

July 13, 2017

Healthcare Mosaic Report

The Growing Mix Shift Toward Government Payers—A Particularly Worrisome Trend for Providers

Summary: In our quarterly *Healthcare Mosaic Report*, we select a far-reaching topic of interest in the healthcare space and provide a variety of data points and analyses to offer a more complete picture of what it means for the broader healthcare marketplace (and investors in this market).

In our third quarter 2017 *Healthcare Mosaic Report*, we take a deeper dive into the ongoing shift of patients toward government payers (Medicare and Medicaid) and the long-term implications of this mix shift on healthcare services providers (and several other healthcare subsectors as well).

More specific, in this report we analyze:

- Current payer mix profiles among a variety of healthcare operators, and how this mix has trended over the past several years;
- a variety of recent data points regarding the payment rate differentials between commercial insurers, Medicare, and Medicaid for the same services;
- how long-term demographic, utilization, and regulatory trends will likely continue to drive growth in the percentage of healthcare services reimbursed by government payers;
- the longer-term implications of this patient mix shift on provider's reimbursement rates and operating profits; and
- our thoughts on potential winners and losers as a result of these changes.

William Blair

Ryan Daniels, CFA +1 312 364 8418
rdaniels@williamblair.com

Jeffrey Garro, CFA +1 312 364 8022
jgarro@williamblair.com

Robert Munnings +1 312 364 5163
rmunnings@williamblair.com

Evolut Health, Inc.
EVH (NYSE) \$26.05
Stock Rating: **Outperform**

MEDNAX, Inc.
MD (NYSE) \$58.24
Stock Rating: **Outperform**

Teladoc, Inc.
TDOC (NYSE) \$35.35
Stock Rating: **Outperform**

Vocera Communications, Inc.
VCRA (NYSE) \$25.28
Stock Rating: **Outperform**

Envision Healthcare Corporation
EVHC (NYSE) \$61.87
Stock Rating: **Outperform**

HMS Holdings Corp.
HMSY (NASDAQ) \$18.53
Stock Rating: **Outperform**

Cotiviti Holdings, Inc.
COTV (NYSE) \$41.17
Stock Rating: **Outperform**

Premier, Inc.
PINC (NASDAQ) \$36.08
Stock Rating: **Outperform**

Cerner Corporation
CERN (NASDAQ) \$65.71
Stock Rating: **Outperform**

athenahealth, Inc.
ATHN (NASDAQ) \$140.36
Stock Rating: **Market Perform**

The Advisory Board Company
ABCO (NASDAQ) \$56.85
Stock Rating: **Outperform**

Please refer to important disclosures on pages 18-19. Analyst certification is on page 18.

William Blair or an affiliate does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. This report is not intended to provide personal investment advice. The opinions and recommendations herein do not take into account individual client circumstances, objectives, or needs and are not intended as recommendations of particular securities, financial instruments, or strategies to particular clients. The recipient of this report must make its own independent decisions regarding any securities or financial instruments mentioned herein.

Introduction

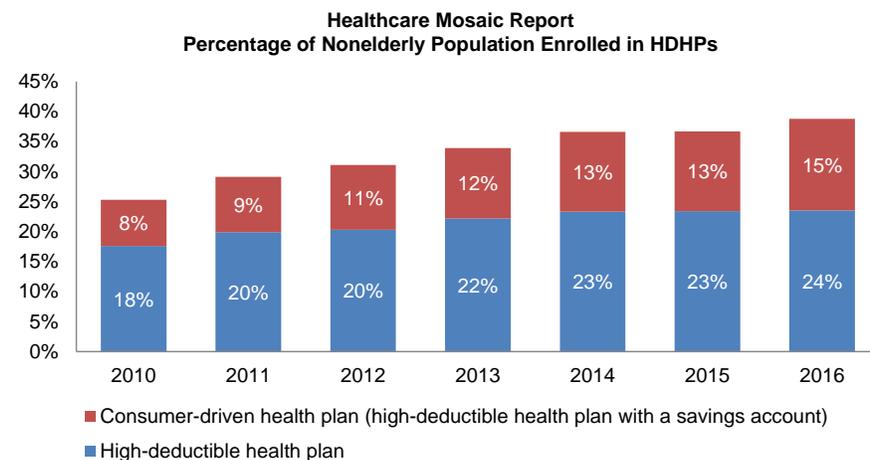
In early 2017, a number of leading healthcare organizations highlighted unanticipated payer mix shifts as a key driver of earnings shortfalls. For example, national physician group practice operator Mednax, Inc. reported a 60-basis-point year-over-year decline in same-facility net reimbursement rates, due to a 90-basis-point patient mix shift toward government payers. Of note, this mix shift was focused in the company’s anesthesiology division (where procedures can be discretionary), which experienced *a roughly 190-basis-point mix shift toward government payers*, while its neonatal business (which we view as nondiscretionary) had relatively stable patient mix.

Similarly, HCA Healthcare, the largest publicly traded hospital chain, prereleased modestly weaker-than-anticipated first quarter 2017 results, in large part driven by a similar shift in patient mix. More specific, the company’s same-facility Medicare admissions composed 48.1% of total admits in the quarter—up roughly 110 basis points year-over-year. Conversely, private-pay admissions dropped 120 basis points versus the prior-year period, to only 27.4% of total patient admissions.

At the same time, commercial insurers continued to reported outsized results, with most exceeding analysts’ earnings expectations and reporting superior growth in government-sponsored programs. For example, larger insurers like Aetna Inc. highlighted that their *government premiums exceeded commercial revenues—for the first time in corporate history—during the first quarter of 2017*.

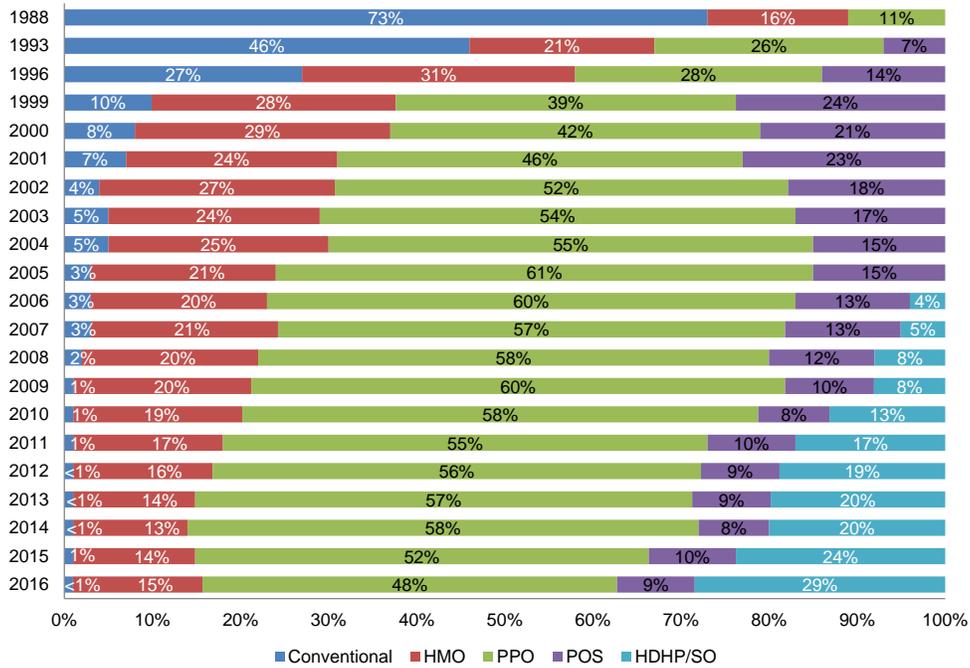
In our view, some of this mix shift is likely due to increased seasonality in the marketplace today, and is a derivative of two key factors: 1) the *growth of high-deductible insurance plans* in U.S. commercial marketplace; and 2) a *larger-than-anticipated year-over-year decline in health insurance exchange (HIX) enrollment* in early 2017. However, we also believe there is an underlying secular trend of more patients shifting into government-sponsored insurance plans, which we believe could accelerate over the coming years (while this is the primary focus of this report, we first address the first-quarter mix shift below).

Regarding the first point, according to the Centers for Disease Control and Prevention (CDC), the number of nonelderly (under the age of 65) Americans with a high-deductible health plan (HDHP) or a consumer-driven health plan (a high-deductible plan with a health savings account) has risen steadily over recent years. For example, in 2010 about 25.3 million persons were covered under some form of HDHP; however, this number rose by 53.3% through the beginning of 2016, to a record 38.8 million persons (exhibit below).



