumer spending and manufacturing in this category showed resilience during the depths of the Great Recession. However, shipments to this segment have been essentially flat since the end of the recession, probably due to consumers turning toward more "luxury" goods outside the dry goods segment or toward imports for more sophisticated fare as the economy improved, particularly in the bounce-back years immediately following the recession. We expect carton shipments to the dry food segment to move more toward contraction over the next five years as consumer product companies are expected to partly shift their focus to e-commerce. This shift is designed to change packaging to meet the needs of e-commerce rather than store shelves.

Figure 1**Dry food products end-use market indicators**

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Spending trends

Over the last ten years, dry food spending has grown by 2.1% annually, reflecting steady demand fundamentals as so many consumer staples fall into this category. Compared to other nonperishable products, spending on dry goods products held up well during the recession. However, the category was far from immune from the impacts on consumer spending, declining 1.6% below the 2007 peak to \$187 billion (2012\$) by 2009. Spending improved in the following five years between 2009 and 2013 by an average annual growth rate of 1.5%, reaching \$205 billion (2012\$) by 2013. Performance accelerated even faster in the past five years, growing at 2.7% annually, on average.

When examining some of the more critical subcategories that make up dry foods, a number of trends stick out. First, growth in spending on coffee, tea and other dry beverage products remained positive during the recession as consumers reduced their visits to coffee shops and similar establishments, and instead made such purchases at retail chains in an effort to ration spending. As economic conditions

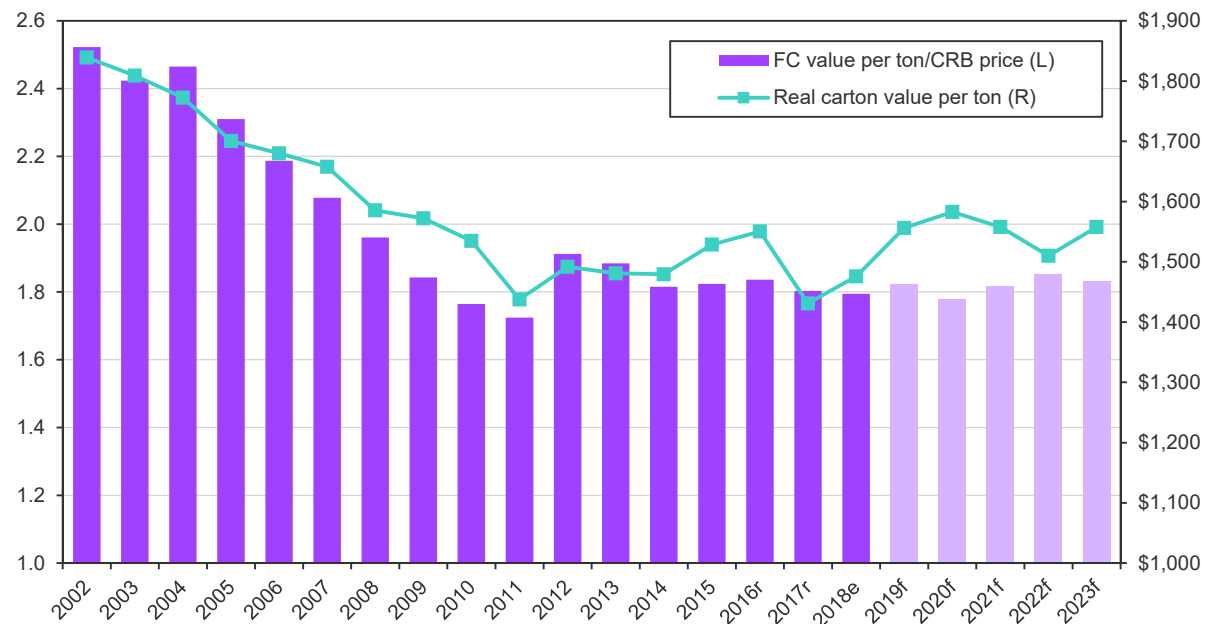
improved during 2011-2015, coffee and tea spending continued to grow, despite the increasing trend of consumers' return to carry-out establishments. Spending in the category has since followed a path of steady growth for the most part, but has been somewhat constrained, likely as further gains have also been made in spending at cafes and similar establishments.

In pet food and other related pet products, spending declined by more than 6.6% in total during 2007-2009 when consumers were tightening their budgets. Pet affordability was undermined by the recession, with many owners forced to bring their pets to shelters for adoption. However, spending on pet products experienced the strongest rebound in the dry foods category, increasing at a 4.0% average annual rate since 2011, more than making up for losses during the recession. Strong spending in this market is mostly driven by families forgoing children longer, and in some cases altogether, and instead spending on their companion animals. Over the past several decades, pet food spending has increased at healthy pace of 3-4%, making for a small, but rapidly growing market.

Figure 2

Dry food products: Carton value per ton relative to CRB price

Real carton values per ton in 2015 US dollars



Source: Fastmarkets RISI, Inc.

Spending for dry goods outside of cereals and confectionary products in 2018 reached \$234 billion (2012\$) and grew 3.6% year-over-year, a good bit higher than its five-year average of 2.7%. This growth dynamic approaches the 3.5-4.0% trend exhibited between 2000 and the Great Recession, reflecting the evident recovery patterns. Rising consumer disposable income and growing nutritional consciousness helped sustain the steady growth in premium dry foods (e.g., gluten-free, whole wheat or organic), raising the real value of their average purchases. However, the ongoing growth in spending will be impacted by the slower economic growth in the forecast. Therefore, Fastmarkets RISI is forecasting that consumer expenditures on dry food will experience slow growth, an average of 0.7% annually for the next five years.

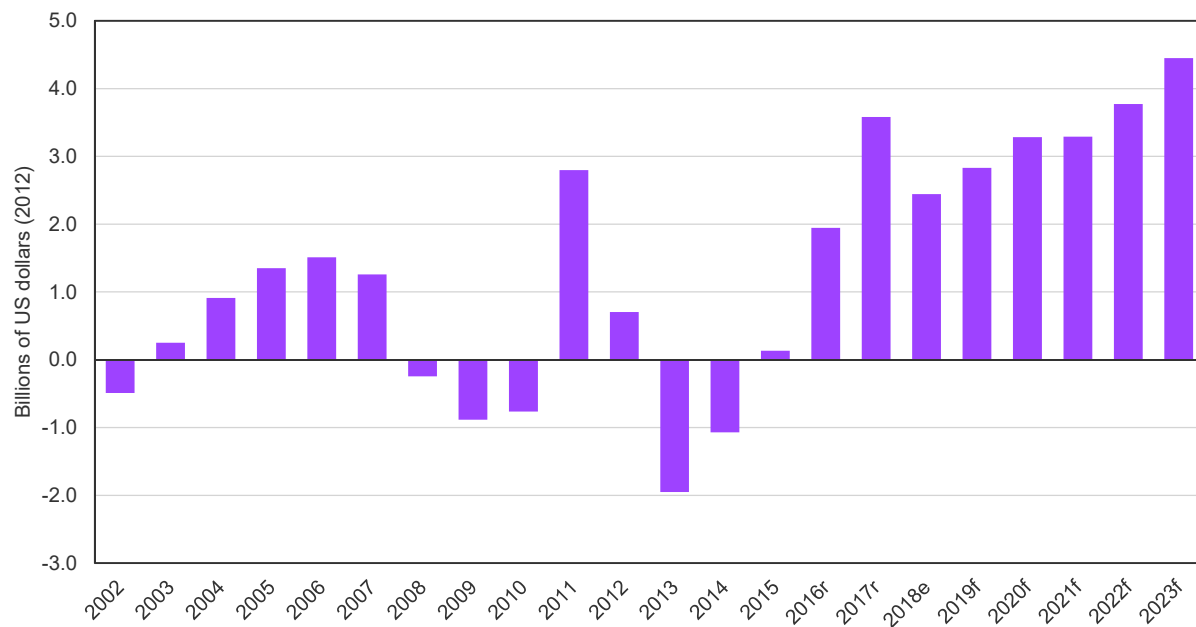
Trade trends

Net trade of dry foods products notably favored imports in 2018, but has fluctuated between surplus and deficit over the past few years for a variety of reasons. Most of

the swings have largely been due to changes in net exports of animal feed and the strong net import position of coffee, tea and spices. Imports, which account for roughly 8.1% of consumer spending, have grown fairly rapidly over the last ten years, posting 5.2% average annual growth over the period, despite a slowdown in demand in 2009. It does not appear that the growing desire for foreign dry goods by US households to fill their spice racks and coffee grinders will cease anytime soon, prompting us to forecast that imports will continue to increase their share of total dry goods spending, which appears to be the secular trend. Meanwhile, exports of dry goods recorded a growth rate of 3.5% on average from 2009-2018. During the period between 2014 and 2018, exports saw some declines at an average rate of 0.7% annually, while imports witnessed strong annual growth of 4.5% on average, given the strengthening of the US dollar during that time. With a mildly strengthening dollar over the forecast, exports will grow at a slower pace compared to imports, raising the trade deficit to \$4.5 billion (2012\$) by 2023.

Figure 3**Dry food products trade balance**

Net imports in billion US dollars (2012)



Source: Fastmarkets RISI, Inc.

Production trends

Dry foods production in the USA seemed to be relatively immune to the effects of the recession. Although production growth slowed for dry goods, output avoided the declines many other categories saw in 2008 and 2009 as consumer spending eased. In 2010, dry goods production jumped 3.2% due to a rebound in domestic consumer spending and surging foreign demand for dry goods. Production growth slowed the following year to less than 1%, mainly because of trade, but then recovered steadily from 2014-2018, with growth averaging 4.2% annually. Dry foods production witnessed a surge in 2018, growing 6.5%. Most of that growth fueled ballooning exports, which soared 11.6%. We expect 2019 production growth to slow to 2.0%, reflecting the expected mild strengthening of the US dollar and the slightly weaker exports market, as well as the relatively slow growth in domestic demand at 0.8%. In the medium term, output for dry foods is anticipated to grow by 1.2% on average from 2019-2023.

Folding carton trends

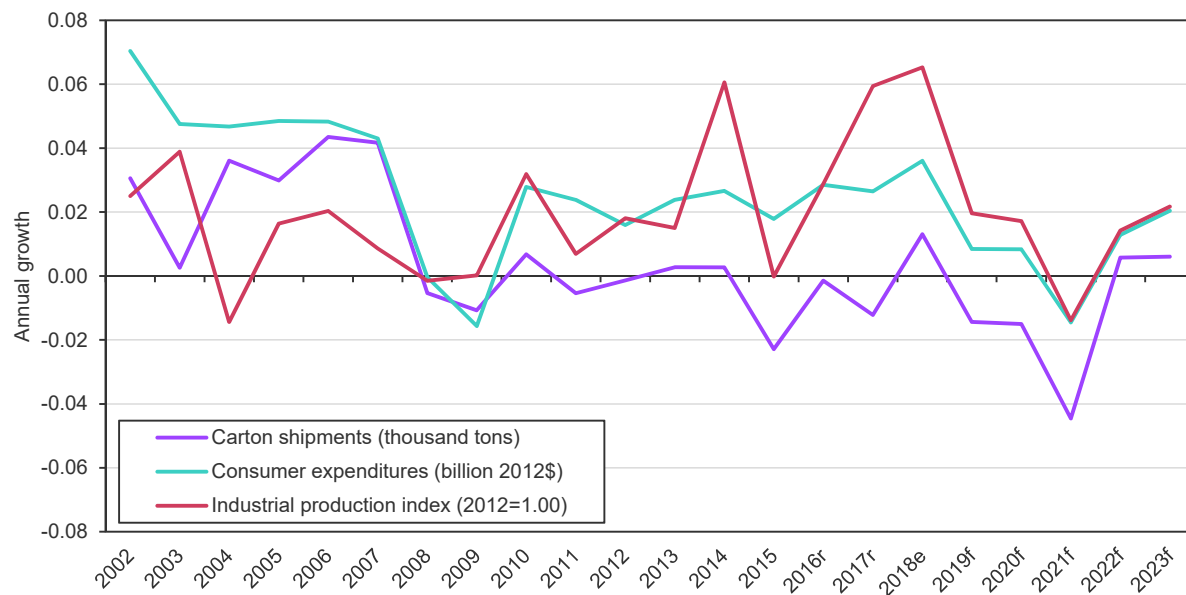
Shipments of folding cartons to the dry foods industry will continue to be an

important avenue for volume growth despite the existing headwinds for the processed food industry. The sector still accounts for about 15.1% of folding carton shipments, or 724,000 tons, in 2018, leaving it second only to beverage carton demand. Folding carton shipments to the dry foods segment, on a tonnage basis, grew at an average annual rate of 1.5% between 2006 and 2010, a bit slower than overall growth in consumer spending, likely due to consumers shifting their spending into more value-oriented goods that are not shipped in cartons during the recession years. Similar to the consumer spending and industrial production figures, folding carton shipments to the dry goods segment of the market were fairly resilient during 2008 and 2009, although there has been a notable absence in growth back to healthy levels since the recession. Average annual shipment growth over the last five years contracted slightly by an average annual rate of 0.4%. However, carton shipments in 2018 experienced robust growth of 1.3% that was likely driven by the accelerating industrial production during the year.

Fastmarkets RISI expects some contraction in folding carton shipments to the dry

Figure 4

Dry food products growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

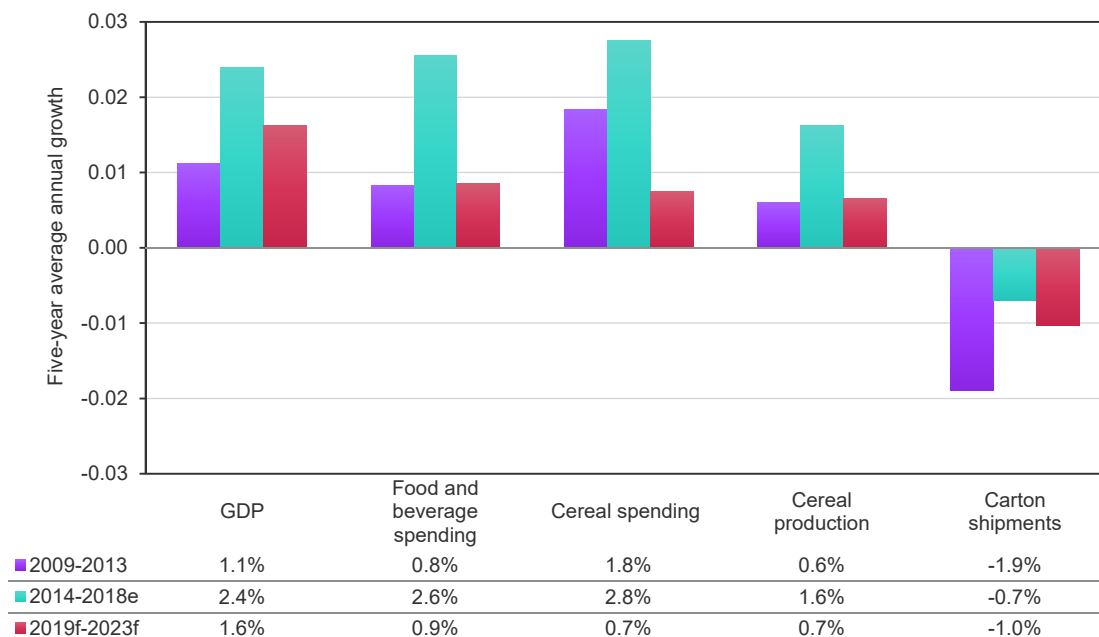
foods sector in 2019 at 1.4%, reflecting the growing pressure from e-commerce's increasing share in the dry food market, as well as the soft consumer spending estimates. We are projecting folding carton shipments in dry goods over the forecast period will observe a decline of 1.3% per year, on average. Shipments will lag well behind the projected 0.7% average annual increase in spending and the 1.2% increase in industrial production over the forecast period. In addition to e-commerce growth, substitution pressure in this market is expected to remain high as end users look for cheaper alternative packaging. Plastic alternatives have had more latitude to undercut boxboard on relative pricing. However, recent petroleum prices, a critical input to plastics production, have shown a high level of volatility. Also, the undesirable environmental image of plastic has negatively impacted its uses in the food industry, allowing paper packaging to gain some share. Finally, imported goods will continue to grow their share of consumer spending in dry foods, evident in the trade deficit developing in the forecast, which will hurt domestic carton demand for dry food products.

Cereals and milled grains

Cereals have been an especially challenged end use for folding carton producers over time due to changes in consumer eating habits. Shipments to the cereals and milled grains segments have eroded by 0.7% per year on average for the last five years. Industrial production has shown some gains on net over the same period, at an average of 1.6% annually, implying some packaging substitution or shifting demand to less carton-intensive sectors. Cereal production growth is expected to slow somewhat between 2019 and 2023, mainly due to the expected soft demand during that period. Carton shipments to this segment will face significant challenges as preferences for less starch-filled breakfast options continue to gain popularity and plastic alternatives to paperboard increasingly fill the packaging needs for this segment. E-commerce is a growing force in the dry foods sector, especially in cereal and milled grains products. The emerging digital retail model has gained momentum with the acquisition of Whole Foods Market by Amazon. The rise of e-commerce in the cereal market will limit the growth of folding carton shipments, allowing corrugated boxes to gain share in the long run.

Figure 5**Cereals and milled grains end-use market indicators**

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Spending trends

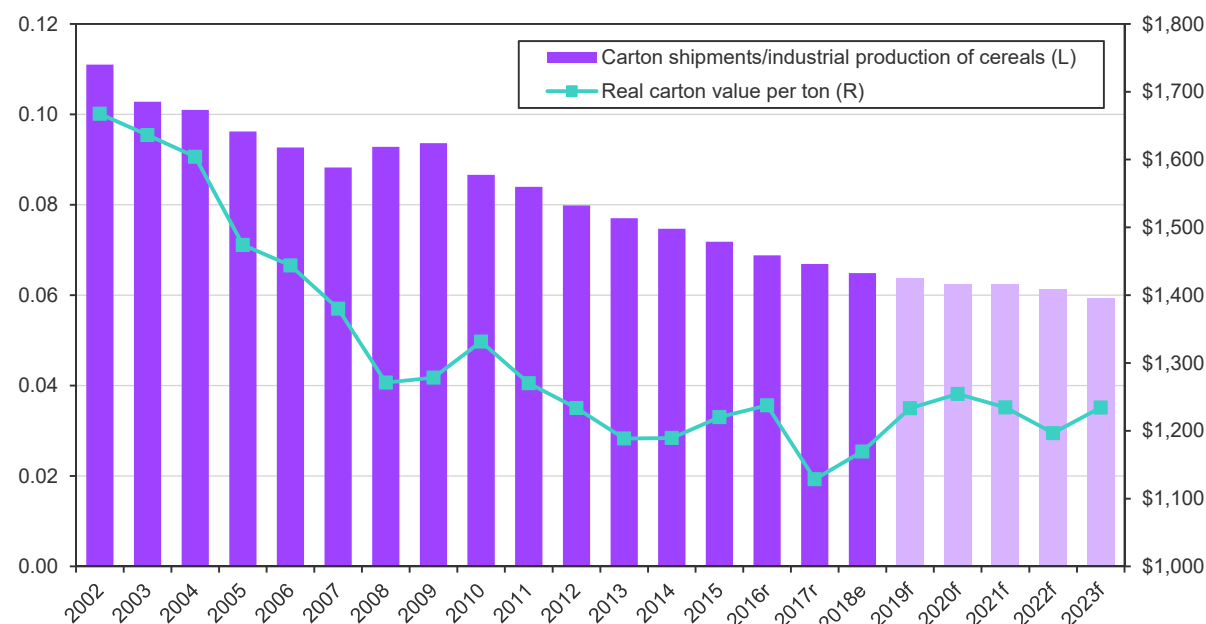
Cereals spending, according to the BEA, has grown by 2.3% annually over the last ten years. In the years prior to the recession, cereals spending increased at a rapid pace, averaging in the mid-single digits. However, much of that growth in spending was on value-added (i.e., brand name, specialty items) and imported products, and therefore did not translate into similar growth in folding carton shipments. Once the effects of the recession in 2008 kicked in, spending declined by 1.5% in 2008 as consumers cut consumption and traded down to private label brands. By 2010, consumer spending on cereals had bounced back by 2.6%, but stalled once again in 2011, recording basically flat growth. Growth accelerated at a healthier pace and stabilized during 2012-2018, leaving total spending at \$54.9 billion (2012\$) in 2018. It appears a considerable proportion of recent growth also came from imported cereal products. Overall, the recovery in cereals and milled grains spending appears in line with total nondurables spending growth over the last five years. On the other hand, cereals spending has actually tracked closely with the overall performance by processed food, which in general has faced significant

challenges shortly after the recession but was able to bounce back during 2012-2018. Readers should also note that Fastmarkets RISI also believes the BEA's estimates for cereals spending growth may be overstated given that the BEA's methodology is probably not accounting for share losses in total sales in the various retail establishments tracked in their monthly surveys.

Consumer spending on breakfast cereals in particular seems poised to continue losing share to other breakfast alternatives for a number of reasons. First is the proliferation of new products consumers are gravitating toward for breakfast. Greek yogurt is a prime example. As consumers have become more conscious of healthy eating, starchy breakfast options are less attractive to lighter, higher protein alternatives. There is also a movement, particularly among younger consumers, to eat away from home, which generally does not favor sitting down and eating a bowl of cereal (think breakfast bars). The irony for cereals producers is the actual number of people eating breakfast is probably on the rise. There has been a notable uptick in breakfast offerings from fast food chains on their menus in

Figure 6**Cereals and milled grains: Carton demand relative to industrial production and real carton value per ton**

US dollars (2015)



Source: Fastmarkets RISI, Inc.

recent years, likely in an effort capture some of this new demand from consumers on the go. This is especially true as the employment situation improves, placing greater time constraints on the working population and pushing them toward dining away from home. However, cereal has proven to be a resilient product over the years, particularly during downturns, given its abundance and cheap price point.

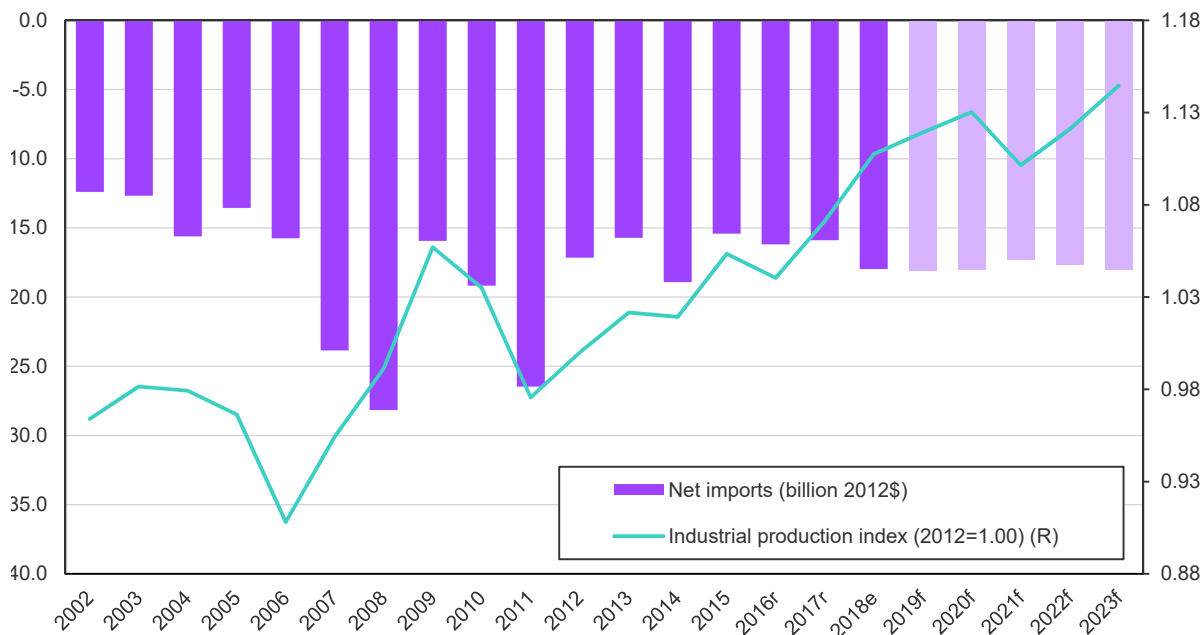
Fastmarkets RISI believes that cereals will continue to account for a smaller proportion of food spending over the forecast period as spending and eating patterns continue to favor low carbohydrate meals on the go. Despite the sector-specific challenges in the cereals segments, the economy is showing some level of uncertainty, which should stabilize spending on cereals as a cheaper alternative to other pricier breakfast options. This is especially the case with consumers feeling increasingly cautious about their spending habits toward 2021. Thus, we anticipate consumer spending on cereals will increase by 0.7% on average during 2019-2023, leaving total consumption at almost \$57 billion (2012\$) in the last year of the forecast.

Trade trends

Trade plays a more important role in the cereal market compared to other dry food market products, since this segment includes bulk grain and seed. Grain exports from the USA surged in the years prior to the recession, more than doubling between 2005 and 2008. The trade surplus for grain followed suit during the period, peaking at \$28.2 billion (2012\$) in 2008, as imports could not keep pace. However, the surge was quickly followed by a collapse in 2009, when exports tumbled 40.7% year-over-year in real terms. As a result, the trade surplus fell to just \$15.9 billion in 2009. Exports have since been extremely volatile, causing the surplus to swell and deflate again, bringing the trade surplus back to \$15.4 billion (2012\$) by 2015. Imports were able to withstand the shock of the downturn better than exports, although they have still exhibited volatility in recent years. The last two years saw the trade surplus reaching \$15.9 billion (2012\$) in 2017 and increasing to \$18.0 billion (2012\$) in 2018. The recent improvement in the trade surplus in 2018 is closely tied to the weakening dollar and the resulting swift growth in exports during the year.

Figure 7**Cereals and milled grains market trade surplus and industrial production**

Billion US dollars (2012), 2012 = 1.00



Source: Fastmarkets RISI, Inc.

Fastmarkets RISI expects annual growth in imports of 2.2% over the five-year forecast, reflecting growing consumer tastes for foreign grain and milled products and driven by a slightly stronger US dollar. Exports will slightly increase over the forecast at 0.5% per year on average. Year-over-year export movements could see more of the tremendous volatility that history has shown, especially if exchange rates swing dramatically in the coming years. Nevertheless, over the next five years, the total value of grain exports will continue to far exceed any imported products, with the trade surplus averaging \$17.8 billion (\$2012).

Production trends

The Federal Reserve Index used to track cereals production, listed as "grain and oilseed milling," is a useful proxy for estimating growth in domestic carton demand in this industry segment; however, it is important to note that this index is heavily weighted toward bulk production of grain and seed for downstream manufacturing and export. Based on the Federal Reserve's latest revision to industrial production of cereals and grains general, output recorded a nearly flat annual average growth rate of 1.1% over the last ten years, as short bursts of growth

were almost always followed by deeper declines. Cereal production from 2006-2010 advanced by 1.4% on average; interestingly, significant growth was seen during the recession years of 2007, 2008 and 2009 at an annual average rate of 5.2%. This growth recorded erosion in the following two years, before stabilizing after 2012. Over the past five years, grain production increased by 1.6% per year on average. The forecast for output will moderate over the next five years in line with the soft spending outlook, at 0.7% annually from 2019-2023.

Folding carton trends

The cereals and milled grain industry consumed 356,000 tons of folding cartons in 2018, accounting for 7.4% of total folding carton shipments for the year. Shipments continue to slip further away from the pre-recession levels, and there is little hope that folding carton shipments for cereals will return to this level anytime soon. Industrial production of these products increased at a 1.6% average annual rate between 2014 and 2018, while shipments declined by an average annual rate of 0.7%, indicating that there is a decoupling between carton shipment growth and overall growth of the cereal and milled grain industry.

Carton demand growth in the cereals segment will lag behind consumer spending growth over the forecast, largely because of the difficulties faced by domestic manufacturers of these goods as imports continue to gain share. As mentioned earlier, the BEA data likely overstate the strength of the cereals market as well, which also justifies the disparity in the growth profiles between spending and shipments. As a result, total carton shipments to the milled grain products industry are forecast to decline over the next five years by 1.0% on average through 2023.

The cereal market continues to be a heavy consumer of clay-coated recycled boxboard (CRB), and prices for this grade increased at a much faster rate than the average values per ton for folding cartons in the cereal industry, compressing margins significantly for some converters. During the 2008-2009 downturn, growth in shipments to recession-resistant end uses helped slow the increased cost pressure facing converters as the boxboard segment struggled. Recent mill closures and the declining capacity in

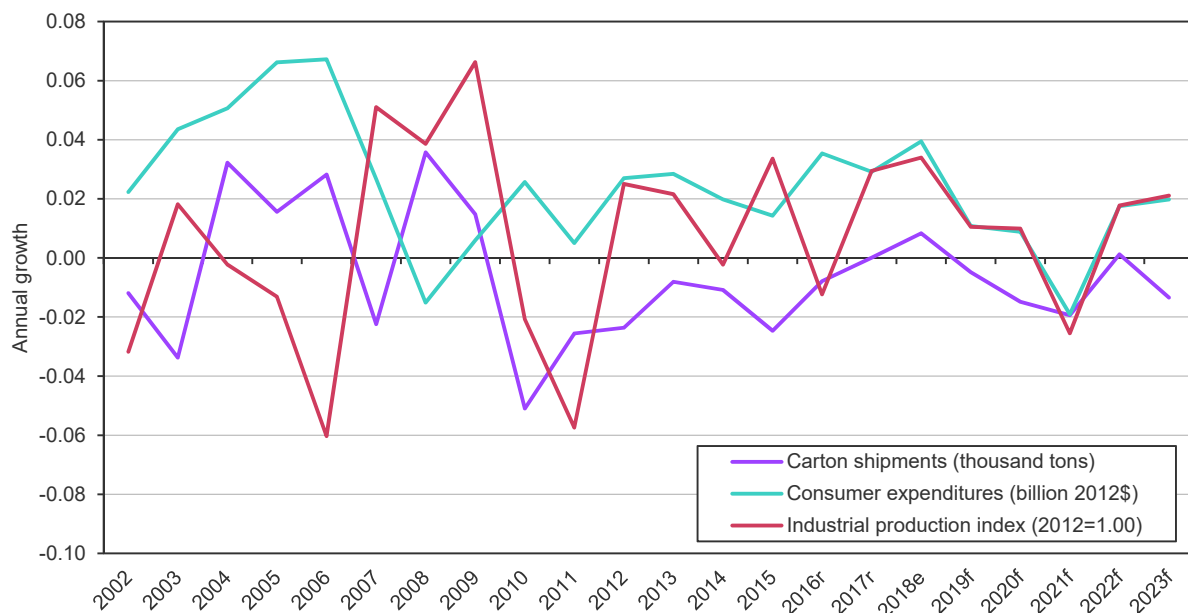
the CRB market are expected to keep CRB prices elevated, which indicates that carton converters in the cereal and breakfast industry will continue to face further increases in paperboard costs throughout 2019.

Confectionery

Confectionary goods remain a fairly small market for folding carton demand, accounting for just 2.5% of total carton shipments (tons) in 2018. This category includes such food items as granola clusters, chocolate bars, breakfast bars, candies and chewing gum, or what we generally would refer to as "sweets." Growth in carton shipments to confectionary end uses are expected to rise by 1.1% on average during the next five years, as consumer spending expands tepidly throughout the forecast period. Confectionary manufacturing, which ran hot for several years, appears to have cooled somewhat, and will likely remain so given the relatively slow demand growth over the forecast.

Figure 8

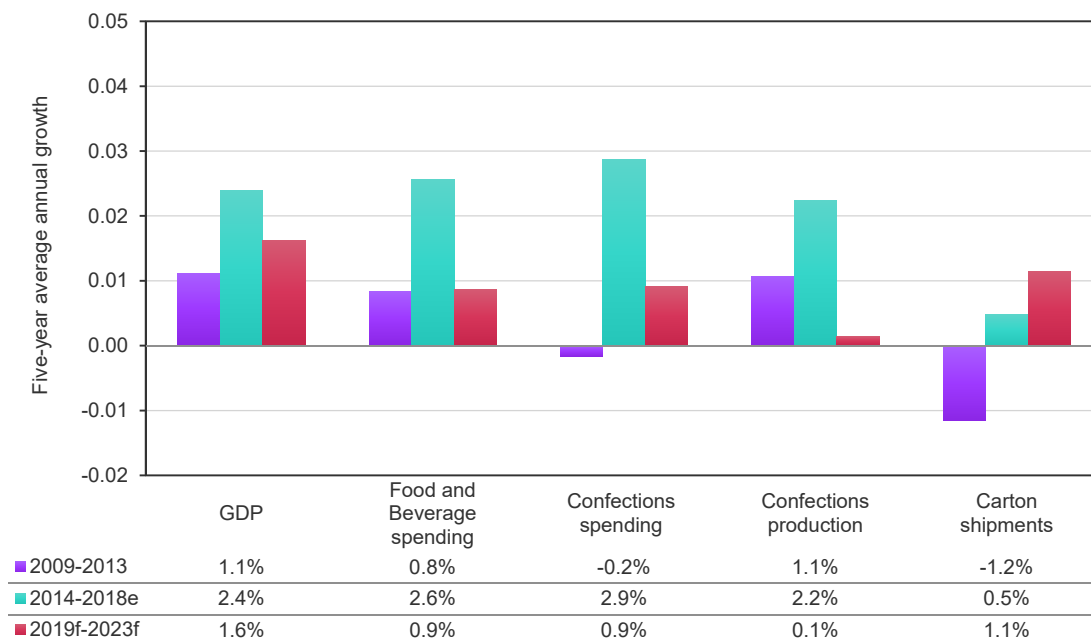
Cereals and milled grains growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Figure 9**Confectionery end-use market indicators**

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Spending trends

Over the past ten years, consumer spending growth on confectionary goods has faced challenges, reflected by real spending levels that have recently surpassed pre-recession highs. From 2006-2010, confectionary spending declined by 2.3% as the impact of the recession was fully felt during this time frame. However, consumer spending on sweets had been sputtering even prior to the economic downturn as preferences shifted toward more nutritious, unprocessed foods. After dropping nearly 10% combined below 2007 levels in 2008 and 2009, declines in spending in the sector slowed in 2010 and 2011, before recording slight positive growth in 2012. The following two years, 2013 and 2014, saw major jumps in consumer spending, expanding 4.3% and 4.4% year-over-year, reflecting the improving economic conditions. The acceleration in spending growth turned into a slight contraction of 0.2% in 2015, leaving spending at \$42.3 billion (2012\$) for the year. The past three years brought back the robust post-recession growth rates. Last year registered strong real spending growth with an annual 3.1% gain

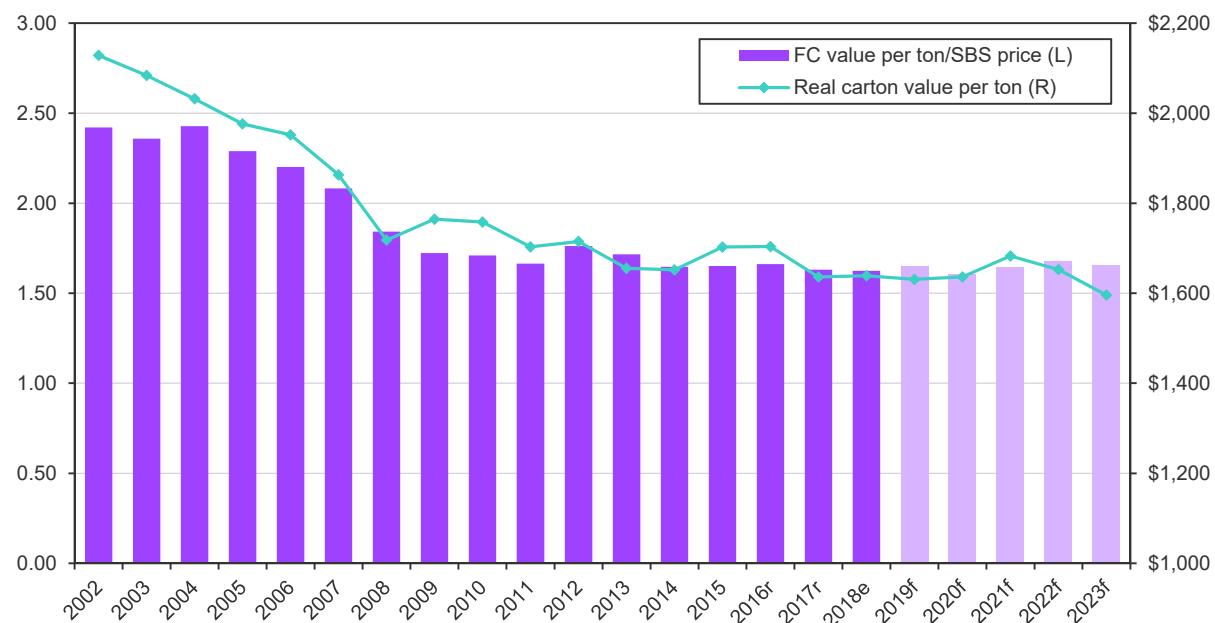
and overall real spending reaching \$46.8 billion (2012\$). Overall, spending on confectionary goods experienced an average annual growth rate of 2.9% over the last five years.

