

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Results of Operations

Net earnings (loss) attributable to Berkshire Hathaway shareholders for each of the past three years are disaggregated in the table that follows. Amounts are after deducting income taxes and exclude earnings attributable to noncontrolling interests (in millions).

	2022	2021	2020
Insurance – underwriting	\$ (90)	\$ 728	\$ 657
Insurance – investment income	6,484	4,807	5,039
Railroad	5,946	5,990	5,161
Utilities and energy	3,904	3,572	3,141
Manufacturing, service and retailing	12,512	11,120	8,300
Investment and derivative contract gains (losses)	(53,612)	62,340	31,591
Other*	2,037	1,238	(11,368)
Net earnings (loss) attributable to Berkshire Hathaway shareholders	<u>\$ (22,819)</u>	<u>\$ 89,795</u>	<u>\$ 42,521</u>

* Includes goodwill and indefinite-lived intangible asset impairment charges of \$157 million in 2022, \$259 million in 2021 and \$11.0 billion in 2020, which includes our share of charges recorded by Kraft Heinz.

Through our subsidiaries, we engage in numerous diverse business activities. We manage our operating businesses on an unusually decentralized basis. There are few centralized or integrated business functions. Our senior corporate management team participates in and is ultimately responsible for significant capital allocation decisions, investment activities and the selection of the Chief Executive to head each of the operating businesses. The business segment data (Note 25 to the accompanying Consolidated Financial Statements) should be read in conjunction with this discussion.

The COVID-19 pandemic affected our operating businesses in varying ways and degrees, particularly in 2020 and 2021. Significant disruptions of supply chains and higher costs emerged in 2021 and persisted in 2022. Further, geopolitical conflicts, including the Russia-Ukraine conflict, developed in 2022 and are continuing in 2023. We cannot reliably predict future economic effects of these events on our businesses. Nor can we reliably predict how these events will alter the future consumption patterns of consumers and businesses we serve.

Insurance underwriting generated an after-tax loss of \$90 million in 2022 and after-tax earnings of \$728 million in 2021 and \$657 million in 2020. Insurance underwriting results included after-tax losses from significant catastrophe events of approximately \$2.4 billion in 2022, \$2.3 billion in 2021 and \$750 million in 2020. Underwriting results in 2022 were also negatively impacted by increases in private passenger automobile claims frequencies and severities at GEICO, and favorably impacted by higher earnings from reinsurance underwriting and foreign currency exchange rate gains arising from the remeasurement of non-U.S. Dollar denominated liabilities of our U.S. insurance subsidiaries.

Underwriting results in 2021 were favorably impacted by reductions in incurred losses for prior accident years under property and casualty insurance and reinsurance contracts. Underwriting results in 2021 were negatively impacted by higher private passenger auto claims frequencies and severities and by the reduction in earned premium from the GEICO Giveback program, as well as from high claims costs in the life reinsurance business. Underwriting results in 2020 included the effects of the pandemic, arising from premium reductions from the GEICO Giveback program, significantly reduced claims frequencies for private passenger automobile insurance and increased loss estimates for certain commercial insurance coverages.

After-tax earnings from insurance investment income increased \$1.7 billion in 2022 compared to 2021, attributable to increased dividend income and higher interest rates. After-tax earnings from insurance investment income in 2021 and 2020 were negatively affected by low interest rates on our substantial holdings of cash and U.S. Treasury Bills.

Management’s Discussion and Analysis (Continued)

Results of Operations (Continued)

After-tax earnings of our railroad, BNSF were relatively unchanged in 2022 compared to 2021 and increased 16.1% in 2021 versus 2020. Results in 2022 reflected higher revenue per car/unit, substantially offset by lower overall freight volumes and higher fuel and other operating costs. The earnings increase in 2021 reflected overall higher freight volumes, higher average revenue per car/unit and improved productivity, partly offset by higher average fuel prices and volume related costs. Earnings in 2020 reflected relatively low railroad operating revenues from reduced shipping volumes, attributable to the COVID-19 pandemic, partly offset by lower operating costs and the effects of productivity improvements.

After-tax earnings of our utilities and energy business increased 9.3% in 2022 compared to 2021 and 13.7% in 2021 versus 2020. The increase in 2022 reflected higher earnings from other energy businesses, including tax equity investments and the Northern Powergrid businesses, as well as from the natural gas pipeline businesses, partly offset by lower earnings from the real estate brokerage business. The increase in 2021 reflected higher earnings from the U.S. utilities and natural gas pipelines businesses.

Earnings from our manufacturing, service and retailing businesses increased 12.5% in 2022 compared to 2021 and 34.0% in 2021 versus 2020. Operating results in 2022 were mixed among our various businesses. While customer demand for products and services was relatively good in 2022, demand began to weaken in the second half of the year at certain of our businesses. We experienced the negative effects of higher materials, freight, labor and other input costs through much of 2022. Many of our businesses generated significantly higher earnings in 2021 compared to 2020, attributable to relatively strong customer demand for products and higher selling prices, partially offset by higher materials, freight and other input costs attributable to ongoing disruptions in global supply chains.

Investment and derivative contract gains (losses) in each of the three years presented predominantly derived from our investments in equity securities and included significant net unrealized gains and losses from market price changes. We believe that investment gains and losses on investments in equity securities, whether realized from dispositions or unrealized from changes in market prices, are generally meaningless in understanding our reported quarterly or annual results or evaluating the economic performance of our operating businesses. These gains and losses have caused and will continue to cause significant volatility in our periodic earnings.

Other earnings included after-tax foreign exchange rate gains of approximately \$1.3 billion in 2022 and \$1.0 billion in 2021 and after-tax losses of \$764 million in 2020 related to the non-U.S. Dollar denominated debt issued by Berkshire and its U.S.-based finance subsidiary, Berkshire Hathaway Finance Corporation (“BHFC”). Other earnings also included after-tax goodwill and indefinite-lived intangible asset impairment charges of \$157 million in 2022, \$259 million in 2021 and \$11.0 billion in 2020. Such amounts included our share of impairment charges recorded by Kraft Heinz. Approximately \$9.8 billion of the charges in 2020 were attributable to impairments of goodwill and indefinite-lived intangible assets recorded in connection with Berkshire’s acquisition of Precision Castparts in 2016.

Insurance—Underwriting

Our management views our insurance businesses as possessing two distinct activities – underwriting and investing. Underwriting decisions are the responsibility of the unit managers, while investing decisions are the responsibility of Berkshire’s Chairman and CEO, Warren E. Buffett and Berkshire’s corporate investment managers. Accordingly, we evaluate performance of underwriting operations without any allocation of investment income or investment gains and losses. We consider investment income as an integral component of our aggregate insurance operating results. However, we consider investment gains and losses, whether realized or unrealized, as non-operating. We believe that such gains and losses are not meaningful in understanding the periodic operating results of our insurance businesses.

The timing and magnitude of catastrophe losses can produce significant volatility in our periodic underwriting results, particularly with respect to our reinsurance businesses. We currently consider pre-tax incurred losses exceeding \$150 million from a current year catastrophic event to be significant. Significant catastrophe events in 2022 included Hurricane Ian and floods in Australia, while significant events in 2021 included Hurricane Ida, floods in Europe and Winter Storm Uri.

Changes in estimates for unpaid losses and loss adjustment expenses, including amounts established for occurrences in prior years, can also significantly affect our periodic underwriting results. Unpaid loss estimates, including estimates under retroactive reinsurance contracts, were approximately \$143 billion as of December 31, 2022 and \$125 billion as of December 31, 2021. Our periodic underwriting results may also include significant foreign currency transaction gains and losses arising from the changes in the valuation of non-U.S. Dollar denominated liabilities of our U.S. based insurance subsidiaries due to foreign currency exchange rate fluctuations.

Management’s Discussion and Analysis (Continued)

Insurance—Underwriting (Continued)

We provide primary insurance and reinsurance products covering property and casualty risks, as well as life and health risks. Our insurance and reinsurance businesses are GEICO, Berkshire Hathaway Primary Group (“BH Primary”) and Berkshire Hathaway Reinsurance Group (“BHRG”). On October 19, 2022, Berkshire acquired Alleghany Corporation (“Alleghany”), which operates property and casualty insurance and reinsurance businesses. These businesses were included in the BH Primary and BHRG underwriting results beginning as of that date.

We strive to produce pre-tax underwriting earnings (premiums earned less losses incurred and underwriting expenses) over the long term in all business categories, except for BHRG’s retroactive reinsurance and periodic payment annuity contracts. Time-value-of-money is an important element in establishing prices for these contracts. We normally receive all premiums at the contract inception date, which are immediately available for investment. Ultimate claim payments can extend for decades and are expected to exceed premiums, producing underwriting losses over the claim settlement periods, primarily through deferred charge amortization and discount accretion charges.

Underwriting results of our insurance businesses are summarized below (dollars in millions).

	2022	2021	2020
Pre-tax underwriting earnings (loss):			
GEICO	\$ (1,880)	\$ 1,259	\$ 3,428
Berkshire Hathaway Primary Group	393	607	110
Berkshire Hathaway Reinsurance Group	1,389	(930)	(2,700)
Pre-tax underwriting earnings	(98)	936	838
Income taxes and noncontrolling interests	(8)	208	181
Net underwriting earnings (loss)	<u>\$ (90)</u>	<u>\$ 728</u>	<u>\$ 657</u>
Effective income tax rate	<u>8.5%</u>	<u>22.2%</u>	<u>21.5%</u>

GEICO

GEICO writes private passenger automobile insurance, offering coverages to insureds in all 50 states and the District of Columbia. GEICO markets its policies mainly by direct response methods where most customers apply for coverage directly to the company via the Internet or over the telephone. A summary of GEICO’s underwriting results follows (dollars in millions).

	2022		2021		2020	
	Amount	%	Amount	%	Amount	%
Premiums written	<u>\$ 39,107</u>		<u>\$ 38,395</u>		<u>\$ 34,928</u>	
Premiums earned	<u>\$ 38,984</u>	100.0	<u>\$ 37,706</u>	100.0	<u>\$ 35,093</u>	100.0
Losses and loss adjustment expenses	36,297	93.1	30,999	82.2	26,018	74.1
Underwriting expenses	4,567	11.7	5,448	14.5	5,647	16.1
Total losses and expenses	<u>40,864</u>	<u>104.8</u>	<u>36,447</u>	<u>96.7</u>	<u>31,665</u>	<u>90.2</u>
Pre-tax underwriting earnings (loss)	<u>\$ (1,880)</u>		<u>\$ 1,259</u>		<u>\$ 3,428</u>	

GEICO’s pre-tax underwriting results in each of the past three years were significantly affected by changes in average claims frequencies and severities. Beginning in the first quarter of 2020 and continuing through the first quarter of 2021, average claims frequencies were significantly below historical levels from the effects of less driving by policyholders during the COVID-19 pandemic. These effects were partially offset by higher average claims severities and lower premiums earned from the GEICO Giveback program, which provided a 15% premium reduction to all new or renewing voluntary auto and motorcycle policies between April 8, 2020 and October 7, 2020. Starting in the second quarter of 2021, average claims frequencies began to increase as driving by policyholders increased. GEICO’s pre-tax underwriting losses in 2022 reflected significant increases in average claims severities, primarily due to significant cost inflation in property and physical damage claims, which began to accelerate in the second half of 2021 and have continued through 2022. Increases in used car prices are producing increased claims severities on total losses and shortages of car parts are contributing to elevated claims severities on partial losses. In addition, injury claims severities continued to trend higher in 2022.