Similarly, the overall percentage of covered workers who enroll in HDHPs has increased markedly over recent years, while plan structures like HMOs and PPOs have seen their market share shrink. In 2016, for example, 29% of employer-sponsored beneficiaries were enrolled in HDHPs, significantly above the 4% mix when they first appeared in 2006 (exhibit on following page). **Also of note, this represented the single largest uptick witnessed in these plans in seven years—demonstrating their significant momentum in the market, in our view—a trend that likely continued into 2017.**

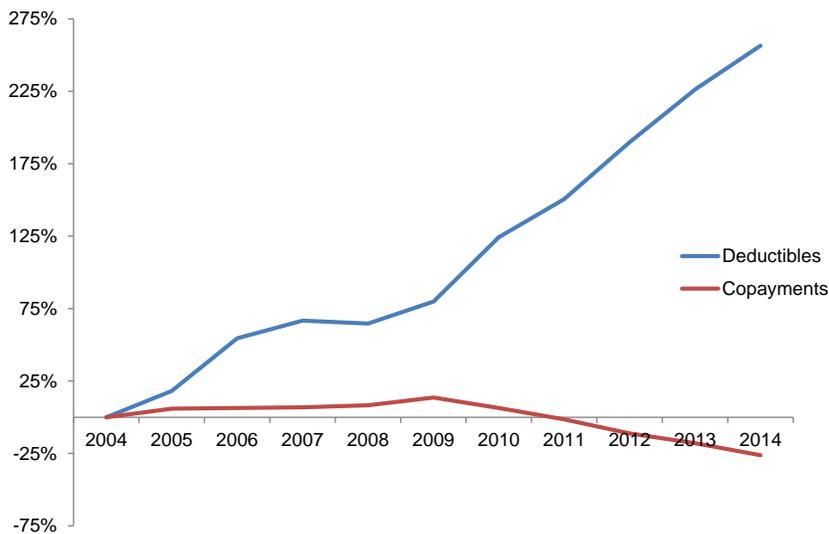
Healthcare Mosaic Report
Distribution of Health Plan Enrollment for Covered Workers, by Plan Type



Source: Kaiser Family Foundation/Health Research & Educational Trust, Employer Health Benefits Survey (2016)

Given this increase in high-deductible plans, it also should come as no surprise that individuals' overall cash payments toward deductibles also have increased materially over the past several years—a point which was confirmed by the 2016 study completed by the Kaiser Family Foundation (KFF). More specific, KFF analyzed a variety of large employer data sets from Truven Health Analytics and the Bureau of Labor Statistics (BLS) and determined that **cumulative payments toward deductibles increased 256% over the past decade, while copayments actually declined by 26%** (exhibit below).

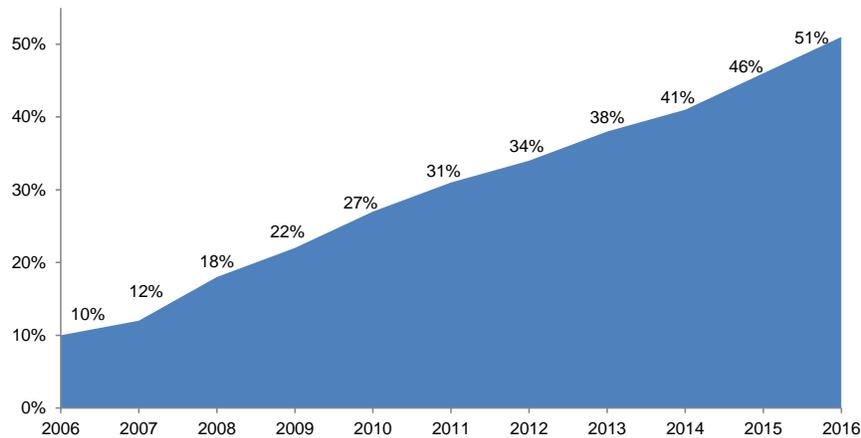
Healthcare Mosaic Report
Cumulative Increases on Deductible Spending Has Skyrocketed Since 2004



Source: Kaiser Family Foundation

Similarly, the same study estimated that in 2016—for the first time in history—the majority of employees in the United States had a deductible in excess of \$1,000 (exhibit below).

Healthcare Mosaic Report
Percentage of Employees with a Deductible in Excess of \$1,000 for Single Coverage



Source: Kaiser Family Foundation and Health Research & Educational Trust

In our view, this is important as deductibles typically drive more price sensitivity than co-payments (which are generally flat dollar amounts)—thus indicating a significant uptick in overall consumer responsibility for healthcare spending. ***And we believe this element of consumerism is most likely to appear in the commercial marketplace at the start of each year (before patients burn through their deductibles and began to consume more care in the latter parts of the year).***

However, this element of seasonality would not appear in the Medicare or Medicaid markets, as the overwhelming majority of individuals covered by government payers are not in high-deductible plans (the exception being a few state Medicaid programs, such as the Healthy Indiana CDHC plan).

Thus, we would anticipate a gradual trend toward more government-sponsored patients receiving care at the start of each year—a mix shift trend that investors should be cognizant of going forward and a topic we have discussed extensively in our annual *Consumer-Centric Healthcare* reports.

Regarding the second point, the most recent data from CMS (released in mid-June 2017) shows that HIX enrollment dropped from 12.2 million lives at the start of 2017 to only 10.3 million lives in March 2017 (a 15.6% decline). This compares with only a 12.6% decline in the comparable period last year (from 12.7 million to 11.1 million effectuated lives). While some of this churn is a natural result of people gaining coverage through an employer or aging into Medicare, we believe that many of these lives are unlikely to qualify for Medicaid and simply moved to the uninsured pool—where they could stay in future quarters and continue to pressure both year-over-year payer mix (increasing bad debt exposure for many providers) and volumes throughout 2017.

Looking Forward. If our observations above are correct, we believe that providers could begin to see a gradual rebound in mix toward commercial payers toward the second half of the year (again, as deductibles are covered and more commercial patients access care); however, **we also see a material long-term trend of mix shift toward government payers—due to economic, utilization, and demographic trends. And we believe this mix shift presents a material, but generally underappreciated, investment risk in the healthcare space.**

Put simply, government payers typically reimburse markedly less for the same service (as we discuss later in this report), and many of these rates are scheduled to decline further in the near future. Thus, we expect mix shift to directly impact same-facility pricing and margins for a number of healthcare services providers over the upcoming decade, which could have a number of derivative implications as well.

Accordingly, we decided to take a much deeper dive into this topic as the focus of our third quarter 2017 *Healthcare Mosaic Report*.

Why Increasing Mix Shift Toward Government Payers Is a Particularly Worrisome Trend for Healthcare Providers.

As discussed in the section above, healthcare services investors saw a number of earnings misses during the first quarter 2017 due to a minor mix shifts toward government payers. For example, Mednax fell \$0.12 short of the \$0.87 consensus forecast (or a 14.1% EPS shortfall), and we estimate that about 55% of this shortfall was due solely to the mix shift issue (with the other 45% related to lower neonatal volumes and higher temporary staffing costs).

The reason this has such a large impact on providers like Mednax—and thus is such a worrisome long-term trend—is twofold: 1) reimbursement rates from commercial payers are often two to three times greater (depending on the industry and procedure at hand) compared with Medicare and—especially—Medicaid rates; and 2) the impact of this pricing pressure has a direct flow-through to the bottom line—as the costs to provide services are the same regardless of the ultimate payer of the bill.

How large is the pricing differential? In answering this question, we believe a recent working paper from the Congressional Budget Office (CBO), which was completed in April 2017 and published in late June 2017, presents some of the most compelling data on pricing we have seen in years. As part of the paper, the authors used data from the Health Care Cost Institute (HCCI) to compare payment rates for both physician services and hospital services for Medicare fee-for-service patients, Medicare Advantage patients, and commercially insured patients.

A key nuance of this report was that the data used to prepare the pricing for commercially insured patients was based on the *actual amount of dollars that hospitals/physicians received for their services*—including patient copayments (as compared with inflated hospital base-rate charges or other proxy measures for the cost of care). Also of note, the payment rates were determined by using commercial data from Aetna, Humana, and UnitedHealth Group, so we believe the sample size (at about 681,000 commercial admissions and 645,000 Medicare stays covering 39 million beneficiaries in all 50 states) was markedly larger than most other studies.

In our view, **the most noteworthy finding from the report was that—on average—commercial rates for the same inpatient service were 89% higher than Medicare FFS rates.** More specific, the study found that the average commercial rate for a hospitalization was \$21,433, but for the exact same admission of a Medicare patient (even after adjusting for geography, and including additional payments for items like teaching hospitals or other supplemental payments) it was only \$11,345. Also of note, the study found that commercial rates for surgical procedures averaged \$30,880 (88% higher than Medicare, at \$16,545) while medical stays were 89% higher (\$13,469 for commercial patients versus only \$7,117 for Medicare).

**Healthcare Mosaic Report
Comparison of Mean Commercial and Medicare FFS Payment Rates**

	<u>All</u>	<u>Medical</u>	<u>Surgical</u>
Commercial revenue per admission	\$ 21,443	\$ 13,469	\$ 30,880
Medicare FFS revenue* per admission	\$ 11,354	\$ 7,177	\$ 16,454
Commercial premium	89%	88%	88%
Number of stays analyzed	620,922	336,899	284,023
Number of metropolitan statistical areas (MSAs) analyzed	297	296	297

* Includes payment for disproportionate share hospitals, indirect medical payments, and outliers
Source: Congressional Budget Office

Conversely, the study found that Medicare Advantage (MA) prices were largely equal to Medicare FFS, as seen in the following exhibit.