We anticipate a moderate gain in 2019, closely tied to expected soft growth in production and a swift rebound in imports. Once growth evens out over the course of the year, we project spending will grow by 1.1% year-over-year. In the medium term, availability of healthier options and increased spending on premium brands will help keep growth steady for the segment as the major players adapt to new product demands. Granola bars, particularly those marketed as "high protein," have seen a bump as healthy eating away from home becomes more prominent given the improved employment situation and shifting eating habits among millennials. Still, consumers are attempting to cut down on sugar intake, which presents a headwind for volume growth over the horizon. As a result, Fastmarkets RISI expects average growth of 0.9% from 2019-2023, which will be slightly faster than the anticipated non-service food expenditures for the period of 0.3%.

Figure 10

Confectionery: Carton value per ton relative to folding boxboard price

US dollars (2015)



Source: Fastmarkets RISI, Inc.

Trade trends

The trade deficit for candy and confectionary products has hovered around an average of \$4.8 billion (2012\$) over the last ten years. After a period when the trade deficit had inflated, downward pressures caused imports of confectionary and sugar products to decline from a peak of \$9.8 billion in 2011 to \$8.1 billion (2012\$) in 2013. Imports reversed course in 2014, however, growing to \$8.9 billion (9.9% year-over-year), likely due to gains in competitiveness for foreign competitors as the US dollar appreciated significantly over the course of the year. Imports remained effectively flat in 2015 after the major uptick the previous year, leaving overall imports at \$8.9 billion (2012\$). In 2016, imports grew once again, reaching \$9.3 billion, before moderately declining to \$9.1 billion in 2017 and back down to \$8.9 billion in 2018. The disparity between the 2.2% decline in imports and the 3.1% robust growth in spending in 2018 can be attributed to domestic producers gaining some market share from imports. This dynamic is reflected in the 1.3% increase in production in the same year.

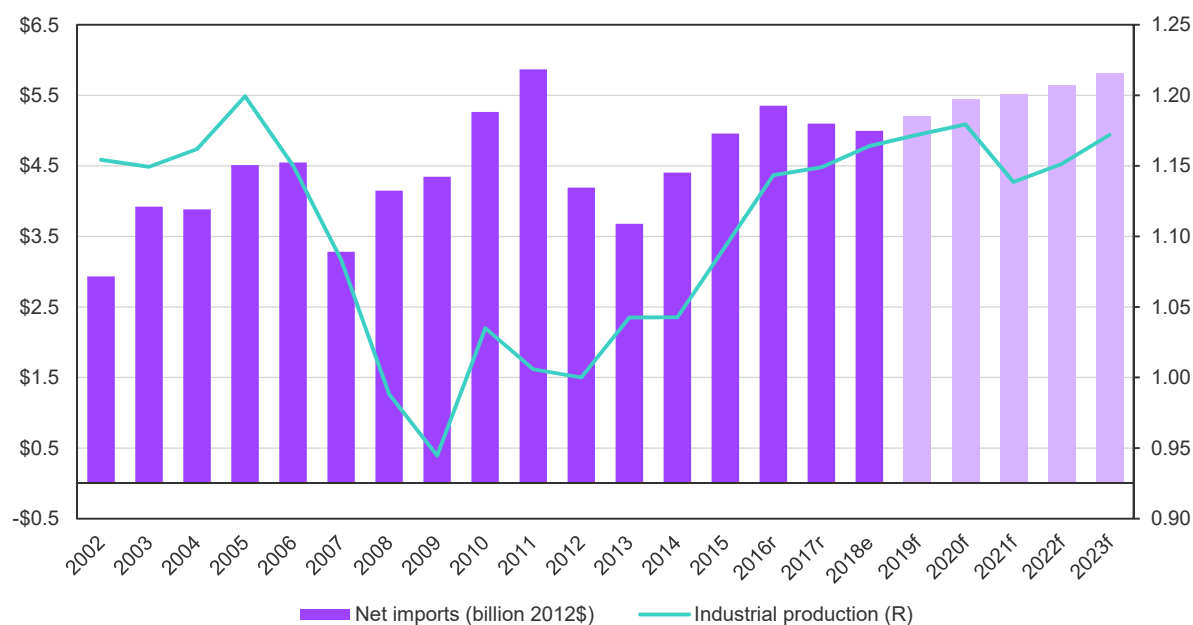
Exports have expanded at a rapid clip during the past decade, albeit from a smaller base than imports, by an average annual growth rate of 3.2%. The strengthening of the US dollar and weak external demand put a damper on export growth in 2014, and exports declined by 13.5% in 2015, the first reduction since the recession years. Exports stabilized in 2016 and 2017 with annual growth rates of 1.2% and 1.7%, respectively. Exports declined by 2.4% in 2018 thanks to the soft foreign demand for confectionary and relatively strong demand at home, leaving it at \$3.9 billion (2012\$).

As of 2018, the trade deficit stood at \$5.0 billion (2012\$), which we expect will soar in the near term due to a slightly stronger exchange rate. Fastmarkets RISI is forecasting a slightly stronger US dollar over the forecast, which should dampen exports and accelerate imports to fuel a swelling share of demand growth. Real net imports of confectionary products will continue their growing trend, leaving the average trade deficit over the period at \$5.5 billion (2012\$).

Figure 11

Confectionery market net imports and industrial production

Billion US dollars (2012), 2012 = 1.00



Source: Fastmarkets RISI, Inc.

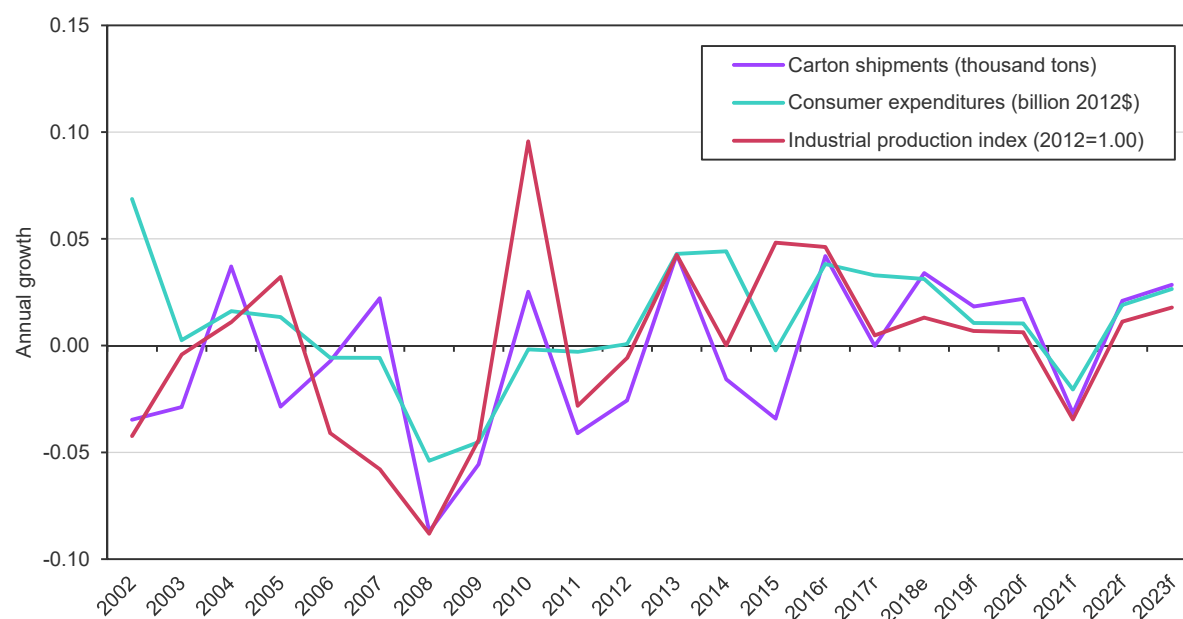
Production trends

Industrial production of sugar and confectionery goods has fluctuated fairly dramatically since 2000. On net, the

unpredictable nature of production resulted in average declines of 0.6% annually between 2007 and 2015. The rate of decline seems to have dissipated in recent years, although determining this is hard to do given the

Figure 12

Confectionery growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

volatility in the data. Following the significant declines in output from the recession, production of confectionary goods rebounded nicely in the following years, not only because of improving domestic consumption, but also due to a large boost in exports of confectionary products in 2010. Since 2011, the industrial production growth rate has moved almost in lockstep with consumer spending growth, which was also quite sporadic, although the five-year average growth rate moderately differed from spending given the short-lived surges in output in 2015 and 2016 that strengthened the growth profile for the period. Fastmarkets RISI believes that growth will be nearly flat, lagging behind spending over the forecast horizon, averaging 0.1% gains in this sector from 2019-2023.

Folding carton trends

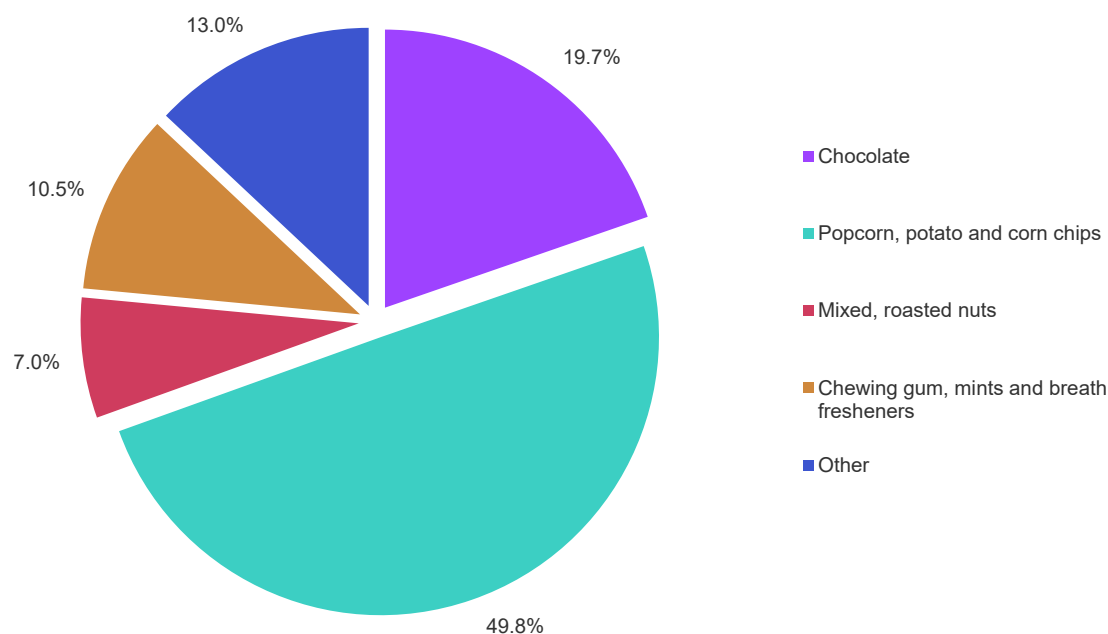
Confectionery products will continue to remain a minor end-use market for folding cartons, accounting for 2.5% of total shipments (on a tonnage basis) on average through the

forecast. Shipments to this segment have been either stagnant or declining for the past 15 years, largely due to the overall decline in manufacturing and increased competition from imports, although the last five years have shown some stabilization in domestic demand and bright spots in the export segment. After declining more than 7% annually during 2008-2009, shipments rebounded 2.5% in 2010. Shipments to confectionary end uses have been generally volatile in recent years, leaving the average growth over the last five years nearly flat at 0.5% annually. Shipments in 2016 saw a notable rebound, thanks to stronger production fundamentals and an increase in consumer spending on confectionary goods. Shipments in 2017 remained unchanged due to nearly flat production growth in that year. We expect this segment to record moderate improvements going forward; consumer spending on confectionary products is forecast to increase at a 0.9% average annual pace between 2019 and 2023, which should allow shipments to this market to increase 1.1% annually during this period.

Figure 13

Confectionary wholesaling in the USA

Products and services segmentation, 2018



Source: IBISWorld.

Frozen and perishable food markets (including frozen foods, retail carry-out, dairy, perishable bakery goods and meat & meat by-products)

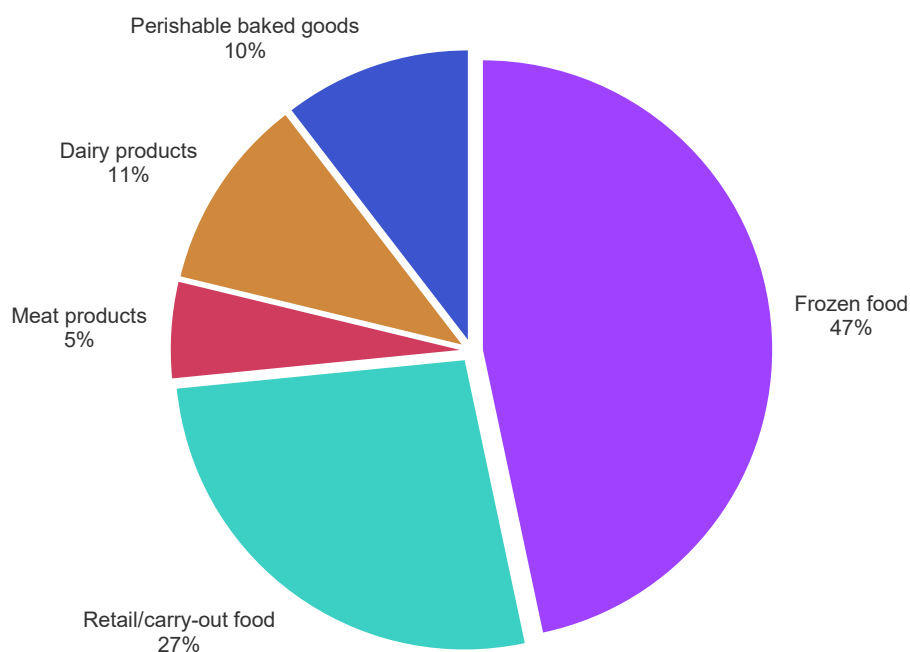
Frozen and perishable foods accounted for 22.2% of total folding carton shipments in 2018, which translates into 1.07 million tons for the year. Consumer spending on these products slowly increased at a 0.5% average annual rate from 2006-2010 due to effect from the recession years. However, spending growth recovered to a respectable annual average of 1.7% from 2010 to 2014, before accelerating to 2.6% between 2014 and 2018. Despite this rebound in spending, with the effects of the recession factored in, folding carton demand declined at a 0.7% average annual rate over the last ten years. The forecast calls for moderate spending and production growth over the next five years, which we expect will push shipment growth to a 0.9% average annual increase, a faster growth rate than total folding carton shipment growth during the same time.

- The frozen foods market is the largest end use in this grouping, and growth in this market is faster than total folding carton demand, implying the category will see further gains in market share over the period. Frozen food shipments accounted for approximately 497,000 tons or 46.5% of total shipments within the broader frozen and perishables grouping in 2018 and will see robust growth through the forecast.
- Industrial production of perishable food products has grown at less-than-stellar rates over the past several years, with the majority of growth being garnered by increased export demand. Over the forecast period, Fastmarkets RISI expects industrial output of frozen and perishable foods will increase at a 0.9% average annual rate—

Figure 1

Frozen and perishable food shipments by market share

Percentage of total carton shipments (thousand tons)



Source: Fastmarkets RISI, Inc.

slow, but in line with the segment's relatively stagnant growth during the last ten years.

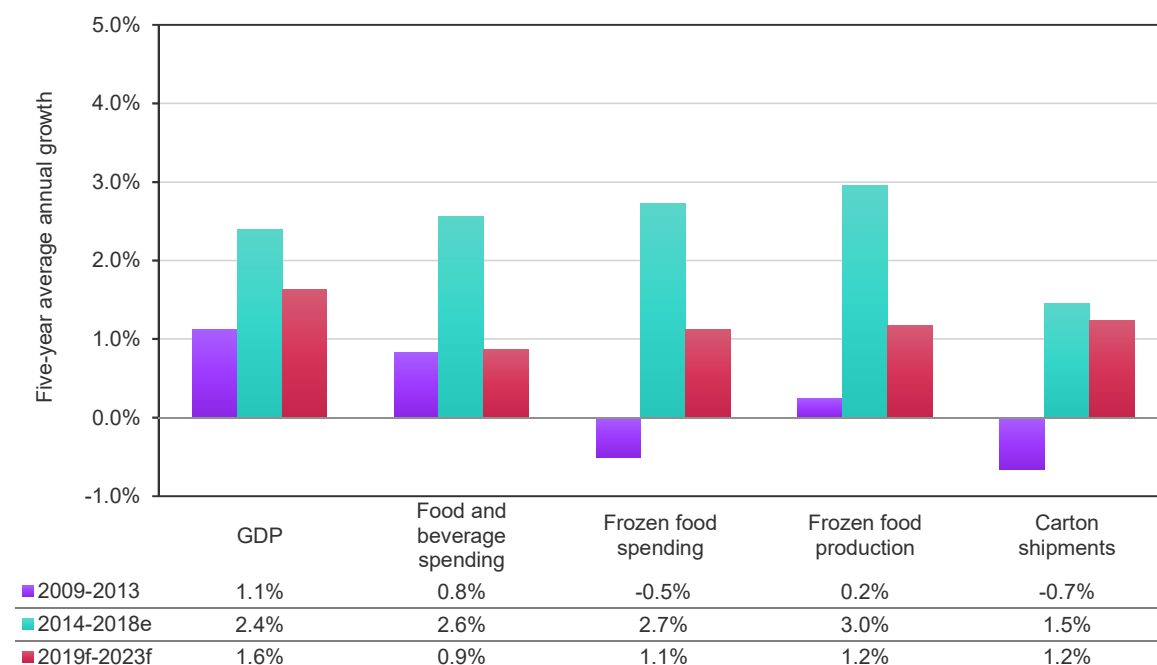
- Folding carton converters for frozen foods, retail carry-out, bakery, dairy and meat are heavy users of bleached board (SBS), and have struggled to raise carton prices to keep up with cost increases for this critical input. Prices for SBS increased at a 2.2% average annual rate over the past decade, while folding carton average values declined by 0.6% per year for the segment. Consequently, margins have been squeezed for frozen and perishable food converters. The increased global competition that SBS faces against European FBB and Asian ivoryboard has kept its price growth at a lower pace compared to coated unbleached kraft (CUK) or coated recycled board (CRB). In the past five years, SBS prices rose by an average annual rate of 1.6%, compared to 2.6% for CUK and 2.8% for CRB. However, the China's new policies regarding recovered paper imports have indirectly constrained Chinese ivoryboard exports, making some global market share available to US and European virgin grades. As a result, SBS prices are expected to slightly increase over the forecast by 0.9% annually on average.

Frozen foods

The frozen food market was challenging for folding carton producers for a number of years, largely because consumer spending has been shifting toward healthier, on-the-go food options. Prior to the recession, frozen foods were one of the fastest growth segments for the folding carton industry; quick and convenient appeared to outweigh fresh and homemade at that time. However, there was some change in preferences among consumers, who exhibited a growing distaste for frozen foods due to health perceptions and chose to consume fresher, locally sourced food. There was also a possibility that the effects of the Great Recession may have forced households to cut their budgets so dramatically that not only was away-from-home dining cut, but also convenient frozen dinner options, choosing instead bare necessities to be prepped and cooked at home. As a result, carton shipments to the segment recorded slow growth over the last ten years by an average annual rate of 0.4%. During the past five years, the demand for frozen food has been noticeably growing again, allowing carton shipments to rise at a 1.5% average annual rate. One explanation is the improving labor market and employment

Figure 2

Frozen foods end-use market indicators



environment, which is imposing time constraints to the working population, pushing them toward greater consumption of frozen food. Additionally, millennials have significantly contributed to the recent rebound in the frozen food market, which offers convenient and less expensive options for young and single consumers. Younger consumers typically wait longer to form families and do not have the time to make fresh meals on a daily basis, making frozen food an appealing option. Prospects for frozen food carton shipments will grow in the forecast, averaging 1.2% per annum over the next five years as total food spending maintains its moderate growth stance thanks to the changing consumption dynamics and improving employment outlook.

Spending trends

Spending on frozen foods is a challenging category to track because there is currently no explicit breakout available in the Bureau of Economic Analysis (BEA) data. Following the 2012 revision to the BEA national income account data, several categories that had been tracked in earlier versions of the report were eliminated. Consumer spending in this category is now estimated using a combination of series including processed fruits and vegetables, as well as fish and seafood.

Frozen food spending has grown on average by 0.8% annually since 2006. Before the recession, frozen food spending grew at a solid pace as consumers' busy lives favored ready-made meals over home cooking. Quick-serve frozen meals, including pizza, breakfast foods and desserts, grew in popularity, and consumer product companies were quick to develop new products to meet demand. However, demand for frozen foods was not immune to the recession and spending declined 3.4% in 2008 and 4.6% in 2009. Post-recession growth in frozen food consumption remained tepid, averaging around 1% annually, before it accelerated again in the last three years. Consumer spending on frozen foods based on Fastmarkets RISI's proxy categories was \$43.8 billion (2012\$) in 2018, \$3.1 billion (2012\$) above pre-recession peak spending levels in 2007.

The trend toward natural, unprocessed foods continues to drive many of the trends in grocery store aisles, and has come mostly

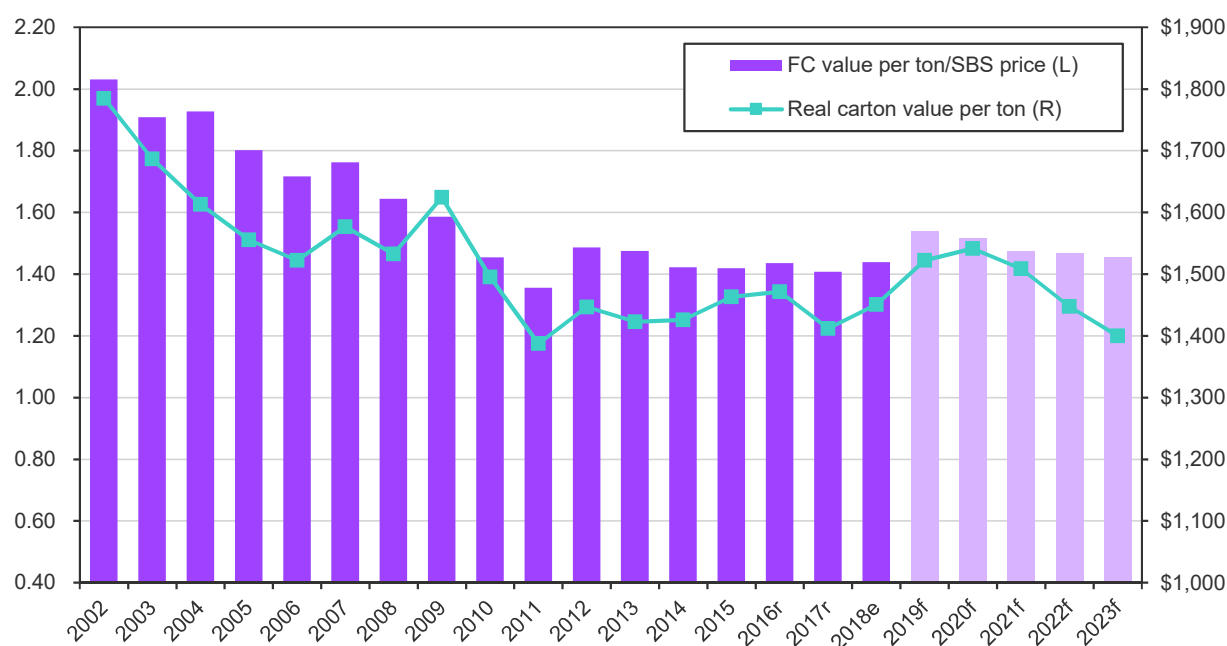
at the detriment of frozen food producers. Major retailers have responded to consumer demand by increasing their offerings in the fresh and organic segments and are leveraging their scale to put downward pressure on pricing. Smaller, trendier retailers who have been specifically targeting these markets for years are reporting increased competition from these mega-retailers and, as a result, are being forced to lower their price points on many products to defend market share. Fresh, organic foods are thus becoming more available and affordable as an alternative to premade meals.

To counter some of the negative connotations, major players in the frozen food industry, such as Nestle and ConAgra Foods, have increased their efforts to raise awareness on the benefits of frozen foods, including promoting research that freezing fruits and vegetables better preserves nutrients than unprocessed food often classified as "fresh." Improvements in freezing technology and efforts to improve frozen meal quality could also help stem the tide of consumers forsaking frozen foods. One growth area in the frozen food segment is consumption of frozen fruit for homemade smoothies and juices. There appears to be a growing number of Americans investing in blenders and food processors to make their own smoothies, juices and energy drinks for nutritious, on-the-go sustenance, which has fed into strong demand for frozen fruits.

The overall economic improvement and persistently low unemployment environment helped frozen food spending increase in the past five years by an average of 2.7% annually. Average work hours are rising in the labor force, which should translate to less time to prepare meals. Additionally, millennials are a major driver of the recent and strong growth in frozen food consumption, which presents an appealing option for convenient and affordable meals. However, wage increases are finally starting to gain traction, and higher incomes are associated with dining out more frequently and rising preferences for healthier foods, which will present a headwind for frozen food growth over the horizon. Initial estimates for spending in 2019 reflect the headwinds presented by dining out, as growth in frozen foods spending slows to 1.1% year-over-year. We expect this growth level to persist over the forecast.

Figure 3**Frozen foods: Carton value per ton relative to SBS price**

Real carton value per ton (2015\$)



Source: Fastmarkets RISI, Inc.

Trade trends

Between 2005 and 2009, exports and imports of frozen foods were nearly balanced. Both imports and exports were growing rapidly prior to the recession, as rising US spending spilled over into import demand, and overseas markets demanded US frozen foods as their economies boomed. However, the parallel developments of exports and imports quickly changed with the onset of the recession years; US exports proved more resilient during the downturn compared to imports as the US consumer slashed spending. In 2010, frozen food imports increased 9.3%, almost keeping pace with the 9.7% increase in exports. The relatively weak dollar supported strong growth in exports during 2011 and the trade surplus was restored to levels experienced in the early years of the new century. Between 2012 and 2014, export growth continued to expand by more than double the rate of imports, pushing the trade surplus to \$3.1 billion in real terms (2012\$) by 2014. However, the sharp strengthening of the dollar in 2015 nearly halted export growth, allowing import growth to outpace export growth in the following three years. The last two years recorded significant changes in the growth directions of

imports and exports that reversed the trade surplus to a deficit. In 2017, exports declined by 0.5% while imports gained 8.1%. Import growth was even stronger in 2018 at a record high 34.4%, compared to exports growing 5.1% for the year. As a result, the trade surplus of \$1.8 billion (2012\$) in 2017 turned into a trade deficit of \$1.3 billion (2012\$) in 2018. Over the forecast horizon, the trade deficit is expected to aggravate even further due to the mild strengthening of the US dollar. Import demand is expected to increase at a 2.5% average annual rate. Exports, meanwhile, will grow 1.3% annually on average, due to the unfavorable exchange rate and anticipated soft foreign demand in light of the expected slowdown in 2021. As a result, the total trade deficit for frozen foods will noticeably inflate over the period, reaching \$2.4 billion (2012\$) by 2023.

Production trends

For producers of processed fruits, vegetables and other foods, the last decade can be characterized by fairly flat output, largely in line with overall processed food production. Output in frozen goods experienced three consecutive years of decline starting in 2008, dropping 4.9% in total. Output of frozen goods

shifted to growth in 2011 and continued to gain momentum through 2014, providing some hope that consumers were finally coming back to the frozen food aisles. Despite no change in spending, production growth slowed dramatically in 2015 to 0.2%, in line with exports' tepid growth of 0.7% for the year due to the sharp strengthening of the US dollar. The last three years saw production recover, growing 2.2% in 2016, before accelerating 7.7% in 2017 and eventually stabilizing at 2.1% in 2018. Fastmarkets RISI expects a somewhat slower performance for frozen food production in 2019, forecasting growth of 1.4% year-over-year, although there is some downside risk here given the reported challenges processed food producers are still facing. The five-year outlook for frozen food production is expected to maintain 1.2% average annual growth as improvements in overall food spending helps carry frozen food spending upward.

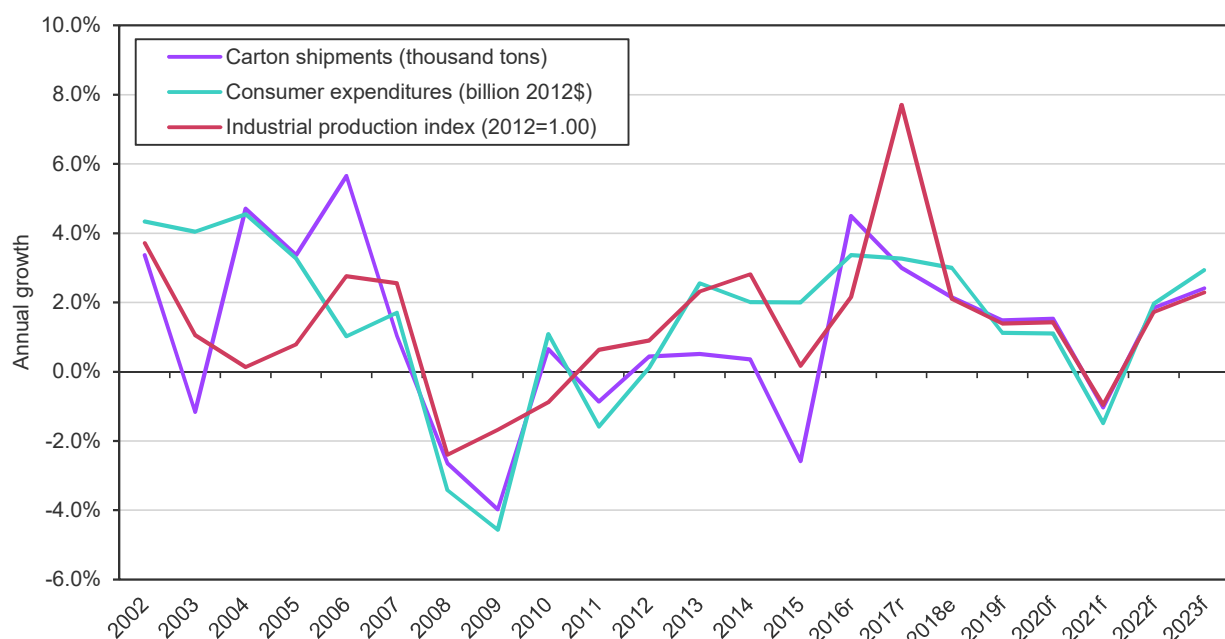
Folding carton trends

Over the last 20 years, the frozen food segment has experienced one of the biggest trend reversals of all of the categories covered in this report. Folding carton shipments to the frozen food industry

experienced stellar growth from 1996-2000, increasing at a 6.1% average annual pace, and gains in shipments far outpaced those in consumer spending and industrial production. Carton trends fell more in line with spending and production during the last ten years. From 2006-2010, shipments barely increased on net due to major declines experienced in 2008 and 2009 (2.6% and 4.0%, respectively). Carton shipments to the frozen segment struggled to recover after the recession but saw marginal growth of 1.5% annually over the last five years as consumer spending on frozen foods increased due to improving labor market conditions. By 2018, folding carton shipments for frozen goods were 497,000 tons, finally surpassed the pre-recession peak set in 2007 by nearly 5,000 tons. The folding carton market is set for a year of positive growth in 2019 based on the forecasted moderate spending growth and buoyant production prospects, which Fastmarkets RISI believes will put the gains in carton shipments to the frozen food sector up 1.4% year-over-year. Shipments to this segment are forecast to increase in line with industrial production and consumer spending later in the forecast, leaving average annual growth at 1.2% between 2019 and 2023.

Figure 4

Frozen foods growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc.

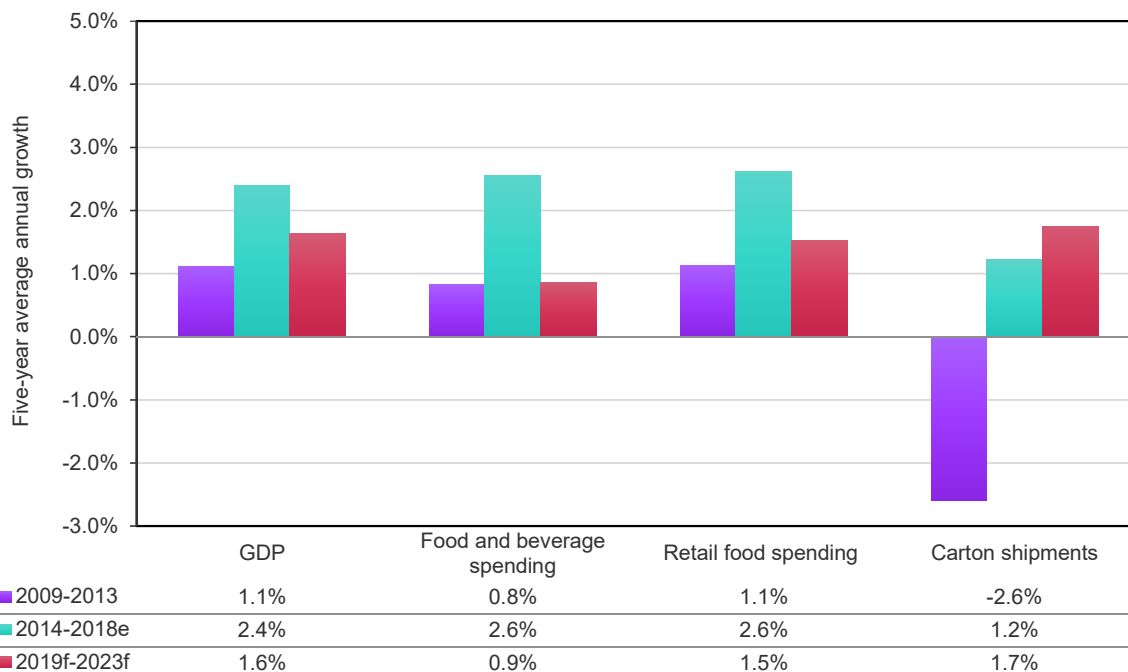
Retail carry-out

Fastmarkets RISI believes that retail carry-out represents a promising market for folding carton producers given the long-term trend of away-from-home food spending gaining share from grocery stores for at-home food consumption. Despite good long-term secular trends in consumer spending data, folding carton shipments to food service establishments have eroded since 2006 when shipments peaked at 321,000 tons. Although there has been some loss in demand, exceptionally strong consumer spending at restaurants and fast food establishments has driven growth in folding carton shipments, putting demand at 287,000 tons in 2018, or 6.0% of the total folding carton market. Despite the improvements in the shipment outlook with more Americans eating away from home, shifting demand preferences in terms of food purchased at such establishments still places tremendous challenges on carton producers serving the segment. However, the topic of packaging materials in food services has recently been brought into the spotlight, focusing on their image and potential impact on the environment. There has been growing

environmental pressure to move away from plastic packaging in retail carry-out to paper-based products. The video of the sea turtle that had a 4-inch straw in his nostril went viral, shedding light on plastic's non-biodegradable nature and its long-term impact on the environment. As the war on plastics heats up, there is strong potential that folding cartons will gain a greater share in the retail carry-out market over the forecast. For instance, McDonald's plans to use renewable, recycled or certified sources for all of its guest packaging by 2025. The interim target is to have all of the fiber-based guest packaging from recycled or certified sources by 2020. In 2017, 70% of the fiber-based guest packaging in McDonald's came from recycled or certified sources. In 2018, all centrally managed guest packaging was completely out of foam packaging. In another example, Dunkin' Donuts started eliminating its polystyrene foam cups in its global supply chain starting in the spring of 2018, with 2020 the target date of completion. The foam cups are replaced with double-walled paper cups. This step falls in line with the company's commitments in the US to have 80% of fiber-based packaging certified by Sustainable Forestry Initiative Standard by

Figure 5
Retail carry-out end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

the end of 2018. Fastmarkets RISI forecasts folding carton shipments to retail carry-out will grow by 1.7% between 2019 and 2023, making it the fastest growing segment over the horizon. This growth is mainly due to environmental pressures to move away from non-recyclable materials in the retail carry-out industry nationwide. However, this growth outlook is constrained by the expected economic slowdown in 2021, which should limit dining out options in customers' budgets. The positive growth outlook will be sufficient to push shipments to 313,000 tons in 2023, still below its 2006 peak.