Management's Discussion and Analysis (Continued)

Insurance—Underwriting (Continued)

GEICO (Continued)

2022 versus 2021

Premiums written increased \$712 million (1.9%) in 2022 compared to 2021, reflecting increases in average premiums per auto policy due to rate increases, which were substantially offset by a decrease in policies-in-force. Voluntary auto policies-in-force declined 8.9% in 2022 compared to 2021 while average premiums per voluntary auto policy increased 11.3%. Premiums earned increased \$1.3 billion (3.4%) in 2022 compared to 2021, partially attributable to a reduction in 2021 of approximately \$475 million from the remaining impact of the GEICO Giveback program.

Losses and loss adjustment expenses increased \$5.3 billion (17.1%) in 2022 compared to 2021. GEICO's ratio of losses and loss adjustment expenses to premiums earned (the "loss ratio") was 93.1% in 2022, an increase of 10.9 percentage points over 2021. The increase was primarily attributable to higher claims frequencies and severities, as well as lower reductions of ultimate loss estimates for prior years' events.

Claims frequencies in 2022 were higher for all coverages, including property damage (one to two percent range), bodily injury and collision (four to five percent range) and personal injury (three to four percent range). Average claims severities in 2022 were higher for all coverages, including property damage (twenty-one to twenty-two percent range), collision (fourteen to sixteen percent range) and bodily injury (nine to eleven percent range). Losses and loss adjustment expenses reflected reductions in the ultimate loss estimates for prior years' loss events of \$653 million in 2022 compared to \$1.8 billion in 2021. The reductions in 2022 reflected decreases in all major coverages except collision and property damage coverages, while the reductions in 2021 were across all major coverages. Losses and loss adjustment expenses were approximately \$400 million from Hurricane Ian in 2022 and \$375 million from Hurricane Ida in 2021.

Underwriting expenses decreased \$881 million (16.2%) in 2022 compared to 2021, primarily due to significant reductions in advertising costs and lower employee-related costs. GEICO's expense ratio (underwriting expense to premiums earned) was 11.7% in 2022, a decrease of 2.8 percentage points compared to 2021, attributable to both the decrease in expenses as well as the increase in earned premiums.

GEICO has successfully obtained premium rate increase approvals from certain states in response to the significant claims costs increases it has experienced in recent years. As a result, we currently expect GEICO to generate an underwriting profit in 2023.

2021 versus 2020

Premiums written in 2021 increased \$3.5 billion (9.9%) compared to 2020, which included a reduction of approximately \$2.9 billion attributable to the GEICO Giveback program. Premiums earned in 2021 increased \$2.6 billion (7.4%) compared to 2020. The GEICO Giveback Program reduced earned premiums by approximately \$2.5 billion in 2020 with the remainder of the impact included in 2021. Voluntary auto policies-in-force in 2021 were slightly higher compared to 2020.

Losses and loss adjustment expenses increased \$5.0 billion (19.1%) compared to 2020. GEICO's loss ratio increased 8.1 percentage points compared to 2020. The increase in the loss ratio reflected an increase in average claims frequencies and severities and higher losses from significant catastrophe events, partially offset by increased reductions of ultimate estimated losses for claims occurring in prior years.

Claims frequencies in 2021 were higher for all coverages, including property damage and bodily injury (thirteen to fourteen percent range), personal injury (sixteen to seventeen percent range) and collision (twenty-one to twenty-two percent range). Average claims severities in 2021 were also higher for property damage coverage (two to three percent range), collision coverage (fifteen to sixteen percent range) and bodily injury coverage (eight to ten percent range). Ultimate claim loss estimates for claims occurring in prior years were reduced approximately \$1.8 billion in 2021 and \$253 million in 2020. Losses incurred attributable to Hurricane Ida in 2021 were \$375 million, while losses in 2020 were \$81 million from significant catastrophe events.

Underwriting expenses decreased \$199 million (3.5%) compared to 2020, reflecting lower advertising expenses. GEICO's expense ratio decreased 1.6 percentage points in 2021, reflecting lower expenses and higher premiums earned.

Management's Discussion and Analysis (Continued)

Insurance—Underwriting (Continued)

Berkshire Hathaway Primary Group

The Berkshire Hathaway Primary Group consists of several independently managed businesses that provide a variety of primarily commercial insurance solutions, including healthcare professional liability, workers' compensation, automobile, general liability, property and specialty coverages for small, medium and large clients. BH Primary's larger insurers include Berkshire Hathaway Specialty Insurance ("BH Specialty"), Berkshire Hathaway Homestate Companies ("BHHC"), MedPro Group, Berkshire Hathaway GUARD Insurance Companies ("GUARD"), National Indemnity Company ("NICO Primary") and U.S. Liability Insurance Company ("USLI"). This group also includes Alleghany's RSUI Group Inc. and CapSpecialty, Inc. ("Alleghany Insurance") beginning October 19, 2022. A summary of BH Primary underwriting results follows (dollars in millions).

	2022		2021		2020	
	Amount	%	Amount	%	Amount	%
Premiums written	\$ 14,619		\$ 12,595		\$ 10,212	
Premiums earned	\$ 13,746	100.0	\$ 11,575	100.0	\$ 9,615	100.0
Losses and loss adjustment expenses	9,889	71.9	8,107	70.0	7,129	74.1
Underwriting expenses	3,464	25.2	2,861	24.8	2,376	24.7
Total losses and expenses	13,353	97.1	10,968	94.8	9,505	98.8
Pre-tax underwriting earnings	\$ 393		\$ 607		\$ 110	

Premiums written increased \$2.0 billion (16.1%) in 2022 compared to 2021, reflecting increases at BH Specialty (16%), USLI (16%), BHHC (15%) and MedPro Group (10%), and from the inclusion of Alleghany Insurance (\$435 million). Premiums written increased \$2.4 billion (23.3%) in 2021 compared to 2020, primarily due to increases from BH Specialty (36%), MedPro Group (16%), NICO Primary (25%), GUARD (7%) and USLI (20%). The increases in each year were across a variety of coverages and in several markets.

BH Primary's loss ratio increased 1.9 percentage points compared to 2021, which decreased 4.1 percentage points versus 2020. Incurred losses from significant catastrophe events were \$641 million in 2022 (\$554 from Hurricane Ian), \$433 million in 2021 (\$239 million from Hurricane Ida) and \$207 million in 2020 (\$160 million from Hurricanes Laura and Sally). Incurred losses in 2020 also included increased liabilities attributable to the pandemic of \$167 million. Incurred losses and loss adjustment expenses reflected net reductions in estimated ultimate liabilities for prior years' loss events of \$428 million in 2022, \$631 million in 2021 and \$265 million in 2020. BH Primary insurers continue to write significant levels of workers' compensation, commercial and professional liability insurance and the related claim costs may be subject to high severity and long claim-tails. Claims liabilities could be greater than anticipated due to a variety of factors.

Underwriting expenses increased \$603 million (21.1%) in 2022 compared to 2021, while underwriting expenses increased \$485 million (20.4%) in 2021 compared to 2020. These increases reflected the increases in premiums earned and changes in business mix.

Berkshire Hathaway Reinsurance Group

The Berkshire Hathaway Reinsurance Group ("BHRG") offers excess-of-loss and quota-share reinsurance coverages on property and casualty risks to insurers and reinsurers worldwide through several subsidiaries, led by National Indemnity Company ("NICO"), General Reinsurance Corporation, General Reinsurance AG and, beginning October 19, 2022, Alleghany's Transatlantic Reinsurance Company and affiliates ("TransRe Group"). We also write life and health reinsurance coverages through General Re Life Corporation, General Reinsurance AG and Berkshire Hathaway Life Insurance Company of Nebraska ("BHLN"). We assume property and casualty risks under retroactive reinsurance contracts written through NICO and we write periodic payment annuity contracts through BHLN.

Management's Discussion and Analysis (Continued)

Insurance—Underwriting (Continued)

Berkshire Hathaway Reinsurance Group (Continued)

A summary of BHRG's premiums and pre-tax underwriting earnings follows (dollars in millions).

	Premiums earned			Pre-tax underwriting earnings (loss)		
	2022	2021	2020	2022	2021	2020
Property/casualty	\$ 16,040	\$ 13,740	\$ 12,214	\$ 2,180	\$ 667	\$ (799)
Life/health	5,279	5,648	5,861	292	(421)	(18)
Retroactive reinsurance	—	136	38	(668)	(782)	(1,248)
Periodic payment annuity	582	658	566	(532)	(508)	(617)
Variable annuity	14	15	14	117	114	(18)
	<u>\$ 21,915</u>	<u>\$ 20,197</u>	<u>\$ 18,693</u>	<u>\$ 1,389</u>	<u>\$ (930)</u>	<u>\$ (2,700)</u>

Property/casualty

A summary of property/casualty reinsurance underwriting results follows (dollars in millions).

	2022		2021		2020	
	Amount	%	Amount	%	Amount	%
Premiums written	<u>\$ 16,962</u>		<u>\$ 14,149</u>		<u>\$ 13,295</u>	
Premiums earned	<u>\$ 16,040</u>	100.0	<u>\$ 13,740</u>	100.0	<u>\$ 12,214</u>	100.0
Losses and loss adjustment expenses	10,605	66.1	9,878	71.9	9,898	81.0
Underwriting expenses	3,255	20.3	3,195	23.2	3,115	25.5
Total losses and expenses	<u>13,860</u>	<u>86.4</u>	<u>13,073</u>	<u>95.1</u>	<u>13,013</u>	<u>106.5</u>
Pre-tax underwriting earnings (loss)	<u>\$ 2,180</u>		<u>\$ 667</u>		<u>\$ (799)</u>	

Premiums written increased \$2.8 billion (19.9%) in 2022 compared to 2021, primarily due to net increases in new property business and higher rates, and the inclusion of the TransRe Group (\$986 million), partially offset by unfavorable foreign currency translation effects. Premiums written increased \$854 million (6.4%) in 2021 compared to 2020, primarily attributable to net new business, increased participations and improved prices on renewals and favorable currency translation effects. The increase was primarily attributable to property coverages.