Healthcare Mosaic Report Comparison of Mean Medicare FFS and Medicare Advantage Payment Rates

	<u>All</u>	<u>Medical</u>	<u>Surgical</u>
Medicare Advantage revenue per admission	\$ 10,667	\$ 7,281	\$ 17,661
Medicare FFS revenue per admission*	\$ 10,716	\$ 7,236	\$ 17,932
Medicare Advantage premium	0%	1%	-2%
Number of stays analyzed	593,044	399,597	193,447
Number of metropolitan statistical areas (MSAs) analyzed	297	296	296

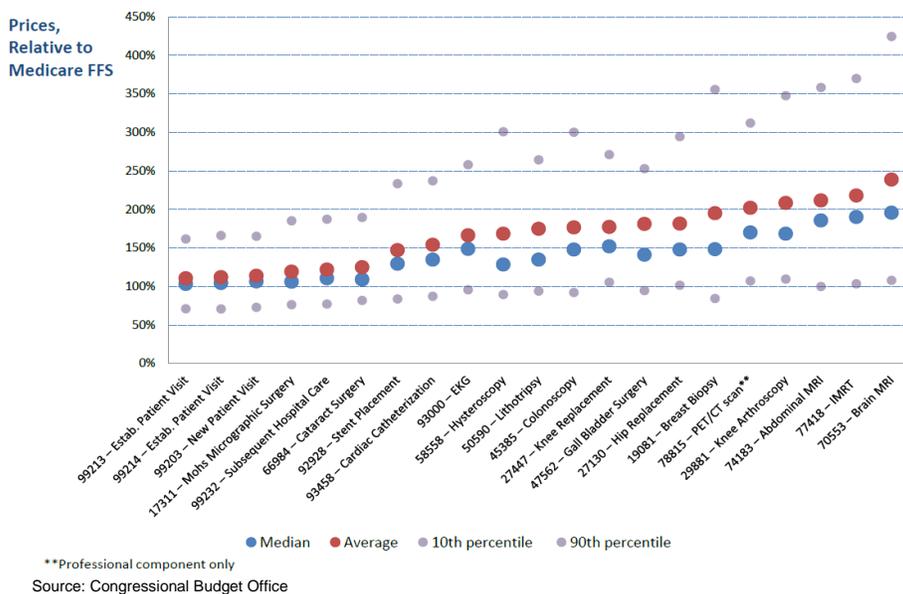
* Includes payment for disproportionate share hospitals, indirect medical payments, and outliers
Source: Congressional Budget Office

The study also found that larger hospitals with greater market share had even higher commercial rates, on average, than their peers. The primary reason for this delta is that while Medicare rates are set, administratively, following rules in federal law, commercial rates are generally negotiated between payer and provider, which allows market clout (and the need for payers to have the largest providers in their network) to drive stronger commercial pricing for many larger healthcare services providers. *Thus, it appears that larger providers—those in a historical position of strength—may actually stand to lose the most from pending payer mix shifts.*

In looking at physician pricing, the detailed study (with actual source data) has yet to be published, but we were able to obtain access to the CBO presentation slides, which also demonstrate large deltas between commercial payments and Medicare fee-for-service (FFS) rates. For example, as seen in the exhibit below, more basic services (e.g., an established patient visit) are fairly comparable, but higher acuity procedures (e.g., knee arthroscopy or MRIs) are reimbursed at *more than a 100% premium* by the average commercial insurer.

Moreover, in looking at the highest-reimbursed providers (the top decile of commercial rates), certain physicians are paid by commercial insurers at a more than 350% relative rate to Medicare FFS (we believe these doctors likely are hospital employees and, thus, have greater leverage with payers under their hospital employer’s commercial pricing agreements).

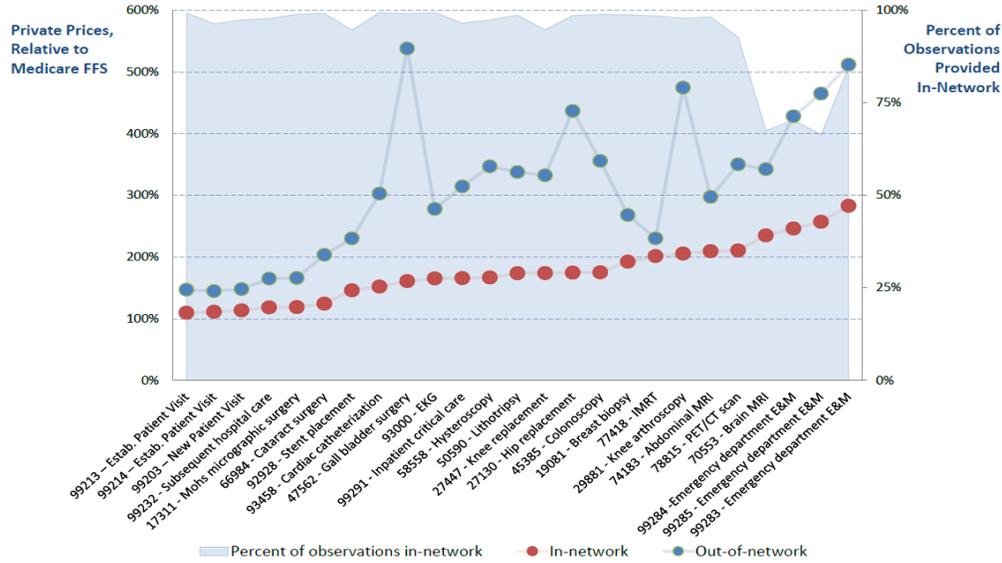
Healthcare Mosaic Report Relative Comparison of Commercial Professional Fees Versus Medicare Fee For Service Payment Rates



Another interesting data point relates to the relative price of commercial services for in-network and out-of-network services. While the vast majority of commercial claims reviewed by the CBO were for in-network services (where the insurer and

provider have a contractual agreement, set pricing schedules, etc.), those services that were billed out-of-network had markedly higher prices than Medicare FFS—some at more than 500% on a relative basis (exhibit below).

Healthcare Mosaic Report
Relative Comparison of Commerical Professional Fees Versus Medicare Fee For Service Payment Rates, By Network Status



Source: Congressional Budget Office

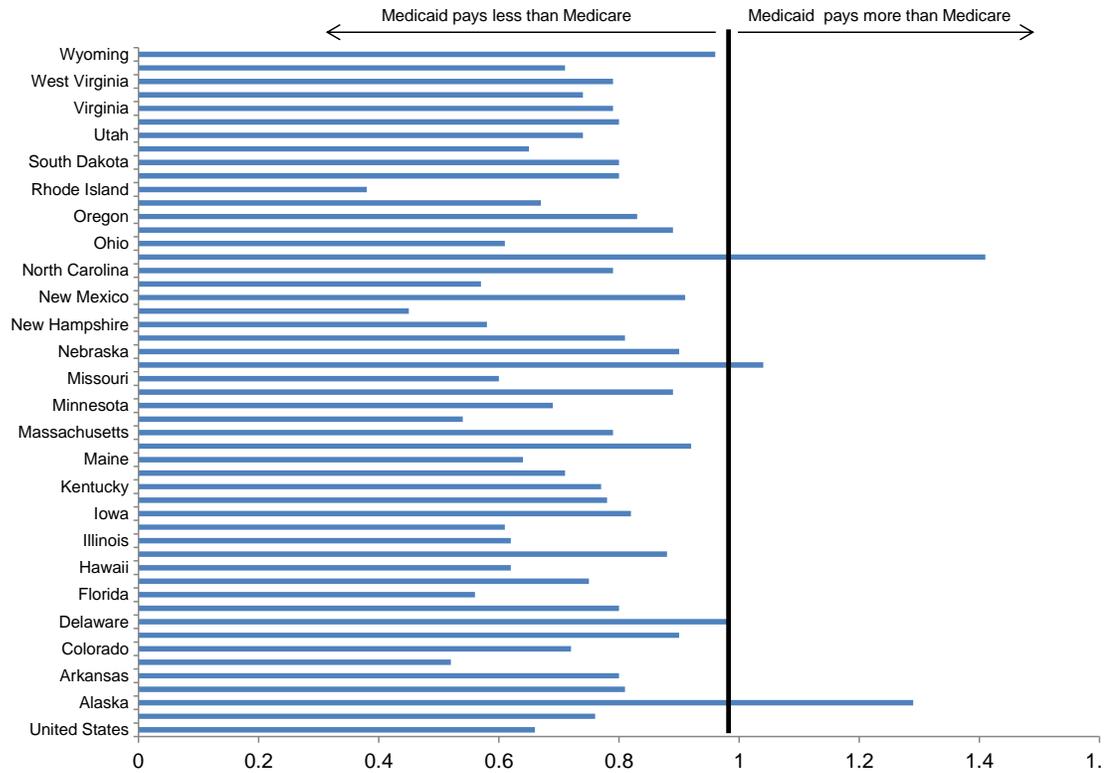
As seen in the exhibit above, this is most prominent in the emergency medicine space, where between 20% and 30% of observations were out-of-network and rates ranged between 400% and 500% of Medicare FFS rates. Accordingly, ***we believe the emergency medicine space, and physician group practice operators like Envision Healthcare, are at particular risk for this mix shift*** (although Envision management has indicated a goal of moving its ED business to 100% in-network over the next 18 months or so—thus eliminating much of this exposure).

What about Medicaid Pricing? The easiest answer to this question is that Medicaid pricing—for practically every service offering—is lower than that of both Medicare and commercial. However, generalities here are difficult, as Medicaid pricing varies on a state-by-state basis.

Still, based on data from the Kaiser Family Foundation and Urban Institute, we were able to analyze typical reimbursement rates for Medicaid FFS and Medicaid relative to primary care services, obstetric care, and a variety of other services.

The following exhibit displays Medicaid prices relative to Medicare prices *for all services tracked*, and shows that only three states—Alaska (at 1.29 times), Montana (1.04 times), and North Dakota (1.41 times)—have Medicaid reimbursement rates above average Medicare levels, while the rest are markedly below this level (with the average state at roughly 0.66 times).

Healthcare Mosaic Report Medicaid-to-Medicare Fee Index (All Services)



Source: Kaiser Family Foundation

Moreover, based on the data reviewed earlier (showing the pricing premium between commercial and Medicare rates), we believe the delta between private payers and Medicaid is even larger. To be clear, while we do not have enough data to do an exact like-for-like analysis between the Medicaid rates and commercial rates, we can use the average commercial-to-Medicare and Medicare-to-Medicaid premiums to back into some rough estimates.

More specific, if these pricing ratios hold, *we estimate the average Medicaid rate is only about 35% of the average commercial payment for all services*—with no state in the Union paying anywhere near commercial rates for their Medicaid population (North Dakota comes closest with an estimated Medicaid-to-commercial payment ratio of 0.75, while Rhode Island is the lowest at an estimated 0.2 rate).