Spending trends

The BEA considers expenditures at limited service restaurants, fast food chains and all other dining establishments as food services, which is separate from consumer spending on food and beverages for at-home (or "off-premises") consumption. Consumer spending on food services experienced steady growth during the early part of the new millennium, growing by 2-3% annually on average and reaching at \$683 billion (2012\$) in 2007. In comparison, growth in spending on food for off-premises consumption grew roughly one-

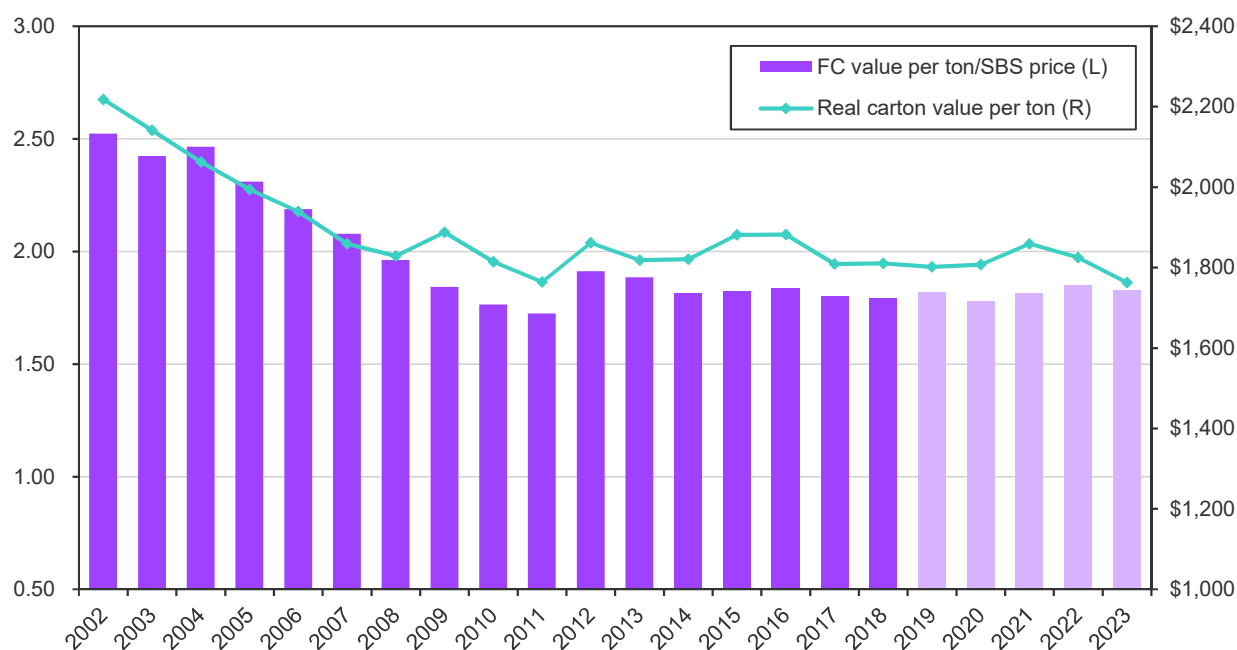
half a percentage point slower over the same period, accounting for \$845 billion (2012\$) in spending in 2007. Consumers' preference for convenience was benefiting food service establishments, especially fast food and take-out restaurants, helping close the gap between service-related food spending and off-premises spending over that period.

However, food service spending faced challenges during the recession, declining 0.8% in 2008 and 3.4% in 2009 as American households slashed spending to prop up their balance sheets. In 2010, food service spending recovered by 2.3%, with the majority of growth concentrated at fast food establishments. Since 2011, food service spending has held steady, growing at an average annual pace of 2.5% annually, which outpaced off-premises food consumption by about 0.7 percentage point between 2011 and 2018. Buoyant signs of convergence between at-home and restaurant/fast food spending appeared between 2011 and 2015. Spending at food services saw an average annual growth rate of 2.9%, while at home processed food spending grew at 1.1% over the same period. However, this convergence trend slowed between 2016 and 2018. In

Figure 6

Retail carry-out: Carton value per ton relative to bleached board prices

Real carton value per ton (2015\$)



Source: Fastmarkets RISI, Inc.

the past five years, carry-out spending increased by 2.6% annually on average, which reflects a growing trend by consumers to trade hard-earned income for time and convenience as budgets are less constrained and more people are heading back to work.

We are seeing rapid growth in "fast, casual dining" establishments, which attract consumers who are looking for a quick meal. Such establishments are generally perceived to produce a higher-quality product with more natural ingredients compared to legacy fast food chains, and this appears to resonate with consumers, especially among the younger demographics. As a result, average spending per meal is also rising as these establishments gain market share. Large fast food chains are being forced to adapt to the new competitive environment by introducing menus that cater to the growing desire for options that are both convenient and healthy, a trend which is unlikely to yield in the medium term.

Additionally, fast food and take-out spending typically gain steam when unemployment falls; unemployment is currently at its lowest level since the years leading up to the Great Recession (3.8% is the expected average for 2019), a stark contrast to the unemployment levels that approached 10% in the depths of the recession. Fastmarkets RISI is forecasting that the economy is going to slow toward 2021, which should translate into weaker food service spending growth of 1.5% per annum from 2019 to 2023, slower than its 2014-2018 average annual growth.

Folding carton trends

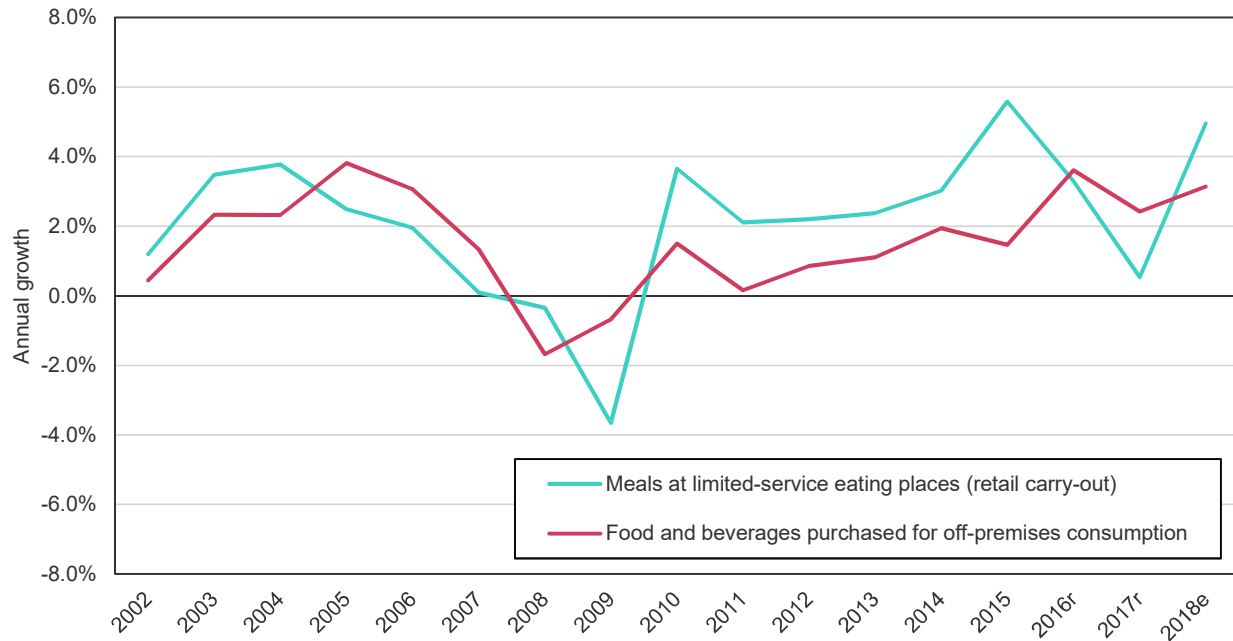
Shipments of folding cartons to the fast food and related industries has faced some challenges over the last decade despite the positive outlook for restaurant and away-from-home spending. The downturn in spending on fast food from early 2007 into 2009 undermined demand, and folding carton shipments plummeted 9.0% from the 2006 peak. Post-recession carton demand struggled to gain traction despite a healthy rebound in consumer spending, widening the gap between the growth in consumer spending

and carton shipments considerably compared to history. After increasing 1.7% in 2010, shipments contracted by another 9.1% from 2011-2013. Despite these difficulties, it seems shipments have changed course in recent years; cartons for fast food and related industries returned to growth in 2014 and accelerated further in 2015, growing 0.7% and 1.5%, respectively. Following two years of moderate growth, 2016 saw a slight decline of 0.8%, with total tonnage for that year equaling 274,000 tons. Shipments accelerated again in 2017, recording a growth rate of 1.9%, reaching 279,000 tons. Shipment tonnage is quickly approaching a post-recession peak of 2010, thanks to the strong 2.9% growth in 2018 that put the total at 287,000 tons. More robust away-from-home spending paved the way for recent gains on the carton side, although shipments are still well below the pre-recession peak of 321,000 tons.

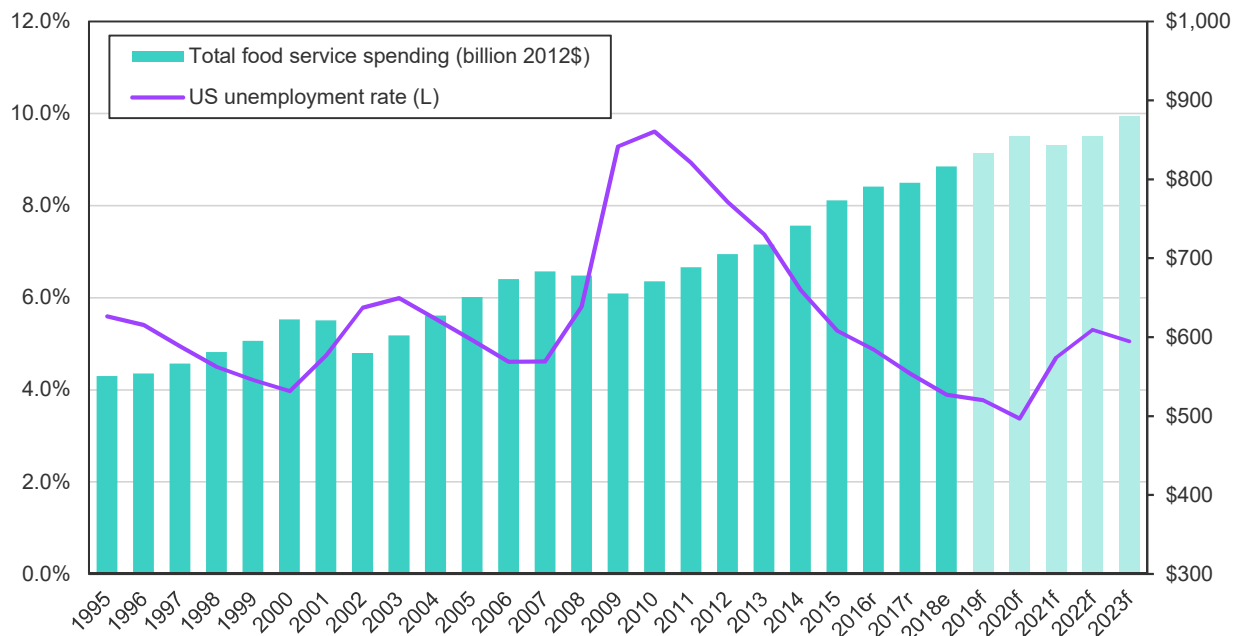
We believe that the consumer spending growth in the fast-food sector will be maintained through the forecast, translating into accelerating folding carton demand for this segment, especially with the substitution pressures and efforts to reduce waste at many restaurant chains. The other benefit for folding carton producers deals with the positive environmental credentials of their product; negative sentiment toward polystyrene foam and plastic bags has led to legislation banning the use of such products in several cities and municipalities across the country. In 2016, California passed a ban on single-use plastic bags. Earlier in 2019, New York Governor Cuomo signed legislation that bans the sale of single-use plastic bags in New York, starting in March 2020. However, the legislation also gives permission to counties and cities to charge a \$0.05 fee for single-use paper bags. Overall, as the war on plastic heats up in legislatures and businesses, there will be further opportunities for folding cartons to benefit from the green movement, at least in this sector, as the large food service chains are so mindful of their reputations. Fastmarkets RISI projects that carton shipments to the retail food sector will increase at a 1.7% average annual rate during the next five years, making it the fastest growing segment in the folding carton industry.

Figure 7**Growth in consumer spending on meals at retail/carry-out establishments**

Percentage change in spending, billion US dollars (2012)



Source: US BEA Real Personal Income Expenditures.

Figure 8**Retail carry-out consumer spending vs unemployment**

Source: US BEA Real Personal Income Expenditures.

Perishable bakery goods

The perishable baked goods industry has been a struggling market for folding cartons for a long time, decreasing by an average of 1.5% per year over the last ten years. Consumer trends shifting away from high carbohydrate goods toward proteins and less starchy foods has notably impacted demand in this segment. Industrial production for baked goods has shown some promise over the last five years, which also has been borne out in the spending numbers. Industrial production for baked goods rose by an average rate of 1.2% during the last five years, which was reflected in the 2.1% growth in consumer spending over the same period. Given the forecast for a decline in consumer spending and industrial production of baked goods, shipments are expected to drop by a 0.2% average annual rate through 2023. The impact of the expected contraction in spending and production on shipments has been mitigated mainly by the effects of the environmental pressure on plastic usage. The negative image of plastic in the food markets will allow folding cartons to gain greater share. Grocery stores and bakeries are moving toward using folding cartons for their freshly baked cakes, pastries and donuts.

Baked products sold in paper packaging sends a powerful message of fresh, organic and natural, compared to the processed and less healthy image associated with plastic.

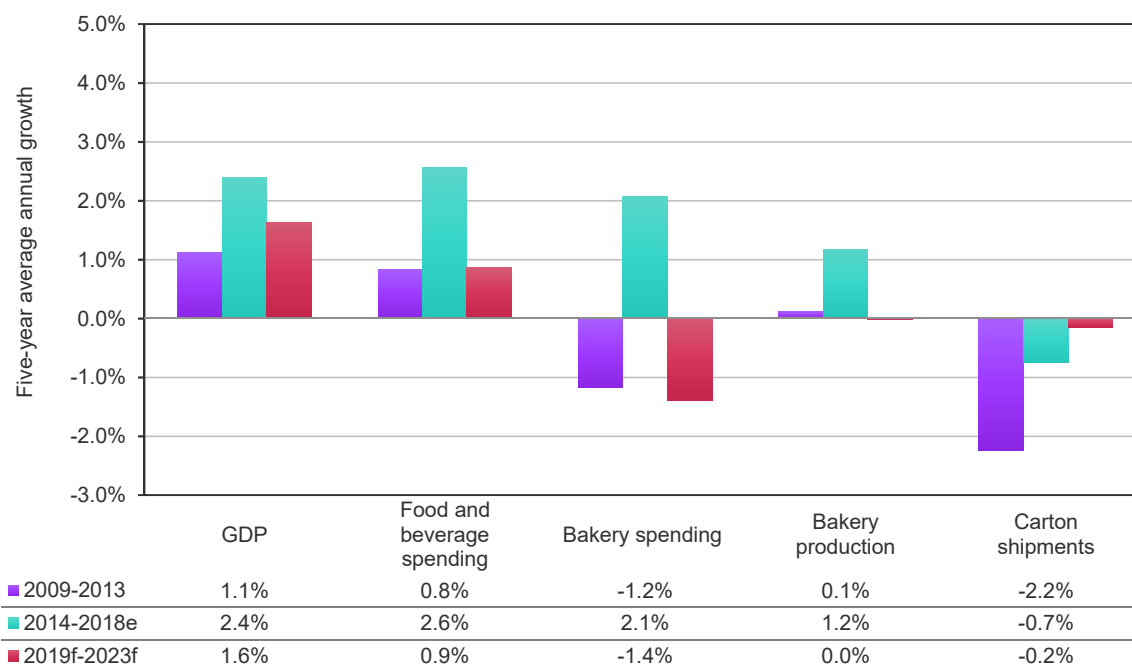
Spending trends

Spending on baked goods appears to have peaked at about \$89 billion (2012\$) in 2006 and has since been on a flat to declining trend, even beyond the recession period. From 2006-2009, spending declined by \$7.5 billion (2012\$), with the recession years accounting for most of the losses, although baked goods showed declines in spending in 2007 as well. Spending's recovery has been sluggish and showed some level of volatility until 2014, which exhibited the beginning of solid growth momentum. The gains prior to 2014 were short-lived, possibly as growth in the immediate post-recession years accounted for some shifting back to more premium baked products that were eschewed as incomes were slashed during the recession. Consumer spending on baked goods saw improvement in 2014, finishing 2.0% above the previous year, while gains in 2015 were nearly flat at 0.6% and left total bakery spending at \$81.7 billion (2012\$). The upward trend stabilized

Figure 9

Perishable bakery goods end-use market indicators

Five-year average annual growth rates



in 2016 and 2017 with a 2.1% and 1.7% increase, respectively, in spending on baked goods. Spending rose even further in 2018 by a robust 3.9%, swiftly approaching its pre-recession peak, reaching \$88.2 billion (2012\$). This accelerated growth is mainly driven by declining unemployment and the increased purchasing power of the working population.

The gains in spending on baked goods in 2018 was slightly faster than the growth recorded by overall off-premises food. Historically, sugar content and general health concerns have pushed down the share of baked goods in total off-premises food spending, a trend which will likely persist over the near term despite last year's performance. Some improved spending on premium and non-private label products as real incomes rise later in the forecast will help prevent the segment from showing significant declines over the next five years. Early indications are 2019 will see a decline of 1.7% in baked goods spending. The soft spending environment is forecast to extend over the forecast, declining at 1.4% average annual rate between 2019 and 2023, clearly weaker than the ten-year average growth rate.

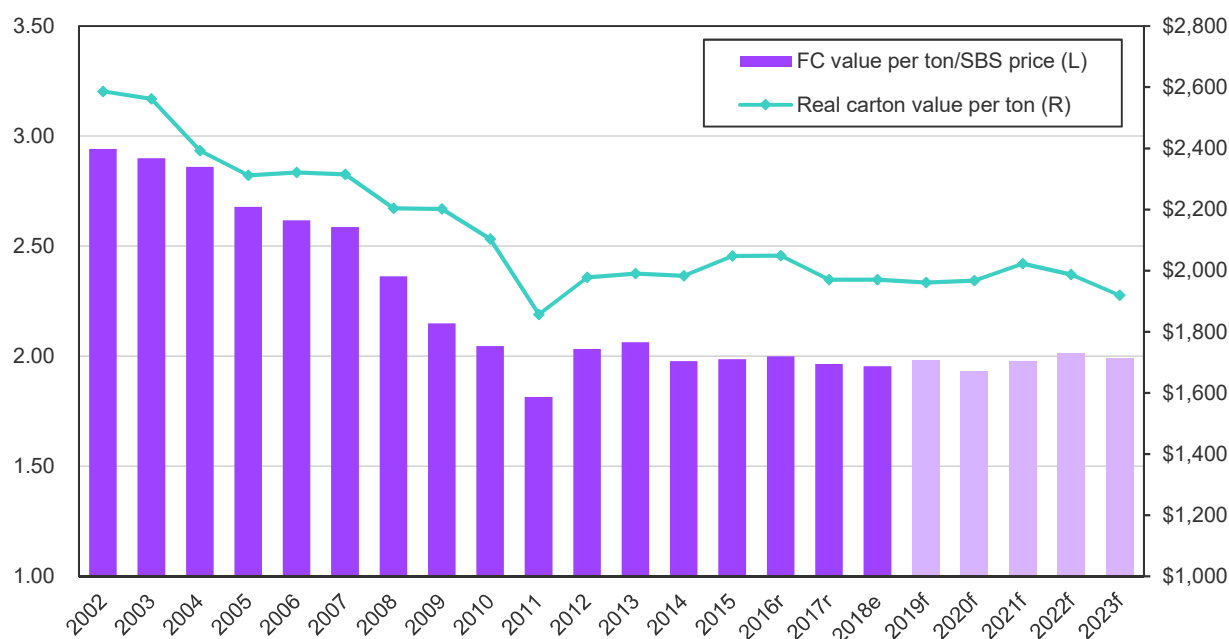
Trade trends

The trade deficit in the bakery market trended up steadily from 2000-2006, growing to about \$1.6 billion (2012\$). However, the deficit began deflating in 2007 as real imports of baked goods notably slowed. As incomes were undermined in 2008 and 2009, the trade deficit declined further to \$1.3 billion (2012\$) by 2009. Meanwhile, exports sustained double-digit growth from 2005-2008, also aiding the shrinking of the trade gap. The deficit reversed, however, once imports bounced back by a rather strong 12.2% in 2010, and proceeded to sustain growth going forward, albeit at a more moderate rate. This jump in imports growth was associated with a rebound in exports growth by double digits between 2010-2012. From 2010-2014, the trade deficit vacillated between \$1.4 billion and \$1.5 billion (2012\$), but 2015 saw exports decline significantly, while imports of baked goods surged as the strength of the US dollar materially impacted the competitiveness of manufacturers of such goods in the USA, leaving net imports at \$1.9 billion (2012\$). The trade deficit widened even further in 2016, with imports growing 13.8%

Figure 10

Perishable bakery goods: Carton value per ton relative to bleached board prices

Real carton value per ton (2015\$)



Source: Fastmarkets RISI, Inc.

while exports dropped 3.2%. The trade deficit continued to balloon to \$2.9 billion (2012\$) in 2017 and \$3.4 billion (2012\$) in 2018, fueled by strong imports growth of 9.9% and 10.9%, respectively, compared exports' 0.5% reduction in 2017 and muted growth of 1.4% in 2018.

We expect to see the trade deficit remain unchanged in 2019 as the competitive landscape adjusts to the new exchange rate environment. The trade balance will stabilize over the forecast, mainly as we anticipate slower imports growth of 0.3% annually, on average, as consumers continue to shift baked goods out of their shopping baskets due to health concerns—although they will still purchase premium or artisan products from abroad. Exports will struggle to rebound thanks to a strengthening dollar, declining by 0.1% between 2019 and 2023.

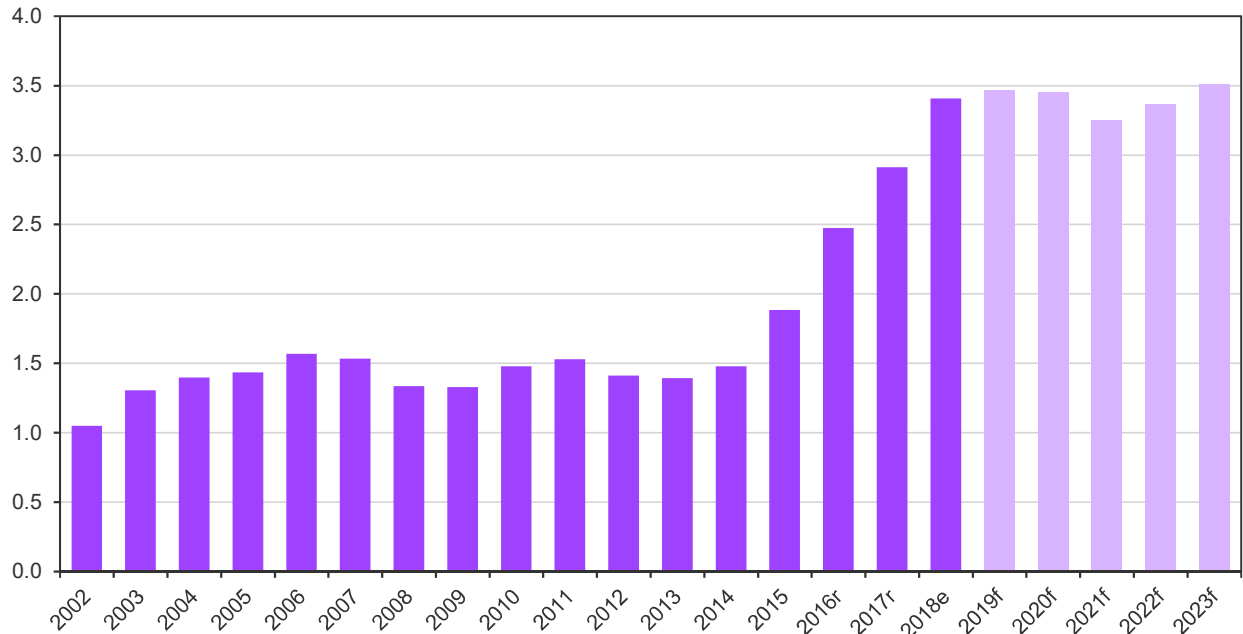
Production trends

Output of baked goods has been fairly cyclical over the past decade. From 2004-2005, production grew by 6.1%, only to reverse trend heading into 2006. Between 2006 and 2009, baked goods output declined by 9.7%. Baked goods output failed to see significant recovery until 2010, although growth was a mere 0.7%. The overall average annual growth rate between 2009 and 2013 was nearly flat at 0.1%, reflecting the mixed rates of contraction at the depths of the recession and the pace of the rebound afterward. Output has steadily recovered over the last five years, albeit somewhat choppily, averaging 1.2% from 2014-2018, with output peaking at the end of the period. Due to a weakening consumer spending outlook and flat trade deficit, Fastmarkets RISI is forecasting output

Figure 11

Perishable bakery goods market trade deficit

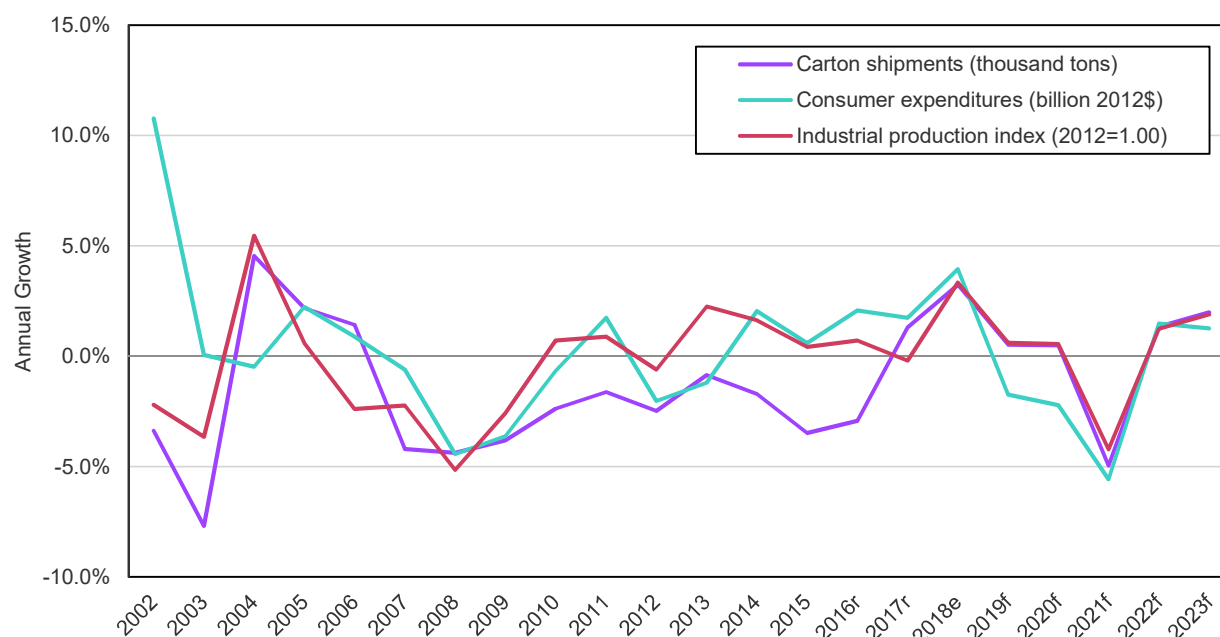
Net imports in billions of 2012 US dollars



Source: Fastmarkets RISI, Inc.

Figure 12

Perishable bakery goods growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve Data.

by baked goods producers will record slow growth of 0.6% in 2019. The five-year outlook for baked goods output is expected to remain flat thanks to the anticipated contraction in spending and the increasingly difficult export environment for US manufacturers.

Folding carton trends

Carton shipments to the perishable baked goods market lagged growth in consumption considerably during the last ten years, since imports of specialty and value-added bakery products have garnered a large proportion of growth in spending. Between 2009 and 2018, carton shipments to this industry declined at a 1.5% average annual rate, which was two percentage points lower than consumer spending on baked goods during the period. Prospects for this market segment are deteriorating due to the tepid outlook for consumer spending and the weak foreign demand in the next five-year period. However, the weak spending and export outlooks should be mitigated by the

increasing pressure to substitute plastic packaging with folding cartons, which will focus on brand names and other more expensive products, providing some growth in carton market share. Both effects are forecast to net a slight contraction in carton shipments to the perishable baked goods segment by 0.2% annually through 2023.

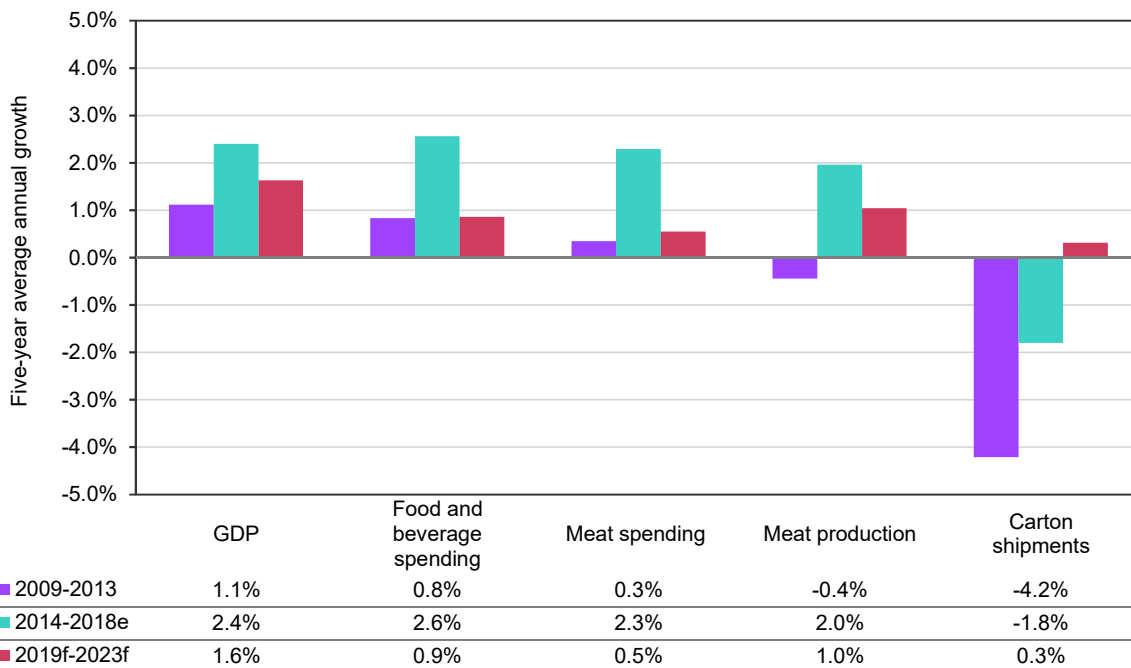
Meat and meat by-products

Meat products represent one of the smallest market segments of folding carton usage based on the categories encompassed in this report, second only to tobacco usage. In 2018, folding carton shipments to the sector were 57,000 tons, or 1.2% of the total folding carton shipments for the year. The prospects for folding carton shipments to the meat and meat by-products markets are quite poor, with an expected average annual growth of 0.3% for the next five years, a slight uptick in the segment and its already small share of the total folding carton market.

Figure 13

Meat products end-use market indicators

Five-year average annual growth rates



Spending trends

Despite being a main staple in meals in the USA for generations, meat products have essentially maintained a flat share in consumer spending. In 2018, meat accounted for 19.6% of non-service food spending, nearly identical to its 19.8% share in 2002. Interestingly, spending growth in the segment grew moderately from 2006-2010, by 1.4% annually on average. The recession did undermine consumer spending on meat, resulting in weak growth in this segment in 2008. This, however, was better than the performance in many segments, some of which experienced deep cuts in demand; spending on meat and meat products seemed to benefit from the temporary shift in consumer spending away from convenience items such as frozen foods or retail carry-out during the recession.

The real downward trend in meat spending actually came after the recession years; looking at spending growth for the category from 2010-2013, real spending declined at an average annual rate of 0.1%. The past five years saw a swift rebound in spending of 2.3% annually on average, reflecting the improving economic and employment conditions. Growing health concerns with

meat, particularly red meats, has driven some consumption toward alternative protein sources. Organizations such as the USDA and health experts also revised down the share of meat that should be included in a healthy diet, although consumers seem to be ahead of the curve on recommendations as seen by their spending habits. As a positive for the industry, some consumers have adjusted by purchasing more premium cuts to satisfy health concerns, trading off volume for quality.

Meat spending's recovery started to accelerate in 2016 at 4.6%, following by 2.7% in 2017 and 3.4% in 2018. Preliminary data suggest that meat spending in 2019 will continue to record nearly flat growth at 0.3%. Our outlook for the next five years is in line with the growth expected for 2019, as we anticipate meat spending will advance just 0.5% annually over the forecast horizon. Part of this is due to the anticipated broad slowdown in consumer spending across all categories, but some of the shifts in meat consumption may also be the result of fad diets pushing spending more in the direction of high-protein, low-carb products. By the end of our forecast, we expect spending to rise to \$194.7 billion (2012\$) in 2023.

Trade trends

The USA has been a significant exporter of meat and meat byproducts for years, with the one exception being in 2004 when concerns over mad cow disease in the USA dramatically shifted the surplus to a deficit. However, from 2005-2008 beef exports experienced double-digit growth, as did exports of all other meats, fats and oils, resulting in a \$7.7 billion (2012\$) trade surplus in 2008. The surplus deflated somewhat in 2009 as external demand declined but rebounded at a double-digit pace in 2010 and 2011 as the global economy recovered and trade improved. Interestingly, exports shrank year-over-year between 2012 and 2015, with the biggest decline coming in 2015 due to weak global demand for beef in a challenging economic environment and greater competition for US meat producers thanks to a stronger US dollar. As a result, the net export position of the US meat industry on a dollar basis has shrunk notably since 2013, declining from \$8.2 billion to just \$5.0 billion (2012\$) by 2018.

Fastmarkets RISI anticipates appetites for meat in emerging economies will soften and

grow at 0.9% annually between 2019 and 2023, reducing the trade surplus to \$4.6 billion (2012\$) by 2023. The mild strengthening of the US dollar over the next few years will place downward pressure on US meat exports, while meat imports will experience moderate growth trends given the more subdued outlook for meat production domestically and the favorable exchange rate. That said, trade flows in the meat and meat by-products segment have exhibited immense volatility in recent years, leaving plenty of upside and downside risk to this forecast.