Losses and loss adjustment expenses increased \$727 million (7.4%) in 2022 compared to 2021 and were relatively unchanged in 2021 compared to 2020. Losses incurred from significant catastrophe events were \$2.0 billion in 2022 (\$1.6 billion from Hurricane Ian), \$2.1 billion (\$933 million from Hurricane Ida) in 2021 and \$667 million in 2020 (\$357 million in the aggregate from Hurricanes Laura and Sally). Losses incurred in 2020 also included \$964 million attributable to the COVID-19 pandemic. Losses and loss adjustment expenses included reductions in estimated ultimate liabilities for prior years' events of \$1.6 billion in 2022 and \$718 million in 2021 and increases of \$162 million in 2020.

Underwriting expenses as percentages of premiums earned decreased 2.9 percentage points in 2022 compared to 2021, primarily attributable to foreign currency exchange rate effects and changes in business mix. Underwriting expenses included foreign currency exchange gains of \$371 million in 2022 compared to \$173 million in 2021, related to the remeasurement of certain non-U.S. Dollar denominated liabilities of our U.S. insurance subsidiaries. The expense ratio in 2021 decreased 2.3 percentage points compared to 2020, primarily attributable to changes in business mix and foreign currency effects.

Management's Discussion and Analysis (Continued)

Insurance—Underwriting (Continued)

Berkshire Hathaway Reinsurance Group (Continued)

Life/health

A summary of our life/health reinsurance underwriting results follows (dollars in millions).

	2022		2021		2020	
	Amount	%	Amount	%	Amount	%
Premiums written	\$ 5,185		\$ 5,621		\$ 5,848	
Premiums earned	\$ 5,279	100.0	\$ 5,648	100.0	\$ 5,861	100.0
Life and health insurance benefits	4,004	75.8	4,933	87.3	4,883	83.3
Underwriting expenses	983	18.7	1,136	20.2	996	17.0
Total benefits and expenses	4,987	94.5	6,069	107.5	5,879	100.3
Pre-tax underwriting earnings (loss)	\$ 292		\$ (421)		\$ (18)	

Life/health premiums written decreased \$436 million (7.8%) in 2022 compared to 2021 which decreased 3.9% from 2020. The decrease in 2022 was primarily due to unfavorable foreign currency translation effects (\$289 million) and decreased volume in the Asia Pacific region. Premiums written in 2020 included \$710 million from a contract that covered U.S. health risks that did not renew in 2021. Otherwise, premiums written in 2021 increased 9.4% versus 2020, primarily due to volume growth in the Asia Pacific region and favorable foreign currency translation effects. Life and health benefits declined \$929 million (18.8%) in 2022 compared to 2021, primarily due to relatively high pandemic-related mortality claims in the U.S., South Africa, India and Latin America in 2021. Underwriting earnings in 2020 were negatively affected by increased life benefits from COVID-19-related claims and from increased liabilities from changes in assumptions used in estimating disability benefit liabilities in Australia, which were mostly offset by lower other life claims and reduced losses from U.S. long-term care business in run-off.

Retroactive reinsurance

Retroactive reinsurance underwriting results primarily derive from the runoff of contracts written several years ago. Pre-tax underwriting losses in each year derived from the amortization of deferred charges and changes in the estimated timing and amounts of future claim payments. Underwriting results also include foreign currency exchange gains and losses from the effects of changes in foreign currency exchange rates on non-U.S. Dollar denominated liabilities of our U.S. subsidiaries. Pre-tax foreign currency gains were \$168 million in 2022 and \$58 million in 2021 versus pre-tax losses of \$171 million in 2020.

Pre-tax underwriting losses before foreign currency gains/losses were \$836 million in 2022, \$840 million in 2021 and \$1.1 billion in 2020, primarily from deferred charge amortization. Underwriting results also reflected the effects of changes in the estimates of the timing of future payments and amounts of ultimate claim liabilities. Estimated ultimate claim liabilities for prior years' contracts were increased \$86 million in 2022 and reduced \$974 million in 2021, which net of related changes in unamortized deferred charges, produced relatively insignificant effects on underwriting earnings.

Gross unpaid losses assumed under retroactive reinsurance contracts were \$35.4 billion at December 31, 2022, a decline of \$2.4 billion since December 31, 2021, primarily attributable to paid claims. Unamortized deferred charges related to retroactive reinsurance contracts were \$9.9 billion at December 31, 2022, a decline of \$769 million since December 31, 2021. Deferred charge amortization will be included in underwriting earnings over the expected remaining claims settlement periods.

Periodic payment annuity

Periodic payment annuity premiums earned decreased \$76 million (11.6%) in 2022 compared to 2021, which increased \$92 million (16.3%) compared to 2020. Periodic payment annuity business is both price and demand sensitive and the supply of available business is affected by the timing of underlying legal claim settlements. Our volumes written may change rapidly due to changes in prices, which are affected by prevailing interest rates, the perceived risks and durations associated with the expected annuity payments, as well as the level of competition.

Management's Discussion and Analysis (Continued)

Insurance—Underwriting (Continued)

Berkshire Hathaway Reinsurance Group (Continued)

Our periodic payment annuity contracts normally produce pre-tax underwriting losses from the recurring accretion of time-value discounted annuity liabilities, which includes discount accruals on liabilities of contracts without life contingencies. Underwriting results also include gains or losses from foreign currency exchange rate changes on non-U.S. Dollar denominated liabilities of our U.S. subsidiaries. Pre-tax underwriting results included foreign currency gains of \$164 million in 2022 and \$18 million in 2021, and pre-tax losses of \$67 million in 2020.

Pre-tax underwriting losses before foreign currency exchange effects were \$696 million in 2022, \$526 million in 2021 and \$550 million in 2020. Pre-tax losses in 2022 included approximately \$130 million attributable to the termination of a reinsurance contract, in which the settlement paid exceeded the carrying value of the liabilities. Pre-tax losses in 2021 were partially offset by the effects of higher mortality and by higher interest rates applicable to settlements under certain contracts. Discounted liabilities were \$15.4 billion at December 31, 2022, which included \$3.9 billion for contracts without life contingencies, and had a weighted average discount rate of approximately 3.9%. Upon the adoption of ASU 2018-12 in 2023, the discount rates on contracts with life-contingent liabilities will be adjusted quarterly based upon prevailing interest rates which could have a significant effect on our recorded liabilities. The periodic effect from discount rate changes will be reflected in other comprehensive income.

Variable annuity

Variable annuity guarantee reinsurance contracts produced pre-tax gains of \$117 million in 2022 and \$114 million in 2021, and pre-tax losses of \$18 million in 2020. The results from these contracts are affected by changes in securities markets, interest rates and foreign currency exchange rates, which can be volatile, and from the periodic amortization of expected profit margins. Underwriting earnings in 2022 and 2021 were primarily attributable to the net effects of interest rate increases and changes in securities markets.

Insurance—Investment Income

A summary of net investment income attributable to our insurance operations follows (dollars in millions).

	2022	2021	2020	Percentage change	
				2022 vs 2021	2021 vs 2020
Dividend income	\$ 6,039	\$ 5,060	\$ 4,890	19.3%	3.5%
Interest and other investment income	1,685	589	1,059	186.1	(44.4)
Pre-tax net investment income	7,724	5,649	5,949	36.7	(5.0)
Income taxes and noncontrolling interests	1,240	842	910		
Net investment income	\$ 6,484	\$ 4,807	\$ 5,039		
Effective income tax rate	16.0%	14.9%	15.3%		

Dividend income increased \$979 million (19.3%) in 2022 compared to 2021 and increased \$170 million (3.5%) in 2021 versus 2020. The increase in 2022 reflected an overall increase in equity security investments during 2022. Dividend income also varies from period to period due to changes in the investment portfolio and the frequency and timing of dividends from certain investees. Dividend income included \$46 million in 2022, \$121 million in 2021 and \$26 million in 2020 from investments in preferred stock of Berkshire Hathaway Energy. Such amounts are deducted from earnings of the utilities and energy segment.

Interest and other investment income increased \$1.1 billion (186.1%) in 2022 compared to 2021, primarily due to significant increases in interest income due to interest rate increases during the year, as well as the inclusion of interest income on assets of Alleghany's insurance subsidiaries. Interest and other investment income in 2021 declined 44.4% compared to 2020, primarily due to lower income from short-term investments and fixed maturity securities. We continue to hold substantial balances of cash, cash equivalents and short-term U.S. Treasury Bills. We continue to believe that maintaining ample liquidity is paramount and we insist on safety over yield with respect to short-term investments.

Management's Discussion and Analysis (Continued)

Insurance—Investment Income (Continued)

Invested assets of our insurance businesses derive from shareholder capital and from net liabilities under insurance and reinsurance contracts or “float.” The major components of float are unpaid losses and loss adjustment expenses, including liabilities under retroactive reinsurance contracts, life, annuity and health insurance benefit liabilities, unearned premiums and other liabilities due to policyholders, reduced by insurance premiums and reinsurance receivables, deferred charges assumed under retroactive reinsurance contracts and deferred policy acquisition costs. Float approximated \$164 billion at December 31, 2022, \$147 billion at December 31, 2021 and \$138 billion at December 31, 2020. Float at December 31, 2022 included approximately \$14 billion attributable to Allegheny’s insurance and reinsurance businesses. Our combined insurance operations generated pre-tax underwriting losses of \$98 million in 2022, and the cost of float was nominal. In 2021 and 2020, our combined insurance operations generated pre-tax underwriting gains, and consequently, the cost of float in each year was negative.

A summary of cash and investments held in our insurance businesses as of December 31, 2022 and 2021 follows (in millions).

	December 31,	
	2022	2021
Cash, cash equivalents and U.S. Treasury Bills	\$ 86,816	\$ 90,688
Equity securities	298,934	334,907
Fixed maturity securities	24,998	16,386
Other	3,417	4,296
	<u>\$ 414,165</u>	<u>\$ 446,277</u>

Fixed maturity investments as of December 31, 2022 were as follows (in millions).

	Amortized cost	Unrealized gains/losses	Carrying value
U.S. Treasury, U.S. government corporations and agencies	\$ 10,029	\$ (237)	\$ 9,792
Foreign governments	10,375	(127)	10,248
Corporate bonds	1,938	251	2,189
Other	2,701	68	2,769
	<u>\$ 25,043</u>	<u>\$ (45)</u>	<u>\$ 24,998</u>

U.S. government obligations are rated AA+ or Aaa by the major rating agencies. Approximately 93% of all foreign government obligations were rated AA or higher by at least one of the major rating agencies. Foreign government securities include obligations issued or unconditionally guaranteed by national or provincial government entities.