Thus, we believe those entities subject to significant mix shift between commercial and Medicaid patients are most at risk here. And, in our coverage universe, we believe Mednax has the greatest exposure, with about one-third of its sales derived from neonatal care (which, by default, is either Medicaid or commercial—as it is the baby who is covered, and a neonate never qualifies for Medicare).

Bad and Getting Worse. While the data above highlights why unfavorable mix shifts should be such a worrisome issue for healthcare providers (as well as investors in a number of areas across the broader healthcare universe), we believe the delta between commercial and government rates is only set to increase over the coming years.

First, **looking at Medicaid**, we believe the federal government (at least with Republicans in control of Congress and the White House) is set on reducing spending on Medicaid. As we have discussed in past issues of our *Healthcare Mosaic Report*, Medicaid has become one of the largest expenditures for the federal government over the past decade—with total spending growing to roughly \$344 billion in 2015 alone (with states contributing an additional \$201 billion in spending, bringing its total to more than half-a-trillion dollars).

Equally important, overall spending on Medicaid—as well as the year-over-year growth in Medicaid contributions paid for by the federal government—has been quite volatile over time, making it difficult for any reliable longer-term budgeting. For example, over the past decade alone, the year-over-year change in federal Medicaid spending has ranged from a high of 21.8% (in 2009, during the Great Recession as stimulus legislation was passed to increase the federal share) to a low of -7.2% (in 2011 when the enhanced federal share expired). And, more recently, federal Medicaid spending has increased at a midteens clip, given the federal government’s 100% funding of Medicaid expansion under the Affordable Care Act (which helped drive a nearly 19% uptick in federal Medicaid spending in 2014).

Given this rapid spending increase and the volatile spending patterns experienced over time, many politicians have called for spending limitations on the program—with the notion of block grants to states gaining particular momentum since the U.S. presidential election. However, the potential for per capita spending limits also has gained momentum in Washington, D.C. over the past several years, so we briefly review each of these two forms of pre-budgeted healthcare spending in the section below.

Medicaid Block Grants. The actual mechanics of how a block grant would function are relatively simple. More specific, block grants would be administered in a similar fashion to other grants that states already receive from the federal government (e.g., education, law enforcement); each state would simply receive a lump sum of money from the federal government, which it could then use (along with any additional funds from the state itself) to fund the Medicaid program in the manner it sees fit.

Thereafter, the federal government could set a pre-budgeted level of annual increases—*at rates likely falling well below current Medicaid spending projections*—that would provide budgetary certainty for both the states and federal government, a significant deviation compared with the annual volatility in spending patterns discussed above.

Conversely, the potential for block grants remains controversial, as it could also limit a state’s ability to provide increased coverage during times of economic crisis, as more people could become uninsured, state budgets would be under pressure, but federal support would be fixed) or disease outbreaks (e.g., funding for Zika), unless the federal government increased funding on a temporary basis.

This likely also would have trickle down effects on a number of providers in the healthcare market, as states could look to increased managed Medicaid, reduced rates to providers, and greater focus on fraud and waste to control long-term expenditures. Again, this would only further magnify the delta between commercial and Medicare rates in the future.

Per Capita Limits. We believe per capita limits on federal Medicaid spending (an option recently included in the *Better Care Reconciliation Act [BCRA] of 2017*) may be a more likely alternative for long-term Medicaid reform. The reason for this is that per capita limits would provide more budget certainty regarding federal spending *per Medicaid enrollee*, but still accommodate for greater enrollment in the program when need arises (e.g., a recession).

Still, to generate longer-term savings, the rate of increase on the per capita cap would have to be below currently forecast trends, which would drive similar needs for states to focus on more managed Medicaid, a reduction in fraud, waste, and abuse, and potentially lower of rates to healthcare providers.

As part of BCRA, for example, the federal government would set per capita rates at a baseline in 2020, and then increase the rate at CPI-M (consumer price index, medical goods) plus 1% through 2025, but then reduce the rate increase to CPI-U (consumer price index for all goods—which grows at a lower rate than CPI-M) thereafter, which would significantly reduce Medicaid spending from the federal government over time, all else equal.

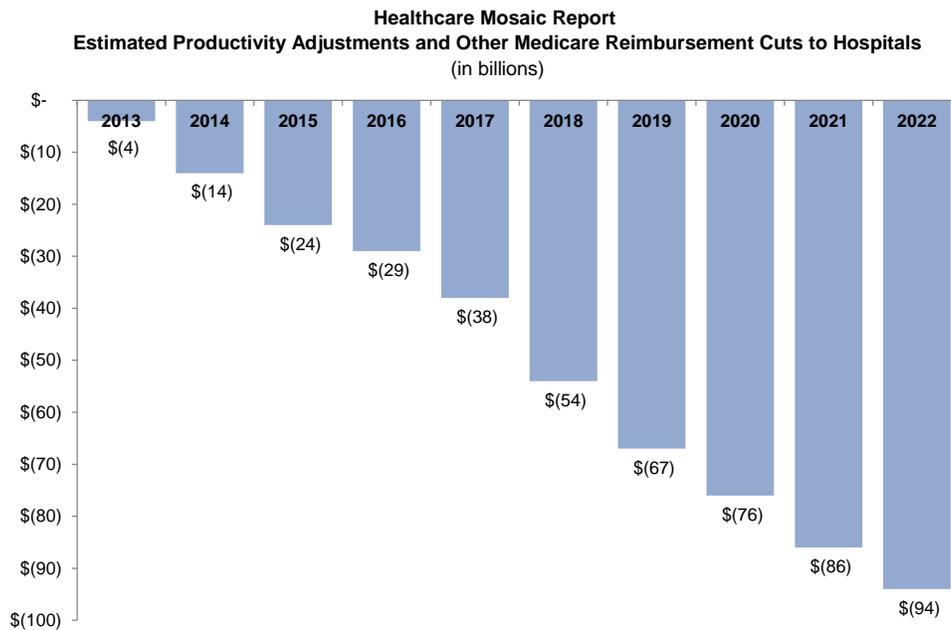
To be fair, the absolute dollar amount from the federal government is theoretically—at least over time—likely be higher than that under block grants, thus proving to be less of a negative for providers and other entities overly exposed to Medicaid reimbursements, in our opinion. Moreover, both block grants and per capita limits would take time to implement, as a number of details would need to be established (e.g., formulas to determine annual spending growth rates, coverage requirements to receive federal funds, risk adjustments or differing per capita rates depending on the type of enrollees in each state, how to manage partial-year enrollments).

However, ***the clear goal would be to limit federal spending, and volatility, over time, so we believe the process will ultimately prove to be at least a modest (and potentially significant) negative to those sectors overly dependent on Medicaid reimbursements or those that could see greater mix shift toward Medicaid in the future.***

Next, **looking at Medicare**, we also believe Medicare rates are likely to face consistent pressure over the coming years—much of which resulted from rate cuts included in the Affordable Care Act (ACA), which we believe are unlikely to be unwound—even if the legislation is eventually repealed/replaced.

On a macro basis, the initial ACA scoring called for *more than \$575 billion in reduced Medicare spending* between 2010 and 2019—much of it related to reduced Medicare payments for Part A and Part B, along with direct reductions to hospitals related to items like inpatient prospective payment adjustments, reductions in payments for disproportionate share hospitals (DSH), and adjustments related to incentive payment programs (such as MACRA/MIPS).

For example, based on analysis of CBO data by The Advisory Board Company, it is estimated that acute-care hospitals could face as much as \$94 billion in annual Medicare payment reductions by 2022 (exhibit below).



Note: Includes items such as inpatient prospective payment system reductions, disproportionate share hospital (DSH) payment reform, and reductions related to the Medicare Access and CHIP Reauthorization Act (MACRA)

Source: The Advisory Board Company and Congressional Budget Office (CBO)

In addition, rate cuts (or productivity adjustments) will affect Medicare reimbursement rates in a variety of other areas, including home health and hospice, long-term care, rehab hospitals, durable medical equipment, and skilled nursing facilities, among other areas. Accordingly, **we view both Medicare and Medicaid rates as likely to see continued pressure on a go-forward basis.** This trend, combined with already low reimbursements relative to commercial rates, is likely to only further exacerbate the risk of mix shifts in the marketplace going forward.

How will demographics and legislative changes impact long-term patient mix? In our view, this is a difficult question to answer—especially as it relates to potential legislative/regulatory changes and how they may affect an individual’s eligibility for various insurance initiatives.

For example, the pending ACA repeal-and-replace legislation could have a marked impact on the number of Medicaid lives that qualify for coverage in the near future (shifting lives back to uninsured status or into the commercial market via health exchanges). Moreover, the movement of Medicaid to per capita spending or block grants could also affect the program’s longer-term enrollment levels.

For example, according to Speaker Ryan’s *A Better Way* publication, funding would be determined using a base year that assumes states transition individuals enrolled in the ACA’s Medicaid expansion into other sources of coverage. In our view, this could be a major hit to Medicaid funding, as it is estimated that nearly \$79 billion in incremental government funding was provided to states between January 2014 and June 2015 (most recent data) to fund Medicaid expansion. To put this in context, this funding—along with roughly \$5 billion contributed directly by states—accounted for nearly 12% of total Medicaid

spending over this time frame. Thus, **it is likely that an outright repeal of the Medicaid expansion provisions in the ACA, or block grants provided at pre-ACA expansion levels, would lead to at least a 10% reduction in total Medicaid expenditures**, by our estimation.

Data also indicate that **more than 11 million enrollees gained coverage due to the Medicaid expansion**, which moved median eligibility for families from 91% of the Federal Poverty Level (FPL) up to 138% and moved median eligibility for other healthy adults from 0% (i.e., ineligible for Medicaid) up to 138% of the FPL as well.