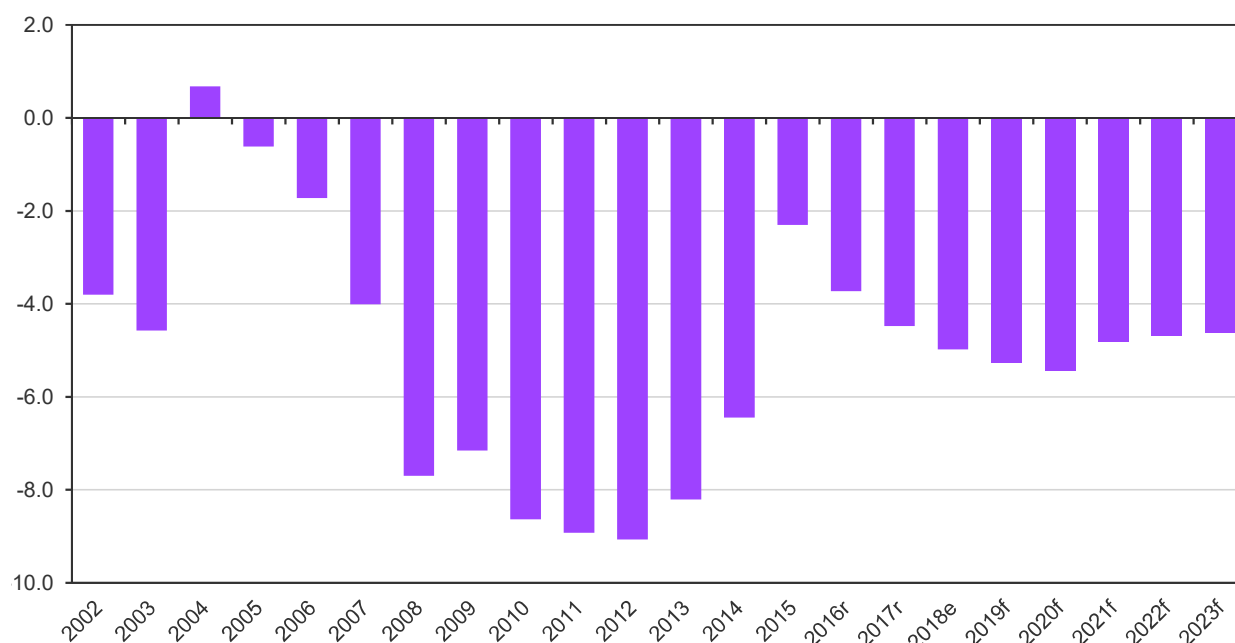
Production trends

Industrial production of meat products has been fairly flat on net over the last ten years, averaging 0.7% annually, although year-to-year production has been quite volatile, making an underlying trend difficult to establish. During 2005 and 2006, industrial production swelled, partially due to the surge in the trade surplus during the period, and domestic demand ratcheted up as US beef came back on the market after the mad cow scare in 2004. However, industrial production has since been relatively unimpressive, obviously affected by the recession in 2008

Figure 14

Meat products trade balance

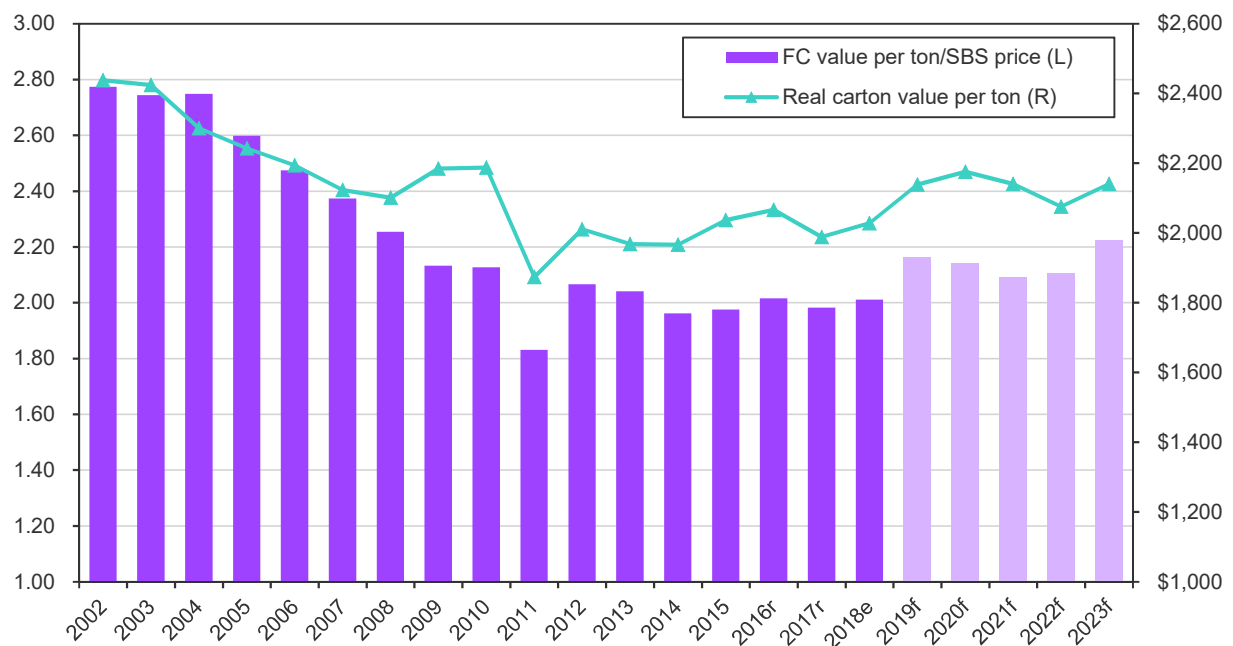
Net imports in billions of 2012 US dollars



Source: Fastmarkets RISI, Inc.

Figure 15**Meat products: Carton value per ton relative to bleached board prices**

Real carton value per ton (2015\$)



Source: Fastmarkets RISI, Inc.

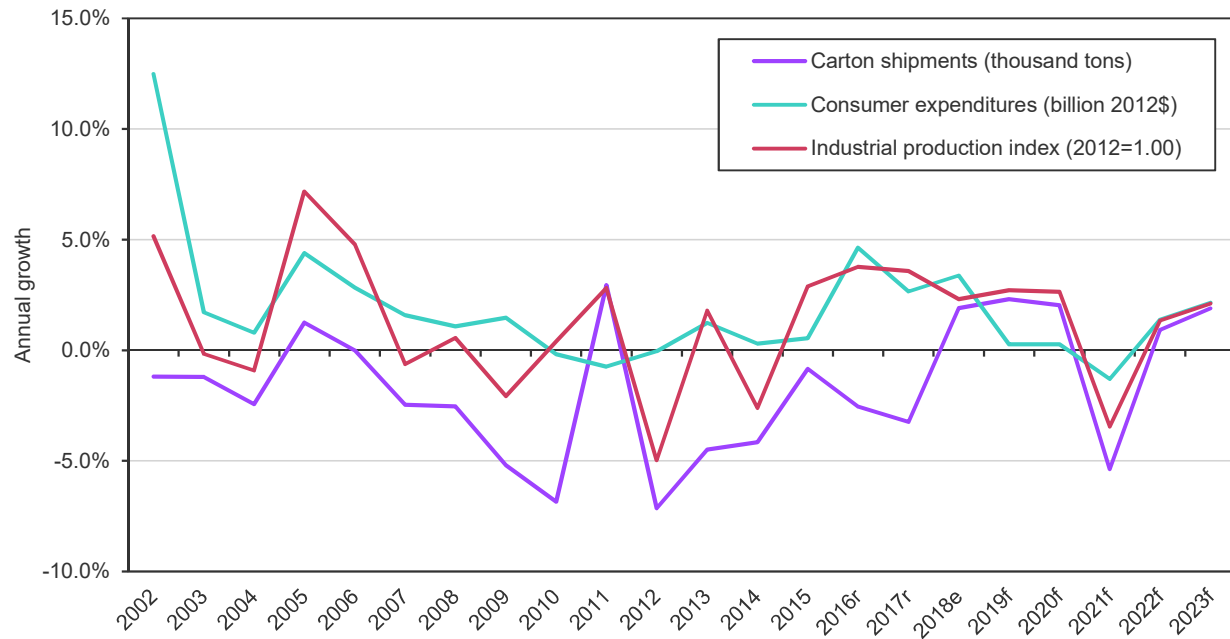
and 2009, and output was quite erratic between 2010 and 2014, recording an average annual growth rate of 0.6%. The past five years showed less volatility as meat production stabilized between 2014 and 2018, growing at an average pace of 2.0% annually. Output grew by 2.3% in 2018, surpassing 2017, the previous peak year for meat production according to the Federal Reserve data. Based on preliminary data, production in 2019 is expected to grow by 2.7% year-over-year. Despite the recent recovery in trade surplus, production growth will be moderate, with an average annual gain of 1.0% between 2019 and 2023 thanks to the subdued growth in spending and the anticipated soft foreign demand over the period.

Folding carton trends

Total shipments to the meat industry continue to lag far behind both output and spending. Carton shipments have declined by 3.0% on average over the past decade, in contrast to the relatively flat growth in industrial production and a 1.3% growth rate in consumer spending during that time frame. The decline in carton shipments is expected to turn into a slow recovery at an average rate of 0.3% during the next five years due to both some improvement in meat production and some easing in substitution pressures as the most susceptible segments to alternative packaging methods have already been captured. Even so, this market segment should remain firmly entrenched in the flat market category.

Figure 16

Meat products growth in shipments, consumer spending and industrial production

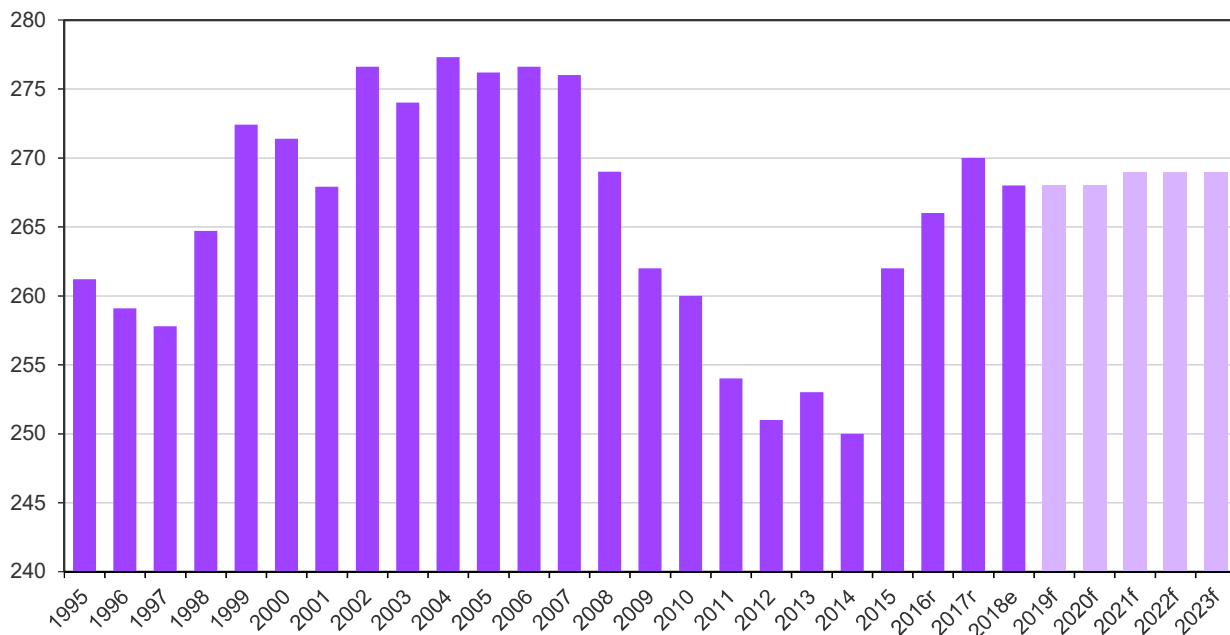


Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Figure 17

US meat consumption

Pounds per person



Source: IBISWorld.

Dairy products

Although not as small as the meat market, folding carton shipments to dairy-related end uses are also a relatively small market, accounting for approximately 2.4% of total shipments (tons) in 2018. Carton shipments to this segment have fallen by 2.7% annually over the past ten years, despite consumer spending and industrial production advancing by roughly 1.9% and 0.6%, respectively, over the same time frame. The primary trend affecting carton shipments in dairy relates to the ongoing shift in consumption from fresh milk to processed dairy, which is significantly affecting the packaging needs of producers in the industry. Shipments are expected to decline less dramatically than in recent years, at an average rate of 1.0% over the forecast period.

Spending trends

The dairy product market has fared well even with the challenges faced during the Great Recession. Dairy consumption expanded by 1.6% annually from 2006–2010 despite a 2.3% year-over-year decline in 2008 as a result of the recession. Dairy spending bounced back fairly strongly in 2009, growing by 3.4%, an anomaly

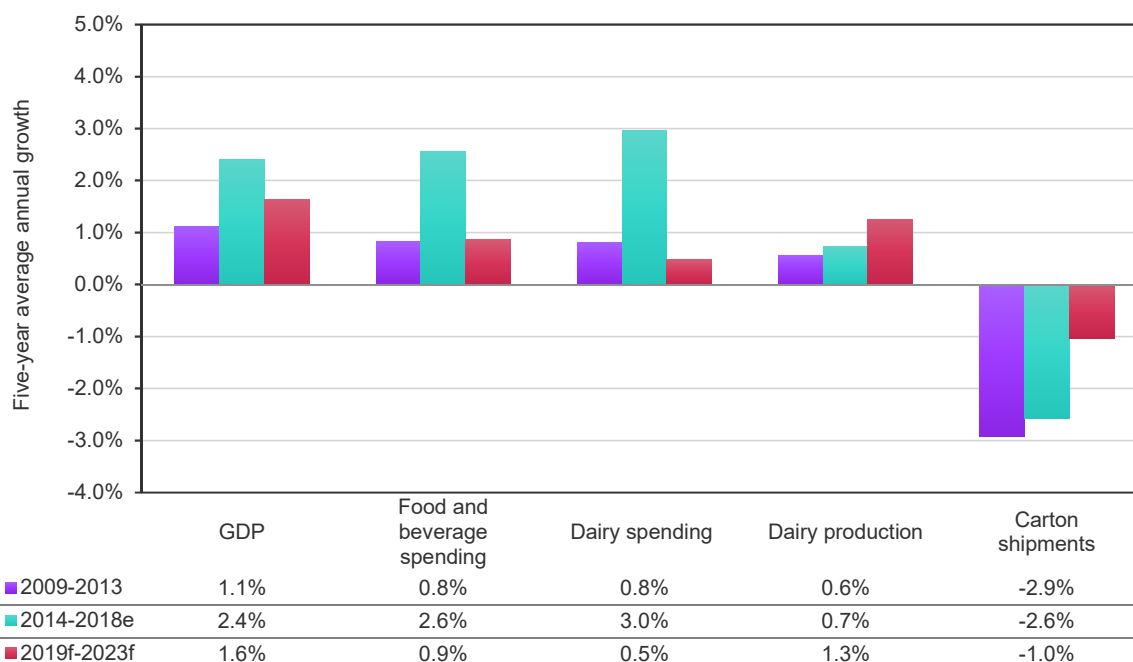
considering this was a year of decline for most food categories. After an unusually strong performance during the recession, growth in dairy spending has been more sporadic, eking out average growth of just 0.8% annually between 2009 and 2013. Consumer spending in the segment has grown at a 1.9% average annual rate since 2008, despite the evident level of volatility in the period between 2009 and 2013. Spending growth stabilized in the last five years at an average rate of 3.0% annually, leaving total spending at \$75.3 billion (2012\$) in 2018. Dairy spending in 2018 extended the growth trend, recording robust year-over-year growth of 4.2%.

The national income accounts report consumer spending on both fresh and processed dairy products. Processed dairy accounts for the lion's share of the broader dairy products category with an average of 65% of total dairy spending since 2002. Despite a strong recovery from the recession in spending on fresh dairy products, a greater proportion of dairy spending favored processed dairy items. In particular, goods such as Greek yogurt and artisan cheeses have experienced a boom in demand as consumers have been favoring healthier food choices and more variety in their

Figure 18

Dairy products end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

diets. Processed dairy products saw an average annual growth rate of 1.5% between 2009 and 2013, compared to a 0.5% contraction in fresh dairy products over the same period. However, 2015 saw a rather significant increase in fresh dairy consumption, taking a 1.3 percentage point share from the processed segment. Shares of dairy consumption remained essentially flat in 2016, 2017 and 2018. Data from organizations like the USDA indicate fluid milk consumption is on the decline in most households, so this would likely indicate some possible share losses to processed dairy in the long run. Fastmarkets RISI projects that total dairy spending will advance by 0.5% per year through 2023, echoing the impact of the anticipated economic slowdown on overall consumer food spending.

Trade trends

Broadly speaking, the USA has gained status as net exporter of dairy products due to its surplus of fluid milk and processed dairy production over the years. Prior to 2007, however, the USA was actually a small net importer of dairy products; the trade deficit in dairy products contracted sharply between 2003 and 2006, then shifted to a surplus in

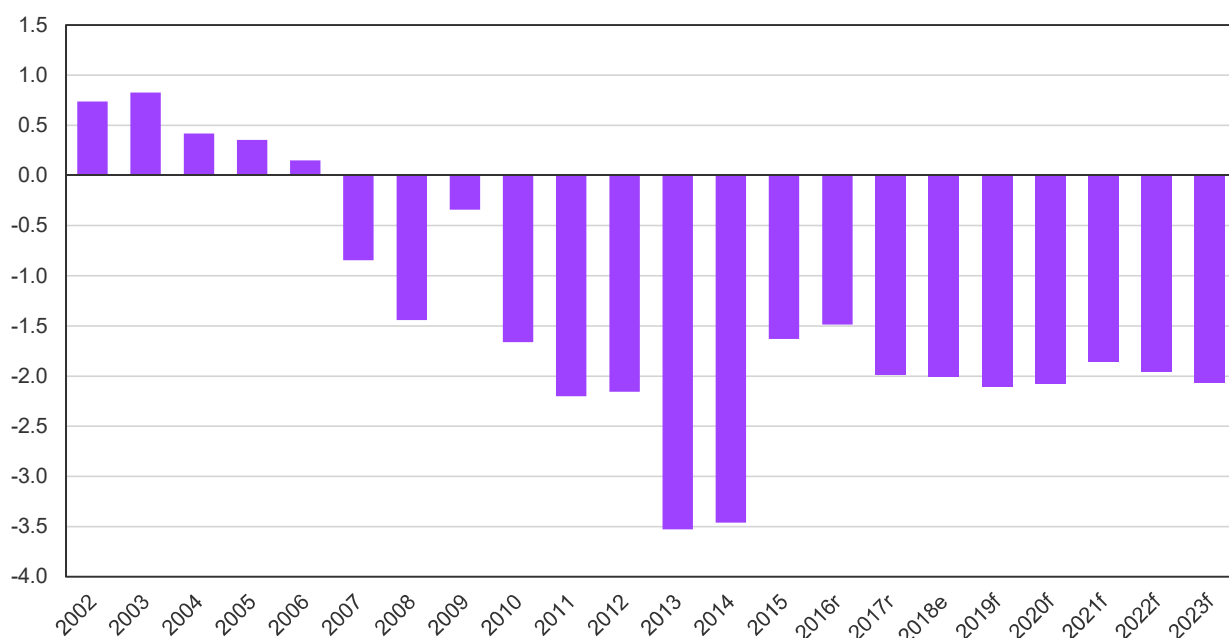
2007 and 2008 due to explosive growth in exports. Total exports of dairy products, most of which come in powdered form and are used to produce anything from baby formula to confectionary products, increased at a 28.6% average annual rate between 2004 and 2008, surging by an astonishing 49.9% in 2007 alone. By comparison, imports only grew by about 1.2% annually on average from 2004-2008, making it easy to see how the trade balance reversed during the period. After reaching \$1.4 billion (2012\$) in 2008, the largest historical trade surplus for this segment, exports plummeted to \$300 million (2012\$) in 2009 as a result of weak external demand.

The trade surplus shot back up in the following years, reaching \$2.2 billion (2012\$) in 2011 as exports continued to increase. This resurgence in export demand stalled during 2012, but ratcheted up once again in 2013, posting 34.8% growth in exports and expanding the trade surplus to \$3.5 billion (2012\$). In 2014, export growth was nearly flat in comparison, and in 2015 deteriorated significantly by 28.4% as the stronger US dollar boosted the competitiveness of key dairy countries like New Zealand and Europe, resulting in net exports plummeting \$1.6 billion (2012\$), effectively

Figure 19

Dairy products trade deficit

Net imports in billions of 2012 US dollars



Source: Fastmarkets RISI, Inc.

halving the trade surplus. The decline in the US dairy trade surplus continued in 2016, albeit at a slower rate, to \$1.5 billion as exports shrank 6.9% while imports contracted 5.7% for the year. Dairy trade surplus saw evident recovery in 2017, reaching \$2.0 billion (2012\$), thanks to the strong export growth of 16.2% compared to the 5.2% growth in imports that year. The dairy trade surplus remained effectively flat in 2018 at \$2.0 billion (2012\$), as exports and imports recorded comparable growth rates of 2.2% and 3.3%, respectively.

The dairy trade is a particularly difficult category to forecast long term given the volatility in production; however, Fastmarkets RISI is expecting dairy exports to grow at a moderate average annual rate of 1.0% between 2019 and 2023, far less than the double-digit growth seen previously. A stronger dollar and diminishing global demand in the near term will dampen the growth outlook, but as history shows, trade tends to be very volatile in the industry. However, there is still increasing demand for dairy products in the growing middle classes in the emerging markets, where consumption per capita is very low, an area that could support some foreign export growth. Net

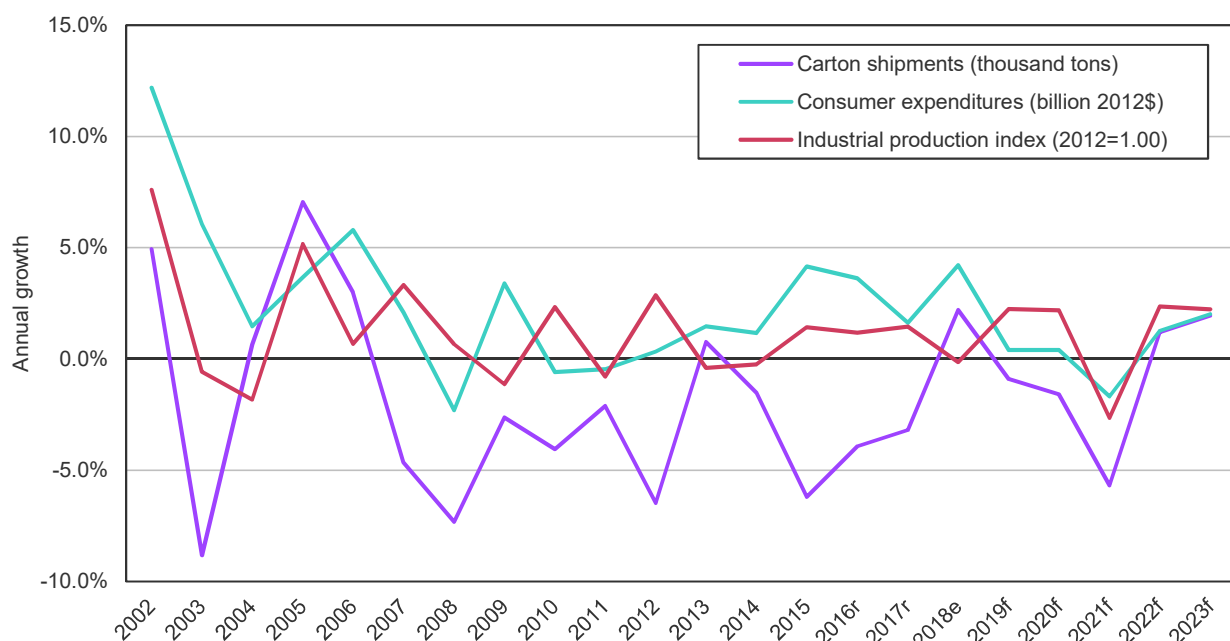
exports will likely remain nearly flat at an expected \$2.1 billion (2012\$) by 2023.

Production trends

Processed dairy production grew by a 1.2% average annual rate between 2006 and 2010, fueled by robust consumer spending and massive gains in exports. Dairy manufacturing held up relatively well during the recession; in 2009 production was just 0.5% lower than the output levels in 2007. Interestingly, based on revised figures from the Federal Reserve, from 2009-2013 dairy production showed a relatively flat trend for dairy products on net, with growth of just 0.6% annually on average, reflecting how tepid domestic consumption was during the period. Despite the improved spending performance over the past five years of 3.0% annually, production showed weak growth of only 0.7% annually over the same period. This is understandable given the average annual contraction in export demand from 2014-2018 of 4.2%. Exports have been an outlet for production, but they have also been fairly volatile, and in the past five years have been impacted significantly by the US dollar. Given the expected, although slow, improvement in exports of 1.0% annually, and

Figure 20

Dairy products growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

nearly flat consumer spending in dairy of 0.5% per year, production is forecast to increase at an average annual rate of 1.3% from 2019-2023.

Folding carton trends

Folding carton shipments to the dairy products market have declined steadily during the last ten years, by 2.7% annually, despite gains in both consumer spending and industrial production for this segment. This is likely due to growth in end-use demand occurring in segments of the processed dairy foods market that are not heavy consumers of folding cartons such as yogurt, pudding and cheese. Substitution pressure may also be an issue due to the

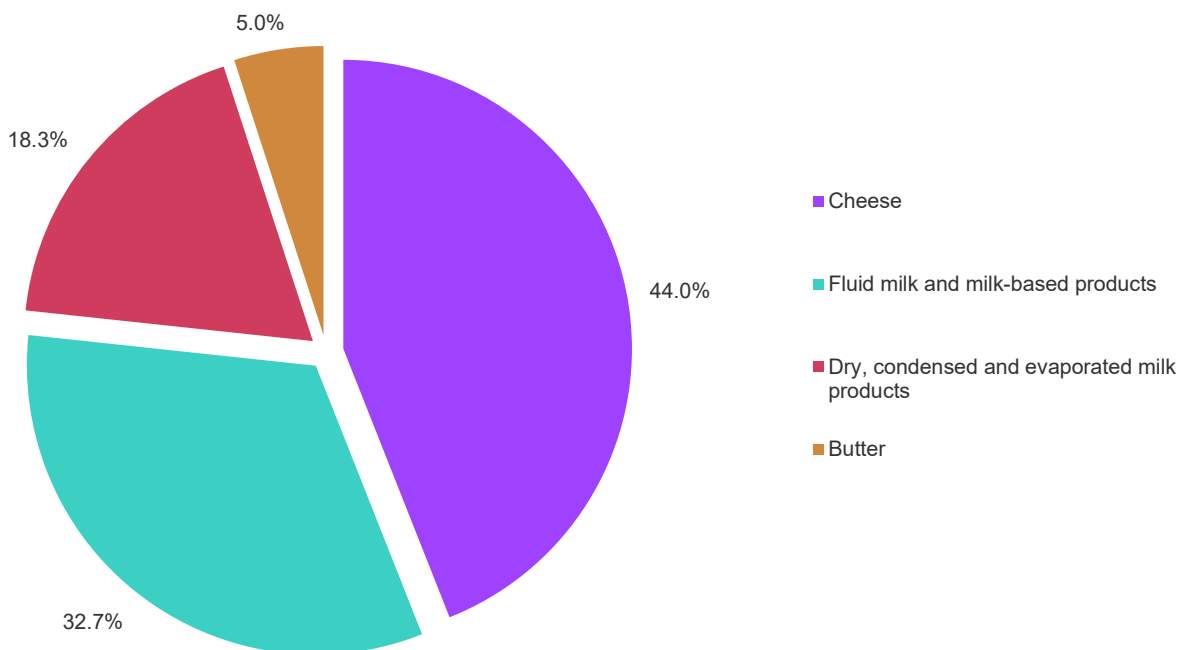
ability of plastic to offer more convenient re-sealable packaging. Additionally, a desire to decrease packaging is likely a factor as evidenced by some yogurt manufacturers opting to sell their yogurt individually rather than in multi-packs packaged in cartons.

The substitution pressures described above contributed to dairy shipments declining by 2.6% on average over the last five years, despite the increase in dairy spending over the same period. Carton shipments to the dairy industry will decline at a relatively slower pace of 1.0% over the horizon as consumer spending is expected to remain effectively unchanged, but our forecast could be optimistic given the history of this segment.

Figure 21

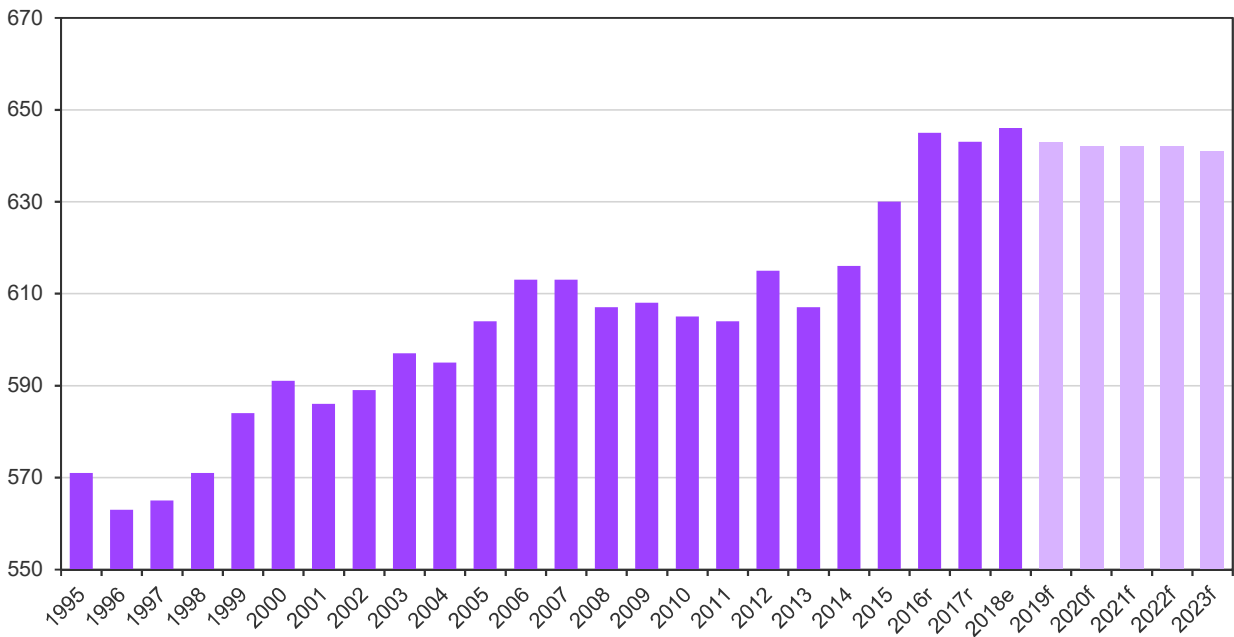
Dairy production

Products and services segmentation (2019)



Source: IBISWorld.

Figure 22
US dairy consumption
Pounds per person



Source: IBISWorld.

Health and beauty care (cosmetics & toiletries and pharmaceuticals)

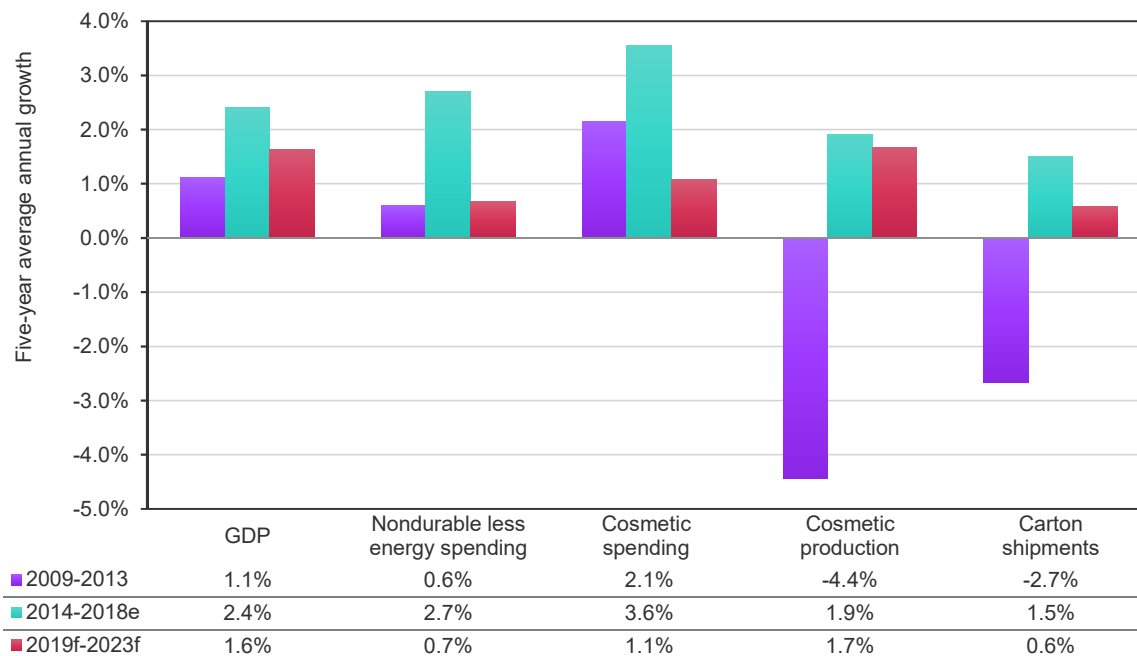
In 2018, shipments of folding cartons to the health and beauty care market totaled 467,000 tons, accounting for about 9.7% of total folding carton shipments. Folding carton demand has eroded gradually on net since the beginning of the new millennium, lagging considerably behind growth in consumer spending on these products due to persistent competition from imported goods and some pressures from alternative packaging. However, a strong spending performance during the past five years has compensated for some of these pressures as the economy improved further, offering carton shipments a positive outlook from 2014-2018. Spending in the next five years is expected to be soft, placing greater downward pressure on carton shipment growth potential. The aging population and expanded healthcare coverage will drive greater spending on pharmaceuticals during this period. Meanwhile, rising personal incomes should allow consumers to loosen their wallets from the restrained spending patterns that set in following the 2009 recession, and cosmetics are one of the

sectors that should benefit from increased discretionary spending on premium goods.

Cosmetics & toiletries

Total carton shipments to the cosmetics & toiletries industry stood at 164,000 tons in 2018, approximately 3.4% of the total folding carton market. Cosmetics & toiletries spending has posted solid growth since the Great Recession, but substitution pressures have clearly undermined demand, helping explain why folding carton shipments to this end-use market have lagged far behind during this period. Although substitution pressures have persisted over the past few years, strong growth in consumer spending and industrial production have more than offset these pressures, translating into a 1.5% average annual gain in carton shipments from 2014-2018. Carton shipment growth is expected to slow to 0.6% annually, reflecting the softer demand environment.

Figure 1
Cosmetics and toiletries end-use market indicators
Five-year average annual growth rates



Spending trends

Cosmetics & toiletries has been an area where spending has been especially strong over the years; real spending growth in the category has averaged 2.8% annually over the last ten years, outpacing spending growth for the vast majority of categories covered in this report. By comparison, overall consumer nondurables spending has averaged 1.6% growth over the same time period. Spending on cosmetics & toiletries did drop in 2009 but rebounded promptly the following year. To no surprise, the deterioration in spending on more discretionary items like makeup, perfumes and lotions fell sharply by 6.1% in 2009, while spending on more necessary personal care items (e.g., toothpaste and shampoo) was more insulated and remained effectively flat during the year. The recovery for the discretionary items was slower than the more necessary personal care items, averaging 1.2% annual growth rate compared to a faster 2.8% from 2009-2013. The broad category experienced a positive rebound of 2.1% annually, on average, over the same period. Over the last five years, consumer spending on cosmetics & toiletries has grown at an even stronger average pace of 3.6%. Spending on cosmetics & toiletries in 2018

reached \$129.7 billion (2012\$), \$76.8 billion of which was for staples such as toothpaste, shaving cream and other necessities. Fastmarkets RISI's forecast for consumer spending on cosmetics & toiletries shows a 1.1% average annual growth rate from 2019-2023. Cosmetics spending as a share of total nondurables has steadily risen over time and we continue to assume this trend will persist over our forecast, particularly as spending on value-added cosmetics accelerates.

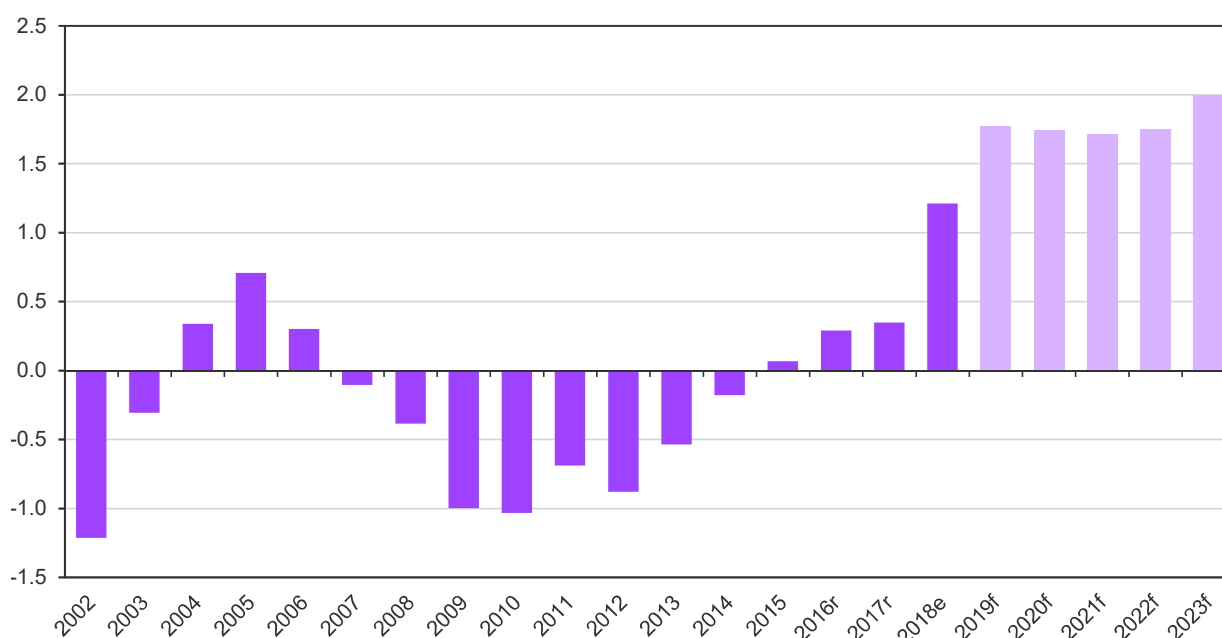
Trade trends

The import share of consumer spending for cosmetics & toiletries continued its upward climb in 2018, accounting for 11.5% of consumer spending in this segment. In 2002, imports accounted for just 4.7% of total cosmetic & toiletries spending. Over the past ten years, imports have grown by 6.1% annually on average, with 2009 being the only year in which imports declined. In 2018, imports stood at \$14.9 billion (2012\$), higher than exports, leaving net trade with a slight deficit of \$1.2 billion (2012\$). US exporters of cosmetic & toiletry products have been fairly competitive in the global marketplace, which has contributed to export growth advancing

Figure 2

Cosmetics and toiletries trade balance

Net imports in billions of US dollars (2012)



Source: Fastmarkets RISI, Inc.

at a similar pace as imports over the years, keeping the trade balance relatively stable. The US maintained a trade surplus in cosmetics & toiletries between 2007 and 2014, but recorded a marginal deficit between 2015 and 2017 of \$200 million (2012\$) on average. However, the size of the deficit increased considerably in 2018 due to imports growing at a faster rate of 11.6% compared to 5.2% for exports. Fastmarkets RISI forecasts that net imports will grow over the forecast horizon to \$2.0 billion (2012\$) due to the relatively faster import growth compared to exports as the US dollar strengthens over the same period.