Management's Discussion and Analysis (Continued)

Railroad

Burlington Northern Santa Fe, LLC ("BNSF") operates one of the largest railroad systems in North America, with over 32,500 route miles of track in 28 states. BNSF also operates in three Canadian provinces. BNSF classifies its major business groups by type of product shipped including consumer products, industrial products, agricultural products and coal. A summary of BNSF's earnings follows (dollars in millions).

	2022	2021	2020	Percentage change	
				2022 vs 2021	2021 vs 2020
Railroad operating revenues	\$ 25,203	\$ 22,513	\$ 20,181	11.9%	11.6%
Railroad operating expenses:					
Compensation and benefits	5,253	4,696	4,542	11.9	3.4
Fuel	4,581	2,766	1,789	65.6	54.6
Purchased services	2,102	2,033	1,954	3.4	4.0
Depreciation and amortization	2,517	2,444	2,460	3.0	(0.7)
Equipment rents, materials and other	2,147	1,763	1,684	21.8	4.7
Total	16,600	13,702	12,429	21.2	10.2
Railroad operating earnings	8,603	8,811	7,752	(2.4)	13.7
Other revenues (expenses):					
Other revenues	685	769	688	(10.9)	11.8
Other expenses, net	(555)	(687)	(611)	(19.2)	12.4
Interest expense	(1,025)	(1,032)	(1,037)	(0.7)	(0.5)
Pre-tax earnings	7,708	7,861	6,792	(1.9)	15.7
Income taxes	1,762	1,871	1,631	(5.8)	14.7
Net earnings	\$ 5,946	\$ 5,990	\$ 5,161	(0.7)	16.1
Effective income tax rate	22.9%	23.8%	24.0%		

The following table summarizes BNSF's railroad freight volumes by business group (cars/units in thousands).

	Cars/Units			Percentage change	
	2022	2021	2020	2022 vs 2021	2021 vs 2020
Consumer products	5,202	5,673	5,266	(8.3)%	7.7%
Industrial products	1,618	1,709	1,622	(5.3)	5.4
Agricultural products	1,200	1,224	1,189	(2.0)	2.9
Coal	1,529	1,529	1,404	—	8.9
	9,549	10,135	9,481	(5.8)	6.9

2022 versus 2021

Railroad operating revenues increased 11.9% in 2022 compared to 2021, reflecting an 18.9% increase in average revenue per car/unit, including the impact from higher fuel surcharge revenue driven by higher fuel prices, partially offset by lower volumes of 5.8%. BNSF's pre-tax earnings decreased 1.9% in 2022 from 2021. Pre-tax earnings in 2022 were impacted by lower volumes and higher fuel and other operating costs, offset by higher yield and fuel surcharge revenue.

Operating revenues from consumer products increased 11.8% in 2022 to \$9.2 billion compared to 2021, reflecting higher average revenue per car/unit, partially offset by a volume decrease of 8.3%. The volume decrease was primarily due to lower intermodal shipments, resulting from supply chain disruptions and lower west coast imports during the second half of the year.

Operating revenues from industrial products were \$5.6 billion in 2022, an increase of 5.6% from 2021, reflecting higher average revenue per car/unit, partially offset by a volume decrease of 5.3%. The volume decrease was primarily due to a decrease in petroleum products related to lower demand for shipments of crude by rail and lower building products, steel and taconite shipments, partially offset by increased mineral shipments.

Operating revenues from agricultural products increased 12.6% to \$5.7 billion in 2022 compared to 2021. The revenue increase reflected higher revenue per car/unit partially offset by lower volumes of 2.0%. The decrease in volumes was primarily due to lower grain exports and fertilizer shipments, partially offset by higher volumes of domestic grains, renewable diesel and feedstocks.

Operating revenues from coal increased 21.7% to \$3.9 billion in 2022 compared to 2021, attributable to higher average revenue per car/unit. Coal volumes were unchanged compared to 2021.

Management's Discussion and Analysis (Continued)

Railroad (Continued)

Railroad operating expenses were \$16.6 billion in 2022, an increase of \$2.9 billion (21.2%) compared to 2021. Our ratio of railroad operating expenses to railroad operating revenues increased 5.0 percentage points to 65.9% in 2022 versus 2021. The operating expense increase was primarily attributable to significant increases in the cost of fuel, as well as higher compensation and benefits expense. Compensation and benefits expenses increased \$557 million (11.9%) in 2022 compared to 2021, primarily due to wage inflation, including the impact from the ratified union labor agreements, higher health and welfare costs and lower productivity. Fuel expenses increased \$1.8 billion (65.6%) in 2022 compared to 2021, primarily due to higher average fuel prices, partially offset by lower volumes. Equipment rents, materials and other expenses increased \$384 million (21.8%) in 2022 compared to 2021, due to general inflation, lower gains from land and easement sales and higher casualty and litigation costs.

Approximately 31,000 of BNSF's employees are members of a labor union. The U.S. Class I railroads and rail labor unions were engaged in multi-party national negotiations from January 2020 through June 2022. Federal mediation was included in that timeframe, followed by a release from the National Mediation Board and subsequent appointment of a Presidential Emergency Board (PEB), in accordance with the Railway Labor Act. The PEB issued its report and recommendations to settle the bargaining disputes on August 16, 2022. Tentative agreements based on these recommendations were reached with all labor unions in September 2022. Thereafter, a majority of the unions ratified those agreements with the remainder being imposed by Congress in December 2022. This concluded the national round which is not subject to re-opening until late 2024.

2021 versus 2020

Railroad operating revenues increased 11.6% in 2021 compared to 2020, reflecting higher volumes of 6.9%, as well as a 3.5% increase in average revenue per car/unit resulting from business mix changes and higher fuel surcharge revenue attributable to higher fuel prices. Pre-tax earnings were \$7.9 billion in 2021, an increase of 15.7% from 2020. The COVID-19 pandemic caused a significant economic slowdown that adversely affected our volumes in 2020. Revenue changes in 2021 were driven by continued improvements from the 2020 effects of the COVID-19 pandemic, partially offset by disruptions in the global supply chain.

Operating revenues from consumer products increased 13.7% in 2021 to \$8.3 billion compared to 2020, reflecting increased volumes of 7.7% and higher average revenue per car/unit. The volume increase was primarily due to growth in intermodal in both international and domestic shipments driven by increased retail sales, inventory replenishments by retailers and increased e-commerce activity. Operating revenues from industrial products were \$5.3 billion in 2021, an increase of 5.0% from 2020. Volumes increased 5.4% while average revenue per car/unit was nearly unchanged from 2020. The volume increase was primarily due to improvement in the U.S. industrial economy, driving higher volumes in the construction and building sectors, partially offset by lower petroleum volumes due to unfavorable market conditions in the energy sector.

Operating revenues from agricultural products increased 5.8% to \$5.1 billion in 2021 compared to 2020. The revenue change reflected a volume increase of 2.9% due to higher domestic grain shipments and higher volumes of ethanol and related commodities, as well as higher revenue per car/unit. Operating revenues from coal increased 21.5% to \$3.2 billion in 2021 compared to 2020 attributable to higher volumes of 8.9% in 2021, as well as higher average revenue per car/unit. The volume increase in 2021 was attributable to increased electricity generation, higher natural gas prices and improved export demand.

Railroad operating expenses were \$13.7 billion in 2021, an increase of \$1.3 billion (10.2%) compared to 2020. The ratio of railroad operating expenses to railroad operating revenues decreased 0.7 percentage points to 60.9% in 2021 versus 2020. The increase in railroad operating expenses reflected higher volumes and higher average fuel prices, partially offset by the favorable impact of productivity improvements. Compensation and benefits expenses increased \$154 million (3.4%) in 2021 compared to 2020, primarily due to increased volumes, wage inflation and health and welfare costs, partially offset by productivity improvements. Fuel expenses increased \$977 million (54.6%) compared to 2020, primarily due to higher average fuel prices. Purchased service expenses increased \$79 million (4.0%) compared to 2020, primarily due to higher volumes and the effects of insurance recoveries in 2020 related to 2019 flooding, partially offset by improved productivity. Equipment rents, materials and other expenses increased \$79 million (4.7%) compared to 2020, due to higher volume-related costs.

Management's Discussion and Analysis (Continued)

Utilities and Energy

We currently own 92% of Berkshire Hathaway Energy Company ("BHE"), which operates a global energy business. BHE's domestic regulated utility interests include PacifiCorp, MidAmerican Energy Company ("MEC") and NV Energy. BHE's natural gas pipelines consist of five domestic regulated interstate natural gas pipeline systems and a 25% interest in a liquefied natural gas export, import and storage facility ("LNG interest"), which BHE operates and consolidates for financial reporting purposes. Three of the natural gas pipeline systems and the LNG interest were acquired on November 1, 2020 from Dominion Energy, Inc. ("BHE GT&S"). Other energy businesses include two regulated electricity distribution businesses operated by BHE subsidiaries (referred to as Northern Powergrid) in Great Britain, a regulated electricity transmission-only business in Alberta, Canada ("AltaLink, L.P.") and a diversified portfolio of mostly renewable independent power projects and investments. BHE also operates a residential real estate brokerage business and a large network of real estate brokerage franchises in the United States.

The rates our regulated businesses charge customers for energy and services are based in large part on the costs of business operations, including income taxes and a return on capital, and are subject to regulatory approval. To the extent such costs are not allowed in the approved rates, operating results will be adversely affected. A summary of BHE's net earnings follows (dollars in millions).

	2022	2021	2020
Revenues:			
Energy operating revenue	\$ 21,069	\$ 18,935	\$ 15,556
Real estate operating revenue	5,268	6,215	5,396
Other income (loss)	56	(54)	148
Total revenue	<u>26,393</u>	<u>25,096</u>	<u>21,100</u>
Costs and expense:			
Energy cost of sales	6,757	5,504	4,187
Energy operating expense	9,233	8,535	7,539
Real estate operating costs and expense	5,117	5,710	4,885
Interest expense	2,140	2,054	1,941
Total costs and expense	<u>23,247</u>	<u>21,803</u>	<u>18,552</u>
Pre-tax earnings	3,146	3,293	2,548
Income tax expense (benefit)*	(1,629)	(1,153)	(996)
Net earnings after income taxes	4,775	4,446	3,544
Noncontrolling interests of BHE subsidiaries	423	399	71
Net earnings attributable to BHE	4,352	4,047	3,473
Noncontrolling interests and preferred stock dividends	448	475	332
Net earnings attributable to Berkshire Hathaway shareholders	<u>\$ 3,904</u>	<u>\$ 3,572</u>	<u>\$ 3,141</u>
Effective income tax rate	<u>(51.8)%</u>	<u>(35.0)%</u>	<u>(39.1)%</u>

* Includes significant production tax credits from wind-powered electricity generation.