Similarly, based on recent CBO scoring of BCRA, Medicaid spending would be 26% lower by 2026 than it would under current law, and the gap would increase to about 35% by 2036. While the majority of this savings relates to moving to per capita spending with lower annual inflationary updates than what would occur under current law, it is difficult to determine how states would deal with this (e.g., cutting provider rates, limiting access to coverage). Still, we believe either scenario would have negative impacts on providers, as they would either see an increase in insured patients (and subsequent uptick in bad debt expense) or lower rates per Medicaid patient.

On the demographic front, however, there is clear evidence that a mix-shift toward more Medicare is inevitable—given both the growth characteristics of various age cohorts in the United States along with the fact that older patients tend to consume markedly more healthcare resources compared with the broader U.S. population.

Regarding the first point on demographics, one need to look no further than U.S. Census Bureau data to reveal the potential for longer-term mix shift toward Medicare patients in the coming years. For example, in the exhibit below, we simply aggregated total population projections for the sub-age-65 cohort (the “other population”) versus the above age-65 cohort (“Medicare eligible population”) as our rough (but likely reasonably accurate) proxy for Medicare-eligible patients as a percentage of the total U.S. population.

As can be seen in the exhibit below, the over-65 population is expected to increase from 14.51% of the U.S. population to nearly 21% by 2032—thus we expect a similar shift in patient mix toward Medicare, all else equal, over the coming 15 years. Moreover, the mix shift should be fairly consistent, with the Medicare-eligible population increasing by about 41 basis points, on average, between 2017 and 2026.

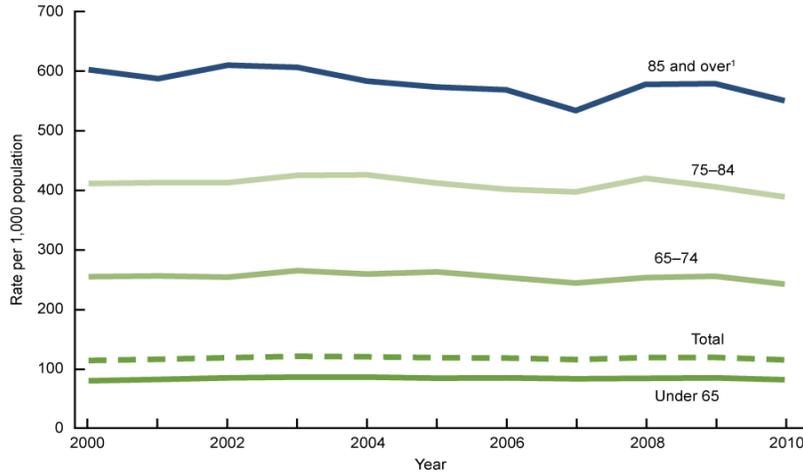
Healthcare Mosaic Report
U.S. Population projections, by Age Cohort (2014 to 2032)

	Total Eligible Lives									As a Percentage of U.S. Population			
	<1 year	1-4 years	5-14 years	15-24 years	25-44 years	45-64 years	65-74 years	75 and older	Other	Medicare	Other	Medicare	YOY Shift to Medicare
2014	3,971,847	15,935,146	41,171,820	43,960,054	83,977,415	83,476,514	26,414,555	19,840,666	272,492,796	46,255,221	85.49%	14.51%	
2015	4,000,831	15,964,283	41,052,222	43,832,296	84,656,925	84,032,062	27,594,081	20,236,164	273,538,619	47,830,245	85.12%	14.88%	0.37%
2016	4,029,356	16,009,204	40,998,787	43,612,557	85,442,042	84,483,199	28,746,759	20,673,624	274,575,145	49,420,383	84.75%	15.25%	0.37%
2017	4,057,231	16,100,019	41,018,683	43,351,778	86,419,998	84,623,030	29,825,167	21,229,885	275,570,739	51,055,052	84.37%	15.63%	0.38%
2018	4,083,375	16,217,210	41,013,241	43,201,939	87,495,098	84,479,136	30,743,426	22,023,040	276,489,999	52,766,466	83.97%	16.03%	0.39%
2019	4,107,606	16,330,429	40,997,414	43,125,002	88,596,533	84,170,088	31,859,679	22,697,235	277,327,072	54,556,914	83.56%	16.44%	0.41%
2020	4,128,810	16,438,858	41,008,879	43,106,877	89,517,706	83,861,301	33,075,174	23,365,853	278,062,431	56,441,027	83.13%	16.87%	0.43%
2021	4,145,903	16,539,784	41,026,669	43,179,525	90,489,007	83,435,982	34,282,808	24,009,290	278,816,870	58,292,098	82.71%	17.29%	0.42%
2022	4,159,190	16,630,074	41,028,792	43,306,104	91,332,345	83,020,199	34,837,912	25,383,463	279,476,704	60,221,375	82.27%	17.73%	0.44%
2023	4,169,856	16,707,648	41,067,836	43,414,798	92,140,654	82,639,565	35,568,188	26,558,757	280,140,357	62,126,945	81.85%	18.15%	0.42%
2024	4,178,872	16,771,740	41,250,084	43,391,379	92,878,502	82,355,850	36,300,670	27,687,202	280,826,427	63,987,872	81.44%	18.56%	0.41%
2025	4,186,576	16,823,642	41,444,251	43,296,794	93,429,132	82,234,965	37,093,437	28,826,115	281,415,360	65,919,552	81.02%	18.98%	0.42%
2026	4,192,911	16,866,165	41,643,355	43,265,905	94,003,461	82,105,687	37,783,394	29,964,707	282,077,484	67,748,101	80.63%	19.37%	0.39%
2027	4,197,539	16,901,703	41,873,399	43,307,246	94,432,778	82,113,212	38,331,267	31,124,331	282,825,877	69,455,598	80.28%	19.72%	0.35%
2028	4,200,651	16,931,175	42,113,126	43,322,706	94,878,727	82,152,990	38,770,279	32,328,716	283,599,375	71,098,995	79.96%	20.04%	0.33%
2029	4,203,058	16,954,700	42,331,757	43,327,374	95,412,395	82,167,719	39,098,187	33,577,640	284,397,003	72,675,827	79.65%	20.35%	0.31%
2030	4,205,295	16,972,911	42,529,114	43,359,086	95,794,581	82,433,799	39,226,195	34,881,213	285,294,786	74,107,408	79.38%	20.62%	0.27%
2031	4,207,608	16,987,009	42,704,238	43,396,541	96,210,047	82,933,906	39,113,826	36,131,565	286,439,349	75,245,391	79.20%	20.80%	0.18%
2032	4,210,700	16,998,749	42,856,111	43,418,288	96,661,337	83,523,611	38,827,577	37,423,154	287,668,796	76,250,731	79.05%	20.95%	0.15%

Source: U.S. Census Bureau and William Blair estimates

All that stated, our analysis above likely *understates* the potential mix shift toward Medicare as utilization among this cohort is even higher than the broader U.S. population. **For example, based on hospital discharge data, the over-65 population experiences nearly three times the level of hospital utilization compared to the under-65 age cohort, and the over-75 population has more than four times the level of hospital utilization (exhibit on following page).**

**Healthcare Mosaic Report
Hospitalizations By Age (2000 to 2010)**



Source: National Hospital Discharge Survey, 2000 - 2010

With this in mind, we attempted to assess the potential growth in healthcare utilization, by age cohort, using U.S. Census Bureau data as well as historical utilization rates, by age cohort, for a variety of different healthcare services.

Building the Market Model. Again, we started with U.S. Census Bureau data regarding expected U.S. population levels by age cohort over the next several decades (as shown in the exhibit above).

We then captured data from the Centers for Disease Control and Prevention (CDC) related to the average number of visits, by age cohort and per 100 persons, for hospital outpatient care, emergency department utilization, hospital inpatient utilization, and physician office visits (note: the most recent CDC data for inpatient utilization only provides data for age 65 and older, so we used this level for the entire population above age 65 in our analyses, which we view as valid as this accounts for transition from commercial into Medicare).

**Healthcare Mosaic Report
Visits per 100 Persons, By Age Cohort**

	<1 year	1-4 years	5-14 years	15-24 years	25-44 years	45-64 years	65-74 years	75 and older
Hospital outpatient department	75.6	38	28.2	24.9	26.6	34.7	50.4	52.2
Emergency department	93.1	56.9	29.2	49.1	45	34.9	38.7	63.5
Physician office	768.6	305.3	201.4	192.2	255.8	371	623.9	715.4
	<15 years	15-44 years	45-64 years	65 and older				
Hospital inpatient	3.2	8.0	11.8	33.5				

Source:Centers for Disease Control and Prevention

Next, we assumed the utilization rates by venue of care and age cohort stay fixed going forward (as these have been relatively stable over time) and applied these utilization rates to the population data presented in our earlier exhibit to predict the total number of patient visits, by venue and age cohort, over the next several decades.

The output of our individual market models, and then a summary market model (combining all levels of care into one master utilization model) are presented in the exhibits on the following pages.