Production trends

Federal Reserve data show mixed growth dynamics in cosmetics production after the recession, representing a collapse in production of about 1.3% annually over the past ten years. This seems to conflict with both the spending data, which depict robust consumption growth of 2.8% annually, and the trade data, which also show strong gains in external markets with exports growing at 4.7% annually. Part of the problem appears to be the broad nature of the index we are using (officially classified as Soap, Cleaning Compounds and Toilet

Preparation), which may not be the best proxy for the cosmetics & toiletries category. This industrial production index could very well be a better fit for soaps as an end-use category.

We are assuming more persistent gains in industrial production over the forecast horizon of 1.7% annually, which we believe is more reflective of underlying demand in the US economy for cosmetics, healthcare products and cleaning goods as well as external demand. This estimate is slower than the average annual growth rate recorded over the past five years of 1.9%.

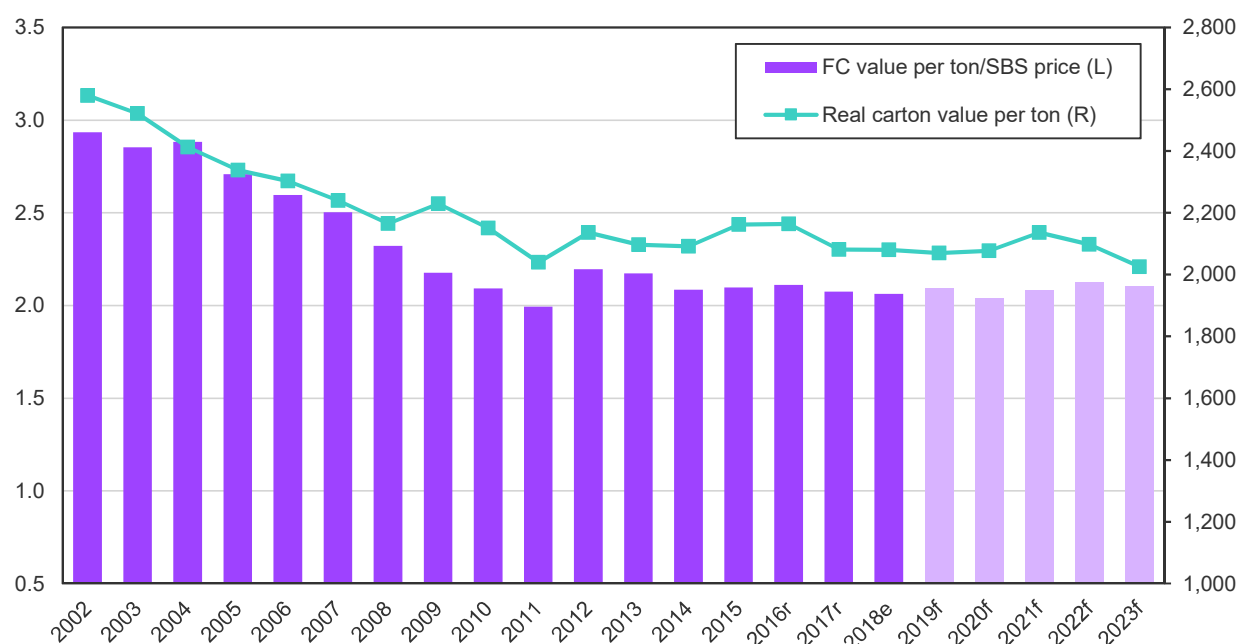
Folding carton trends

Despite the positive gains in consumer spending for cosmetics and personal care products, folding carton shipments to this end use declined at a 0.6% average annual rate during the last ten years. It should be noted that there is a wide divergence in the growth rates experienced before and after the recession. Prior to 2008 and 2009, folding carton shipments to the cosmetics and personal care segment were flat to slightly positive on net. Since the recession, however, shipments have been on a steady decline,

Figure 3

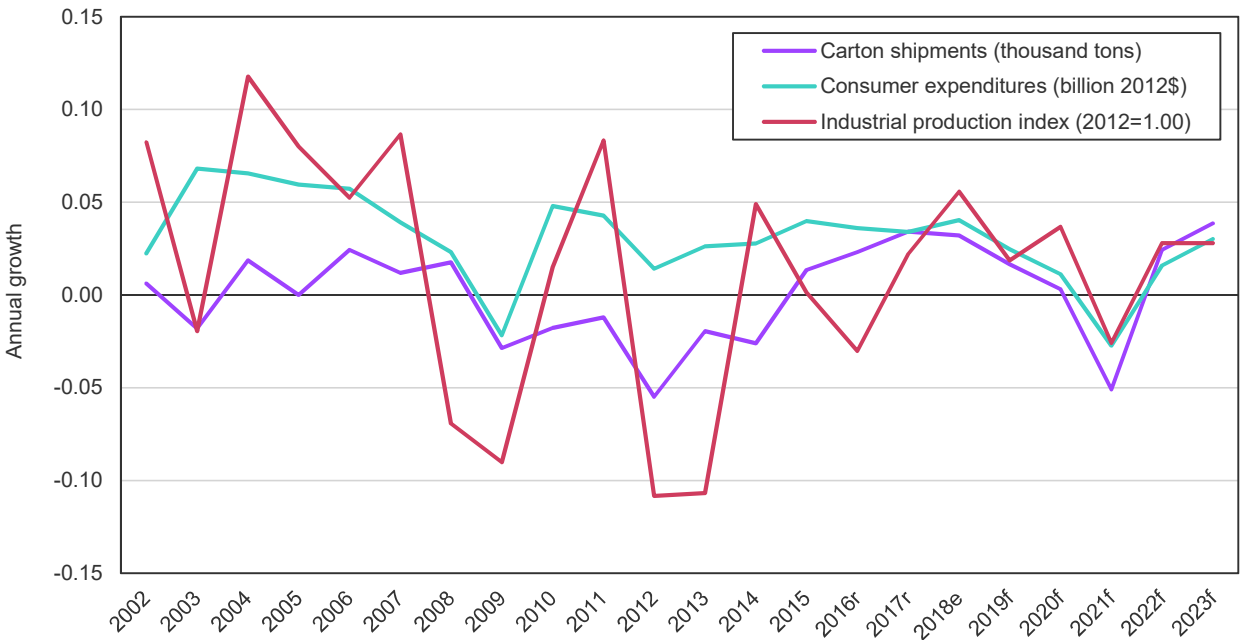
Cosmetics and toiletries: Carton value per ton relative to bleached board prices

Real carton value per ton in US dollars (2015)



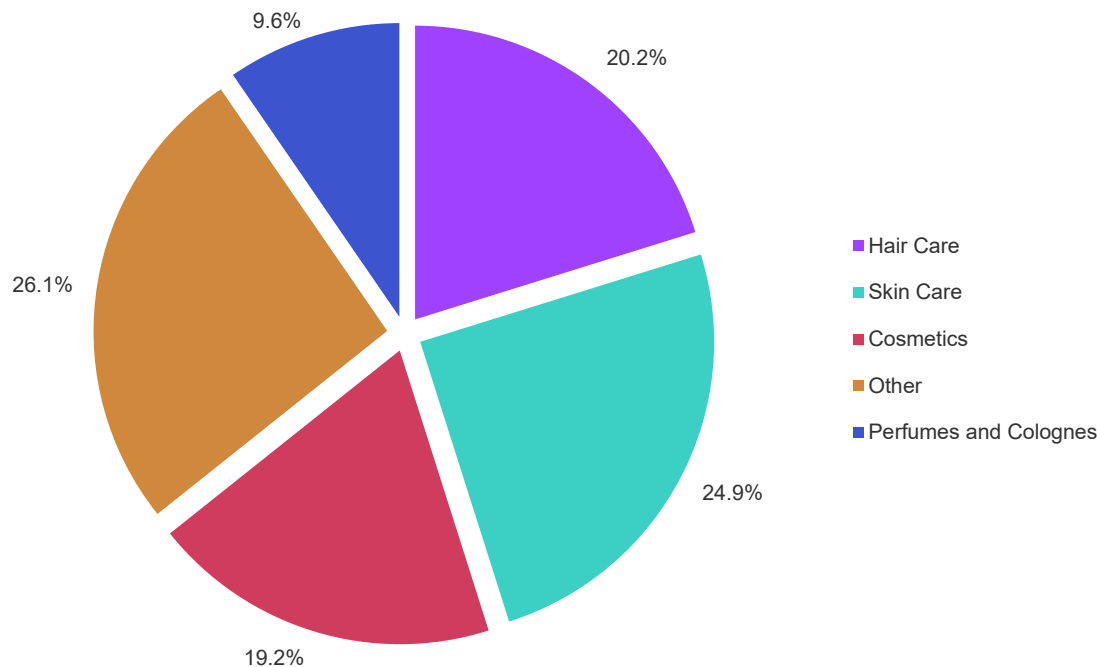
Source: Fastmarkets RISI, Inc.

Figure 4
Cosmetics and toiletries growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Figure 5
Cosmetic and beauty manufacturing in the USA
Products and services segmentation (2019)



Source: IBISWorld.

averaging 1.9% annually between 2008 and 2012. Part of this decline could be due to the consumption of value-added and luxury cosmetics deteriorating during the recession, losing share to staple products such as toothpaste, hair care and other toiletries as noted earlier. Recent years saw some recovery, averaging 1.5% annually between 2014 and 2018. The last three years exhibited most of the recent rebound, growing at 2.3%, 3.4% and 3.2% in 2016, 2017 and 2018, respectively. Much of the post-recession rebound in spending was likely tied to necessity personal care products and more value-oriented cosmetics. However, the recent recovery was also fueled by stronger spending on premium items that are shipped in higher value-added packaging.

We expect folding cartons recovery to continue in the coming years, albeit at a slower pace, mainly thanks to the overall moderate growth in consumer spending in the category coupled with cosmetics finally regaining some share lost during the recession as the consumer's situation improves. Total shipments to the cosmetics sector are expected to grow by 0.6% annually and reach 169,000 tons by 2023. Fastmarkets RISI acknowledges there is downside risk to this forecast if imports grow faster than we forecast or packaging substitution pressures are more severe than we anticipate.

Pharmaceuticals

The pharmaceutical industry is a small but important market for folding cartons, with strong upward trends in real spending. In 2018, pharmaceutical consumption of folding cartons in the USA accounted for 303,000 tons, or 6.3% of total folding carton shipments. Despite experiencing some strong growth in the early part of the last decade, shipments to this market have been on a downward trend, reflecting much of the broader weakness in the folding carton market. Fastmarkets RISI estimates folding carton shipments are at levels seen in the early 2000s when shipments to the segment were growing. Part of this reflects the exceptionally poor performance for industrial production since the recession, with output in 2018 coming in 21.1% below the peak levels recorded in 2007. It seems production has returned to a path of growth, however, prompting Fastmarkets RISI to

forecast that folding carton shipments to the pharmaceuticals industry will grow at a 1.0% average annual rate during 2019-2023.

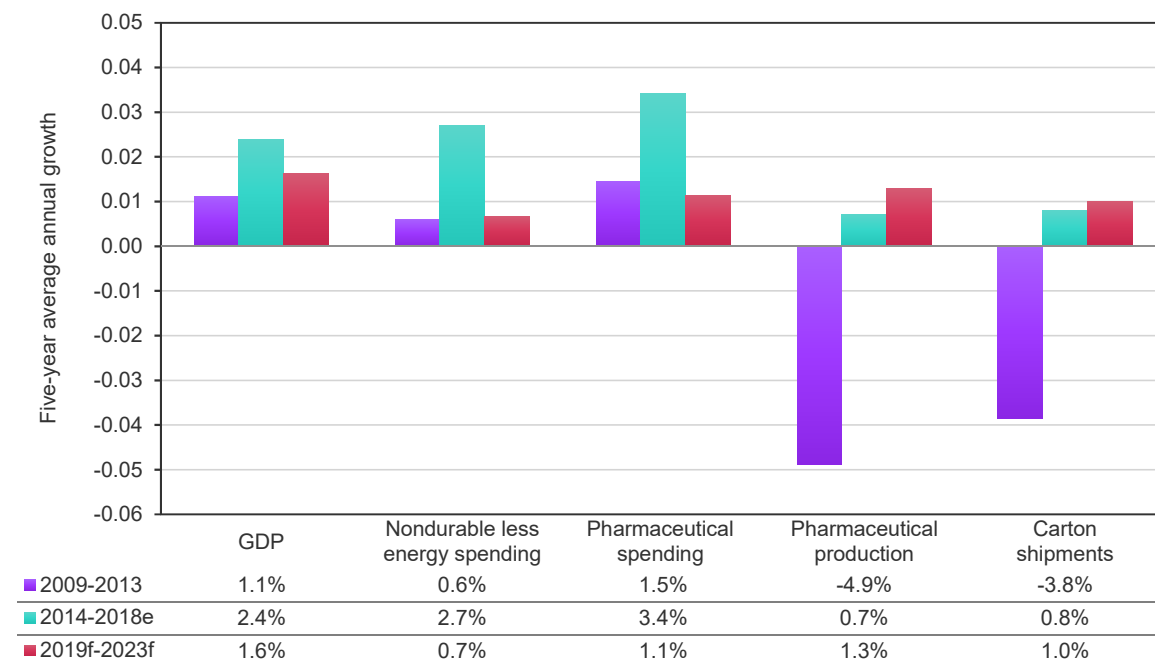
Spending trends

Consumer spending on pharmaceuticals has historically been very strong and extremely recession resistant. Expenditures increased on average 2.6% annually between 2006 and 2010; this is one of the only segments of the economy where consumer spending rose during the depths of the recession, with growth averaging 0.9% per year in 2008-2009. While spending on other medical equipment declined by 2.5% in 2009, spending on prescription and non-prescription drugs increased by 0.8% and 3.4%, respectively. In the period between 2009 and 2013, the trends changed, however, as spending levels on prescription drugs remained effectively flat at 0.6% annually, while non-prescription drug spending continued its exceptional performance at 6.8% and spending on medical supplies rebounded at a robust 4.2%. The overall spending on pharmaceuticals saw 1.5% average annual growth over the same period. Spending gains across all categories persisted from 2011 forward, translating to average spending growth of 3.4% annually over the last five years, with a noticeable acceleration in spending of 3.1% annually experienced on the prescription side of the market. Other categories continued their strong performance, with non-prescription growing at 4.8% annually and other medical products recording 5.7% average annual growth from 2014-2018. As of 2018, consumer spending on pharmaceuticals stood at \$438.9 billion (2012\$), 81.8% of which was prescription drugs.

Fastmarkets RISI's estimates for spending on pharmaceuticals point to slower growth in 2019 at 1.6%, softer than the 2.7% growth in 2018. Growth during the forecast period will be driven by aging baby boomers, new drug development and rising healthcare coverage. However, this could be undermined by significant drops in revenue from the ongoing patent cliff, which is allowing generics to proliferate for a number of critical drugs developed in the early 1990s. Profit margins are greater for wholesalers of generics, but revenue from such products will be greatly undermined, creating noteworthy downside risk to our spending forecast. Despite this,

Figure 6**Pharmaceuticals end-use market indicators**

Five-year average annual growth rates



Fastmarkets RISI anticipates that spending will increase at an average annual rate of 1.1% from 2019-2023, slightly lower than the post-recession growth rates.

Trade trends

Trade flows of pharmaceutical products have continued to swell over the years in the USA, with a widening trade deficit in the category. From 2002-2018, net imports of pharmaceuticals expanded from \$11.4 billion to \$57.8 billion (2012\$). Much of this was due to soaring prescription drug costs in the USA, which drove consumers to purchase cheaper alternatives available in Canada and other industrialized countries that impose price ceilings on drug prices. Imported pharmaceutical products grew by 8.5% per year between 2006 and 2010. Exports expanded at a faster pace of 10.2% annually over the same period; however, this growth was from a significantly lower base than imports, helping explain the jump in the trade deficit for pharmaceuticals. The recession temporarily abated the deficit expansion as imports slowed but exports continued to rapidly expand in 2008 and 2009. But this was

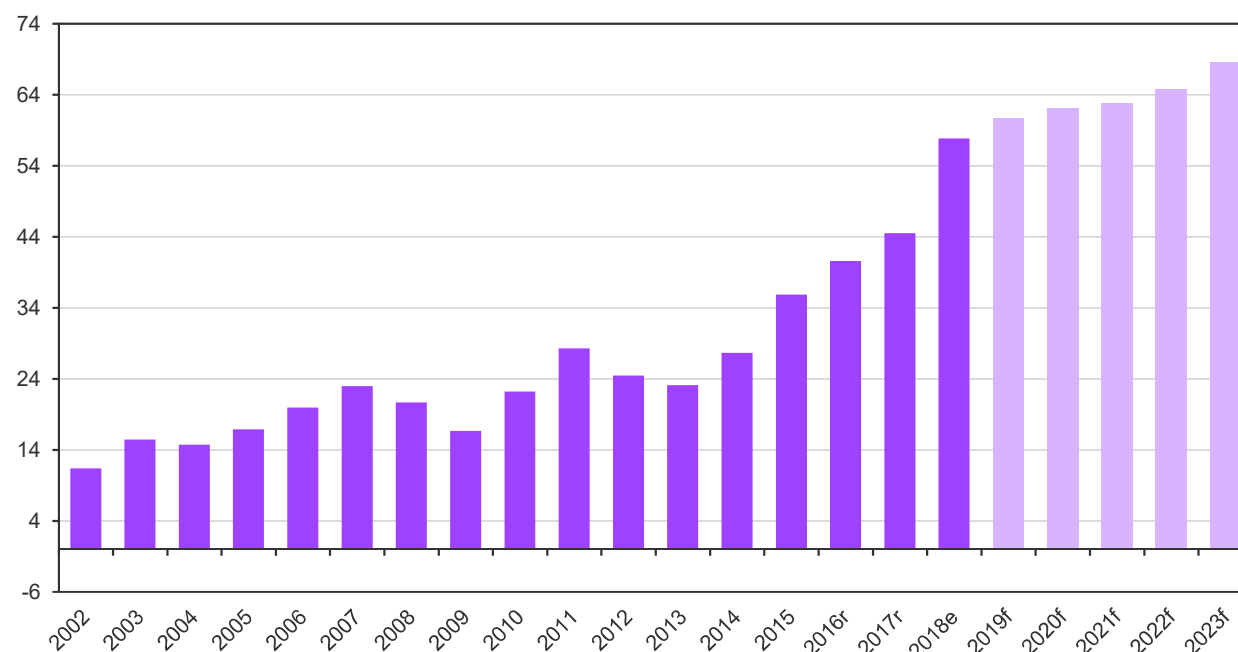
short-lived as the effects of the economic slowdown in the USA spilled over to the world economy, undermining exports and allowing the trade deficit to resume its upward trend.

The past five years saw the deficit balloon by an enormous 20.2% average annual rate, which was mostly fueled by the accelerating growth in imports of 9.7% annually and slow growth in exports of 1.0%. In 2015, we saw the second-highest growth rate of imports since the recession at 13.5% to fulfill some of the 4.9% growth in spending for the year. This growth pushed the trade deficit in 2015 to \$35.8 billion (2012\$), 29.6% higher than 2014 levels. This significant change in the trends could be partly attributed to the rapid strengthening of the US dollar over that period.

We expect the trade deficit to widen further in the coming years as the moderate consumer spending and a slightly stronger US dollar will translate to import growth that will surpass gains by exports, and as regulations on imported prescription drugs ease. Fastmarkets RISI expects the trade deficit to grow by 3.5% annually from 2019-2023 and approach \$68.5 billion (2012\$) by the end of the period.

Figure 7**Pharmaceuticals trade deficit**

Net imports in billions of US (2012)



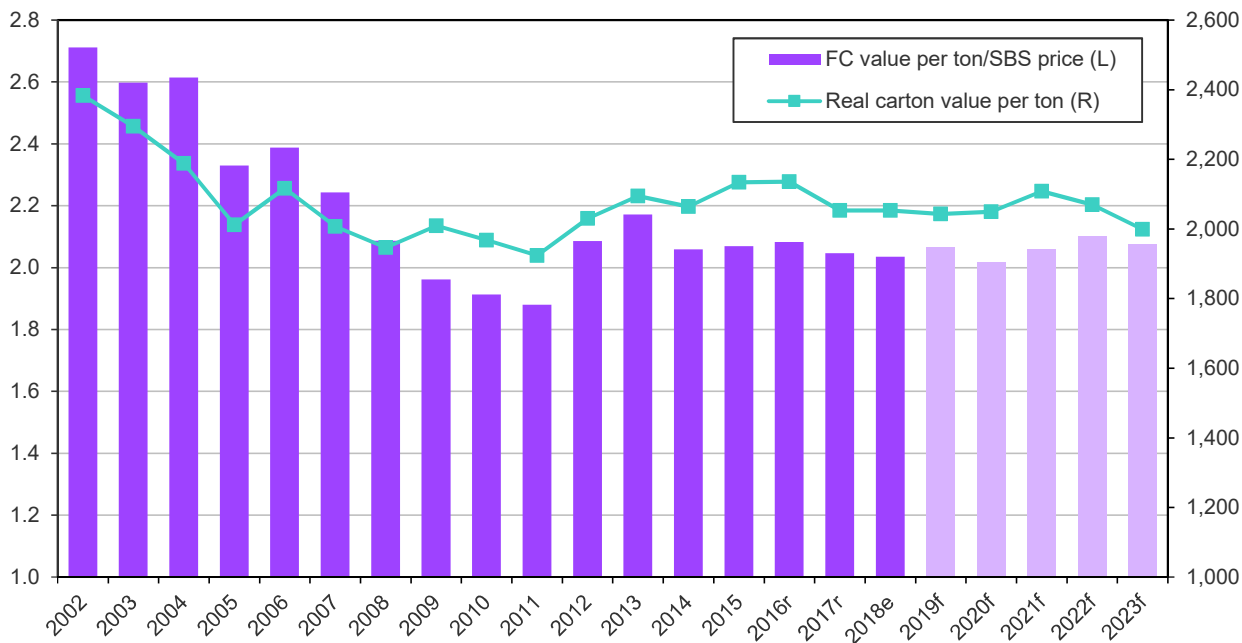
Source: Fastmarkets RISI, Inc.

Production trends

Manufacturing of pharmaceuticals and medications was very strong prior to the recession, but during the recession production experienced its first declines since 1992, falling 2.3% and 5.9% in 2008 and 2009, respectively. Output losses deepened in 2010, decreasing by 6.9%, and then temporarily ceased in 2011 with effectively flat production growth. However, the next two years saw further declines of 3.3% and 8.1%, respectively. Production losses then moderated to a more bearable 1.6% decline in 2014. It appears 2015 is the year that broke the stagnant-to-declining pharmaceutical production data, with growth expanding by 4.1% year-over-year, which also seems more consistent with the consumer spending figures. Production of pharmaceuticals declined again in 2016 and 2017 by 1.5% and 1.0%, respectively.

Part of the explanation for the challenging output data seems to be soaring import growth, as imports' rising share of total pharmaceutical spending has contributed to the slower growth in industrial production, although this does not fully account for the inconsistency with strong spending growth over the period. The challenging exports market in 2016 and 2017 is another factor behind the volatility in production. Exports recorded a 4.3% drop in 2016 and deteriorated even further in 2017 by 6.9% year-over-year. Overall, production recorded a nearly flat average annual growth rate of 0.7% from 2014-2018. As of 2018, pharmaceutical industrial production was still 21.1% below 2007 levels. As consumer spending and exports grow moderately, industrial production is forecast to increase at a 1.3% average annual rate between 2019 and 2023, although it will continue to face challenges from imported products.

Figure 8
Pharmaceuticals: Carton value per ton relative to bleached board prices
Real varton value per ton, US dollars (2015)



Source: Fastmarkets RISI, Inc.

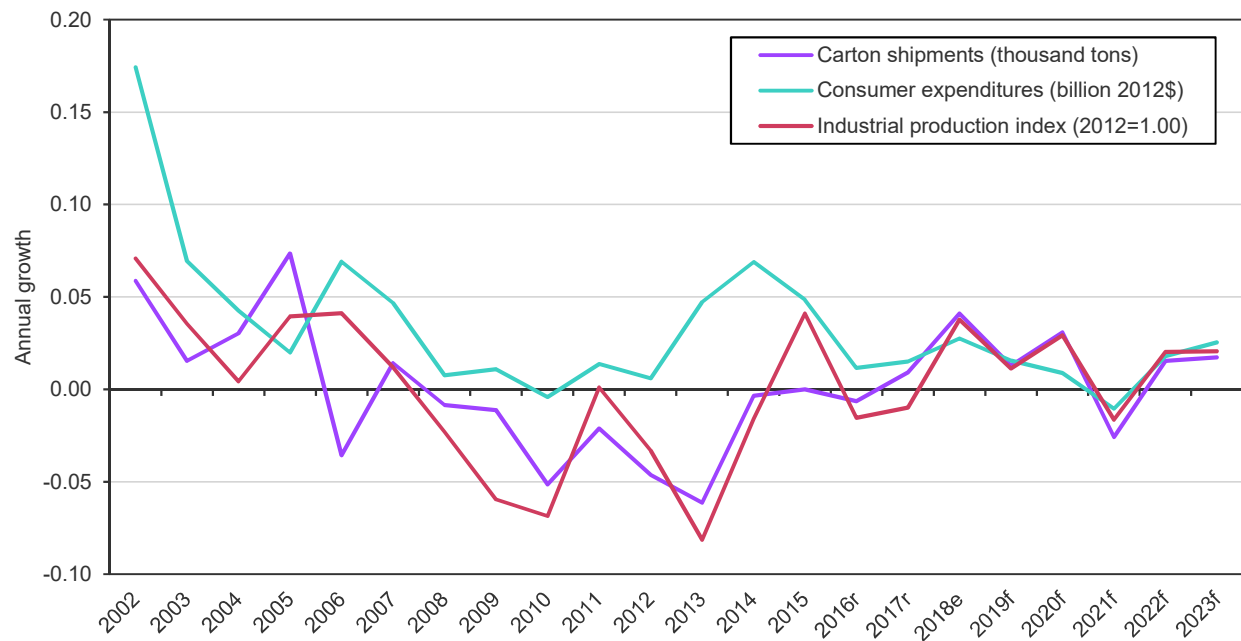
Folding carton trends

Shipments of folding cartons to the pharmaceutical segment have had difficulty rebounding to pre-recession growth levels; in the years leading up to the recession, folding carton shipments to pharmaceutical end uses grew by roughly 3%. Despite showing some initial resilience, industrial production had deteriorated notably by 2010, dragging folding carton shipments down as a consequence. Pharmaceutical manufacturing in the USA rebounded by 2011, but had difficulty keeping that momentum, and subsequently contracted by 4.9% annually from 2009-2013, leaving average carton shipments down by 3.8% over the same period. The following five years

(2014-2018) provided a slight recovery in the production and carton shipment fronts. Production recorded a nearly flat recovery of 0.7% annually, echoed by carton shipment's 0.8% annual growth. As noted, there has been an odd disparity in industrial production and consumer spending growth since the recession, even when factoring in the growing trade deficit, but we believe output will grow moderately and fall closer in line with consumer spending in pharmaceuticals over the next five years. Improved pharmaceutical output will be driven by wider healthcare coverage and greater access to more affordable generic options, which should help carton shipments to this sector to grow by 1.0% annually for the next five years.

Figure 9

Pharmaceuticals growth in shipments, consumer spending and industrial production



Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Other non-food products (hardware & household supplies, converted paper products, recreational & sporting, soap, tobacco) and miscellaneous

Other non-food products include hardware and tools, small electronics, stationery, envelopes and mailers, soap, detergents, tobacco, and other miscellaneous products not classified elsewhere. Folding carton shipments to these markets, excluding miscellaneous products, have been undermined for the past 20 years due to substantial demand and substitution pressures, leaving very little probability for growth in this segment.

- Soaps and detergent accounted for 29.2% of total shipments (in tons) in the non-food market segment (excluding miscellaneous products) in 2018, followed by paper products at 26.8%, hardware at 21.5%, sporting and recreational products at 13.2% and tobacco products at 9.3%.
- Other non-food carton demand has been on a steep descent for a number of years now. In 2000, carton shipments to other non-food markets excluding miscellaneous products were 1.05 million tons, accounting for 19% of total carton demand. After more than a decade of nearly constant declines, total shipments had fallen to 538,000 tons in 2018, or about 11.2% of carton shipments.
- The share of imports comprising consumer spending continues to grind higher, increasing from 9.0% in 2002 to 19% in 2018. Categories like hardware and converted paper products have been especially susceptible to import competition over the last several decades due to the globalization of supply chains and economical transportation costs.
- Despite modest spending gains in this category over the next five years, carton demand is projected to erode by 1.5% annually. However, the decline in carton shipments to these markets should be far less pronounced than was the case during the last ten years, when average losses were around 4.4% annually due to categories like tobacco and hardware, which were hit especially hard.
- The miscellaneous or other markets accounted for approximately 8.8% of total folding carton shipments in 2018 and will remain within that range over the forecast horizon.

Hardware and household supplies

The prospects for the hardware market remain difficult for US producers challenged by foreign competition. Over the past ten years, hardware carton shipments have performed worse than any other end-use category except tobacco, declining by 5.7% annually on average. Although less grim, carton shipments are still forecast to decline 1.4% per year over the next five years, due to the continued pressure on producers of hardware and household supplies from persistent increases in import competition. Additionally, consumers are increasingly turning to e-commerce for their home tools and appliances. The convenience of online shopping, the competitive prices and the variety of options have enhanced e-commerce in the hardware and household supplies market. This shift will create strong substitution pressure on folding cartons, moving more appliances and home tools from the store shelves to the Internet.

Spending trends

Consumer spending on hardware and household supplies has advanced by 5.7% on average since 2008, demonstrating the clear pickup in spending after the recession years. Between 2006 and 2010, spending was particularly slow, with annual gains of 0.6% on average. Since 2010, hardware and household supplies showed a strong recovery in spending, recording exceptional growth patterns of 10.1%, 9.0% and 8.7% for 2010, 2011 and 2012, respectively. Overall spending in 2009-2013 registered average annual growth of 5.4%. Spending has maintained this growth momentum over the past five years, growing by 6.0% on average per year. Improved labor market conditions and upward pressures on

wage growth have allowed spending in this segment to rebound nicely, reaching \$38 billion (2012\$) in 2018, 69.2% higher than the pre-recession peak in 2006 of \$22.5 billion (2012\$).

National income accounts report consumer spending in two categories: tools, hardware and supplies and small electric household appliances. The small electric appliances category has seen its share grow relative to tools and hardware, accounting for close to 26% of total spending across the entire category in 2018; this compares with an 18.1% share in 2002. Expenditures on tools, which is heavily dependent on the housing market, experienced declines starting in 2006 that persisted through 2009. Since regaining the path of growth, the category has advanced to reach \$28.2 billion (2012\$) in 2018, 58.2% higher than its pre-recession peak of \$17.8 billion (2012\$). Small electric devices, on the other hand, held up relatively well despite the recession, posting growth in the mid-single digits over the past five years and spending well above their pre-recession peak.

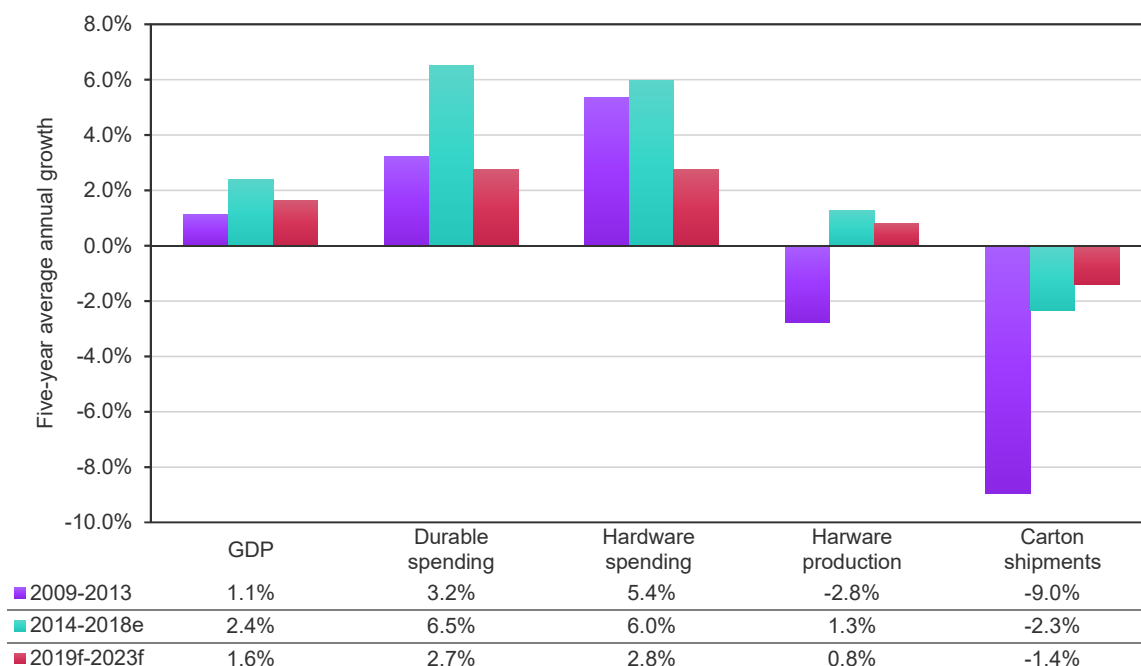
A moderate year of growth is anticipated for tools and hardware, driving Fastmarkets

RISI's forecast of a 3.8% year-over-year increase for 2019. Consumers appear to be investing in their homes and leveraging the opportunity to improve the value of their biggest financial asset. Additionally, many existing homeowners still lack the financial resources to upgrade to a new house and supply constraints in the housing market make new home construction challenging, pushing many to upgrade their existing household instead. Looking further down the forecast horizon, Fastmarkets RISI is forecasting housing starts will continue to grow on a healthy trajectory through 2020 before softening during the downturn year of 2021. The exceptional growth trends in spending are sensitive to labor market conditions and the housing starts outlook. Although the spending outlook seems robust in 2019 and 2020, growing at 3.8% and 3.1% year-on-year, respectively, the general outlook for the next five years is noticeably weakened due to the expected slowdown in 2021. We anticipate total spending on tools, hardware and small household appliances will grow at 2.8% average annual pace between 2019 and 2023, slower than the rate recorded over the past ten years.

Figure 1

Hardware supplies end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Trade trends

With a devastating effect on US producers, imports have been able to protect their market share of consumer spending during the last ten years, accounting for 58% in 2018, the same level they controlled in 2008. Imports bore the brunt of the downturn in consumer demand between 2007 and 2009, pushing the import share of consumer spending down to 46% in 2009 compared to 62% in 2007. However, spending on imports picked up sharply during 2010 and the years following, increasing imports' share back to the 55-59% range. The past ten years saw imports growth accelerating by 5.5% annually, accounting for a significant share of the ballooning spending over that period. Imports' performance over the past five years has remained consistent and kept its momentum at an exceptional average annual rate of 5.9%. The growth dynamic especially strengthened in 2017 and 2018 at 7.4% and 9.7%, respectively, bringing 2018 spending on imported tools and hardware up to \$21.9 billion (2012\$).

On the other side, exports have registered moderate ten-year average growth of 2.3%.