Management's Discussion and Analysis (Continued)

Utilities and Energy (Continued)

The discussion of BHE's operating results that follows is based on after-tax earnings, reflecting how the energy businesses are managed and evaluated. A summary of net earnings attributable to BHE follows (dollars in millions).

	2022	2021	2020	Percentage change	
				2022 vs 2021	2021 vs 2020
U.S. utilities	\$ 2,295	\$ 2,211	\$ 1,969	3.8%	12.3%
Natural gas pipelines	1,040	807	528	28.9	52.8
Other energy businesses	1,338	979	953	36.7	2.7
Real estate brokerage	100	387	375	(74.2)	3.2
Corporate interest and other	(421)	(337)	(352)	24.9	(4.3)
	<u>\$ 4,352</u>	<u>\$ 4,047</u>	<u>\$ 3,473</u>	7.5	16.5

2022 versus 2021

Our U.S. utilities operate in several states, including Utah, Oregon and Wyoming (PacifiCorp), Iowa and Illinois (MEC) and Nevada (NV Energy). After-tax earnings increased \$84 million in 2022 compared to 2021. The earnings increase reflected higher electric utility margin (operating revenue less cost of sales) and a \$157 million increase in production tax credits recognized on new wind-powered generating facilities placed in-service at PacifiCorp and MEC, partially offset by higher operating expenses and state income taxes. Operating expenses increased due to higher costs associated with certain regulatory mechanisms at MEC and NV Energy, increases in general and plant maintenance costs, incremental depreciation expense from additional assets placed in-service and higher accruals at PacifiCorp associated with the 2020 wildfires.

The U.S. utilities' electric utility margin was \$7.7 billion in 2022, an increase of \$586 million (8.3%) compared to 2021. The increase reflected higher operating revenue from favorable retail and wholesale pricing and increases in retail customer volumes, partially offset by increases in thermal generation and purchased power costs. Retail customer volumes increased 2.4% (1.6% at PacifiCorp, 4.3% at MEC and 2.2% at NV Energy) in 2022 compared to 2021, primarily due to higher customer usage, an increase in the average number of customers and the favorable impact of weather.

Natural gas pipelines' after-tax earnings increased \$233 million in 2022 compared to 2021. Substantially all of the increase was derived from BHE GT&S, primarily attributable to higher regulated storage and service revenues from a general rate case settlement and higher revenues and margins from non-regulated activities, as well as income tax adjustments.

Other energy businesses' after-tax earnings increased \$359 million in 2022 compared to 2021. The increase was primarily due to increased wind tax equity investment earnings of \$200 million and the impact in 2021 on income tax expense of \$109 million at Northern Powergrid related to the enactment in June 2021 of an increase in the United Kingdom corporate income tax rate from 19% to 25%, effective April 1, 2023. The earnings increase also reflected higher operating revenue from owned renewable energy projects and earnings from new gas exploration and solar projects, partially offset by lower earnings from natural gas generating facilities and unfavorable foreign currency translation effects in 2022. The increase in wind tax equity investment earnings reflected the impact of losses in 2021 on pre-existing tax equity investments due to the February 2021 winter storms as well as increased income tax benefits from projects reaching commercial operation over the past twelve months.

Real estate brokerage after-tax earnings decreased \$287 million in 2022 compared to 2021. The decrease reflected lower brokerage services revenues and margins, primarily due to an 11% reduction in closed brokerage transaction volumes, as well as lower mortgage services revenues and margins from a 40% decrease in closed transaction volumes, attributable to lower homeowner refinancing activity resulting from rising interest rates.

Corporate interest and other after-tax earnings decreased \$84 million in 2022 compared to 2021. The decrease was primarily due to lower state income tax benefits and higher interest expense from corporate debt issued in 2022.

Management's Discussion and Analysis (Continued)

Utilities and Energy (Continued)

2021 versus 2020

The U.S. utilities' after-tax earnings increased \$242 million in 2021 compared to 2020. The increase reflected higher electric utility margin and an increase of \$139 million in production tax credits recognized at PacifiCorp and MEC, partially offset by higher operating expenses. Operating expenses increased due to higher costs associated with certain regulatory mechanisms at MEC, increased depreciation expense from additional assets placed in-service and by the impacts of a depreciation study effective January 1, 2021 at PacifiCorp. The operating expense increase was partially offset by the impact of accruals at PacifiCorp in 2020 associated with wildfires and changes to a settlement agreement in 2021 related to a hydroelectric facility, as well as lower costs associated with certain regulatory mechanisms at NV Energy.

The U.S. utilities' electric utility margin was \$7.1 billion in 2021, an increase of \$126 million (1.8%) compared to 2020. The increase reflected higher operating revenue from increases in retail and wholesale customer volumes and favorable wholesale pricing, partially offset by increases in thermal generation and purchased power costs as well as lower base tariff general rates in 2021 and a favorable regulatory decision in 2020 at NV Energy. Retail customer volumes increased 3.8% in 2021 compared to 2020, primarily due to higher customer usage, an increase in the average number of customers and the favorable impact of weather.

Natural gas pipelines' after-tax earnings increased \$279 million in 2021 compared to 2020. The earnings increase in 2021 was primarily due to incremental earnings of \$211 million from the BHE GT&S acquisition completed in November 2020. In addition, earnings in 2021 reflected the effects of higher margins on natural gas sales and higher transportation revenue at Northern Natural Gas due to increased demand from the February 2021 winter storms, partially offset by lower transportation revenue primarily due to lower volumes for the remainder of the year.

Other energy businesses' after-tax earnings increased \$26 million in 2021 compared to 2020. The increase was primarily due to higher earnings at Northern Powergrid (\$46 million), partially offset by lower earnings from renewable energy. The increase at Northern Powergrid was attributable to higher tariff rates and units distributed, lower write-offs of gas exploration costs and favorable foreign currency exchange rate movements, partially offset by an increase in income tax expense of \$74 million from increases in the United Kingdom corporate income tax rates in both 2021 and 2020. The decline in earnings from renewable energy reflected a reduction in wind tax equity investment earnings of \$56 million, which included increased losses from pre-existing tax equity investments of \$165 million, largely attributable to the February 2021 winter storms, partially offset by increased income tax benefits from projects reaching commercial operation over the past twelve months.

Real estate brokerage after-tax earnings increased \$12 million in 2021 compared to 2020. The increase was due to an increase in closed brokerage transaction volumes in 2021, partially offset by lower mortgage volume due to a decrease in refinance activity.

Corporate interest and other after-tax earnings increased \$15 million in 2021 compared to 2020. The increase was primarily due to an increase in state income tax benefits and higher earnings from non-regulated energy services, offset by higher operating expenses and higher interest expense from corporate debt issued in 2020.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing

A summary of revenues and earnings of our manufacturing, service and retailing businesses follows (dollars in millions). Beginning January 31, 2023, this group will include Pilot Travel Centers.

	2022	2021	2020	Percentage change	
				2022 vs 2021	2021 vs 2020
Revenues					
Manufacturing	\$ 75,781	\$ 68,730	\$ 59,079	10.3%	16.3%
Service and retailing	91,512	84,282	75,018	8.6	12.3
	<u>\$ 167,293</u>	<u>\$ 153,012</u>	<u>\$ 134,097</u>	9.3	14.1
Pre-tax earnings					
Manufacturing	\$ 11,177	\$ 9,841	\$ 8,010	13.6%	22.9%
Service and retailing	5,042	4,711	2,879	7.0	63.6
	16,219	14,552	10,889	11.5	33.6
Income taxes and noncontrolling interests	3,707	3,432	2,589		
Net earnings*	<u>\$ 12,512</u>	<u>\$ 11,120</u>	<u>\$ 8,300</u>		
Effective income tax rate	22.2%	23.0%	23.3%		
Pre-tax earnings as a percentage of revenues	9.7%	9.5%	8.1%		

* Excludes certain acquisition accounting expenses, which primarily related to the amortization of identified intangible assets recorded in connection with our business acquisitions. The after-tax acquisition accounting expenses excluded from earnings above were \$681 million in 2022, \$690 million in 2021 and \$783 million in 2020. In 2020, net earnings also excluded after-tax goodwill and indefinite-lived intangible asset impairment charges of \$10.4 billion. These expenses are included in "Other" in the summary of earnings on page K-33 and in the "Other" earnings table on page K-56.

Manufacturing

Our manufacturing group includes a variety of industrial, building and consumer products businesses. A summary of revenues and pre-tax earnings of our manufacturing operations follows (dollars in millions).

	2022	2021	2020	Percentage change	
				2022 vs 2021	2021 vs 2020
Revenues					
Industrial products	\$ 30,824	\$ 28,176	\$ 25,667	9.4%	9.8%
Building products	28,896	24,974	21,244	15.7	17.6
Consumer products	16,061	15,580	12,168	3.1	28.0
	<u>\$ 75,781</u>	<u>\$ 68,730</u>	<u>\$ 59,079</u>		
Pre-tax earnings					
Industrial products	\$ 4,862	\$ 4,469	\$ 3,755	8.8%	19.0%
Building products	4,789	3,390	2,858	41.3	18.6
Consumer products	1,526	1,982	1,397	(23.0)	41.9
	<u>\$ 11,177</u>	<u>\$ 9,841</u>	<u>\$ 8,010</u>		
Pre-tax earnings as a percentage of revenues					
Industrial products	15.8%	15.9%	14.6%		
Building products	16.6%	13.6%	13.5%		
Consumer products	9.5%	12.7%	11.5%		

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Industrial products

The industrial products group includes metal products for aerospace, power and general industrial markets (Precision Castparts Corp. ("PCC")), specialty chemicals (The Lubrizol Corporation ("Lubrizol")), metal cutting tools/systems (IMC International Metalworking Companies ("IMC")), and Marmon, which consists of more than 100 autonomous manufacturing and service businesses, internally aggregated into eleven groups, and includes equipment leasing for the rail, intermodal tank container and mobile crane industries. The industrial products group also includes equipment and systems for the livestock and agricultural industries (CTB International) and a variety of industrial products for diverse markets (Scott Fetzer and LiquidPower Specialty Products). Beginning October 19, 2022, this group includes the structural steel fabrication products business conducted through W&W|AFCO Steel, acquired in connection with the Alleghany acquisition. Additionally, the Alleghany businesses included certain other smaller manufacturers that primarily became part of Marmon.

2022 versus 2021

Revenues of the industrial products group in 2022 increased \$2.6 billion (9.4%) and pre-tax earnings increased \$393 million (8.8%) compared to 2021. Pre-tax earnings as a percentage of revenues in 2022 was 15.8%, a decrease of 0.1 percentage points compared 2021.