Estimated Hospital Outpatient Visits, By Age Cohort

	<u><1 year</u>	<u>1-4 years</u>	<u>5-14 years</u>	<u>15-24 years</u>	<u>25-44 years</u>	<u>45-64 years</u>	<u>65-74 years</u>	<u>75 and older</u>	Total
2014	3,002,716	6,055,355	11,610,453	10,946,053	22,337,992	28,966,350	13,312,936	10,356,828	106,588,685
2015	3,024,628	6,066,428	11,576,727	10,914,242	22,518,742	29,159,126	13,907,417	10,563,278	107,730,586
2016	3,046,193	6,083,498	11,561,658	10,859,527	22,727,583	29,315,670	14,488,367	10,791,632	108,874,127
2017	3,067,267	6,118,007	11,567,269	10,794,593	22,987,719	29,364,191	15,031,884	11,082,000	110,012,930
2018	3,087,032	6,162,540	11,565,734	10,757,283	23,273,696	29,314,260	15,494,687	11,496,027	111,151,258
2019	3,105,350	6,205,563	11,561,271	10,738,125	23,566,678	29,207,021	16,057,278	11,847,957	112,289,243
2020	3,121,380	6,246,766	11,564,504	10,733,612	23,811,710	29,099,871	16,669,888	12,196,975	113,444,707
2021	3,134,303	6,285,118	11,569,521	10,751,702	24,070,076	28,952,286	17,278,535	12,532,849	114,574,389
2022	3,144,348	6,319,428	11,570,119	10,783,220	24,294,404	28,808,009	17,558,308	13,250,168	115,728,003
2023	3,152,411	6,348,906	11,581,130	10,810,285	24,509,414	28,675,929	17,926,367	13,863,671	116,868,113
2024	3,159,227	6,373,261	11,632,524	10,804,453	24,705,682	28,577,480	18,295,538	14,452,719	118,000,884
2025	3,165,051	6,392,984	11,687,279	10,780,902	24,852,149	28,535,533	18,695,092	15,047,232	119,156,222
2026	3,169,841	6,409,143	11,743,426	10,773,210	25,004,921	28,490,673	19,042,831	15,641,577	120,275,622
2027	3,173,339	6,422,647	11,808,299	10,783,504	25,119,119	28,493,285	19,318,959	16,246,901	121,366,052
2028	3,175,692	6,433,847	11,875,902	10,787,354	25,237,741	28,507,088	19,540,221	16,875,590	122,433,433
2029	3,177,512	6,442,786	11,937,555	10,788,516	25,379,697	28,512,198	19,705,486	17,527,528	123,471,279
2030	3,179,203	6,449,706	11,993,210	10,796,412	25,481,359	28,604,528	19,770,002	18,207,993	124,482,414
2031	3,180,952	6,455,063	12,042,595	10,805,739	25,591,873	28,778,065	19,713,368	18,860,677	125,428,332
2032	3,183,289	6,459,525	12,085,423	10,811,154	25,711,916	28,982,693	19,569,099	19,534,886	126,337,985

Source: William Blair estimates, using data from the Centers for Disease Control and Prevention and the U.S. Census Bureau

Estimated Emergency Department Visits, By Age Cohort

	<u><1 year</u>	<u>1-4 years</u>	<u>5-14 years</u>	<u>15-24 years</u>	<u>25-44 years</u>	<u>45-64 years</u>	<u>65-74 years</u>	<u>75 and older</u>	Total
2014	3,697,790	9,067,098	12,022,171	21,584,387	37,789,837	29,133,303	10,222,433	12,598,823	136,115,841
2015	3,724,774	9,083,677	11,987,249	21,521,657	38,095,616	29,327,190	10,678,909	12,849,964	137,269,036
2016	3,751,330	9,109,237	11,971,646	21,413,765	38,448,919	29,484,636	11,124,996	13,127,751	138,432,821
2017	3,777,282	9,160,911	11,977,455	21,285,723	38,888,999	29,533,437	11,542,340	13,480,977	139,647,124
2018	3,801,622	9,227,592	11,975,866	21,212,152	39,372,794	29,483,218	11,897,706	13,984,630	140,955,582
2019	3,824,181	9,292,014	11,971,245	21,174,376	39,868,440	29,375,361	12,329,696	14,412,744	142,248,057
2020	3,843,922	9,353,710	11,974,593	21,165,477	40,282,968	29,267,594	12,800,092	14,837,317	143,525,672
2021	3,859,836	9,411,137	11,979,787	21,201,147	40,720,053	29,119,158	13,267,447	15,245,899	144,804,464
2022	3,872,206	9,462,512	11,980,407	21,263,297	41,099,555	28,974,049	13,482,272	16,118,499	146,252,798
2023	3,882,136	9,506,652	11,991,808	21,316,666	41,463,294	28,841,208	13,764,889	16,864,811	147,631,464
2024	3,890,530	9,543,120	12,045,025	21,305,167	41,795,326	28,742,192	14,048,359	17,581,373	148,951,092
2025	3,897,702	9,572,652	12,101,721	21,258,726	42,043,109	28,700,003	14,355,160	18,304,583	150,233,657
2026	3,903,600	9,596,848	12,159,860	21,243,559	42,301,557	28,654,885	14,622,173	19,027,589	151,510,072
2027	3,907,909	9,617,069	12,227,033	21,263,858	42,494,750	28,657,511	14,834,200	19,763,950	152,766,280
2028	3,910,806	9,633,839	12,297,033	21,271,449	42,695,427	28,671,394	15,004,098	20,528,735	154,012,779
2029	3,913,047	9,647,224	12,360,873	21,273,741	42,935,578	28,676,534	15,130,998	21,321,801	155,259,796
2030	3,915,130	9,657,586	12,418,501	21,289,311	43,107,561	28,769,396	15,180,537	22,149,570	156,487,594
2031	3,917,283	9,665,608	12,469,637	21,307,702	43,294,521	28,943,933	15,137,051	22,943,544	157,679,279
2032	3,920,162	9,672,288	12,513,984	21,318,379	43,497,602	29,149,740	15,026,272	23,763,703	158,862,131

Source: William Blair estimates, using data from the Centers for Disease Control and Prevention and the U.S. Census Bureau

Estimated Physician Office Visits, By Age Cohort

	<u><1 year</u>	<u>1-4 years</u>	<u>5-14 years</u>	<u>15-24 years</u>	<u>25-44 years</u>	<u>45-64 years</u>	<u>65-74 years</u>	<u>75 and older</u>	Total
2014	30,527,616	48,650,001	82,920,045	84,491,224	214,814,228	309,697,867	164,800,409	141,940,125	1,077,841,514
2015	30,750,387	48,738,956	82,679,175	84,245,673	216,552,414	311,758,950	172,159,471	144,769,517	1,091,654,544
2016	30,969,630	48,876,100	82,571,557	83,823,335	218,560,743	313,432,668	179,351,029	147,899,106	1,105,484,169
2017	31,183,877	49,153,358	82,611,628	83,322,117	221,062,355	313,951,441	186,079,217	151,878,597	1,119,242,591
2018	31,384,820	49,511,142	82,600,667	83,034,127	223,812,461	313,417,595	191,808,235	157,552,828	1,133,121,875
2019	31,571,060	49,856,800	82,568,792	82,886,254	226,629,931	312,271,026	198,772,537	162,376,019	1,146,932,419
2020	31,734,034	50,187,833	82,591,882	82,851,418	228,986,292	311,125,427	206,356,011	167,159,312	1,160,992,209
2021	31,865,410	50,495,961	82,627,711	82,991,047	231,470,880	309,547,493	213,890,439	171,762,461	1,174,651,402
2022	31,967,534	50,771,616	82,631,987	83,234,332	233,628,139	308,004,938	217,353,733	181,593,294	1,189,185,573
2023	32,049,513	51,008,449	82,710,622	83,443,242	235,695,793	306,592,786	221,909,925	190,001,348	1,203,411,678
2024	32,118,810	51,204,122	83,077,669	83,398,230	237,583,208	305,540,204	226,479,880	198,074,243	1,217,476,367
2025	32,178,023	51,362,579	83,468,722	83,216,438	238,991,720	305,091,720	231,425,953	206,222,027	1,231,957,182
2026	32,226,714	51,492,402	83,869,717	83,157,069	240,460,853	304,612,099	235,730,595	214,367,514	1,245,916,963
2027	32,262,285	51,600,899	84,333,026	83,236,527	241,559,046	304,640,017	239,148,775	222,663,464	1,259,444,038
2028	32,286,204	51,690,877	84,815,836	83,266,241	242,699,784	304,787,593	241,887,771	231,279,634	1,272,713,939
2029	32,304,704	51,762,699	85,256,159	83,275,213	244,064,906	304,842,237	243,933,589	240,214,437	1,285,653,943
2030	32,321,897	51,818,297	85,653,636	83,336,163	245,042,538	305,829,394	244,732,231	249,540,198	1,298,274,354
2031	32,339,675	51,861,338	86,006,335	83,408,152	246,105,300	307,684,791	244,031,160	258,485,216	1,309,921,969
2032	32,363,440	51,897,181	86,312,208	83,449,950	247,259,700	309,872,597	242,245,253	267,725,244	1,321,125,571

Source: William Blair estimates, using data from the Centers for Disease Control and Prevention and the U.S. Census Bureau

Estimated Hospital Inpatient Utilization, By Age Cohort

	<1 year	1-4 years	5-14 years	15-24 years	25-44 years	45-64 years	65-74 years	75 and older	Total
2014	126,424	507,216	1,310,499	3,529,992	6,743,386	9,849,394	8,855,744	6,651,782	37,574,437
2015	127,346	508,143	1,306,692	3,519,733	6,797,951	9,914,943	9,251,192	6,784,376	38,210,377
2016	128,254	509,573	1,304,991	3,502,088	6,860,996	9,968,173	9,637,638	6,931,039	38,842,753
2017	129,142	512,464	1,305,625	3,481,148	6,939,526	9,984,671	9,999,185	7,117,531	39,469,292
2018	129,974	516,194	1,305,451	3,469,116	7,025,856	9,967,693	10,307,041	7,383,444	40,104,770
2019	130,745	519,798	1,304,948	3,462,938	7,114,302	9,931,229	10,681,276	7,609,475	40,754,709
2020	131,420	523,249	1,305,313	3,461,482	7,188,272	9,894,795	11,088,783	7,833,636	41,426,949
2021	131,964	526,461	1,305,879	3,467,316	7,266,267	9,844,612	11,493,654	8,049,355	42,085,508
2022	132,387	529,335	1,305,946	3,477,480	7,333,987	9,795,553	11,679,758	8,510,060	42,764,508
2023	132,727	531,804	1,307,189	3,486,208	7,398,895	9,750,642	11,924,591	8,904,089	43,436,145
2024	133,013	533,844	1,312,990	3,484,328	7,458,144	9,717,167	12,170,163	9,282,411	44,092,060
2025	133,259	535,497	1,319,171	3,476,733	7,502,359	9,702,904	12,435,946	9,664,243	44,770,110
2026	133,460	536,850	1,325,508	3,474,252	7,548,478	9,687,650	12,667,261	10,045,968	45,419,427
2027	133,608	537,981	1,332,830	3,477,572	7,582,952	9,688,538	12,850,941	10,434,743	46,039,165
2028	133,707	538,919	1,340,461	3,478,813	7,618,762	9,693,231	12,998,124	10,838,525	46,640,542
2029	133,783	539,668	1,347,420	3,479,188	7,661,615	9,694,969	13,108,058	11,257,240	47,221,942
2030	133,855	540,248	1,353,702	3,481,735	7,692,305	9,726,364	13,150,974	11,694,275	47,773,457
2031	133,928	540,696	1,359,276	3,484,742	7,725,667	9,785,372	13,113,301	12,113,468	48,256,451
2032	134,027	541,070	1,364,110	3,486,489	7,761,905	9,854,951	13,017,333	12,546,487	48,706,372