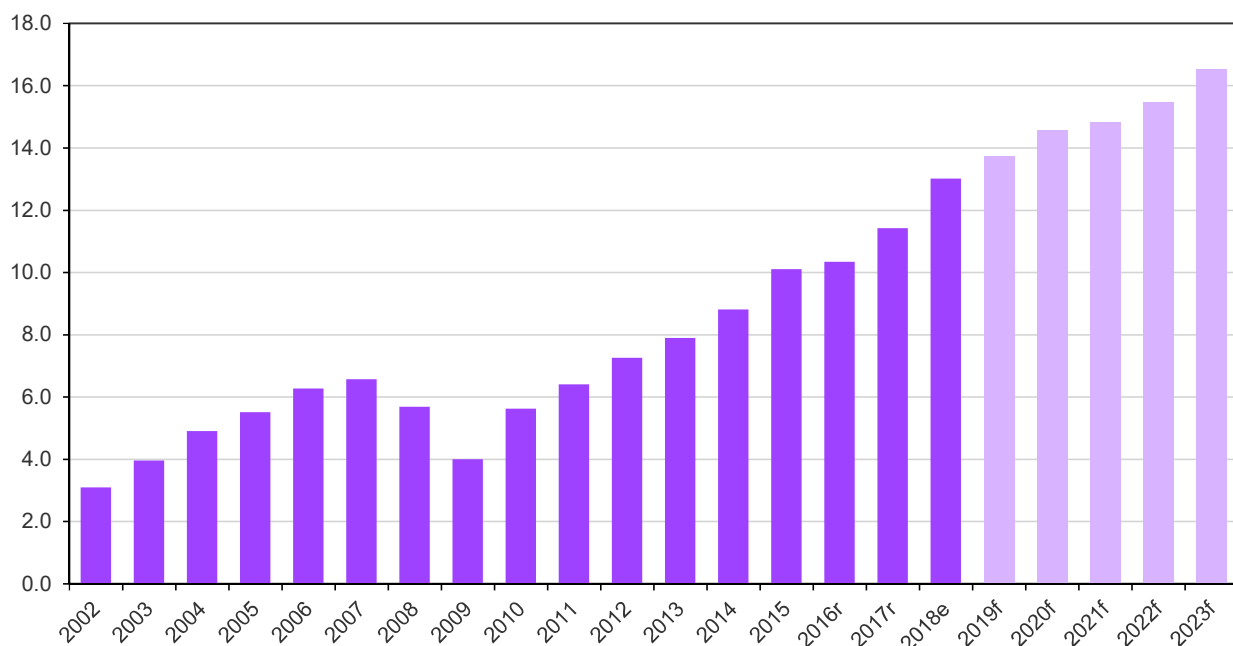
However, most of the growth momentum was in 2009-2013 at 3.8% annually, while the past five years had an anemic performance of 0.9% annually. After the recession, exports showed good recovery potential, growing 28.1% and 11.2% in 2010 and 2011. However, the strengthening of the US dollar halted this rebound and exports declined by 4.6% and 2.6% in 2015 and 2016, respectively. Growth has gotten back on track in the past two years, albeit at a much slower rate than imports, rising by 3.5% in 2017 and 4.1% in 2018, increasing the trade deficit to \$13.0 billion (2012\$) in 2018.

Fastmarkets RISI projects that the trade deficit for hardware products and household supplies will climb further over the forecast horizon, with foreign producers attaining a 60% share of the market by the end of the forecast. Tariffs on imported items from China could introduce cost pressures but are unlikely to significantly impact the volume of imports. This is mainly due to the potential shift in manufacturing operations to other countries that are unaffected by the tariffs, providing little or no reprieve for domestic producers of such goods.

Figure 2

Hardware supplies trade deficit

Net imports in billions of 2012\$



Source: Fastmarkets RISI, Inc.

Production trends

The persistently high share of imports in spending during the last decade has contributed to the overall decline to the nearly no growth stance in industrial production of hardware, hand tools and small appliances. Manufacturing of these products has fallen at a 0.8% average annual rate since 2009. Following the industry's pummeling during the recession, the recovery in output has not been stable, posting a further contraction of 2.8% annually from 2009-2013. Despite the weak start in 2014 and the declines in 2016 and 2017, the rebound in production in 2018 pushed the average growth rate from 2014-2018 to 1.3% annually. We expect output to continue on its recent positive trend going into 2019, growing 2.6% year-on-year, which should be supported by strong growth in spending (3.8%) and the persistently improving exports market (3.9%). Output, however, will likely experience some volatility or even decline

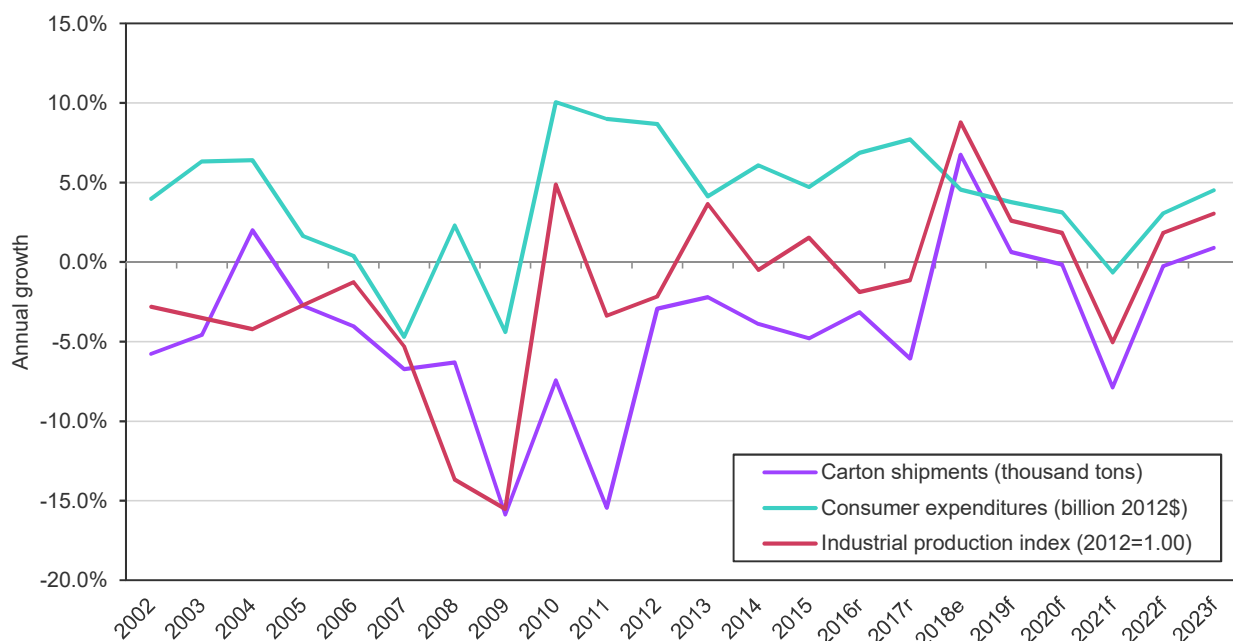
as imports continue to garner most of the growth in consumer spending. Fastmarkets RISI expects industrial production will gain 0.8% annually on average from 2019-2023.

Folding carton trends

The challenges faced by hardware and household supply manufacturers has devastated folding carton shipments to the sector, which declined at a 5.7% average annual rate between 2009 and 2018. Imports will likely continue to undermine domestic hardware producers and drive carton shipments down further, which are forecast to fall at an average annual rate of 1.4% between 2019 and 2023. The share of hardware carton shipments to total carton shipments will slip to 2.2% by the end of the period. Carton shipments will likely fare worse than industrial production as substitution pressures by alternative packaging products will persist, especially with the increase in CRB prices over the forecast horizon.

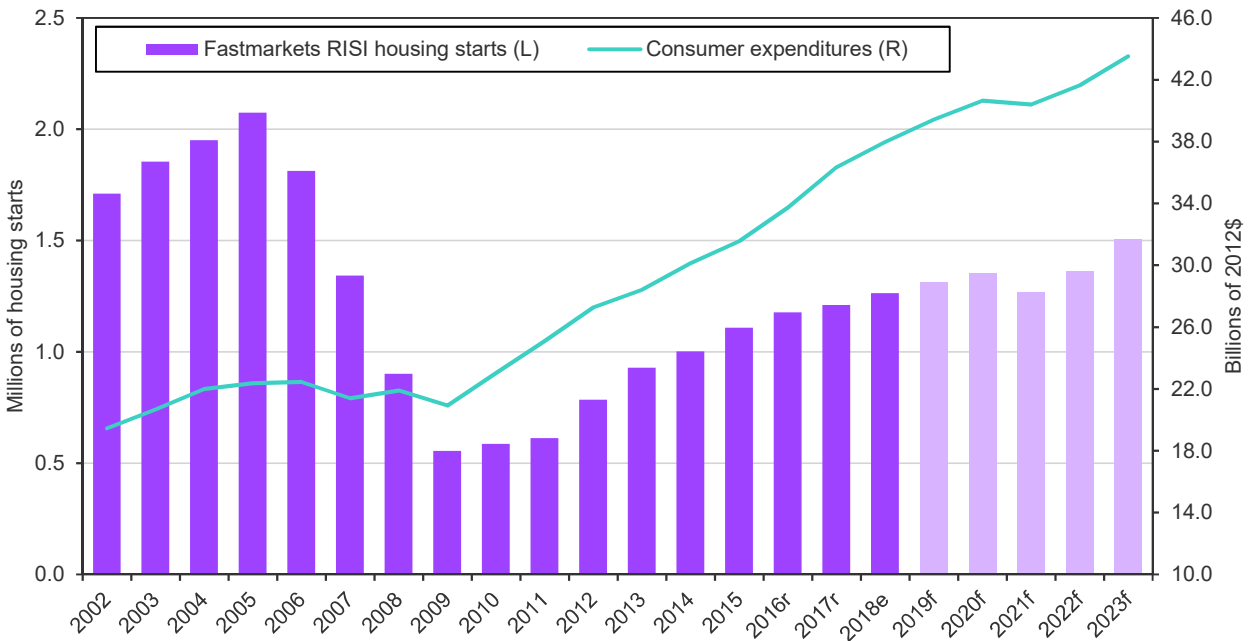
Figure 3

Hardware supplies growth in shipments, consumer spending and industrial production



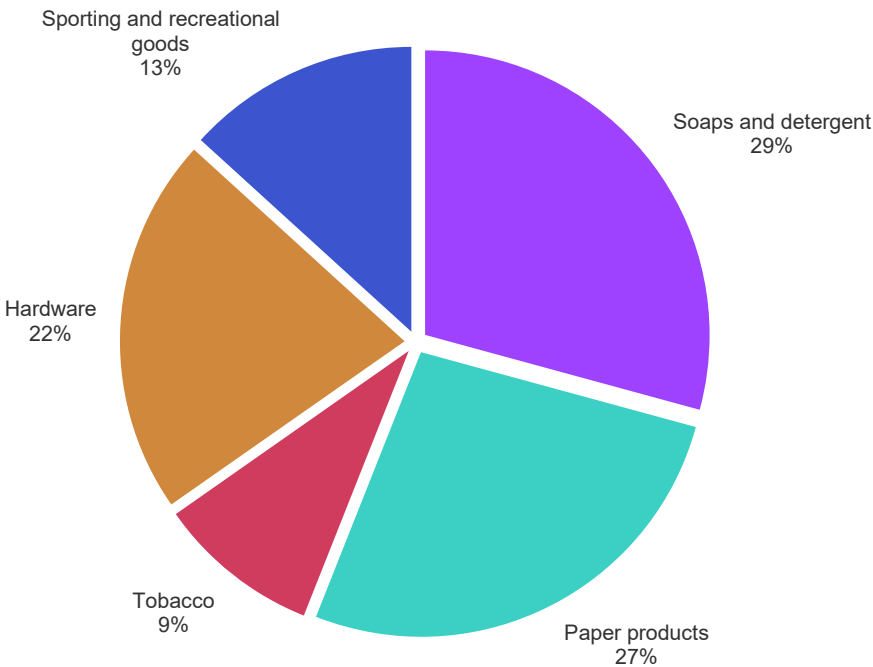
Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Figure 4
Fastmarkets RISI housing starts forecast and consumer expenditures on hardware and household supplies



Source: Fastmarkets RISI, Inc., US BEA.

Figure 5
Other non-food carton shipments by market share
Percentage of total carton shipments (thousand tons)



Source: Fastmarkets RISI, Inc.

Converted paper products

The proliferation of digital media in the 21st century has placed significant downward pressures on converted paper products demand over the years, translating into a state of perpetual decline in folding carton shipments to the sector. Demand for key products in this category, such as printed stationery, checkbooks, cards, envelopes, etc., have been the most susceptible to electronic substitution, eroding spending prospects for the overall category. The forecast for converted paper product spending and output is expected to be subdued during the next five years, and carton shipments are predicted to contract at a 0.9% average annual rate through 2023, reflecting further shifts from paper-based communications in financial services, bill payments and general communications.

Spending trends

Despite challenges for the sector generated by technological change and plummeting aggregate demand during the recession years, consumer spending on converted paper products has actually grown in recent years, increasing 3.2% on average annually

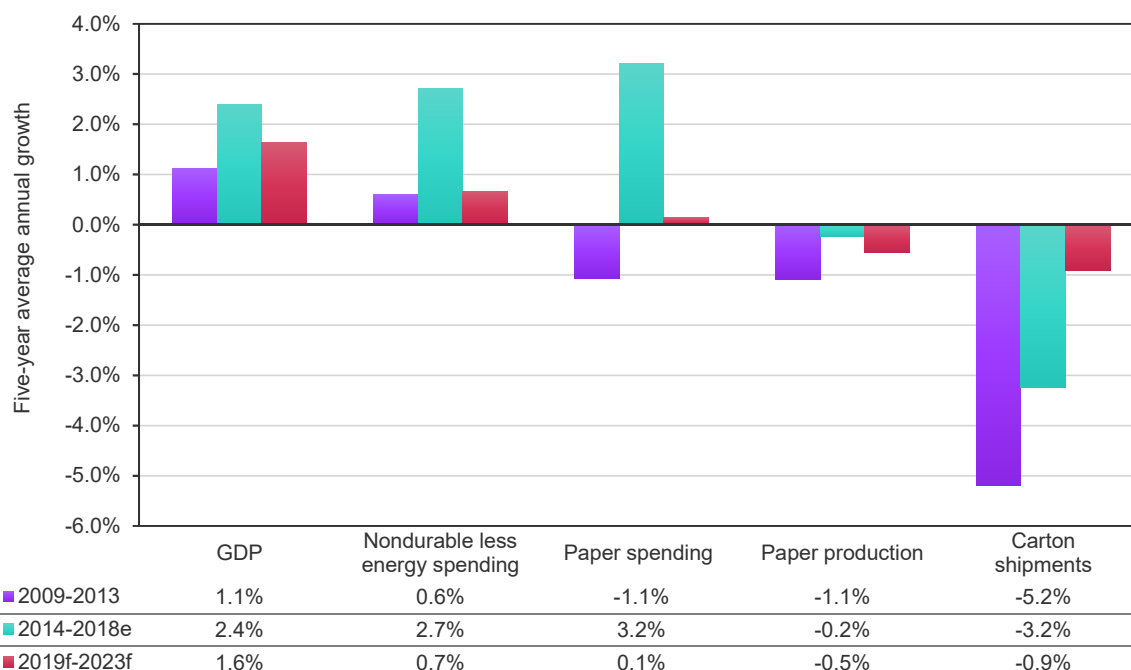
between 2014 and 2018. The BEA data used to estimate converted paper products comprise two categories: household paper products and stationery & miscellaneous paper products. Of the two, household paper products took the larger hit during the recession, declining 2.8% between 2006 and 2010. Meanwhile, stationery & miscellaneous paper products slipped by a milder 1.0% over the same period.

Consumer spending in both categories stepped onto the path of recovery in 2011, although household paper products have yet to regain their pre-recession peak from 2005, and growth in the segment remains fairly subdued. Real consumer spending in 2018 reached nearly \$66.6 billion (2012\$) and experienced a strong year of growth (4.1%), mainly due to the stationery & miscellaneous products category. Fastmarkets RISI forecasts soft 0.5% year-over-year growth in 2019, and anticipates somewhat even more muted growth over the five-year forecast of 0.1% annually. Households continue to shift away from printed stationery and cards as electronic alternatives become more popular, undermining long-term growth in the segment and shrinking this category's share of non-durable expenditures.

Figure 6

Converted paper products end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Trade trends

Imports have adversely impacted many of the converted paper markets over the course of the last decade. Prior to this, the converted paper industry maintained a solid trade surplus throughout the 1990s. However, this surplus disappeared in 2002, and a trade deficit for these products blossomed between 2003 and 2008, growing to about \$1.0 billion (2012\$) by the end of the period. In the meantime, industrial production of these goods began to notably deteriorate. The trade deficit receded modestly in 2008 and 2009, largely because imports bore the brunt of the downturn in spending. Following the recession, however, the trade deficit stabilized through 2013, hovering around \$600 million to \$800 million (2012\$), but opened up once again as the US dollar made substantial gains against most other currencies, adversely affecting US manufacturers. The deficit jumped in 2015 to \$1.4 billion (2012\$), mirroring strong growth and an increase in imports of 6.0% and 7.0% in 2014 and 2015, respectively, compared to nearly flat growth in exports.

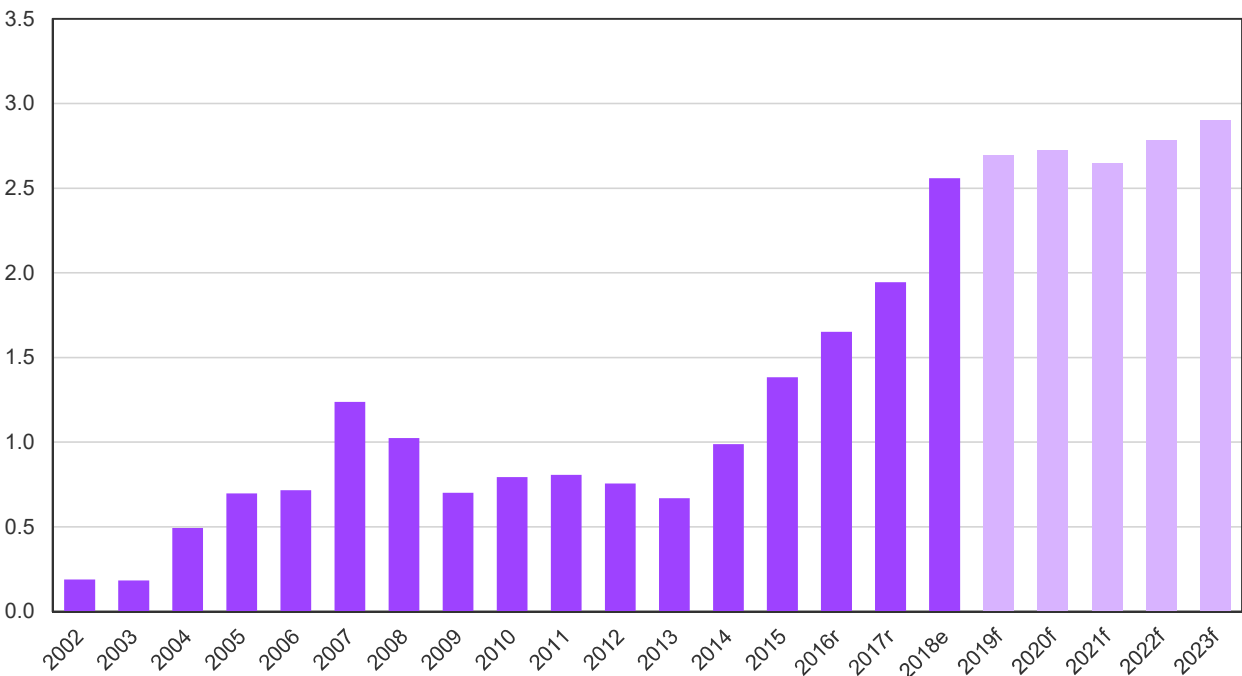
The following three years did not offer much relief on the deficit side, as it continued

its upward trajectory, reaching \$2.6 billion (2012\$) as of 2018. Accelerating imports growth has driven much of the deteriorating trade outlook, as it increased at a 5.8% average annual rate in the past five years, compared to some decline in exports of 0.2% annually over the same period. Fastmarkets RISI forecasts imports will see slower growth, echoing the soft spending outlook, while export growth will see further declines in the stronger exchange rate environment that we are currently forecasting. By 2023, real net imports of converted paper products will be \$2.9 billion (2012\$), thanks to imports growing at an average annual rate of 0.6% in 2019-2023 and exports declining by 0.4% per year on average over the same time period.

Production trends

Industrial output of converted paper products has been on a slight downward trend for some time, declining by 0.7% annually over the past ten years. Foreign competition and slowing domestic demand for printed paper end uses have made for an especially challenging environment for US producers. The effects of the recession only accelerated

Figure 7
Converted paper products trade balance
Net imports in billions of 2012\$



Source: Fastmarkets RISI, Inc.

the declines facing producers, pushing output down by nearly 16% by 2009 from 2007 levels. Although the industry bounced back in 2010, growing by 1.6% due to inventory restocking, the period since 2011 can be mostly characterized by stagnant output, with the exception of a surge in production in 2012. The past five years showed production declining at 0.2% annually on average, reflecting the weak export environment and imports' growing share of spending.

Converted paper products manufacturing shows little sign that the long-term downward trend in output will improve. We are forecasting output will decrease by 0.5% over the next five years, basically in line with the performance seen in the last five years, although this could be optimistic if import pressures are more severe than anticipated and domestic demand is further undermined by electronic substitution.

Folding carton trends

The broad converted paperboard markets (corrugated boxes, folding cartons, etc.) account for roughly half of all converted paper

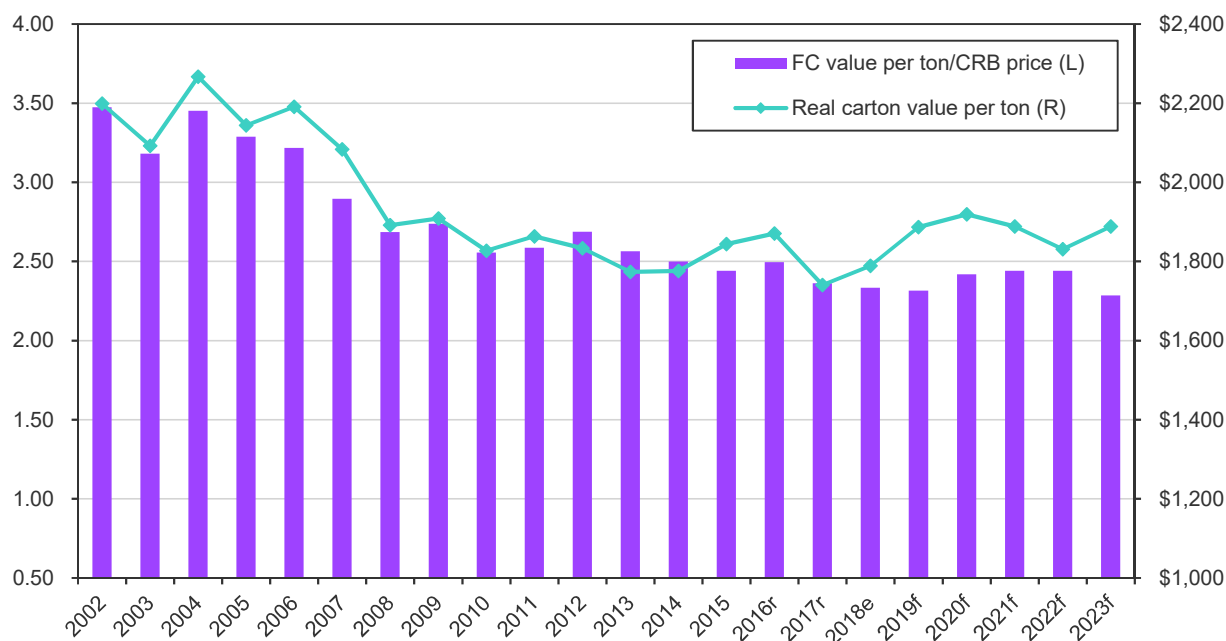
products production. However, carton demand linked to converted paper products is mainly tied to segments like office supplies, envelopes, other stationery products, tissue and toweling products, and other converted products. The tissue and toweling segment is the only one that is expected to record any meaningful growth over the next five years. Electronic substitutes for some traditional office supplies, mailers and financial services continue to become more commonplace, which translates into eroding carton demand in this market.

From 2009-2018, converted paper products carton shipments declined by an average of 4.2%. During 2008-2009, folding carton shipments to the converted paper industry plummeted 8.4%, making this one of the worst-performing market segments. Unlike many other market segments, carton demand for converted paper products did not record a post-recession recovery. Instead, carton shipments continued to fall, sliding to 144,000 tons in 2018, 35.9% below the pre-recession levels seen in 2007. The past five years showed carton shipments falling at an average annual rate of 3.2%, in line with weak industrial production and exports.

Figure 8

Converted paper products: Carton value per ton relative to recycled board prices

Real carton values per ton (2015\$)



Source: Fastmarkets RISI, Inc.

Industrial production appears unlikely to move in a direction of persistent growth, and our demand forecast remains modest at best as demand will be supplied by a greater share of imports. Fastmarkets RISI forecasts folding carton shipments will decline approximately 0.9% annually between 2019 and 2023, and the decline could be even more dramatic if the effects of electronic substitution do not begin to taper off fairly soon.

Recreational and sporting

At 71,000 tons, the recreation and sporting markets accounted for only 1.5% of total folding carton shipments in 2018. Strong consumer spending and a soft production performance will provide some growth for this eclectic market. However, this will not be enough to accelerate carton shipments given the outlook for imports, resulting in 0.1% average annual growth in shipments over the five-year forecast horizon.

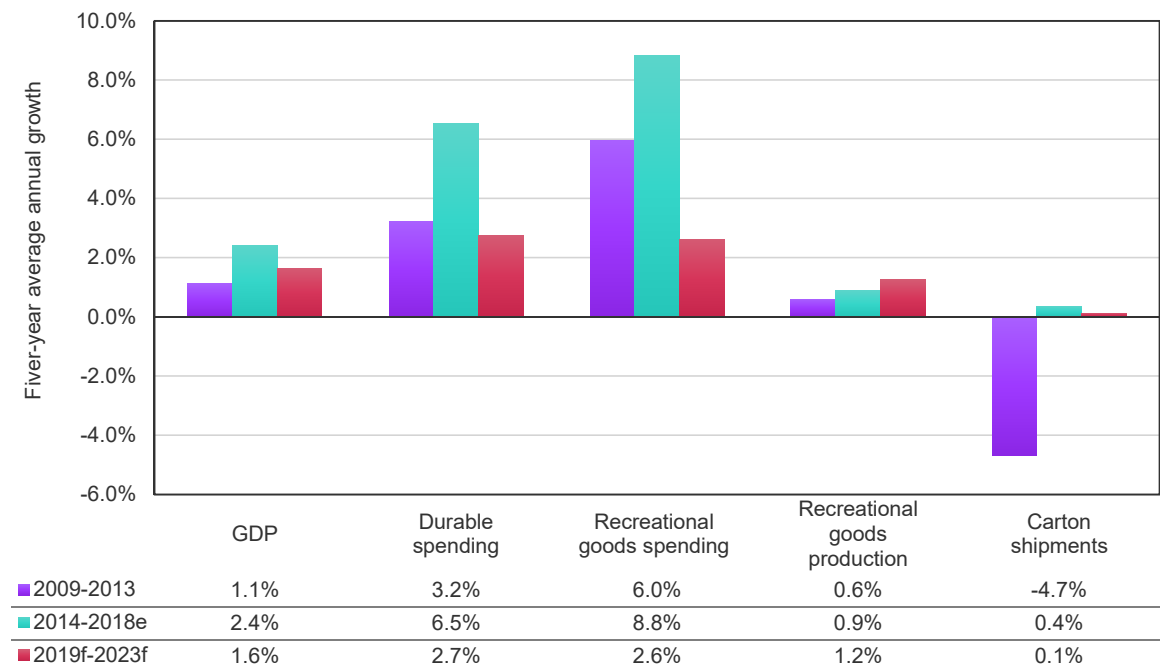
Spending trends

Consumer spending on recreation products has grown rapidly in the past decade, increasing at an average annual rate of

7.4% from 2009-2018. This market segment has three major components: games, toys and hobbies (55.1% market share); sporting equipment, guns and ammunition (41.3%); and film and photographic supplies (3.6%).

Toys, games and hobbies was one of the few segments of the economy where spending did not fall during the 2008/2009 recession, but rather increased at a strong 7.7% average annual rate. It is likely that consumers cut costs by substituting expensive vacations and recreational activities with lower priced, stay-at-home alternatives such as video and board games. Looking more broadly, the category has also experienced rapid growth over the past ten years, averaging 10.2% annually. Meanwhile, spending on sporting equipment, guns and ammunition grew at an average annual rate of 4.7% over the same period. This category was not recession-proof, with expenditures falling 2.5% in 2008 and 7.2% in 2009, leaving total spending at 2005 levels. The sporting equipment, guns and ammunition category has since recovered strongly from the recession, although it has notably lost share to games, toys and hobbies, for which spending has advanced at a blistering pace.

Figure 9
Recreational products end-use market indicators
Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

The sporting equipment, guns and ammunition category had a 56.4% share in 2007 but this has declined over the years to 41.3% in 2018, while the games, toys and hobbies category regained its lost share, growing from a 40.1% market share in 2007 to a 55.1% share in 2018.

As a whole, consumer spending in this segment in the last five years has grown by a healthy 8.8% annually, reaching \$196.4 billion (2012\$) in 2018. Our forecasts show that 2019 will be a strong year for spending growth, albeit slower than 2018, advancing by 4.2% year-over-year. We anticipate growth will continue at a moderate pace of 2.6% annually through our forecast, noticeably impacted by the expected slowdown in 2021.

Trade trends

Imports have supplied much of the growth in consumer spending on recreational products during the last decade. Net imports of toys and sporting goods grew at a 6.0% average annual rate between 2009 and 2018. A surge

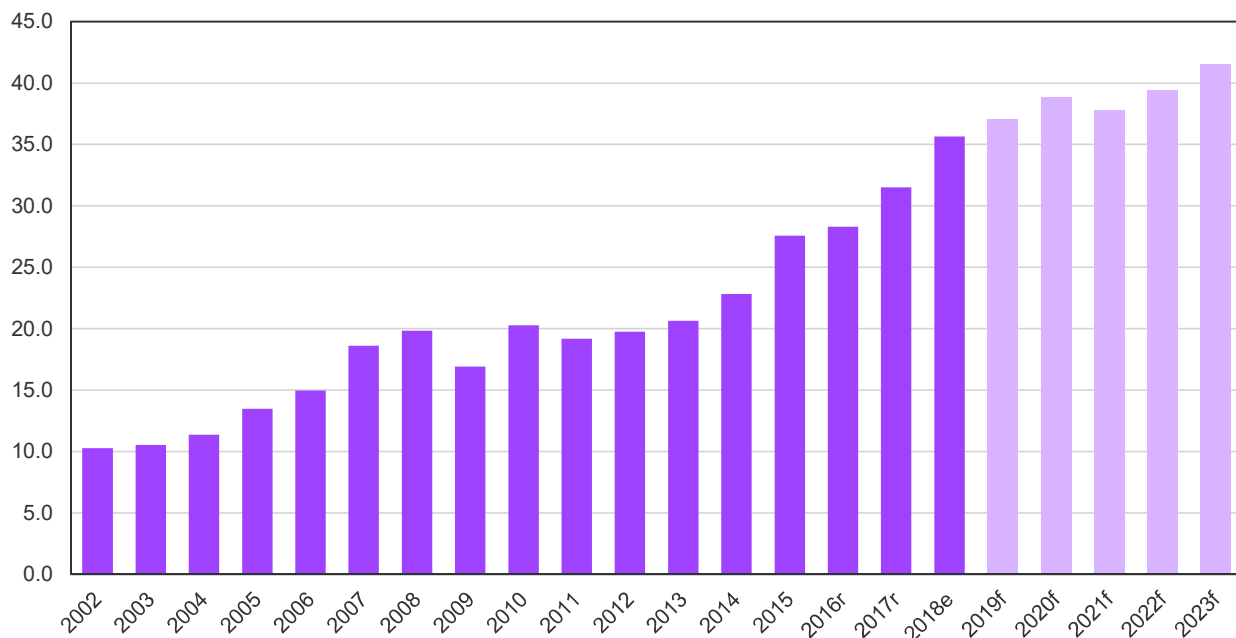
in import growth leading into 2008 was partially responsible for the bulging trade deficit. Following the recession, import growth eased substantially and actually kept the trade deficit fairly stable through 2013. However, the trade deficit started to widen again heading into 2014 and expanded in 2015 due to the stronger US dollar, which drove import growth well in excess of exports in both years. By 2018, the trade deficit had swelled to \$35.6 billion (2012\$), more than double the level seen in 2006 in real terms. During the past five years, exports grew by 5.4% annually on average, compared to exceptional 9.5% annual growth in imports, which explains the deficit swelling at an annual rate of 11.6% over the same period.

The trade deficit should continue to climb throughout the forecast period as gains in import spending outweigh steady export gains, putting net imports at \$41.5 billion (2012\$) by 2023. Imports are forecast to grow by an average of 2.5% annually, compared to a tepid 1.1% for exports over the period from 2019-2023.

Figure 10

Recreational products trade deficit

Net imports in billions of 2012\$



Source: Fastmarkets RISI, Inc.

Production trends

Looking at industrial production of durables, output has expanded by approximately 0.7% annually over the last ten years. Output was adversely affected by the 2008/2009 recession, plummeting by about 21.5% during the two years combined. However, production recovered strongly the year after, mostly a reflection of robust consumer spending. Despite the continued expansion in durable spending, durable production growth slowed in 2013 to 2.1% year-on-year, likely due to the increasingly noticeable pressure from imports. Durables production contracted by 1.1% and 2.1% in 2015 and 2016, respectively, due to strengthening of the US dollar, creating an unfavorable environment for US exports and accelerating imports even further. On average, output advanced by an annual rate of 0.9% in the last five years. Over the forecast period, durables production will hold steady, resulting in a more robust 1.2% average annual increase in production.

Folding carton trends

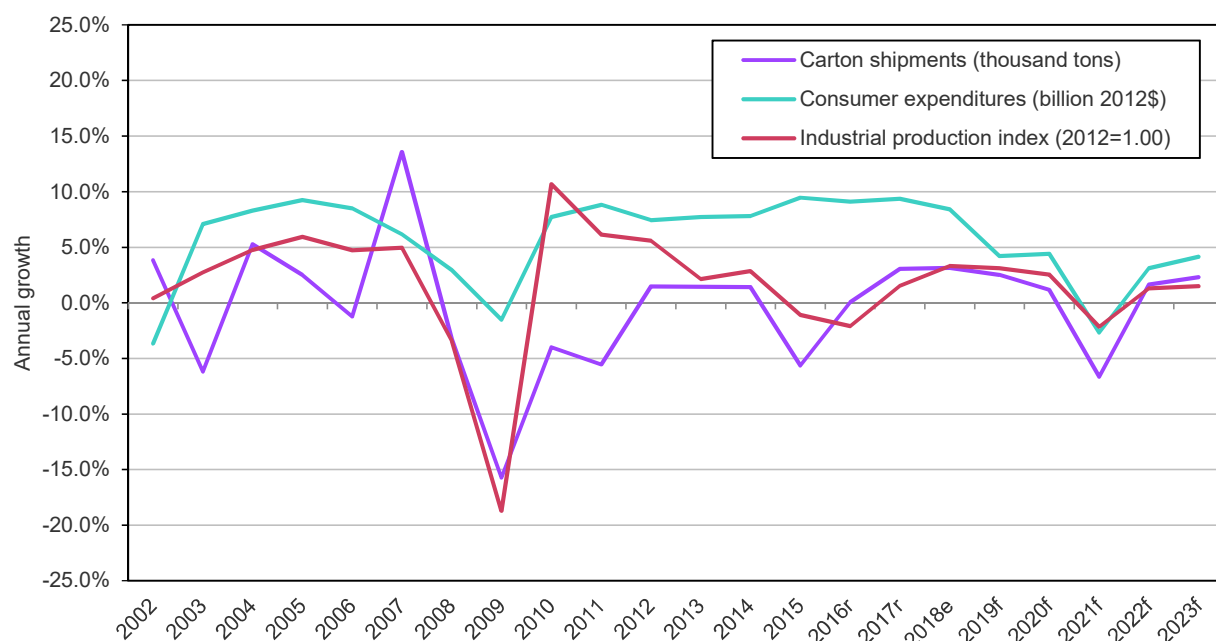
Folding carton shipments to the sporting and recreational goods markets declined

by 2.2% annually on average over the past ten years, substantially lower than consumer spending. Folding cartons to the sector are in some cases being displaced by mini-flute corrugated packaging, and it is also possible that less folding-carton-intensive sectors have accounted for a disproportionate share of the recovery in production. By 2018, carton shipments to sporting and recreational goods were 71,000 tons, nearly 22.5% lower than peak levels achieved in 2007.

Fastmarkets RISI's forecast shows carton shipments expanding through 2019, reaching 73,000 tons, at a growth rate of 2.5% year-over-year, before slowing in 2020 to 1.2%. However, these gains are expected to diminish in 2021 by 6.6%, as the economy is heading toward a downturn, placing downward pressure on production and exports of sporting and recreational goods. Shipments to the recreational and sporting goods markets are expected to grow marginally over the five-year forecast by 0.1%, slower than the moderate growth prospects in spending and production, reaching 72,000 tons.