PCC's revenues were \$7.5 billion in 2022, an increase of \$1.1 billion (16.5%) compared to 2021. PCC derives significant revenues and earnings from aerospace products. The revenue increase in 2022 was primarily attributable to higher demand for aerospace products. Commercial aircraft delivery rates by original equipment manufacturers ("OEMs") of narrow-body aircraft have rebounded since the onset of the pandemic. Deliveries of wide-body aircraft remain relatively low, in part, attributable to the pause in the Boeing 787 program. However, Boeing resumed deliveries in the third quarter of 2022. Long-term industry forecasts continue to show growth and strong demand for air travel and aerospace products.

PCC's pre-tax earnings in 2022 were \$1.2 billion, an increase of 1.6% compared to 2021. PCC's results in 2022 were negatively affected by increased costs for labor and training, materials and utilities and supply chain disruptions, as well as a \$59 million reduction in pension plan income. PCC management has taken and will continue to take actions to improve operations, maintain safety and prepare for increased demand for its products. Growth in PCC's revenues and earnings will be predicated on the ability to successfully increase production levels to match the expected growth in aerospace demand, including managing through the current supply chain and employment environments.

Lubrizol's revenues were \$6.7 billion in 2022, an increase of 3.2% compared to 2021. The revenue increase reflected higher average selling prices, partially offset by lower volumes and adverse foreign currency translation effects from the stronger U.S. Dollar. Sales volumes throughout 2022 were restricted by effects of supply constraints for certain raw materials and the effects of unplanned plant maintenance activities, both of which limited Lubrizol's production capabilities. The increase in average selling prices was driven by escalating prices for raw materials, including oil feedstocks, as well as for utilities, packaging, shipping and freight costs. We believe supply chain and required maintenance constraints are easing and that we can increase production rates and sales volumes in 2023.

Lubrizol's pre-tax earnings in 2022 increased 48.6% compared to 2021. Pre-tax earnings in 2022 included insurance recoveries of \$242 million related to a fire in 2019 at the Rouen, France facility and a fire in 2021 at the Rockton, Illinois, facility compared to insurance recoveries of \$55 million in 2021. Earnings in 2022 also included aggregate losses related to the Rockton, Illinois fire of \$36 million compared to aggregate losses and asset impairment charges in 2021 of \$257 million related to the Rockton facility fire and an underperforming business in the Advanced Materials product lines. Earnings in 2022 were also negatively impacted by rising raw material costs, lower sales volumes, higher unplanned maintenance expenses, and by unfavorable foreign currency translation effects, partially offset by higher selling prices. Earnings in 2021 were negatively impacted by severe winter storms, which caused industry-wide temporary facilities closures, including at our Additives facilities, which experienced lost sales and incremental manufacturing and other operating costs.

Marmon's revenues were \$10.7 billion in 2022, an increase of \$934 million (9.6%) compared to 2021. Nearly all of Marmon's business groups generated higher revenues in 2022, led by significant increases in the Transportation, Retail Solutions, Metal Services and Crane groups, which contributed 82% of the increase. These increases generally reflected higher volumes and prices in our heavy-duty truck & trailer, shopping cart and store shelving businesses, stronger demand in Canada for metal services and higher demand in the mining and infrastructure markets. Revenues of most of Marmon's other groups, particularly those serving the transit, oil & gas, utility and restaurant markets, also increased in 2022, reflecting higher volumes. These increases were partially offset by lower lease revenues in the Rail & Leasing group, reflecting lower renewal rates and fewer third-party tank car sales.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Industrial products (Continued)

Marmon's pre-tax earnings in 2022 increased 11.3% compared to 2021. Earnings in 2022 reflected increases in the Transportation, Metal Services, Retail, Crane and several other business groups due to higher volumes and pricing, which were partially offset by lower earnings from the Rail & Leasing group, reflecting lower renewal rates, higher repair costs and losses of approximately \$90 million related to the shutdown in the second quarter of its business in Russia.

IMC's revenues increased 4.5% to \$3.7 billion in 2022 compared to 2021, reflecting increased sales in most regions, partially offset by the foreign currency translation effects of a stronger U.S. Dollar, lower sales in China (attributable to the pandemic) and the effects the Russia-Ukraine conflict in Europe. IMC's pre-tax earnings decreased 2.5% in 2022 compared to 2021, primarily due to lower average gross sales margins, primarily attributable to changes in product sales mix and higher raw material costs. Earnings were also negatively affected by unfavorable foreign currency translation effects and the Russian-Ukraine conflict.

2021 versus 2020

Revenues of the industrial products group in 2021 increased \$2.5 billion (9.8%) from 2020. Pre-tax earnings increased \$714 million (19.0%) compared to 2020 and pre-tax earnings as a percentage of revenues in 2021 was 15.9%, an increase of 1.3 percentage points compared to 2020.

PCC's revenues were \$6.5 billion in 2021, a decrease of \$853 million (11.6%) compared to 2020. The COVID-19 pandemic contributed to material declines in commercial air travel and OEM aircraft production in 2021 and 2020. PCC's revenues were negatively impacted in both years by reduced aircraft production levels, which reflected order delays and cancellations by airlines and inventory reduction initiatives within the industry.

PCC's pre-tax earnings in 2021 were \$1.2 billion, an increase of 78.8% compared to 2020, which reflected significant restructuring costs and inefficiencies associated with reduction in production. Asset impairment and restructuring costs in 2020 were \$295 million. The 2021 earnings increase also reflected the actions taken by management in 2020 and 2021 to resize, restructure and improve operations and to prepare for more normalized demand, as well as from a decline in restructuring costs.

Lubrizol's revenues were \$6.5 billion in 2021, an increase of 8.6% compared to 2020. The increase reflects higher average selling prices, driven by significant increases in materials and other manufacturing costs, as well as slightly higher volumes. Sales volumes in the Additives product lines in 2021 were negatively affected by the impacts of the severe winter weather events in the first quarter, raw materials supply constraints and unplanned maintenance in the second half of the year.

Lubrizol's pre-tax earnings in 2021 decreased 50.8% compared to 2020. The earnings decline in 2021 included previously mentioned losses of \$257 million related to the Rockton, Illinois facility fire and asset impairment charges, as well as the adverse effects of rising raw material costs and the winter storms in 2021.

Marmon's revenues were \$9.8 billion in 2021, an increase of \$2.1 billion (27.9%) compared to 2020, which was negatively impacted by the initial effects of the pandemic. Revenues in 2021 from the Electrical, Metal Services and Plumbing & Refrigeration groups increased 54% over 2020, accounting for over half of the aggregate increase in Marmon's revenues. These increases were attributable to higher volumes and prices, including the impact of significantly higher average copper and metal prices. Revenues of most of Marmon's other groups, particularly those serving the construction, automotive, heavy-duty truck and restaurant markets, also increased in 2021, reflecting higher volumes. These increases were partially offset by the impact of divestitures and business closures in the Water Technologies and Retail Solutions groups and lower lease revenues in the Rail & Leasing group, reflecting fewer railcars on lease and changes in lease mix.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Industrial products (Continued)

Marmon's pre-tax earnings increased 40.3% in 2021 compared to 2020. The increase was primarily due to earnings increases in the Electrical, Metal Services and Plumbing & Refrigeration groups due to higher volumes and average margins and relatively low earnings in 2020 attributable to the pandemic. Earnings of several other business groups also increased attributable to higher sales volumes, sales mix changes and lower restructuring charges, which were partially offset by lower earnings from the Rail & Leasing and Water Technologies groups.

IMC's revenues increased 19.5% in 2021 compared to 2020, reflecting improving business conditions in most geographic regions and favorable foreign currency translation effects. IMC's pre-tax earnings increased 47.7% in 2021 versus 2020, primarily attributable to higher customer demand, improved manufacturing efficiencies, operating cost management saving initiatives and favorable foreign currency translation effects.

Building products

The building products group includes manufactured and site-built home construction and related lending and financial services (Clayton Homes), flooring (Shaw), insulation, roofing and engineered products (Johns Manville), bricks and masonry products (Acme Building Brands), paint and coatings (Benjamin Moore) and residential and commercial construction and engineering products and systems (MiTek).

2022 versus 2021

Revenues of the building products group increased \$3.9 billion (15.7%) in 2022 and pre-tax earnings increased \$1.4 billion (41.3%) compared to 2021. Pre-tax earnings as percentages of revenues were 16.6% in 2022 and 13.6% in 2021. During 2021 and much of 2022, our businesses experienced relatively strong customer demand and higher sales volumes. Our building products businesses benefited in recent years from the low interest rate environment. However, interest rates in the U.S. increased significantly during 2022, which contributed to slowing demand for new home construction in the fourth quarter. As such, comparative revenues and earnings in the near term will likely decline from current levels.

Clayton Homes' revenues were approximately \$12.7 billion in 2022, an increase of \$2.2 billion (21.1%) over 2021. Revenues from home sales for the year increased \$2.1 billion (25.1%) in 2022 to approximately \$10.4 billion, primarily due to higher average selling prices. New home unit sales increased 6.2% in 2022, reflecting a 6.0% increase in factory-built manufactured home unit sales and a 7.1% increase in site-built home unit sales. However, unit sales in the fourth quarter of 2022 declined 3.9% from 2021, and our net order backlog declined significantly during 2022. We expect the comparative decline in unit sales to accelerate in the near term. Financial services revenues, which include mortgage, insurance and interest income from lending activities, increased 4.7% in 2022 compared to 2021. Loan balances, net of allowances for credit losses, were approximately \$21.3 billion as of December 31, 2022, an increase of approximately \$2.5 billion from December 31, 2021. Actual and anticipated loan foreclosures rose during the fourth quarter of 2022.

Pre-tax earnings of Clayton Homes were approximately \$2.4 billion in 2022, an increase of \$685 million (40.7%) compared to 2021. Earnings in 2022 reflected higher home sales, gross margin rates and net interest income. As previously mentioned, we expect unit home sales to decline in the near term and we anticipate earnings will also decline in 2023 compared to 2022.

Aggregate revenues of our other building products businesses were approximately \$16.2 billion in 2022, an increase of 11.8% versus 2021. The increase was primarily due to higher average selling prices, and to a lesser extent, from higher unit volumes in certain product lines and product mix changes. Significant cost inflation in 2021, that continued through 2022, largely drove the higher selling prices.

Pre-tax earnings of the other building products businesses were approximately \$2.4 billion in 2022, an increase of 41.9% over 2021. Pre-tax earnings as a percentage of revenues was 15.0% in 2022, a 3.2 percentage point increase compared to 2021. Earnings in 2022 benefitted from higher selling prices and strong demand in certain product categories, as well as an increase in gains from certain business divestitures and asset sales and reduced impairment and restructuring charges. The increase in earnings in 2022 also reflected the negative impact of severe winter storms in the first quarter of 2021, which reduced sales and increased production and other operating costs in 2021.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Building products (Continued)

2021 versus 2020

Revenues of the building products group increased \$3.7 billion (17.6%) in 2021 and pre-tax earnings increased \$532 million (18.6%) compared to 2020. Pre-tax earnings as percentages of revenues were 13.6% in 2021 and 13.5% in 2020. During 2021, our businesses experienced strong customer demand and higher sales volumes. We also experienced various forms of supply chain disruptions that contributed to considerable raw material and logistics cost inflation and supply constraints.