Source: William Blair estimates, using data from the Centers for Disease Control and Prevention and the U.S. Census Bureau

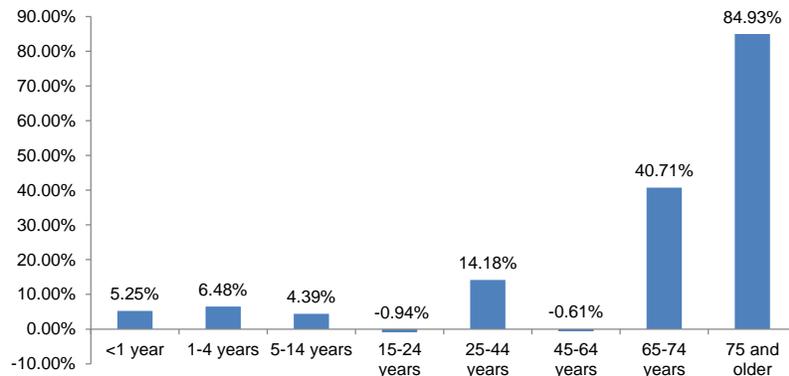
Estimated Total Healthcare Visits Across All Treatment Venues, By Age Cohort

	<1 year	1-4 years	5-14 years	15-24 years	25-44 years	45-64 years	65-74 years	75 and older	Total
2014	37,354,546	64,279,670	107,863,169	120,551,656	281,685,443	377,646,915	197,191,521	171,547,557	1,358,120,476
2015	37,627,135	64,397,204	107,549,843	120,201,305	283,964,724	380,160,208	205,996,989	174,967,135	1,374,864,543
2016	37,895,408	64,578,407	107,409,852	119,598,715	286,598,241	382,201,147	214,602,030	178,749,528	1,391,633,330
2017	38,157,568	64,944,740	107,461,976	118,883,581	289,878,599	382,833,741	222,652,626	183,559,105	1,408,371,937
2018	38,403,448	65,417,468	107,447,719	118,472,677	293,484,807	382,182,766	229,507,668	190,416,930	1,425,333,484
2019	38,631,336	65,874,174	107,406,255	118,261,693	297,179,351	380,784,636	237,840,787	196,246,195	1,442,224,428
2020	38,830,756	66,311,559	107,436,291	118,211,989	300,269,241	379,387,687	246,914,773	202,027,240	1,459,389,537
2021	38,991,513	66,718,677	107,482,898	118,411,211	303,527,276	377,463,548	255,930,075	207,590,564	1,476,115,763
2022	39,116,475	67,082,891	107,488,460	118,758,329	306,356,085	375,582,550	260,074,071	219,472,021	1,493,930,882
2023	39,216,787	67,395,812	107,590,749	119,056,401	309,067,396	373,860,566	265,525,771	229,633,918	1,511,347,399
2024	39,301,581	67,654,348	108,068,208	118,992,179	311,542,359	372,577,042	270,993,940	239,390,747	1,528,520,403
2025	39,374,036	67,863,712	108,576,892	118,732,798	313,389,337	372,030,159	276,912,151	249,238,085	1,546,117,171
2026	39,433,615	68,035,242	109,098,511	118,648,091	315,315,809	371,445,307	282,062,860	259,082,648	1,563,122,083
2027	39,477,141	68,178,597	109,701,187	118,761,461	316,755,867	371,479,350	286,152,874	269,109,058	1,579,615,535
2028	39,506,409	68,297,482	110,329,231	118,803,857	318,251,714	371,659,305	289,430,213	279,522,484	1,595,800,694
2029	39,529,046	68,392,378	110,902,007	118,816,658	320,041,797	371,725,939	291,878,131	290,321,006	1,611,606,961
2030	39,550,085	68,465,838	111,419,049	118,903,622	321,323,763	372,929,682	292,833,744	301,592,037	1,627,017,819
2031	39,571,838	68,522,707	111,877,844	119,006,334	322,717,361	375,192,161	291,994,881	312,402,905	1,641,286,031
2032	39,600,918	68,570,064	112,275,725	119,065,971	324,231,123	377,859,981	289,857,957	323,570,320	1,655,032,058

Source: William Blair estimates, using data from the Centers for Disease Control and Prevention and the U.S. Census Bureau

As can be seen in the last exhibit above (which is the aggregation of visit data in hospital outpatient departments, hospital inpatient units, physician offices, and emergency departments), U.S. population growth and demographic changes are expected to drive higher visit volume among most age cohorts through 2032 (with the exception of the 15- to 24-year-old and 45- to 64-year-old age cohorts); however, the largest jump in utilization will be driven by increased visit volume in the age 65 to 74 population (with visits up an estimated 41% between 2014 and 2032) and the 75 years and older population (up an estimated 85% over the same time frame)—see the exhibit below.

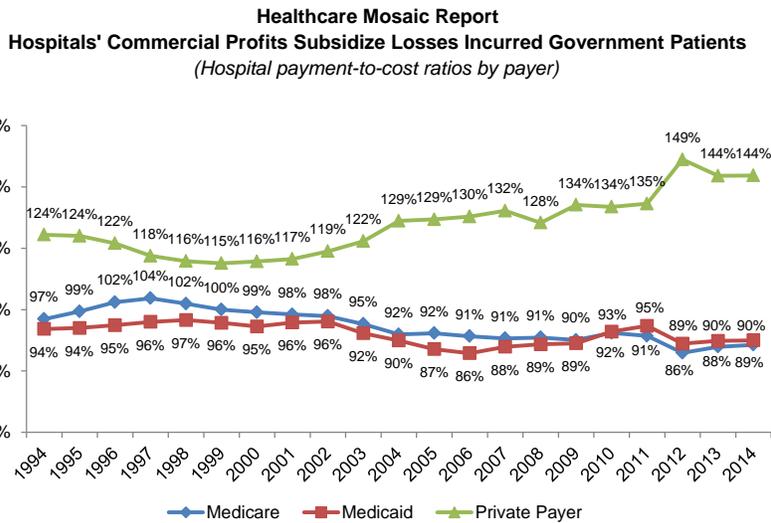
Healthcare Mosaic Report
Forecasted Change in Total Healthcare Visits, 2015 versus 2032, by Age Cohort



Source: William Blair estimates, using data from the Centers for Disease Control and Prevention and the U.S. Census Bureau

To be fair, there are changes afoot that could reduce healthcare utilization trends going forward (wellness programs, shared-savings models, investments to reduce care needs by improving health, etc.). Thus, our demand model could overestimate the number of actual visits on a go-forward basis; however, we believe it still represents a reasonably accurate depiction of the coming care needs—and thus patient mix—among the U.S. population; the analysis also *clearly shows a large uptick in services that likely will be required by the Medicare population over the coming 15 years or so.*

Tying it All Together. At present, we believe there is a high degree of uncertainty surrounding the future of federal healthcare policy, as well as its associated impact on insurance coverage and healthcare providers’ subsequent payer mix. Still, we are comfortable predicting, *ceteris paribus*, that the historic coverage expansions of 2015 and 2016 likely represented a high water mark for the industry—at least in the form of a favorable payer mix—which is unlikely to be sustained in the future. Thus, while investors continue to read tea leaves to divine the outcome of a potential repeal and replacement of the Affordable Care Act, *we believe the country’s demographic time bomb lurks as an underappreciated investment risk in the service space.* For example, a review of company presentations shows that management teams almost universally pitch the “Silver Tsunami” as a volume tailwind, but usually fail to mention the strains that will be placed on the system from a margin standpoint. An analysis of the American Hospital Association (AHA) Annual Survey data; however, demonstrates that while the aggregate hospital payment-to-cost ratio for commercial payers is positive (143.7% in 2014), the payments from both Medicare and Medicaid fall well below the costs incurred (exhibit below). Thus, despite potential volume tailwinds from the aging U.S. population, we expect the shift from profitable commercially insured patients to largely *unprofitable* government-insured patients to pressure provider margins over the long term.



Source: Analysis of American Hospital Association Annual Survey data, 2014, for community hospitals.
 Note: Medicare and Medicaid payments include Disproportionate Share payments.

To be fair, all else is never equal in reality, and we believe there are two main offsetting factors to the negative implications highlighted above. First, the substantially higher rate of healthcare resource consumption (as shown earlier, the over-65 rate of hospital utilization is three times higher than the under-65 rate) means that hospitals’ fixed costs likely will be spread across a significantly larger revenue base (thus improving margins across the board). Second, the ascendant role of government in the financing of healthcare represents a tectonic shift over decades, not quarters, thus affording providers ample time to adapt to the new reality.