Figure 11

Recreational products growth in shipments, consumer spending and industrial production

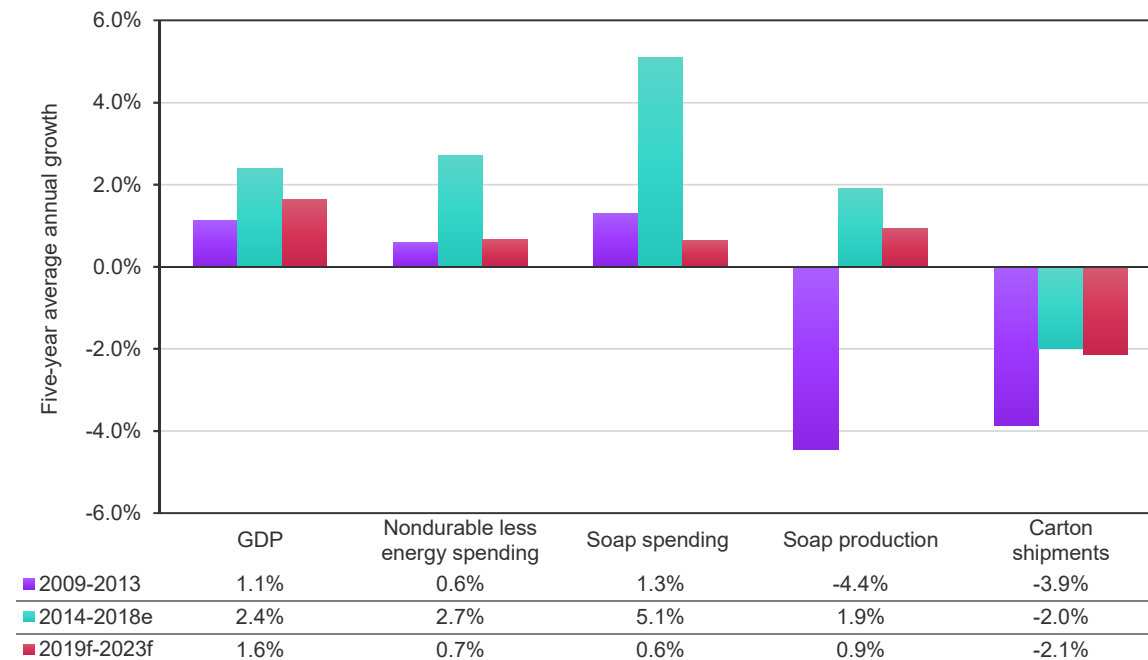


Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Figure 12

Soap and detergent end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Soap and detergent

Carton consumption in the soap and detergent markets has suffered due to substitution pressures in the last ten years along with challenged industrial production, leading shipments to decline at a 2.9% average annual rate from 2009-2018. Fastmarkets RISI's forecast shows carton shipments to the soap and cleaning preparations industry falling 2.1% from 2019-2023, which is an improvement compared to recent history but would still lag well behind the 0.9% average annual increase in soap and detergent production due to continuing competition from plastic packaged soaps and cleaners, which will see notable demand growth over our forecast period.

Spending trends

Spending on soap and detergents declined on average by 0.6% (2012\$) from 2007-2011, with most of the declines being logged during the recession years. As a result, consumer spending hit a low of \$42.6 billion (2012\$) in 2009. However, the industry has experienced a steady recovery since the recession, growing its share of nondurables spending; consumer spending growth between 2009 and 2013 averaged 1.3%

annually, reaching \$47.7 billion (2012\$) by 2013, surpassing its pre-recession peak of 2005.

Spending accelerated even further between 2014 and 2018, growing at an average 5.1% rate and exceeded \$61 billion (2012\$) by the end of that period, representing about 2.1% of total non-durables spending. Within the broader soaps and detergents category, household cleaning products account for 65.6% of spending, with the balance being miscellaneous household products. Hotels and restaurants account for a substantial proportion of demand for cleaning supplies, both of which have seen business pick up as the US economy improves, bolstering service spending on meals and vacations. Cleaning products have slowly lost share to the smaller miscellaneous category, declining by over 14 percentage points since 2005.

The data from the first few months of 2019 point to continued spending growth in line with the last several years, prompting Fastmarkets RISI to forecast that spending will expand by 1.4% year-over-year. Fastmarkets RISI projects consumer spending will continue to grow, albeit at a much slower pace, throughout the forecast, largely moving in line with broader non-durables spending.

Trade trends

Trade trends are a notable, although not critical, factor in the soap and cleaning preparations market compared to other industry segments. The import share of consumer spending was about 5% in 2004 and increased only marginally to 6% by 2018. Exports have grown at a slightly slower pace compared to imports over the past ten years, by roughly 0.9 percentage points less on average. Since the recession, the trade outlook has improved, with exports growing at an exceptional average annual rate of 5.2% over the period from 2009-2013, while imports maintained 3.0% growth, helping to expand the trade surplus for soaps and detergents from \$2.4 billion to \$4.3 billion between 2007 and 2013.

The strengthening of the US dollar in 2015 created an unfavorable environment for exports, which contracted 4.0% and 2.5% year-over-year in 2015 and 2016, respectively. Overall growth in exports between 2014 and 2018 averaged 0.8% annually, while imports enjoyed robust expansion of 4.9%, as the swings in the exchange rate over that period

improved their competitiveness. Due to exports rebounding in 2017 and 2018 by a promising 4.6% then a weak 0.3%, and thanks to imports ongoing exceptional performances of 6.8% and 9.6% during the same time period, the trade surplus shrank to \$3.8 billion (2012\$), below its level in 2011. We expect the surplus to observe a period of some instability, ranging from \$3.4-3.8 billion, given the expected strengthening of the US dollar over the forecast, causing the trade surplus to eventually drop to \$3.7 billion (2012\$) by 2023.

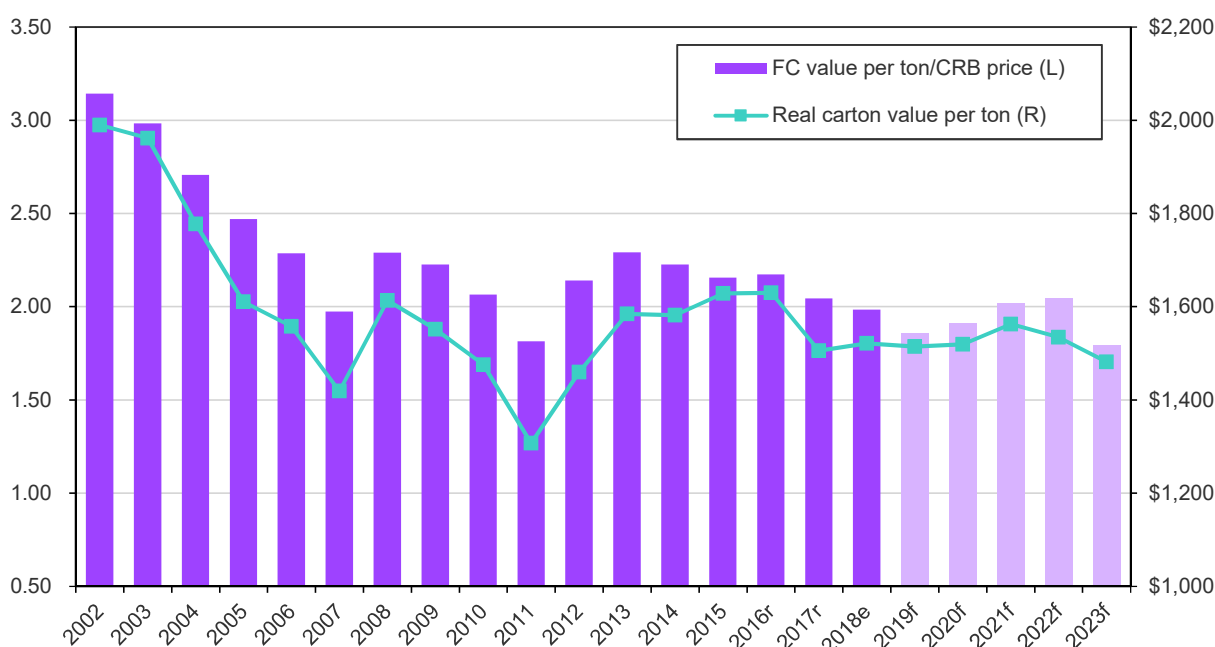
Production trends

Following the recession, growth in industrial production of soaps, cleaning compounds and toiletries showed relatively flat growth, in contrast to the very robust growth that characterized the years before the recession. The biggest declines predictably occurred in 2008 and 2009. Production had a very modest recovery in 2010, but accelerated notably in 2011, rising by 8.3% year-over-year. However, this recovery was short-lived, and output growth registered an average annual decline of 4.4% over the period from 2009-2013.

Figure 13

Soap and detergent: Carton value per ton relative to CRB price

Real carton values per ton (2015\$)



Source: Fastmarkets RISI, Inc.

Production improved over the past five years, growing 1.9% annually on average, a reflection of the considerable expansion in spending. As of 2018, the output of soaps, cleaning compounds and toiletries clocked growth of 5.6%, after a considerable decline in 2016 and then a moderate gain in 2017. Fastmarkets RISI is assuming soaps output will slowly grow in line with spending in the forecast, since in recent years the growth in consumer spending and output seems to have converged, translating to output growth averaging 0.9% between 2019 and 2023.

Folding carton trends

The soap and cleaning preparations markets did not prove to be a very good one for folding cartons during the last ten years, which to some degree is partially a reflection of poor output growth from manufacturers of such goods. Efforts by alternative packaging to displace folding cartons or growth in sub-segments of soaps and cleaners which are less carton intensive could also be responsible for the losses, as carton shipments to the sector have fallen faster than even industrial production over the last ten years (2.9%

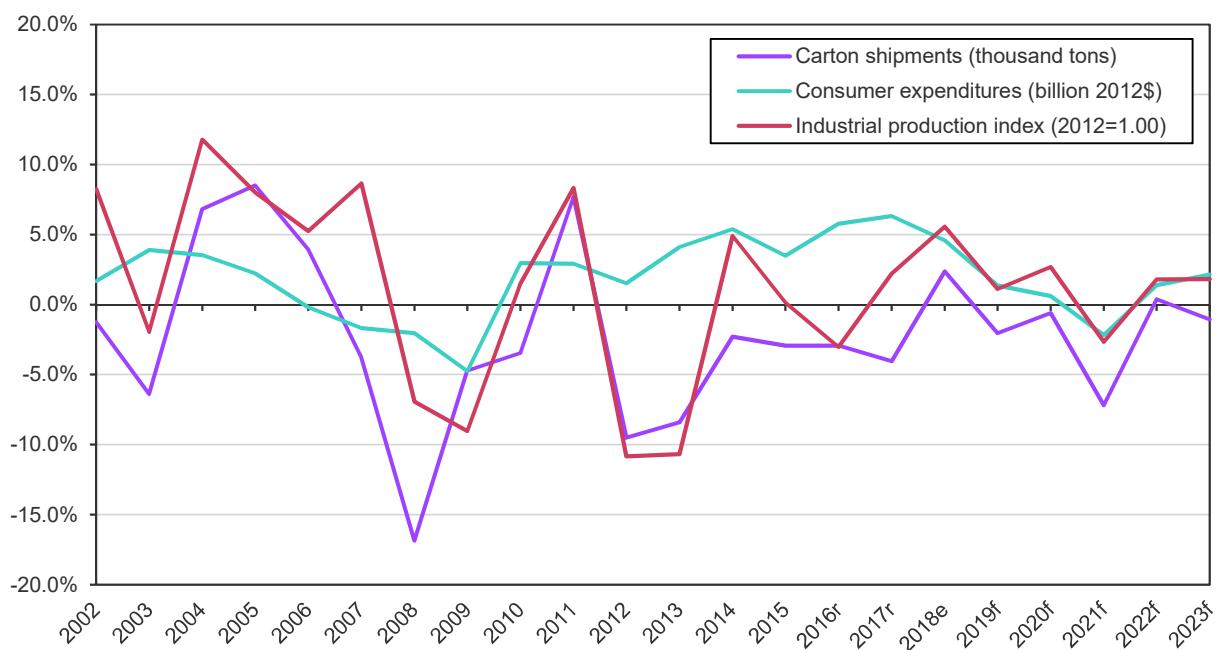
compared to 1.3% declines). One example is the incursion of liquid soap and detergent products on retailers' shelves, which tend to favor plastic packaging over cartons. With the combination of increasing prices of recycled boxboard and substitution pressure from plastic packaging over the horizon, we expect a 2.1% average annual decrease in carton shipments to the soap and cleaning preparations industry during the next five years.

Tobacco

Both domestic and export demand for tobacco products has been on a path of persistent decline for several decades now as consumers shun the product due its well-documented negative health effects, which has led to sharp drops in demand for folding cartons in this segment. And there is no indication this trend will reverse anytime soon. Tobacco has historically been the fastest declining market for folding carton shipments of all the major end-use categories defined in this report, and will continue to hold this status, falling by 3.7% over the next five years.

Figure 14

Soap and detergent growth in shipments, consumer spending and industrial production

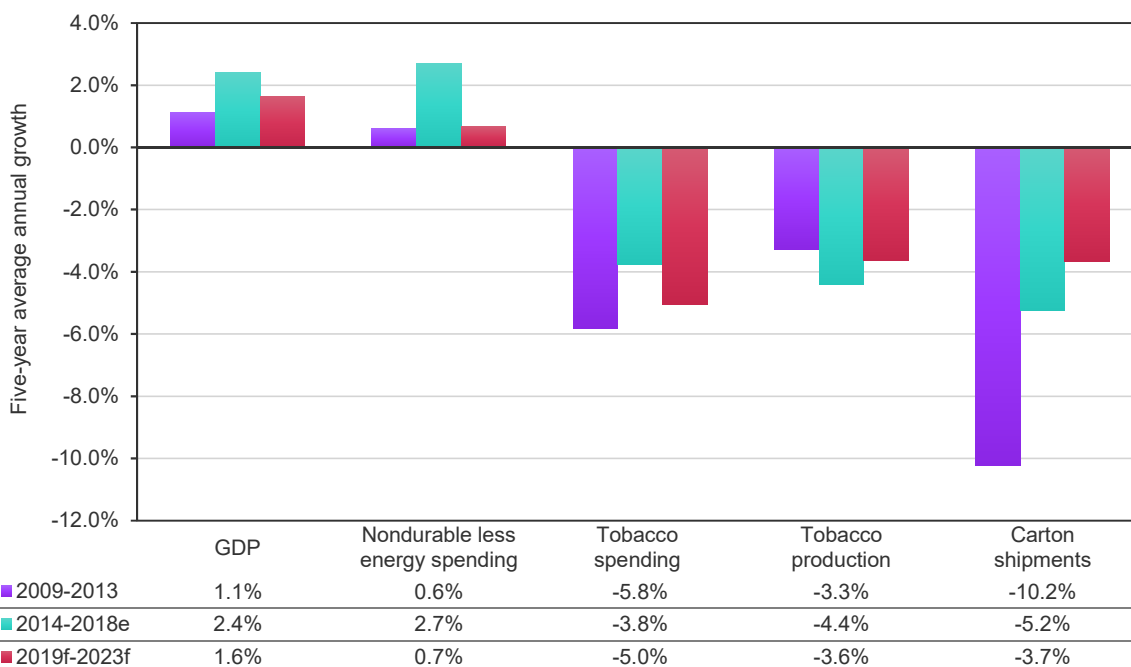


Source: Fastmarkets RISI, Inc. using US BEA and Federal Reserve data.

Figure 15

Tobacco end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

Spending trends

The US population of regular smokers continues to decrease, which, unsurprisingly, has translated directly into declines in spending over the years. Consumer spending in the tobacco market has fallen on average by 4.8% annually over the last ten years. Interestingly, during the last decade, 2015 was the last time real spending for the market increased at all, with a marginal uptick of 0.4% year-on-year. Growing awareness regarding the health effects and costs of tobacco use have contributed to the secular decline in spending in this industry segment. Tobacco's share of total nondurable expenditures is down to 2.6%, compared with 6.0% in 2002. The secular decline in spending is expected to continue through 2019 with real tobacco spending falling again this year, which we currently forecast at 3.0% year-over-year. We believe tobacco spending will continue to decline by 5.0% over the forecast period. The development of electronic cigarettes and their acceptance by existing consumers will also be an important factor directly impacting spending trends in this market. In addition to

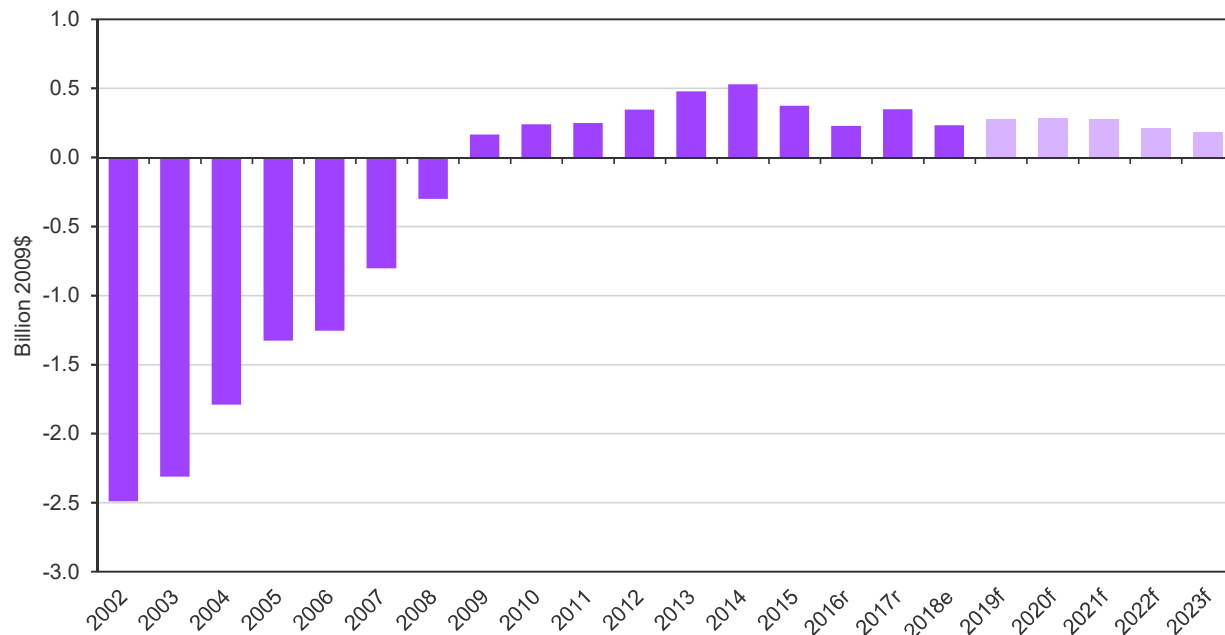
the industry-specific factors, the expected downturn in 2021 will considerably contribute to the spending decline from 2019-2023.

Trade trends

Exports of all finished tobacco products declined at a 2.2% average annual rate during the last ten years, as more companies built cigarette factories in key markets where demand is still actually growing, primarily Asia. Exports as a share of production have plummeted over the past ten years. Imports, meanwhile, have held relatively steady as a share of consumer spending, and have actually seen a noticeable uptick in the last decade, growing by 2.7% annually on average. The exports/imports dynamic caused the trade balance to reverse in 2008 from a surplus of \$300 million (2012\$) to a deficit of \$200 million (2012\$) in 2009 and further to \$230 million (2012\$) in 2018. This deficit is expected to remain in place for the next five years but trend slightly downward to \$180 million (2012\$), assuming import spending diminishes by 3.7% annually on average and exports remain on the decline at 3.4% annually.

Figure 16**Tobacco trade balance**

Billions of 2012\$



Source: Fastmarkets RISI, Inc.

Production trends

To no surprise, given the trajectory of consumer spending on tobacco, industrial production of tobacco declined 3.9% annually between 2009 and 2018. Over this time span, output only achieved growth in two years, 2010 and 2015. Similar to consumer spending, we expect a continued decline in output in 2019 of 3.3%. We anticipate declines in output will persist in the tobacco segment in the long term as this period of production growth subsides and falls back toward long-term trends, with output reducing by 3.6% annually on average from 2019-2023.

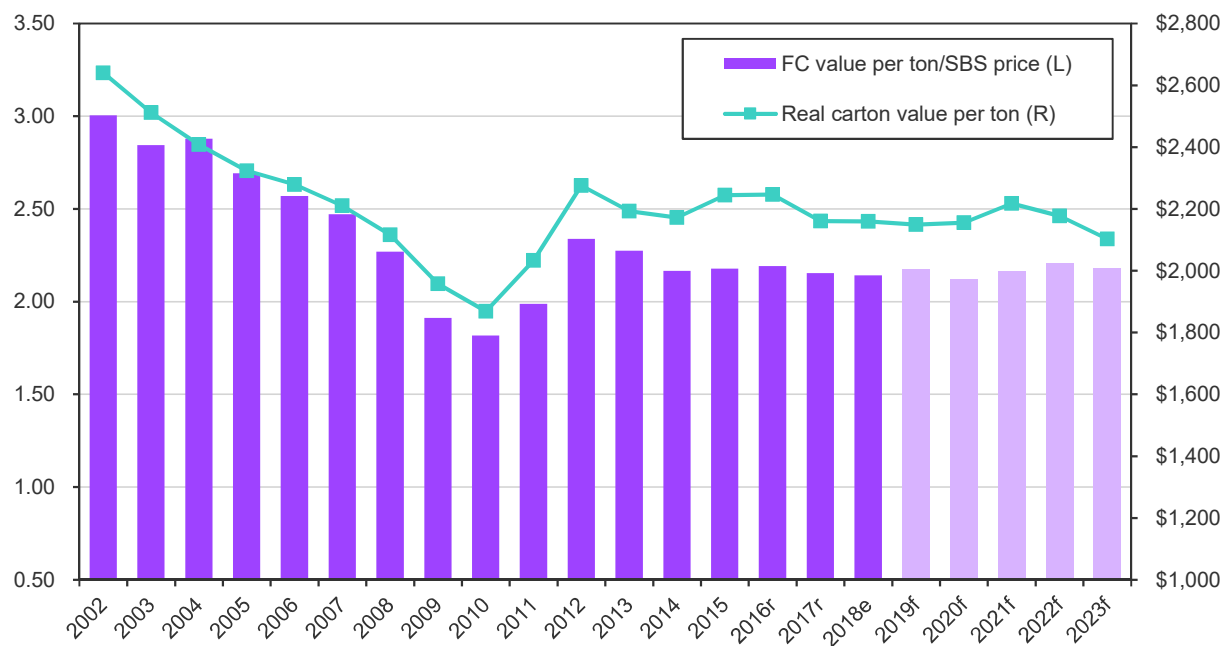
Folding carton trends

Declining demand for tobacco products, both domestically and in the export markets, has drastically undermined carton demand during the last decade, making this segment the worst performing end use for folding carton shipments. Total carton shipments

fell from 127,000 tons in 2007 to just 50,000 tons by 2018, yielding an average annual decline of 7.8% per year for the last ten years. Carton shipments will continue to decline, although we expect a more moderate rate of reduction given some recent improvements in spending and output for tobacco products, leaving average declines at 3.7% annually from 2019-2023. Given the potential for electronic cigarettes to displace combustible cigarettes over the next few years, there could be further downside risk to this forecast as well, although tobacco spending and output experienced growth in 2015 despite the entrance of electronic cigarettes into the market. However, if electronic cigarettes do proliferate in greater quantities, this could pose a danger to the already ravaged portion of carton shipments dedicated to the sector. A package of e-liquid refills is much smaller than an individual cigarette pack and can provide enough e-juice to replace five to seven packs of regular cigarettes. Furthermore, refills are sometimes shipped in just a bottle.

Figure 17**Tobacco: Carton value per ton relative to bleached board prices**

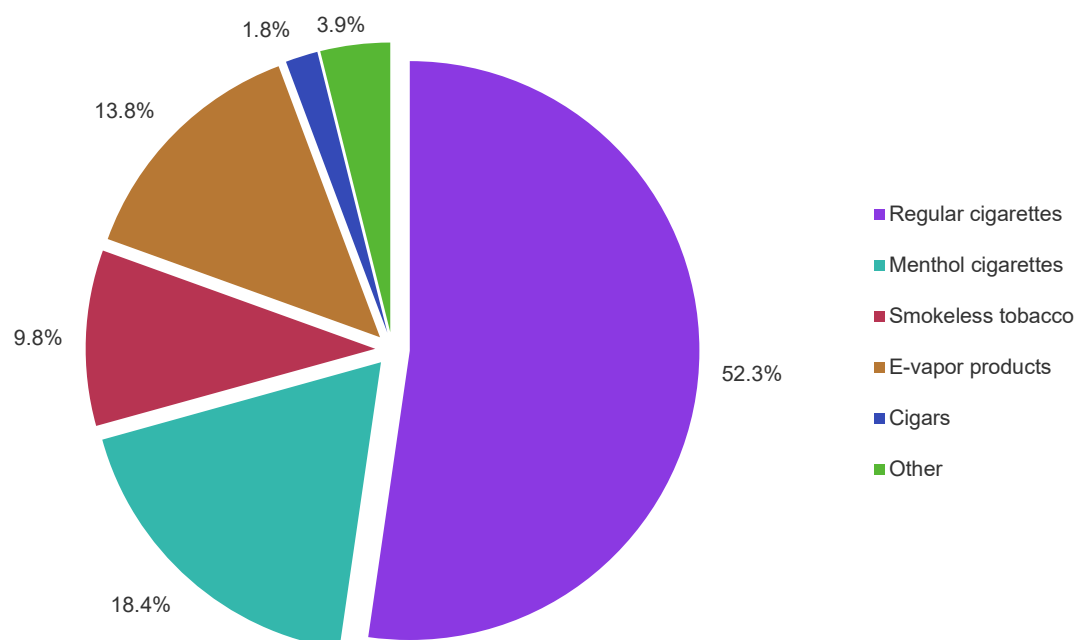
Real carton values per ton (2015\$)



Source: Fastmarkets RISI, Inc.

Figure 18**Cigarette and tobacco manufacturing in the USA**

Products and services segmentation (2018)



Source: IBISWorld.

Miscellaneous markets

This final grouping comprises a wide array of products, including textiles, apparel, plastic and rubber goods, chemicals, books, and software to name a few. It accounted for 8.8% of total shipments in 2018, making it the fourth-largest segment behind beverages, dry goods and frozen foods. The broad range of products included also makes this category the most difficult to analyze. Carton shipments to this category are effectively the residual left from total carton shipments minus the 16 other categories covered in this report. Thus, this grouping also includes any and all potential errors in the shipment figures to the other carton end-use categories.

Spending trends

Miscellaneous consumer spending on goods is approximated by subtracting spending on all carton end-use categories covered in this report (excluding food service spending, which falls under service spending) from total spending on consumer goods (durables and nondurables). Although far from a perfect metric, this estimate captures consumer

goods spending associated with the balance of carton shipments not included in categories previously covered. Spending on miscellaneous goods has been especially strong and is largely accounted for by robust growth in the durables portion of spending following the recession years. Although spending for this category dropped 8.2% from 2007-2009, consumer spending has since recovered, leaving average spending growth for the category at 4.6% annually between 2014 and 2018. Spending on miscellaneous goods will grow slightly slower between 2019 and 2023, increasing at an average annual rate of 2.0%, as the durables component of the category holds steady in the forecast.

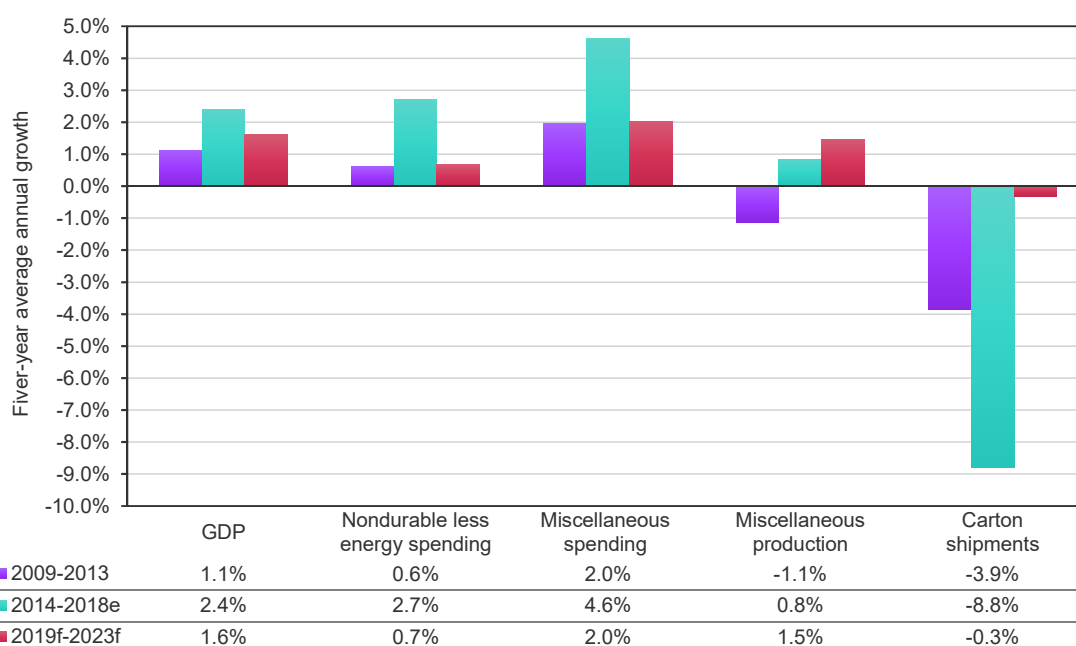
Trade trends

Our estimate for trade of consumer spending on all other goods outside the end-use categories covered previously has shown a trade deficit which is finally moderating. In 2007, the trade deficit for other goods had ballooned to \$294.5 billion (2012\$), but this finally reversed a year later as imports collapsed dramatically compared to exports. The trade deficit quickly bounced back to growth in 2010 as consumer spending rebounded, generating greater

Figure 19

Miscellaneous end-use market indicators

Five-year average annual growth rates



Source: Fastmarkets RISI, Inc.

demand for imports. After continuing on a path of growth in 2011, the trade deficit held relatively flat through 2014. The trade deficit naturally widened by 2015, however, given the major shifts in the value of the US dollar, raising the deficit in miscellaneous goods to more than \$315 billion (2012\$). But then this trend reversed in the following three years, posting a deficit of \$268 billion (2012\$) by 2018. Over the next five years, we anticipate that due to the moderate growth outlook in industrial production of 1.5% annually, as well as a stronger US dollar, exports will register tepid growth of 1.0% annually, outpaced by 1.5% growth in imports. As a result, the trade deficit will slowly inflate to \$291.3 billion (2012\$) by 2023, although this is still less than the levels seen in 2015 and 2016.

Production trends

For Fastmarkets RISI's purposes, we utilize nondurables industrial production as a proxy for output of goods not encompassed by our various end-use categories. Industrial production of nondurable goods suffered during the recession, falling 13.2% below the 2007 level in 2009. Production of these goods recovered by a healthy 2.2% in 2010, but in subsequent years has been almost completely flat. Over the past five years, production saw a 0.8% growth rate annually on average, reflecting a nearly flat pace until the last two years that provided most of the growth acceleration. In 2017, nondurables industrial production finally grew at a consequential pace, advancing

1.9% year-over-year. Production continued its recent upward trend, with 2018 showing another 1.9% increase. Nondurables production still sits at about 7.3% below pre-recession levels, which emphasizes the magnitude of lost output resulting from the financial crisis. Output of nondurables is expected to continue improving over the next five years at an average annual rate of 1.5% from 2019-2023.

Folding carton trends

Historically, shipments to this category are the residual derived from removing all the "identified" shipments to the other market segments from total shipments of all cartons. This inherently creates a great deal of uncertainty concerning the actual trends for this segment, since any data errors will be concentrated most heavily in this market segment.

Carton shipments in the miscellaneous category declined at a 6.4% average annual rate between 2009 and 2018. Fastmarkets RISI forecasts that carton shipments to miscellaneous end uses will endure further declines at a 0.3% annual rate over the forecast horizon, as carton shipments lag behind production and consumer spending figures. We believe many of the manufactured goods that fall under this category are subject to significant substitution pressures, justifying the negative growth outlook in carton shipments.

Appendix A: End-use methodology

End-use market activity

For most end-use markets, there are at least two distinct measures of activity that can be used to calculate the overall growth in the individual market segments: consumer spending data collected by the Department of Commerce's Bureau of Economic Analysis (BEA) and industrial production data released by the Federal Reserve Board. A third source of data that was used to assess the health of the various markets was trade data, as reported by the Department of Commerce's International Trade Administration.

Theoretically, there should be a tight correlation between these sets of series. Spending on domestically produced goods should equal total consumer spending less imports. Adding exports of these products to this figure would result in total production of these goods. This production figure should be the most important measure that can be used to track potential carton demand, since goods produced in the USA are primarily going to be packaged in folding cartons produced in the USA. Most consumer product imports are going to be packaged in their home countries.

In practice, calculated shipments for the various end-use markets rarely match up with the reported industrial production figures. The main reason for this is that the consumer spending data and the industrial production data often reflect slightly different aggregations of products. The industrial production figures were shifted over to the new North American Industrial Classification System (NAICS) in 2002, but the trade data are reported using a completely separate classification system. The consumer spending data do not fit into either of these systems, since the government calculates consumer expenditures on a commodity basis instead of an industry basis. Both consumer spending and industrial output are important measures used to gauge the health of the various end-use markets, and both were used in deriving the growth potential for folding cartons.

Carton demand by end use

The end-use market activity described above is the primary driver for the demand forecast by segment for folding cartons. The other is the ratio of carton shipments relative to end-use market growth. Fastmarkets RISI primarily uses the ratio of carton shipments relative to industrial production to generate the forecasts, since this ratio tends to have a tighter historical fit than the ratio relative to consumer expenditures. However, the second ratio provides a very good method to check whether the overall growth projections seem reasonable.

One glance at the trend of these ratios, which Fastmarkets RISI calls "end-use factors," gives a vivid illustration of whether carton shipments are exceeding general end-use market growth, which is rare, or lagging behind the end-use markets, which is much more common. Several factors contribute to the trend relative to end-use activity. One is that folding cartons may be heavily dependent on a specific sub-segment of the various end-use markets that is growing at a different pace than the general market.

The end-use factor also incorporates all other aspects that affect demand. The most important of these is substitution by alternative packaging materials such as plastics or mini-flute corrugated. Another would be the shift toward using lighter-weight boxboard in the carton converting process, which leads to lower tonnage consumed per thousand square feet. In most cases, there is a very strong correlation between shifts in the end-use factor away from its trend and changes in real values per ton for folding cartons. Fastmarkets RISI used its projections of future changes in boxboard prices (primarily driven by fiber costs) to project the future trend in real carton values per ton. This was necessary to understand whether the carton markets would be subjected to intensifying losses in market share to competing materials or moderating losses over time, like those that occurred during the early part of the last decade. Total shipments for the various carton end-use markets were then calculated by multiplying the

end-use factor by the measure of overall growth in spending or output for that particular market.

Historical carton shipments by end use

Starting with the *2006 Trends Report*, with encouragement from the PPC, Fastmarkets RISI began to estimate shipments by end use based on the underlying growth trends for the different end-use markets rather than a PPC survey. The main purpose of the revision was to ensure that shipment numbers in each industry more closely reflected the activity in the end-use market, specifically the end-use factor. Another benefit of the revision is that total shipments, in tons, are now more consistent with Fastmarkets RISI's boxboard demand series.

Fastmarkets RISI uses the total folding carton shipment data to calculate a boxboard consumption estimate at carton plants by adjusting for the average converting loss at carton plants. The difference between this "true" consumption figure and the apparent consumption data for folding cartonboard is categorized as non-carton usage of folding boxboard. The final step of the forecast process requires a minor adjustment to the growth projections for all of the folding carton end-use markets so that this non-carton use figure will fall into an acceptable range. In the case of Canada, Fastmarkets RISI directly estimates carton shipments from folding cartonboard apparent consumption after factoring out losses, leaving out a non-carton use estimate for the country.