Clayton Homes' revenues were approximately \$10.5 billion in 2021, an increase of \$1.9 billion (22.2%) over 2020. Revenues from home sales increased \$1.8 billion (26.5%) in 2021 to approximately \$8.3 billion, reflecting increased revenue per home sold, changes in sales mix and a net increase in new units sold. Unit sales of site-built homes increased 15.8% in 2021, while factory-built manufactured home unit sales increased 1.5%. Site-built home unit sales were constrained by longer construction periods arising from supply chain constraints and labor shortages. Financial services revenues increased 7.8% in 2021 compared to 2020. Loan balances, net of allowances for credit losses, were approximately \$18.8 billion as of December 31, 2021, an increase of approximately \$1.7 billion compared to December 31, 2020.

Pre-tax earnings of Clayton Homes were approximately \$1.7 billion in 2021, an increase of \$440 million (35.3%) compared to 2020. Earnings in 2021 reflected higher earnings from home sales, mortgage originations, net interest income and lower provisions for expected credit losses, partially offset by the impact of rising manufacturing and supply chain costs. The provision for expected credit losses in 2020 was unusually high and included provisions for the expected impact of the COVID-19 pandemic.

Aggregate revenues of our other building products businesses were approximately \$14.5 billion in 2021, an increase of 14.4% versus 2020. The increase was primarily due to higher average selling prices driven by significantly higher input and supply chain costs, as well as higher unit volumes for paint and coatings, flooring, insulation, roofing and other engineered products.

Pre-tax earnings of the other building products businesses were approximately \$1.7 billion in 2021, an increase of 5.7% over 2020. Pre-tax earnings as a percentage of revenues were 11.8% in 2021, a 1.0 percentage point decrease compared to 2020. While customer demand in 2021 was generally strong, reduced availability of materials and other product inputs from supply chain disruptions negatively affected operating results. In addition, higher restructuring and impairment charges contributed to the reduction in our pre-tax margin rates.

Consumer products

The consumer products group includes leisure vehicles (Forest River), several apparel and footwear operations (including Fruit of the Loom, Garan, H.H. Brown Shoe Group and Brooks Sports) and a manufacturer of high-performance alkaline batteries (Duracell). This group also includes custom picture framing products (Larson-Juhl), jewelry products (Richline) and beginning October 19, 2022, Jazwares, LLC ("Jazwares"), a global toy company acquired in connection with the Alleghany acquisition.

2022 versus 2021

Consumer products group revenues increased \$481 million (3.1%) in 2022 versus 2021, reflecting an 8.0% increase from Forest River and the impact of the Jazwares acquisition, substantially offset by lower apparel and footwear and Duracell revenues (4.7% in the aggregate). In the fourth quarter of 2022, consumer products revenues before the impact of the Jazwares acquisition declined 15.7%, driven by significant declines in recreational vehicle unit sales. Revenues of Forest River increased 8.0% in 2022 compared to 2021, while apparel and footwear and Duracell revenues decreased 4.5% and 5.2%, respectively. The declines in apparel and footwear revenues were driven by lower volumes, as major retailers reduced orders in response to rising inventories. Duracell's revenue decline was primarily due to lower volumes and unfavorable foreign currency translation effects of the stronger U.S. Dollar.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Consumer products (Continued)

Consumer products group pre-tax earnings declined \$456 million (23.0%) in 2022 compared to 2021 and as a percentage of revenues in 2022 decreased 3.2 percentage points to 9.5%. The earnings decline reflected lower aggregate earnings from the apparel and footwear businesses (68.0%) and Duracell (30.6%), partially offset by higher earnings from Forest River (7.6%).

Our apparel businesses were negatively affected in 2022 by low sales volumes, reduced manufacturing efficiencies and higher input costs, including raw materials, freight, labor and other operating costs. The reductions in sales volumes and supply chain issues in 2021 and 2022 have also elevated our current inventories. We currently believe retailers will continue to constrain purchases in the near term and that our sales volumes and earnings will continue to be negatively affected. We are taking measures to right-size our operations for the long-term and reduce product inventories to more appropriate levels. Duracell's earnings in 2022 declined, primarily due to lower sales, cost inflation and foreign currency translation effects.

Earnings from Forest River increased in 2022, primarily due to the increase in unit sales in the first half of the year and higher average selling prices, partly offset by higher materials costs. However, sales volumes, revenues and earnings declined over the second half of the year compared to the elevated levels in the first half of 2022 and in 2021. We currently expect demand for recreational vehicles will continue to slow and Forest River's comparative revenues and earnings to decline in 2023, particularly over the first half of the year.

2021 versus 2020

Consumer products group revenues increased \$3.4 billion (28.0%) in 2021 versus 2020. Revenues from Forest River increased 40.2% in 2021 compared to 2020, driven by a 27.6% increase in recreational vehicle unit sales and higher average selling prices, primarily due to significant increases in manufacturing costs.

Revenues of several of our other consumer products businesses were significantly higher in 2021 as compared to 2020. The initial impacts of the pandemic in the first half of 2020 from temporary retail store closures and reduced demand had a severe impact on most of these businesses. Apparel and footwear revenues increased 25.3% in 2021 compared to 2020, reflecting significant increases in unit sales, partly attributable to inventory restocking by certain customers, and from increased consumer demand. Revenues from Richline increased 39.9%, while revenues from Duracell increased 2.4%.

Consumer products group pre-tax earnings increased \$585 million (41.9%) in 2021 compared to 2020 and as a percentage of revenues in 2021 increased 1.2 percentage points to 12.7%. The increase reflected significant earnings increases at many of our businesses. However, our consumer products businesses, particularly the apparel and footwear businesses, also experienced significant cost increases and supply chain disruptions, causing pre-tax margins in the second half of 2021 to be 1.1 percentage points lower than in the first half of the year.

Service and retailing

A summary of revenues and pre-tax earnings of our service and retailing businesses follows (dollars in millions).

	2022	2021	2020	Percentage change	
				2022 vs 2021	2021 vs 2020
Revenues					
Service	\$ 19,006	\$ 15,872	\$ 12,346	19.7%	28.6%
Retailing	19,297	18,960	15,832	1.8	19.8
McLane	53,209	49,450	46,840	7.6	5.6
	<u>\$ 91,512</u>	<u>\$ 84,282</u>	<u>\$ 75,018</u>		
Pre-tax earnings					
Service	\$ 3,047	\$ 2,672	\$ 1,600	14.0%	67.0%
Retailing	1,724	1,809	1,028	(4.7)	76.0
McLane	271	230	251	17.8	(8.4)
	<u>\$ 5,042</u>	<u>\$ 4,711</u>	<u>\$ 2,879</u>		
Pre-tax earnings as a percentage of revenues					
Service	16.0%	16.8%	13.0%		
Retailing	8.9%	9.5%	6.5%		
McLane	0.5%	0.5%	0.5%		

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Service

Our service group consists of several businesses. The largest of these businesses are NetJets and FlightSafety (aviation services), which offer shared ownership programs for general aviation aircraft and high technology training products and services to operators of aircraft, and TTI, a distributor of electronics components. Our other service businesses franchise and service a network of quick service restaurants (Dairy Queen), lease transportation equipment (XTRA) and furniture (CORT), provide third party logistics services that primarily serve the petroleum and chemical industries (Charter Brokerage), distribute electronic news, multimedia and regulatory filings (Business Wire) and operate a television station in Miami, Florida (WPLG). Beginning, October 19, 2022, this group includes IPS Integrated Project Services, LLC (IPS), a provider of various services in facilities construction management.

2022 versus 2021

Service group revenues increased \$3.1 billion (19.7%) in 2022 compared to 2021, primarily attributable to revenue increases from TTI and the aviation services businesses, as well as the impact of the IPS acquisition. Revenues from TTI increased 17.4% in 2022 versus 2021. However, in the third quarter, new orders began to slow in certain regions and markets and the slowing of new orders was observed across nearly all regions in the fourth quarter. The slowing of electronic components demand is in part attributable to elevated inventory levels within the supply chain. Revenues from aviation services increased 18.2% in 2022 compared to 2021. The revenue increase reflected year-to-date increases in training hours (11%), customer flight hours (9%), most of which occurred in the first half of the year, and fuel surcharges to customers due to the increase in customer flight hours and significant increases in fuel prices. These increases were partially offset by changes in sales mix.

Pre-tax earnings of our service business group increased \$375 million (14.0%) in 2022 to \$3.0 billion. Pre-tax earnings of the group as a percentage of revenues were 16.0% in 2022, a decrease of 0.8 percentage points compared to 2021. The earnings increase in 2022 was attributable to TTI (19.4%) and aviation services (3.4%), as well as increased earnings from several of our smaller services businesses. The increase from TTI was primarily attributable to the increase in sales and higher average gross margin rates, partially offset by unfavorable foreign currency effects in 2022 and a favorable legal settlement in 2021. The earnings increase from aviation services in 2022 compared to 2021 was primarily attributable to improved product sales margins, increased training hours and lower restructuring costs at FlightSafety. Earnings at our smaller services companies increased \$106 million (19.3%) over 2021, reflecting a combination of higher revenues and operating cost leverage.

2021 versus 2020

Service group revenues increased \$3.5 billion (28.6%) in 2021 compared to 2020, primarily attributable to higher revenues from TTI and the aviation services businesses. Revenues from TTI increased 37.4% in 2021 versus 2020, primarily attributable to significantly higher volumes across all significant markets and product categories, and to a lesser extent, higher average prices and changes in sales mix. Customer demand accelerated throughout 2021, as customers attempted to maintain adequate inventories in response to high demand for components in end products and effects of supply chain disruptions. Revenues from aviation services increased 27.5% in 2021 over low 2020 levels, primarily due to higher training hours (24%) and customer flight hours (70%).

Pre-tax earnings of our service business group increased \$1.1 billion (67.0%) to \$2.7 billion. Pre-tax earnings of the group as a percentage of revenues was 16.8% in 2021, an increase of 3.8 percentage points compared to 2020. Earnings at nearly all service businesses increased in 2021 compared to 2020, with the largest increases from TTI, the aviation services businesses and the XTRA leasing business. TTI's earnings increase was primarily attributable to increases in sales volumes, as well as from improved operating cost leverage, changes in sales mix and a gain from a legal settlement. The increase in earnings from aviation services was attributable to the favorable effects of higher volume, changes in business mix, increased operating efficiencies, lower impairment charges and the effects of past restructuring efforts, partly offset by higher subcontractor costs attributable to the significant increase in flight demand.