In fact, we believe that many of the strategic developments currently underway in the provider industry (in particular the movement to risk-bearing business models and the consolidation of market share) carry ancillary benefits that should help providers mitigate some of this pending mix shift. However, the sheer magnitude of the payer mix shift toward an unprofitable payer base makes it likely that industry margins will be sustainably pressured going forward, in our view.

Potential Winners and Losers.

Those at risk. In our view, the losers from this shift largely will be concentrated among providers of healthcare services—primarily hospitals, ancillary facility operators, and physician group practices, as they bear the most exposure to negative mix shifts and the concomitant pricing/margin pressure that will arise over time.

Specific to our coverage universe, we believe that both Mednax and Envision have exposure to this risk over the longer term, although Mednax will be (relatively) more insulated as half of the company's revenue is generated via businesses with no exposure to an elderly population (neonatology, maternal fetal medicine, pediatric cardiology, and other pediatric subspecialties). Envision, on the other hand, has a very small exposure to neonatology and pediatric care, and its remaining businesses are fully exposed to this mix shift risk, in our view.

We also believe the acute-care space (including a wide variety of operators like HCA Healthcare, Lifepoint Health, Tenet Healthcare, and Community Health Systems) face material long-term risks. Universal Health Services also faces risk in its acute division, but is relatively less exposed as it has a large behavioral healthcare business as well (where the reimbursement rates between commercial and government payers is modest).

Similarly, we view Acadia Healthcare as having only minimal risk, again, given its geographic and payer mix diversity, as well as the fact that mix shifts in the behavioral space drive less payment diversity than in most other healthcare services sectors.

We also believe other subsectors are relatively immune to this trend—for example, diagnostic laboratory operators often see *higher reimbursement rates from government versus commercial payers*, while operators in spaces like home health and hospice already are so exposed to government payers (often as high as 80% to 90% of patient mix) that demographic trends should be expected to drive volume growth without any material impact to payer mix.

Potential winners. As mentioned above, we believe that providers will respond to the coming trend by focusing on cost control measures and adopting new risk-bearing business models, such as ACOs and provider-sponsored health plans.

In this light, we believe entities such as Evolent Health, which helps providers transition into this type of payment model, are well positioned to benefit from this trend. In fact, *Evolent's management team recently indicated that the company is experiencing a record sales pipeline, as it believes nearly 40% of the provider market is already aggressively seeking value-based solutions, versus just 10% a few years ago.*

We further believe there are a number of privately held operators in this space that are well positioned to thrive in the long-term, including organizations such as Lumeris, Sharecare, Enli, Wellcentive, xG Health Solutions, and Alignment Healthcare, among others. We also believe Health Catalyst is uniquely positioned in the space—offering services, analytic applications, and data warehousing platforms that help drive both cost and operating improvements throughout organizations while also benefiting patient outcomes.

We believe IT vendors offering discrete cost-reduction products that demonstrate a high ROI for providers also are well positioned to benefit from the trends outlined above. Companies that fall into this bucket include organizations such as Premier (the company's GPO and supply chain analytics solutions—along with a number of Performance Services tools and collaboratives—directly help to lower costs and identify inefficiencies), Cerner, Modernizing Medicine, and athenahealth (population health solutions and EHRs), Teladoc, MDLive, and American Well (which enable systems to launch telehealth programs), and Vocera (the company's solutions improve throughput and staff efficiency along with patient care).

On the payer side, we believe entities such as Cotiviti and HMS Holdings, which provide cost containment solutions, also will benefit from this trend over the long term, especially as they increasingly acquire technology platforms that help payers and providers manage the transition from volume- to value-based care.

On the provider side, we again view the behavioral space as uniquely insulated (as mix shift has limited impact on pricing and margins) and believe the lab space could benefit from this trends as mix shift toward Medicare is actually beneficial for companies like Quest Diagnostics (DGX \$108.90; Market Perform) and LabCorp (LH \$152.45; Outperform) (both of which are covered by analyst Amanda Murphy).

Lastly, we believe the larger healthcare consultancies stand to see strong demand for continued integration, network management, and cost-reduction solutions; thus providers like Huron Consulting (HURN \$42.60; Market Perform) (covered by analyst Tim McHugh) could also experience longer-term benefits from this trend.

Prior *Healthcare Mosaic Reports*. Below, we provide links to William Blair's most-recent *Healthcare Mosaic Reports* (in order of most recent publications).

To access more reports, please visit www.rdocs.com or contact your William Blair sales representatives.

[*The Growing Prevalence of Physician Employment by U.S. Healthcare Providers*](#)
[*Pre-Budgeted Healthcare: the Future of Healthcare Financing in America?*](#)
[*Post-Acute Care Integration; a Key Priority in the Face of Shifting Reimbursement Schemes*](#)
[*An In-Depth Look at the Changing U.S. Healthcare Workforce and What It Means for Investors*](#)
[*An In-Depth Analysis of Interoperability Initiatives: What It All Means for Investors*](#)
[*A Deep Dive Into the Alphabet Soup of Quality Reporting: What It All Means for Investors*](#)
[*Waste Not, Want Not; a Trillion-Dollar Opportunity to Reduce U.S. Healthcare Spending*](#)
[*Emerging Spotlight on Healthcare Analytics and Its Impact on the Broader Healthcare Market*](#)
[*Growth in Account-Based Plans and Their Impact on the Broader Healthcare Marketplace*](#)

IMPORTANT DISCLOSURES

This report is available in electronic form to registered users via R*Docs™ at www.rdocs.com or www.williamblair.com.

Please contact us at +1 800 621 0687 or consult williamblair.com/Research-and-Insights/Equity-Research/Coverage.aspx for information related to our equity research coverage.

Ryan Daniels attests that 1) all of the views expressed in this research report accurately reflect his/her personal views about any and all of the securities and companies covered by this report, and 2) no part of his/her compensation was, is, or will be related, directly or indirectly, to the specific recommendations or views expressed by him/her in this report. We seek to update our research as appropriate. Other than certain periodical industry reports, the majority of reports are published at irregular intervals as deemed appropriate by the research analyst.

DOW JONES: 21,532.14
 S&P 500: 2,443.25
 NASDAQ: 6,261.17

Additional information is available upon request.

Current Rating Distribution (as of 06/30/17)

Coverage Universe	Percent	Inv. Banking Relationships*	Percent
Outperform (Buy)	59	Outperform (Buy)	11
Market Perform (Hold)	34	Market Perform (Hold)	3
Underperform (Sell)	1	Underperform (Sell)	0

*Percentage of companies in each rating category that are investment banking clients, defined as companies for which William Blair has received compensation for investment banking services within the past 12 months.

The compensation of the research analyst is based on a variety of factors, including the quality and accuracy of research, client feedback, contributions to other firm departments, competitive factors, and firm profitability.

OTHER IMPORTANT DISCLOSURES

Stock ratings and valuation methodologies: William Blair & Company, L.L.C. uses a three-point system to rate stocks. Individual ratings reflect the expected performance of the stock relative to the broader market (generally the S&P 500, unless otherwise indicated) over the next 12 months. The assessment of expected performance is a function of near-, intermediate-, and long-term company fundamentals, industry outlook, confidence in earnings estimates, valuation (and our valuation methodology), and other factors. Outperform (O) – stock expected to outperform the broader market over the next 12 months; Market Perform (M) – stock expected to perform approximately in line with the broader market over the next 12 months; Underperform (U) – stock expected to underperform the broader market over the next 12 months; not rated (NR) – the stock is not currently rated. The valuation methodologies include (but are not limited to) price-to-earnings multiple (P/E), relative P/E (compared with the relevant market), P/E-to-growth-rate (PEG) ratio, market capitalization/revenue multiple, enterprise value/EBITDA ratio, discounted cash flow, and others. Stock ratings and valuation methodologies should not be used or relied upon as investment advice. Past performance is not necessarily a guide to future performance.

The ratings and valuation methodologies reflect the opinion of the individual analyst and are subject to change at any time.

Our salespeople, traders, and other professionals may provide oral or written market commentary, short-term trade ideas, or trading strategies—to our clients, prospective clients, and our trading desks—that are contrary to opinions expressed in this research report. Certain outstanding research reports may contain discussions or investment opinions relating to securities, financial instruments and/or issuers that are no longer current. Always refer to the most recent report on a company or issuer. Our asset management and trading desks may make investment decisions that are inconsistent with recommendations or views expressed in this report. We will from time to time have long or short positions in, act as principal in, and buy or sell the securities referred to in this report. Our research is disseminated primarily electronically, and in some instances in printed form. Research is simultaneously available to all clients. This research report is for our clients only. No part of this material may be copied or duplicated in any form by any means or redistributed without the prior written consent of William Blair & Company, L.L.C.

This is not in any sense an offer or solicitation for the purchase or sale of a security or financial instrument. The factual statements herein have been taken from sources we believe to be reliable, but such statements are made without any representation as to accuracy or completeness or otherwise, except with respect to any disclosures relative to William Blair or its research analysts. Opinions expressed are our own unless otherwise stated and are subject to change without notice. Prices shown are approximate.

This material is distributed in the United Kingdom and the European Economic Area (EEA) by William Blair International, Ltd., authorized and regulated by the Financial Conduct Authority (FCA), and is only directed at and is only made available to persons falling within articles 19, 38, 47,

and 49 of the Financial Services and Markets Act of 2000 (Financial Promotion) Order 2005 (all such persons being referred to as “relevant persons”).

“William Blair” and “R*Docs” are registered trademarks of William Blair & Company, L.L.C. Copyright 2017, William Blair & Company, L.L.C. All rights reserved.