Appendix B: End-use market definitions

End-use markets	NAICS code(s)	Description of key end-use markets and products
Beverages	3121 Beverage	Soft drinks, fruit drinks (except juice which is reflected in frozen foods), flavored water, bottled water, iced coffee and tea (non-iced in dry foods), wine, beer, spirits and other alcoholic beverages consumed off-premises and at food service establishments
Cereals/milled grains	3112 Grain & Oilseed	Breakfast cereals, other milled grain products
Confectionery	3113 Sugar and Confectionery	Granola clusters, chocolate bars, breakfast bars, fudge, chocolate candies, chewing gum, hard candies, jelly candies, licorice, marshmallow, popcorn, toffee, fruit peels
Dry foods	3111 Animal Food, 31182 Cookie, Cracker and Pasta, 31191 Snack Food, 31192 Coffee & Tea, 31194 Seasoning & Dressing	Snack foods, potato chips, corn chips, pretzels, pork rind, nuts, coffee and tea, flavoring syrup, condiments, animal food, dog and cat food, other snack food, spices and extracts
Frozen foods	31141 Frozen Food	Frozen fruit, frozen juices, frozen vegetables, frozen specialty foods, such as frozen dinners, entrees, and side dishes, frozen pizza, frozen whipped toppings, frozen waffles, pancakes, and french toast
Perishable bakery goods	3118 Bakeries and Tortilla	Refrigerated biscuits & dough, frozen cakes, pies and other pastries, pasta and tortilla manufacturing
Dairy	3115 Dairy	Fluid milk, dry and condensed milk, creamery butter, cheese, ice cream, popsicles, puddings, sherbets and other frozen desserts (except frozen bakery products)
Meat products	3116 Animal Slaughtering, 3117 Seafood	Beef, pork, chicken, seafood (fresh or frozen), animal fats and oils
Retail carry-out	722513 Limited-Service Restaurants	Fast food restaurants, take-out sandwich shops, pizza delivery shops
Cosmetics & toiletries	32562 Toilet Preparation	Perfumes, shaving preparations, hair preparations, face creams, lotions (including sunscreens), and other cosmetic preparations
Hardware & appliances	3325 Hardware, 334 Computer & Electronics, 335 Electrical Equipment, 3363 Motor Vehicle, 33221 Metal Cutlery	Metal hardware, such as hinges, handles, keys, and locks, computer and electronic products, video and audio equipment, laptops, CD drives, household appliances, motor vehicle parts
Converted paper product	32223 Stationary, 32229 Other Converted Products	Office supplies, mailers, household stationary, greeting cards, cups, plates, cartons, food trays
Pharmaceuticals	3254 Pharmaceutical, 3391 Medical Equipment	Medicine intended for internal and external consumption in such forms as ampoules, tablets, capsules, vials, ointments, powders, etc.
Soap & other detergent	325611 Soap and Other Detergent	Bar soap, liquid soap, laundry detergents, dishwashing detergents, pastes, powders, wetting agents, emulsifiers and other industrial agents
Recreational (sporting & toys)	33992 Sporting & Athletic Goods, 33993 Doll, Toy and Game	Balls, bows, clubs, weights, rackets, surfboards, skateboards, exercise equipment, dolls, action figures, toys, games (including electronic), hobby kits
Tobacco	31221 Tobacco	Chewing tobacco, cigars, cigarettes, snuff, prepared pipe tobacco
Miscellaneous markets		All other products not specified in the above categories

Appendix C: Percentage changes in forecasts, 2011-2023

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Consumer spending on nondurable goods													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	1.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	3.0%	1.6%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	2.8%	1.7%	2.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	3.5%	2.5%	3.0%	3.4%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	3.3%	3.5%	3.6%	3.3%	3.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	1.7%	1.4%	2.4%	3.3%	2.8%	0.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	2.3%	0.9%	1.7%	2.4%	2.6%	3.0%	1.0%	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	1.9%	1.4%	2.0%	2.4%	3.0%	2.8%	1.0%	2.2%	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	1.8%	0.7%	1.9%	1.8%	2.1%	2.6%	1.9%	2.4%	2.6%	n/a	n/a	n/a	n/a
2016 Trends Report	1.8%	0.6%	1.9%	2.1%	2.6%	1.9%	2.2%	2.7%	2.9%	2.9%	n/a	n/a	n/a
2017 Trends Report	1.8%	0.6%	1.7%	2.6%	2.6%	2.5%	2.2%	2.5%	2.7%	2.7%	2.5%	n/a	n/a
2018 Trends Report	1.8%	0.6%	1.7%	2.6%	3.0%	2.8%	2.4%	2.5%	2.7%	2.7%	0.7%	1.0%	n/a
2019 Trends Report	0.9%	0.4%	1.8%	2.6%	3.4%	2.7%	2.1%	2.8%	0.9%	0.2%	-0.8%	1.1%	1.9%
Consumer spending on foods													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	1.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	2.6%	1.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	2.3%	1.1%	1.6%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	4.0%	2.3%	2.0%	2.4%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	3.8%	2.9%	2.6%	2.4%	2.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	1.5%	0.9%	2.1%	3.0%	2.4%	0.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	2.5%	0.1%	1.3%	2.4%	2.4%	2.8%	0.8%	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	1.6%	1.3%	1.3%	2.1%	3.0%	2.7%	0.9%	2.2%	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	1.1%	0.8%	1.0%	0.0%	0.0%	2.3%	1.6%	2.1%	2.3%	n/a	n/a	n/a	n/a
2016 Trends Report	1.1%	0.1%	1.0%	0.5%	0.1%	1.1%	0.9%	2.2%	2.6%	2.6%	n/a	n/a	n/a
2017 Trends Report	1.1%	0.1%	-0.1%	2.1%	0.0%	2.8%	3.4%	2.1%	2.4%	2.5%	2.2%	n/a	n/a
2018 Trends Report	1.1%	0.1%	-0.1%	2.1%	-0.2%	2.7%	2.6%	2.7%	2.4%	2.5%	0.5%	0.8%	n/a
2019 Trends Report	0.2%	0.9%	1.1%	1.9%	1.5%	3.6%	2.4%	3.1%	0.0%	0.0%	-1.1%	0.9%	1.6%
Industrial output of nondurable goods													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	0.3%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	3.1%	0.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	4.7%	2.9%	2.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	4.4%	2.4%	3.5%	4.4%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	3.2%	4.1%	4.0%	4.6%	3.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	3.2%	0.5%	2.2%	3.2%	3.1%	0.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	0.2%	1.1%	2.4%	3.5%	3.6%	2.9%	0.8%	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	0.2%	1.2%	1.3%	2.1%	3.2%	2.9%	0.4%	2.5%	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	0.2%	1.2%	1.3%	2.1%	2.3%	2.0%	1.3%	2.2%	2.5%	n/a	n/a	n/a	n/a
2016 Trends Report	0.1%	0.1%	0.0%	-0.6%	1.7%	1.2%	1.2%	1.9%	2.3%	3.2%	n/a	n/a	n/a
2017 Trends Report	0.1%	0.1%	0.0%	-0.6%	1.7%	0.1%	1.7%	2.0%	2.3%	3.0%	1.9%	n/a	n/a
2018 Trends Report	0.2%	0.1%	0.0%	-0.6%	0.3%	0.8%	1.4%	2.0%	2.1%	1.5%	0.2%	1.8%	n/a
2019 Trends Report	0.2%	0.1%	0.0%	-0.6%	0.3%	0.8%	1.9%	1.9%	0.8%	2.6%	0.5%	1.7%	1.7%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Industrial output of processed foods													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	0.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	2.7%	1.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	3.1%	1.7%	2.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	2.3%	1.8%	2.5%	2.8%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	0.8%	3.9%	3.7%	3.5%	2.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	1.2%	2.5%	2.2%	4.1%	3.0%	0.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	-0.1%	3.7%	1.9%	2.8%	3.3%	3.0%	0.8%	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	-0.1%	4.4%	1.6%	2.3%	2.9%	2.7%	0.7%	2.4%	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	-0.1%	4.4%	1.7%	1.9%	2.5%	2.0%	1.4%	2.1%	2.3%	n/a	n/a	n/a	n/a
2016 Trends Report	-0.2%	-0.2%	2.0%	0.2%	0.9%	2.0%	1.6%	2.2%	2.4%	2.8%	n/a	n/a	n/a
2017 Trends Report	-0.2%	-0.2%	2.0%	0.9%	1.8%	2.7%	2.3%	1.8%	2.2%	2.6%	1.7%	n/a	n/a
2018 Trends Report	-0.2%	-0.2%	2.0%	0.9%	1.5%	2.1%	4.1%	3.4%	1.9%	1.6%	-0.2%	1.2%	n/a
2019 Trends Report	-0.2%	-0.2%	2.0%	0.9%	1.5%	2.1%	4.0%	2.8%	1.7%	1.6%	-0.5%	1.2%	1.9%
TOTAL FOLDING CARTON													
Shipments (thousand tons)													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	6,003	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	5,887	5,944	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	5,628	5,653	5,701	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	5,415	5,448	5,523	5,601	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	5,334	5,409	5,533	5,741	5,807	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	5,203	5,298	5,352	5,371	5,353	5,327	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	5,203	5,266	5,361	5,398	5,469	5,507	5,492	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	5,203	5,053	5,028	5,075	5,173	5,230	5,230	5,353	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	5,203	5,053	5,028	5,034	4,974	4,997	5,011	5,109	5,166	n/a	n/a	n/a	n/a
2016 Trends Report	5,203	5,053	5,028	5,034	4,935	4,844	4,878	4,963	5,009	5,049	n/a	n/a	n/a
2017 Trends Report	5,203	5,053	5,028	5,034	4,935	4,903	4,869	4,895	4,934	5,005	5,008	n/a	n/a
2018 Trends Report	5,203	5,053	5,028	5,034	4,935	4,903	4,904	4,935	5,024	5,039	5,029	5,099	n/a
2019 Trends Report	5,203	5,053	5,028	5,034	4,935	4,903	4,904	4,803	4,769	4,789	4,735	4,773	4,831
Percent change													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	1.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	1.5%	1.0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	1.9%	0.4%	0.9%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	-0.9%	0.6%	1.4%	1.4%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	-0.8%	1.4%	2.3%	3.8%	1.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	-3.3%	1.8%	1.0%	0.4%	-0.4%	-0.5%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	-3.3%	1.2%	1.8%	0.7%	1.3%	0.7%	-0.3%	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	-3.3%	-2.9%	-0.5%	0.9%	1.9%	1.1%	0.0%	2.4%	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	-3.3%	-2.9%	-0.5%	0.1%	-1.2%	0.4%	0.3%	1.9%	1.1%	n/a	n/a	n/a	n/a
2016 Trends Report	-3.3%	-2.9%	-0.5%	0.1%	-2.0%	-1.9%	0.7%	1.7%	0.9%	0.8%	n/a	n/a	n/a
2017 Trends Report	-3.3%	-2.9%	-0.5%	0.1%	-2.0%	-0.7%	-0.7%	0.5%	0.8%	1.4%	0.1%	n/a	n/a
2018 Trends Report	-3.3%	-2.9%	-0.5%	0.1%	-2.0%	-0.7%	0.0%	0.6%	1.8%	0.3%	-0.2%	1.4%	n/a
2019 Trends Report	-3.3%	-2.9%	-0.5%	0.1%	-2.0%	-0.7%	0.0%	-2.1%	-0.7%	0.4%	-1.1%	0.8%	1.2%

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Shipments (million dollars)													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	10,946	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	11,851	11,581	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	9,828	10,197	10,441	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	9,147	9,651	9,881	10,449	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	9,009	9,613	9,956	10,738	11,405	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	8,626	9,032	9,221	9,436	9,653	9,686	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	8,626	8,845	9,033	9,069	9,190	9,246	9,328	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	8,626	8,845	8,760	9,084	9,518	9,675	9,413	9,502	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	8,626	8,845	8,760	8,940	9,030	9,108	9,084	9,153	9,525	n/a	n/a	n/a	n/a
2016 Trends Report	8,626	8,845	8,760	8,940	8,712	8,492	8,318	8,209	8,434	8,855	n/a	n/a	n/a
2017 Trends Report	8,626	8,845	8,760	8,940	8,712	8,595	8,569	8,819	9,072	9,435	9,651	n/a	n/a
2018 Trends Report	8,626	8,845	8,760	8,940	8,712	8,595	8,393	8,710	9,489	10,048	10,010	9,961	n/a
2019 Trends Report	8,626	8,845	8,760	8,940	8,712	8,595	8,393	8,500	8,871	9,253	9,283	9,193	9,311
Percent change													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	-2.1%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	3.3%	-2.3%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	4.9%	3.8%	2.4%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	3.9%	5.5%	2.4%	5.7%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	3.3%	6.7%	3.6%	7.8%	6.2%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	-1.1%	4.7%	2.1%	2.3%	2.3%	0.3%	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	-1.1%	2.5%	2.1%	0.4%	1.3%	0.6%	0.9%	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	-1.1%	2.5%	-1.0%	3.7%	4.8%	1.7%	-2.7%	0.9%	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	-1.1%	2.5%	-1.0%	2.1%	1.0%	0.9%	-0.3%	0.8%	4.1%	n/a	n/a	n/a	n/a
2016 Trends Report	-1.1%	2.5%	-1.0%	2.2%	-2.5%	-2.5%	-2.0%	-1.3%	2.7%	5.0%	n/a	n/a	n/a
2017 Trends Report	-1.1%	2.5%	-1.0%	2.2%	-2.5%	-1.3%	-0.3%	2.9%	2.9%	4.0%	2.3%	n/a	n/a
2018 Trends Report	-1.1%	2.5%	-1.0%	2.2%	-2.5%	-1.3%	-2.4%	3.8%	8.9%	5.9%	-0.4%	-0.5%	n/a
2019 Trends Report	-1.1%	2.5%	-1.0%	2.2%	-2.5%	-1.3%	-2.4%	1.3%	4.4%	4.3%	0.3%	-1.0%	1.3%
Average value per ton													
2003 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2004 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2005 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2006 Trends Report	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2007 Trends Report	1,823	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2008 Trends Report	2,013	1,948	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2009 Trends Report	1,746	1,804	1,831	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2010 Trends Report	1,689	1,772	1,789	1,866	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2011 Trends Report	1,689	1,777	1,800	1,870	1,964	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2012 Trends Report	1,658	1,705	1,723	1,757	1,803	1,818	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2013 Trends Report	1,658	1,680	1,685	1,680	1,680	1,679	1,699	n/a	n/a	n/a	n/a	n/a	n/a
2014 Trends Report	1,658	1,751	1,742	1,790	1,840	1,850	1,800	1,775	n/a	n/a	n/a	n/a	n/a
2015 Trends Report	1,658	1,751	1,742	1,776	1,815	1,823	1,813	1,792	1,844	n/a	n/a	n/a	n/a
2016 Trends Report	1,658	1,751	1,742	1,776	1,765	1,753	1,705	1,654	1,684	1,754	n/a	n/a	n/a
2017 Trends Report	1,658	1,751	1,742	1,776	1,765	1,753	1,760	1,802	1,839	1,885	1,927	n/a	n/a
2018 Trends Report	1,658	1,751	1,742	1,776	1,765	1,753	1,711	1,765	1,889	1,994	1,991	1,953	n/a
2019 Trends Report	1,658	1,751	1,742	1,776	1,765	1,753	1,711	1,770	1,860	1,932	1,961	1,926	1,928

Source: Fastmarkets RISI, Inc.

Appendix D: End-use summary

Table A1D

End-use summary

Market	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f	% Growth 23/18
BEVERAGES											
Tons (thousands)	1,053	1,056	1,063	1,079	1,105	1,112	1,124	1,104	1,129	1,162	1.0%
Percent change	1.6%	0.3%	0.7%	1.5%	2.4%	0.6%	1.1%	-1.7%	2.2%	2.9%	
Dollars (millions)	1,526.0	1,503.2	1,506.5	1,535.2	1,696.8	1,857.5	1,965.4	1,903.1	1,889.2	1,919.6	2.5%
Percent change	4.2%	-1.5%	0.2%	1.9%	10.5%	9.5%	5.8%	-3.2%	-0.7%	1.6%	
Average value per ton	1,449.8	1,423.5	1,417.1	1,422.5	1,535.1	1,671.0	1,748.8	1,723.0	1,673.9	1,652.4	1.5%
NON-PERISHABLE (DRY FOODS)											
Cereal/milled grain											
Tons (thousands)	365	356	353	353	356	354	349	342	343	338	-1.0%
Percent change	-1.1%	-2.5%	-0.8%	0.0%	0.8%	-0.5%	-1.5%	-1.9%	0.1%	-1.3%	
Dollars (millions)	448.9	434.4	432.7	407.3	438.4	471.7	485.6	471.7	463.5	481.6	1.9%
Percent change	0.9%	-3.2%	-0.4%	-5.9%	7.6%	7.6%	3.0%	-2.9%	-1.7%	3.9%	
Average value per ton	1,229.8	1,220.2	1,225.1	1,152.9	1,230.8	1,330.6	1,390.5	1,377.6	1,351.9	1,423.8	3.0%
Dry foods (including crackers, biscuits, pasta & pet food)											
Tons (thousands)	742	725	724	715	724	714	703	672	676	680	-1.3%
Percent change	0.3%	-2.3%	-0.1%	-1.2%	1.3%	-1.4%	-1.5%	-4.5%	0.6%	0.6%	
Dollars (millions)	1,135.0	1,108.3	1,111.2	1,045.6	1,125.4	1,199.1	1,234.3	1,168.3	1,153.1	1,221.8	1.7%
Percent change	2.1%	-2.4%	0.3%	-5.9%	7.6%	6.6%	2.9%	-5.3%	-1.3%	6.0%	
Average value per ton	1,529.6	1,528.6	1,534.9	1,462.1	1,553.3	1,679.3	1,754.9	1,738.6	1,706.2	1,796.9	3.0%
Confections											
Tons (thousands)	117	113	118	118	122	124	127	123	125	129	1.1%
Percent change	-1.6%	-3.4%	4.2%	0.0%	3.4%	1.8%	2.2%	-3.2%	2.1%	2.9%	
Dollars (millions)	200	192	199	197	210	218	230	230	234	237	2.5%
Percent change	0.1%	-3.7%	3.2%	-0.9%	6.7%	3.9%	5.3%	0.3%	1.5%	1.4%	
Average value per ton	1,708.0	1,702.6	1,686.7	1,671.8	1,724.9	1,759.8	1,814.1	1,878.0	1,867.0	1,841.0	1.3%
Subtotal											
Tons (thousands)	1,224	1,194	1,195	1,186	1,202	1,192	1,179	1,137	1,144	1,147	-0.9%
Percent change	-0.3%	-2.5%	0.1%	-0.7%	1.4%	-0.8%	-1.1%	-3.6%	0.6%	0.3%	
Dollars (millions)	1,783.7	1,735.0	1,742.5	1,649.6	1,773.7	1,888.9	1,949.7	1,870.4	1,850.4	1,940.5	1.8%
Percent change	1.5%	-2.7%	0.4%	-5.3%	7.5%	6.5%	3.2%	-4.1%	-1.1%	4.9%	
Average value per ton	1,457.3	1,453.1	1,458.3	1,390.8	1,475.2	1,584.0	1,653.4	1,644.9	1,617.6	1,691.8	2.8%
FROZEN/PERISHABLE FOODS											
Dairy products											
Tons (thousands)	129	121	116	113	115	114	112	106	107	109	-1.0%
Percent change	-1.5%	-6.2%	-3.9%	-3.2%	2.2%	-0.9%	-1.6%	-5.7%	1.2%	1.9%	
Dollars (millions)	235.2	220.3	209.7	201.3	212.1	214.4	217.5	212.4	213.7	214.8	0.3%
Percent change	0.1%	-6.3%	-4.8%	-4.0%	5.4%	1.1%	1.4%	-2.4%	0.6%	0.5%	
Average value per ton	1,823.4	1,820.7	1,803.7	1,788.4	1,844.2	1,881.6	1,939.5	2,007.9	1,996.1	1,968.3	1.3%
Frozen foods											
Tons (thousands)	464	452	472	486	497	504	512	507	516	528	1.2%
Percent change	0.4%	-2.6%	4.5%	3.0%	2.1%	1.5%	1.5%	-1.0%	1.8%	2.4%	
Dollars (millions)	684.0	661.4	688.1	701.7	758.8	828.2	875.0	853.2	844.2	853.4	2.4%
Percent change	2.5%	-3.3%	4.0%	2.0%	8.1%	9.2%	5.6%	-2.5%	-1.1%	1.1%	
Average value per ton	1,474.1	1,463.3	1,456.8	1,442.5	1,527.0	1,642.4	1,709.0	1,683.8	1,635.8	1,614.7	1.1%

Table A1D (continued)

End-use summary

Market	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f	% Growth 23/18
Meats products											
Tons (thousands)	60	59	57	56	57	58	59	56	57	58	0.3%
Percent change	-4.2%	-0.8%	-2.6%	-3.2%	1.9%	2.3%	2.0%	-5.4%	0.9%	1.9%	
Dollars (millions)	121.0	120.2	117.6	113.0	121.0	133.8	142.7	133.8	132.5	142.2	3.3%
Percent change	-2.4%	-0.7%	-2.2%	-3.9%	7.1%	10.6%	6.6%	-6.3%	-1.0%	7.3%	
Average value per ton	2,033.6	2,037.1	2,045.4	2,031.7	2,134.6	2,307.7	2,411.6	2,389.2	2,344.6	2,469.3	3.0%
Perishable bakery goods											
Tons (thousands)	115	111	108	109	113	113	114	108	110	112	-0.2%
Percent change	-1.7%	-3.5%	-2.9%	1.3%	3.2%	0.5%	0.5%	-5.0%	1.3%	2.0%	
Dollars (millions)	235.8	227.3	218.6	219.7	233.7	239.7	248.3	244.3	246.1	247.5	1.2%
Percent change	-0.2%	-3.6%	-3.8%	0.5%	6.4%	2.6%	3.6%	-1.6%	0.7%	0.6%	
Average value per ton	2,050.4	2,047.9	2,028.8	2,012.8	2,073.7	2,115.8	2,180.9	2,257.8	2,244.5	2,213.3	1.3%
Retail carry-out											
Tons (thousands)	272	276	274	279	287	294	305	298	303	313	1.7%
Percent change	0.7%	1.5%	-0.8%	1.9%	2.9%	2.6%	3.5%	-2.2%	1.7%	3.3%	
Dollars (millions)	512.0	519.2	510.0	515.2	546.7	572.2	610.5	618.0	624.6	636.3	3.1%
Percent of total value	2.7%	1.4%	-1.8%	1.0%	6.1%	4.7%	6.7%	1.2%	1.1%	1.9%	
Average value per ton	1,882.4	1,881.0	1,863.4	1,847.9	1,905.1	1,943.7	2,003.6	2,074.2	2,062.0	2,033.3	1.3%
Subtotal											
Tons (thousands)	1,040	1,019	1,028	1,043	1,068	1,084	1,102	1,075	1,092	1,120	0.9%
Percent change	-0.3%	-2.0%	0.8%	1.5%	2.5%	1.5%	1.7%	-2.5%	1.6%	2.5%	
Dollars (millions)	1,788.0	1,748.4	1,743.9	1,750.9	1,872.3	1,988.4	2,094.0	2,061.7	2,061.0	2,094.1	2.3%
Percent of total value	1.5%	-2.2%	-0.3%	0.4%	6.9%	6.2%	5.3%	-1.5%	0.0%	1.6%	
Average value per ton	1,720.1	1,715.8	1,697.3	1,679.4	1,752.6	1,834.4	1,900.4	1,918.5	1,887.1	1,869.9	1.3%
HEALTH & BEAUTY CARE											
Cosmetics & toiletries											
Tons (thousands)	148	150	153	159	164	167	167	159	162	169	0.6%
Percent change	-2.6%	1.4%	2.3%	3.4%	3.2%	1.7%	0.3%	-5.1%	2.4%	3.9%	
Dollars (millions)	320.0	324.4	328.7	337.4	358.6	371.9	384.6	377.9	384.8	394.0	1.9%
Percent change	-1.0%	1.4%	1.4%	2.6%	6.3%	3.7%	3.4%	-1.7%	1.8%	2.4%	
Average value per ton	2,162	2,162	2,142	2,126	2,189	2,234	2,303	2,384	2,370	2,337	1.3%
Pharmaceuticals & OTC											
Tons (thousands)	290	290	288	291	303	307	316	308	313	318	1.0%
Percent change	-0.3%	0.0%	-0.6%	0.9%	4.1%	1.3%	3.1%	-2.6%	1.6%	1.7%	
Dollars (millions)	619.0	618.9	609.2	610.1	654.2	676.0	718.3	724.5	731.4	733.7	2.3%
Percent change	0.1%	0.0%	-1.6%	0.2%	7.2%	3.3%	6.3%	0.9%	1.0%	0.3%	
Average value per ton	2,134	2,134	2,114	2,098	2,161	2,204	2,272	2,352	2,339	2,306	1.3%
Subtotal											
Tons (thousands)	438	440	442	450	467	473	483	467	475	487	0.9%
Percent change	-1.1%	0.5%	0.4%	1.8%	3.8%	1.4%	2.1%	-3.4%	1.8%	2.5%	
Dollars (millions)	939.0	943.2	937.9	947.5	1,012.8	1,047.9	1,102.9	1,102.4	1,116.2	1,127.8	2.2%
Percent change	-0.3%	0.4%	-0.6%	1.0%	6.9%	3.5%	5.2%	0.0%	1.3%	1.0%	
Average value per ton	2,144	2,144	2,124	2,108	2,171	2,215	2,283	2,363	2,349	2,317	1.3%

Table A1D (continued)

End-use summary

Market	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f	% Growth 23/18
OTHER NON-FOOD PRODUCTS											
Hardware											
Tons (thousands)	125	119	115	108	116	116	116	107	107	108	-1.4%
Percent change	-3.9%	-4.8%	-3.2%	-6.1%	6.7%	0.6%	-0.2%	-7.9%	-0.3%	0.9%	
Dollars (millions)	314.0	299.9	287.7	261.9	289.2	297.0	305.7	291.5	289.1	287.6	-0.1%
Percent change	-2.2%	-4.5%	-4.1%	-9.0%	10.4%	2.7%	2.9%	-4.6%	-0.8%	-0.5%	
Average value per ton	2,512	2,520	2,497	2,419	2,503	2,553	2,632	2,725	2,709	2,671	1.3%
Paper products											
Tons (thousands)	165	158	149	146	144	141	141	136	137	138	-0.9%
Percent change	-2.9%	-4.2%	-5.5%	-2.4%	-1.1%	-2.0%	-0.3%	-3.5%	0.6%	0.6%	
Dollars (millions)	303.0	291.4	276.6	259.4	271.5	287.8	300.0	286.9	283.3	300.2	2.0%
Percent change	-1.0%	-3.8%	-5.1%	-6.2%	4.7%	6.0%	4.2%	-4.4%	-1.3%	6.0%	
Average value per ton	1,836	1,844	1,852	1,778	1,883	2,036	2,128	2,108	2,069	2,179	3.0%
Recreational products											
Tons (thousands)	71	67	67	69	71	73	74	69	70	72	0.1%
Percent change	1.4%	-5.6%	0.1%	3.1%	3.2%	2.5%	1.2%	-6.6%	1.6%	2.3%	
Dollars (millions)	167.0	158.8	160.2	160.0	174.2	193.0	204.0	188.7	188.2	202.8	3.1%
Percent change	3.5%	-4.9%	0.9%	-0.1%	8.9%	10.8%	5.7%	-7.5%	-0.3%	7.8%	
Average value per ton	2,352	2,370	2,389	2,315	2,443	2,641	2,760	2,735	2,684	2,826	3.0%
Soap & other cleansers											
Tons (thousands)	170	165	160	154	157	154	153	142	143	141	-2.1%
Percent change	-2.3%	-2.9%	-2.9%	-4.0%	2.4%	-2.0%	-0.6%	-7.2%	0.4%	-1.1%	
Dollars (millions)	278.0	268.7	258.3	236.4	251.9	251.8	258.0	247.9	247.4	241.3	-0.9%
Percent change	-0.6%	-3.4%	-3.8%	-8.5%	6.6%	-0.1%	2.5%	-3.9%	-0.2%	-2.4%	
Average value per ton	1,635	1,628	1,613	1,538	1,601	1,634	1,684	1,743	1,733	1,709	1.3%
Tobacco											
Tons (thousands)	57	58	56	53	50	48	47	43	42	41	-3.7%
Percent change	-12.7%	1.8%	-3.4%	-5.6%	-5.7%	-3.3%	-1.8%	-8.4%	-3.1%	-1.6%	
Dollars (millions)	128.0	130.2	124.6	116.8	113.4	111.8	113.2	107.4	103.5	100.4	-2.4%
Percent change	-11.9%	1.7%	-4.3%	-6.3%	-2.9%	-1.3%	1.3%	-5.2%	-3.7%	-3.0%	
Average value per ton	2,246	2,245	2,224	2,207	2,273	2,319	2,390	2,474	2,460	2,425	1.3%
Subtotal (excluding miscellaneous)											
Tons (thousands)	588	567	548	530	538	533	532	498	499	500	-1.5%
Percent change	-3.5%	-3.6%	-3.4%	-3.3%	1.6%	-1.0%	-0.3%	-6.4%	0.2%	0.2%	
Dollars (millions)	1,190.0	1,148.9	1,107.5	1,034.4	1,100.2	1,141.4	1,180.9	1,122.4	1,111.3	1,132.3	0.6%
Percent change	-1.9%	-3.5%	-3.6%	-6.6%	6.4%	3.7%	3.5%	-5.0%	-1.0%	1.9%	
Average value per ton	2,024	2,026	2,021	1,953	2,044	2,141	2,221	2,255	2,229	2,265	2.1%
Other products (miscellaneous products)											
Tons (thousands)	692	659	628	617	422	375	369	454	435	416	-0.3%
Percent change	3.4%	-4.7%	-4.7%	-1.8%	-31.6%	-11.2%	-1.6%	23.1%	-4.2%	-4.5%	
Dollars (millions)	1,713.0	1,633.4	1,557.0	1,475.3	1,044.1	946.5	959.7	1,223.3	1,165.1	1,097.2	1.0%
Percent change	5.5%	-4.6%	-4.7%	-5.2%	-29.2%	-9.4%	1.4%	27.5%	-4.8%	-5.8%	
Average value per ton	2,475	2,477	2,479	2,391	2,474	2,524	2,602	2,694	2,678	2,640	1.3%

Table A1D (continued)

End-use summary

Market	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f	23/18
TOTAL NON-FOOD (EX. MISCELLANEOUS)											
Tons (thousands)	1,026	1,007	990	979	1,005	1,006	1,015	964	974	987	-0.4%
Percent change	-2.5%	-1.9%	-1.7%	-1.0%	2.6%	0.1%	0.8%	-5.0%	1.0%	1.3%	
Dollars (millions)	2,129	2,092	2,045	1,982	2,113	2,189	2,284	2,225	2,228	2,260	1.4%
Percent change	-1.2%	-1.7%	-2.2%	-3.1%	6.6%	3.6%	4.3%	-2.6%	0.1%	1.5%	
Average value per ton	2,075	2,078	2,067	2,024	2,103	2,176	2,251	2,307	2,288	2,291	1.7%
TOTAL INDUSTRY											
Tons (thousands)	5,034	4,935	4,903	4,904	4,803	4,769	4,789	4,735	4,773	4,831	0.1%
Percent change	0.1%	-2.0%	-0.7%	0.0%	-2.1%	-0.7%	0.4%	-1.1%	0.8%	1.2%	
Dollars (millions)	8,939.7	8,712.2	8,595.4	8,393.0	8,499.9	8,870.7	9,252.6	9,283.3	9,193.2	9,311.5	1.8%
Percent change	2.0%	-2.5%	-1.3%	-2.4%	1.3%	4.4%	4.3%	0.3%	-1.0%	1.3%	
Average value per ton	1,776	1,765	1,753	1,711	1,770	1,860	1,932	1,961	1,926	1,928	1.7%

Source: Fastmarkets RISI, Inc.

Note(s): r = revised, e = estimate, f = forecast.

Table A2D

Folding carton shipments by segment

Percentage share

	2014	2015	2016r	2017r	2018e	2019f	2020f	2021f	2022f	2023f
Beverages	20.9%	21.4%	21.7%	22.0%	23.0%	23.3%	23.5%	23.3%	23.6%	24.0%
Dry food	14.7%	14.7%	14.8%	14.6%	15.1%	15.0%	14.7%	14.2%	14.2%	14.1%
Frozen foods	9.2%	9.2%	9.6%	9.9%	10.3%	10.6%	10.7%	10.7%	10.8%	10.9%
Pharmaceutical products	5.8%	5.9%	5.9%	5.9%	6.3%	6.4%	6.6%	6.5%	6.6%	6.6%
Retail carry-out	5.4%	5.6%	5.6%	5.7%	6.0%	6.2%	6.4%	6.3%	6.3%	6.5%
Hardware	2.5%	2.4%	2.4%	2.2%	2.4%	2.4%	2.4%	2.3%	2.2%	2.2%
Paper	3.3%	3.2%	3.0%	3.0%	3.0%	3.0%	2.9%	2.9%	2.9%	2.9%
Milled grain products (cereals, biscuits & crackers)	7.3%	7.2%	7.2%	7.2%	7.4%	7.4%	7.3%	7.2%	7.2%	7.0%
Soap & other cleansers	2.9%	2.8%	2.8%	2.6%	2.7%	2.7%	2.6%	2.4%	2.5%	2.4%
Dairy products	2.6%	2.5%	2.4%	2.3%	2.4%	2.4%	2.3%	2.2%	2.2%	2.3%
Tobacco	1.1%	1.2%	1.1%	1.1%	1.0%	1.0%	1.0%	0.9%	0.9%	0.9%
Cosmetics & toiletries	2.9%	3.0%	3.1%	3.2%	3.4%	3.5%	3.5%	3.3%	3.4%	3.5%
Confections	2.3%	2.3%	2.4%	2.4%	2.5%	2.6%	2.6%	2.6%	2.6%	2.7%
Perishable bakery	2.3%	2.2%	2.2%	2.2%	2.3%	2.4%	2.4%	2.3%	2.3%	2.3%
Recreational products	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Meats & lard	1.2%	1.2%	1.2%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Other markets	13.7%	13.4%	12.8%	12.6%	8.8%	7.9%	7.7%	9.6%	9.1%	8.6%

Source: Fastmarkets RISI, Inc.

Note(s): r = revised, e = estimate, f = forecast.

Appendix E: Analysis of changes in forecasts

As shown in the tables in Appendix C, historical revisions of both the US government macroeconomic data and the PPC carton market shipment data have had some effect on the forecast for folding carton demand over the years. This is because the forecasts for the individual markets are all based on the historical relationship between carton shipments, consumer spending and industrial production.

Specific revisions to the historical data include:

- GDP/consumer spending
 - Every summer, the US Bureau of Economic Analysis (BEA) releases an annual revision to the national income and product data for the prior three years. The BEA released a comprehensive revision of the National Income and Product Accounts (NIPA) in July 2018. These comprehensive revisions are released every four or five years. In any of these, all data from 1929 forward are subject to revisions, although changes extending that far back in time tend to be definitional in nature. Some examples of this from the 2009 comprehensive revision were the shift of all spending on food consumed away from home (restaurants and bars) over to the service sector, the removal of some antiquated categories and the introduction of new categories (such as wireless communications and Internet access). There were no such definitional changes for consumer spending on goods in the 2013 or 2018 revisions. Consequently, the adjustments to the spending figures only extended back to 1998 and reflected statistical improvements coming from the incorporation of new or revised source data. The BEA also changed the base year for the real spending calculations from 2009 to 2012, which affected the actual consumption level figures rather than the growth figures. Overall, the revisions to consumer spending figures were relatively minor from 1998-2010, but more significant in 2011 and 2012.
- Industrial production
 - The Federal Reserve Board (FRB) released a comprehensive revision to all industrial production series in early 2016. All industrial production series have been rebased from 2007 to 2012 as well. Most of the changes in industrial production output appear to downwardly revise output in the post-recession years, with obviously greater variation at the more granular level as discussed more specifically in the end-use chapters.
- Folding carton shipments
 - In August 2013, the Paperboard Packaging Council (PPC) released a significant revision to the tonnage shipment data that are published in its *Market Flash Report*. The Executive Committee of the PPC had appointed a special task force to review and confirm the published figures for folding carton size, a task that had not been done for many years. The task force found that the dollar size of the market for 2012 (\$8.845 billion) was correct, but that the tonnage had been slightly overstated. The corrected figures lowered tonnage shipments about 4% for that year, while the average value per ton increased by a similar amount.
 - This revision was constrained to the year 2012 alone, and there were no revisions to the tonnage data for prior years. While the revised data show shipments declining 2.9% for the year during 2012, it should be stressed that this figure probably overstated the actual decline during that particular year. Given the number of years since the PPC last conducted a comprehensive review of the data, some of the reduction in shipments in the 2012 data probably reflects adjustments for prior years. However, this does not really matter in the context of the *Trends Report*, which inherently looks at longer-term trends rather than specific year-to-year movements.

- Fastmarkets RISI adjusted the 2012 tonnage shipment data for all of the market segments to reflect the new total shipment levels from the *Market Flash Report*. Special emphasis was given to adjusting the data in market segments that the revised consumer spending and industrial production data indicated should have been weaker than previously expected in

2012. However, the shipment figures for every market segment were lowered to one degree or another. Even so, the brunt of the revision fell on the miscellaneous product category, which by its nature is very vague. In much of the data published by the government, categories such as this are referred to as “Not Elsewhere Specified or Included” or NESOI.