Retailing

Our largest retailing business is Berkshire Hathaway Automotive, Inc. ("BHA"), which represented 65% of our combined retailing revenue in 2022. BHA consists of over 80 auto dealerships that sell new and pre-owned automobiles and offer repair services and related products. BHA also operates two insurance businesses, two auto auctions and an automotive fluid maintenance products distributor. Our retailing businesses also include four home furnishings businesses (Nebraska Furniture Mart, R.C. Willey, Star Furniture and Jordan's), which sell furniture, appliances, flooring and electronics. The home furnishings group represented 20% of the combined retailing revenues in 2022.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Retailing (Continued)

Other retailing businesses include three jewelry businesses (Borsheims, Helzberg and Ben Bridge), See's Candies (confectionary products), Pampered Chef (high quality kitchen tools), Oriental Trading Company (party supplies, school supplies and toys and novelties) and Detlev Louis Motorrad ("Louis"), a retailer of motorcycle accessories based in Germany.

2022 versus 2021

Retailing group revenues in 2022 increased \$337 million (1.8%) compared to 2021, reflecting an increase at BHA, partially offset by combined lower revenues from our other retailers. BHA's revenues in 2022 increased 6.1% compared to 2021. Revenues from new and used retail vehicle sales increased 5.9% compared to 2021, attributable to higher average vehicle transaction prices, partly offset by a 4.5% decline in total retail units sold. New vehicle unit sales continue to be constrained by relatively low new vehicle production, although production gradually trended higher during 2022. Revenues from BHA's service and repair business increased 11.1% versus 2021. Revenues of the home furnishings group declined 2.6%, while revenues of all other retailers declined 8.9%, primarily due to lower sales at Pampered Chef.

Pre-tax earnings in 2022 of the retailing group decreased \$85 million (4.7%) from 2021 and the pre-tax margin rate decreased 0.6 percentage points to 8.9%. BHA's pre-tax earnings increased 18.4%, primarily due to increases in vehicle gross profit margins. BHA's comparative vehicle gross profit margin rates began to accelerate during the second half of 2021, attributable to low available inventory. BHA's vehicle gross margin rates peaked in the first half of 2022 and have since declined. Aggregate pre-tax earnings for the remainder of our retailing group decreased \$233 million (23.2%) in 2022 compared to 2021, primarily due to reduced earnings from the home furnishings group, See's Candies and Pampered Chef.

2021 versus 2020

Retailing group revenues in 2021 increased \$3.1 billion (19.8%) compared to 2020. BHA's revenues increased 19.0%, with vehicle sales, service and repair, and finance and service contract revenues each increasing versus 2020. Revenues from vehicle sales increased \$1.7 billion (20.7%), primarily due to higher average selling prices, as well as a 2.7% increase in units sold. However, new vehicle unit sales in the second half of 2021 declined 18% compared to the second half of 2020, reflecting significant new vehicle supply shortages at manufacturers attributable to the global computer chip shortages and other supply chain disruptions. Home furnishings group revenues increased 22.0%, attributable to higher consumer demand and higher average selling prices, driven by higher inventory and freight costs.

Pre-tax earnings of the retailing group increased \$781 million (76.0%) in 2021 from 2020 and the pre-tax margin rate increased 3.0 percentage points to 9.5%. BHA's pre-tax earnings increased 47.5%, primarily due to increased vehicle sales margins and higher earnings from finance and service contract activities. In addition, earnings in 2021 benefitted from lower floorplan interest expense, attributable to significant declines in inventory levels, and from ongoing operating cost control efforts.

Home furnishings group pre-tax earnings increased 67.6% in 2021 versus 2020, reflecting generally higher average gross margin rates and sales mix changes and cost control efforts, partly offset by higher personnel costs. Aggregate pre-tax earnings for the remainder of our retailing group increased \$321 million in 2021 compared to 2020. The initial effects of the pandemic in 2020 were severe for most of our other retailers due to the restricted operations at many of those businesses. Results in 2021 also benefitted from relatively strong consumer demand and the effects of restructuring efforts in 2020.

Management's Discussion and Analysis (Continued)

Manufacturing, Service and Retailing (Continued)

Retailing (Continued)

McLane

McLane Company, Inc. ("McLane") operates a wholesale distribution business that provides grocery and non-food consumer products to retailers and convenience stores ("grocery") and to restaurants ("foodservice"). McLane also operates businesses that are wholesale distributors of distilled spirits, wine and beer ("beverage"). The grocery and foodservice businesses generate high sales and very low profit margins. These businesses have several significant customers, including Walmart, 7-Eleven, Yum! Brands and others. Grocery sales comprised about 62% of McLane's consolidated sales in 2022 with food service comprising most of the remainder. A curtailment of purchasing by any of its significant customers could have an adverse impact on periodic revenues and earnings.

2022 versus 2021

Revenues of \$53.2 billion in 2022 increased \$3.8 billion (7.6%) compared to 2021. Revenues from the grocery business increased 4.4%, while revenues from the foodservice and beverage businesses increased 14.1% and 6.0%, respectively.

Pre-tax earnings increased \$41 million (17.8%) in 2022 as compared to 2021. The increase reflected slightly higher gross margin rates in the grocery and foodservice businesses, partly offset by higher personnel costs, fuel expense and insurance costs. McLane's grocery and food service operating results continue to be adversely affected by supply chain constraints, including the effects of labor and truck driver shortages, high fuel costs and high inventory costs.

2021 versus 2020

Revenues increased \$2.6 billion (5.6%) in 2021 compared to 2020. Revenues from the grocery business increased 1.5%, while revenues from the foodservice and beverage businesses increased 13.1% and 17.8%, respectively. The foodservice business was significantly impacted by pandemic-related restaurant closures in 2020.

Pre-tax earnings decreased \$21 million (8.4%) in 2021 as compared to 2020. The decrease reflected significant increases in personnel, contract transportation and fuel costs, which more than offset the favorable impact of higher sales and slightly higher gross sales margins. McLane's grocery and food service operations were significantly affected in 2021 by upstream supply chain constraints, including the effects of labor and truck driver shortages, which contributed to higher inventory costs, and disruptions in inventory availability. These upstream supply chain effects, together with the truck driver and warehouse personnel shortages that we experienced, adversely affected our customer service levels and reduced our operating efficiencies. In response, hiring and wage and benefits costs increased significantly in 2021. The increase in fuel costs was primarily attributable to significant increases in petroleum prices.

Investment and Derivative Contract Gains (Losses)

A summary of investment and derivative contract gains (losses) follows (dollars in millions).

	2022	2021	2020
Investment gains (losses)	\$ (67,623)	\$ 77,576	\$ 40,905
Derivative contract gains (losses)	(276)	966	(159)
Gains (losses) before income taxes and noncontrolling interests	(67,899)	78,542	40,746
Income taxes and noncontrolling interests	(14,287)	16,202	9,155
Net earnings (loss)	<u>\$ (53,612)</u>	<u>\$ 62,340</u>	<u>\$ 31,591</u>
Effective income tax rate	<u>20.9%</u>	<u>20.4%</u>	<u>21.7%</u>

Management's Discussion and Analysis (Continued)

Investment and Derivative Contract Gains (Losses) (Continued)

Investment gains (losses)

Unrealized gains and losses arising from changes in market prices of our investments in equity securities are included in our reported earnings, which significantly increases the volatility of our periodic net earnings due to the magnitude of our equity securities portfolio and the inherent volatility of equity securities prices. Unrealized gains and losses also include the effects of changes in foreign currency exchange rates on investments in non-U.S. issuers that are held by our U.S.-based subsidiaries. Pre-tax investment gains and losses included net unrealized losses of approximately \$63.1 billion in 2022 and gains of approximately \$76.4 billion in 2021 and \$55.0 billion in 2020 attributable to changes in market prices of equity securities we held at the end of each year. In each year, we also recorded pre-tax gains and losses from market value changes during each year on equity securities sold during such year, including losses of \$3.9 billion in 2022, gains of \$1.0 billion in 2021 and losses of \$14.0 billion in 2020. Taxable investment gains on equity securities sold, which is generally the difference between sales proceeds and the original cost basis of the securities sold, were \$769 million in 2022, \$3.6 billion in 2021 and \$6.2 billion in 2020.

We believe that investment gains and losses, whether realized from sales or unrealized from changes in market prices, are often meaningless in terms of understanding our reported consolidated earnings or evaluating our periodic economic performance. We continue to believe the investment gains and losses recorded in earnings in any given period has little analytical or predictive value.

Derivative contract gains (losses)

Derivative contract gains and losses include the changes in fair value of our few remaining equity index put option contract liabilities. The periodic changes in the fair values of these liabilities are recorded in earnings. Substantially all of our contracts have expired and our exposure to loss in the future is insignificant.

Other

A summary of after-tax other earnings follows (in millions).

	2022	2021	2020
Equity method earnings	\$ 1,528	\$ 804	\$ 615
Acquisition accounting expenses	(681)	(690)	(783)
Goodwill and intangible asset impairments	—	—	(10,381)
Corporate interest expense, before foreign currency effects	(269)	(305)	(334)
Foreign currency exchange rate gains (losses) on Berkshire and BHFC non-U.S. Dollar senior notes	1,263	955	(764)
Other earnings	196	474	279
	<u>\$ 2,037</u>	<u>\$ 1,238</u>	<u>\$ (11,368)</u>

After-tax equity method earnings include our proportionate share of earnings attributable to our investments in Kraft Heinz, Pilot, Occidental Petroleum and Berkadia. Equity method earnings increased \$724 million in 2022 versus 2021, primarily due to higher earnings from Kraft Heinz and Pilot and from the inclusion of Occidental Petroleum, beginning in the fourth quarter of 2022. See Note 5 to the Consolidated Financial Statements.

Our after-tax earnings from Kraft Heinz were \$550 million in 2022, \$317 million in 2021 and \$170 million in 2020, which included our after-tax share of goodwill and other intangible asset impairment charges recorded by Kraft Heinz of \$157 million in 2022, \$259 million in 2021 and \$611 million in 2020. Our after-tax earnings from Occidental in 2022 were \$258 million and our after-tax earnings from Pilot increased \$267 million in 2022 compared to 2021. As a result of the increase in our ownership in Pilot to 80% on January 31, 2023, we discontinued the use of the equity method on that date. See Note 26 to the Consolidated financial Statements.

After-tax acquisition accounting expenses include charges arising from the application of the acquisition method in connection with certain of Berkshire's past business acquisitions. Such charges arise primarily from the amortization or impairment of intangible assets recorded in connection with those business acquisitions. Goodwill and intangible asset impairments in 2020 included after-tax charges of \$9.8 billion attributable to impairments of goodwill and certain identifiable intangible assets that were recorded in connection with our acquisition of PCC in 2016. See Other Critical Accounting Policies on page K-62 for additional details.