Defined Benefit Pension Trends

J.P. Morgan Asset Management Strategy & Analytics | March 2021

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Agenda

- Funded Status
- Assumptions
- Asset Returns
- Asset Allocation
- Contributions
- Regulatory
- Risk Transfer
- Other
- Accounting
Plans ended the year at 88.9% funded, a 0.9% annual improvement but with significant intra-year funded status volatility.

Despite double digit asset returns and all plans outperforming their expected return assumptions, most plans only modestly beat their liabilities during 2020.

Both assets and liabilities grew during 2020 as interest rates fell and equities rallied.

Despite the increase in funded status percentage, dollar deficits were not reduced.

# 2020 Funded Status Drivers Similar to 2019

## TOP 100 PLANS: GAAP FUNDED STATUS ATTRIBUTION 2009 THROUGH 2020

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<tbody>
<tr>
<td>Service Cost</td>
<td>-1.6%</td>
<td>-1.6%</td>
<td>-1.5%</td>
<td>-1.4%</td>
<td>-1.6%</td>
<td>-1.5%</td>
<td>-1.3%</td>
<td>-1.3%</td>
<td>-1.3%</td>
<td>-1.3%</td>
<td>-1.2%</td>
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<tr>
<td>Interest Cost</td>
<td>-4.7%</td>
<td>-4.4%</td>
<td>-3.6%</td>
<td>-2.9%</td>
<td>-4.1%</td>
<td>-3.1%</td>
<td>-3.1%</td>
<td>-3.0%</td>
<td>-2.9%</td>
<td>-3.5%</td>
<td>-2.6%</td>
</tr>
<tr>
<td>Actuarial (G)/L</td>
<td>-5.1%</td>
<td>-7.2%</td>
<td>-8.2%</td>
<td>7.6%</td>
<td>-12.3%</td>
<td>3.5%</td>
<td>-3.1%</td>
<td>-4.8%</td>
<td>6.2%</td>
<td>-10.8%</td>
<td>-8.2%</td>
</tr>
<tr>
<td>Contribution</td>
<td>4.2%</td>
<td>3.7%</td>
<td>3.8%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>1.6%</td>
<td>2.4%</td>
<td>3.7%</td>
<td>3.5%</td>
<td>2.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Actual Return</td>
<td>10.7%</td>
<td>5.0%</td>
<td>9.4%</td>
<td>7.7%</td>
<td>8.5%</td>
<td>0.0%</td>
<td>5.8%</td>
<td>10.9%</td>
<td>-3.0%</td>
<td>14.9%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Benefit Payments</td>
<td>-1.1%</td>
<td>-0.9%</td>
<td>-2.1%</td>
<td>-1.3%</td>
<td>-0.7%</td>
<td>-1.1%</td>
<td>-1.2%</td>
<td>-1.3%</td>
<td>-0.9%</td>
<td>-0.9%</td>
<td>-0.8%</td>
</tr>
<tr>
<td>Other</td>
<td>-0.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.6%</td>
<td>0.2%</td>
<td>-0.1%</td>
<td>0.0%</td>
<td>-0.1%</td>
<td>0.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Net Change</strong></td>
<td>1.9%</td>
<td>-5.5%</td>
<td>-2.2%</td>
<td>12.1%</td>
<td>-7.4%</td>
<td>-0.4%</td>
<td>-0.6%</td>
<td>4.4%</td>
<td>1.4%</td>
<td>0.6%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

- Each component in the table is measured by its **contribution to the annual funded status change**.
- The pattern of funded status change for 2020 was quite similar to 2019. In both years liability discount rates fell dramatically inflating liabilities and asset portfolios generated double-digit returns, leaving funded status slightly improved.

The chart plots the attribution of the surplus/(deficit) change for the top 100 plans since 2009.

- Since 2009 the deficit is fundamentally unchanged.
- Sponsor contributions have outpaced new benefit accruals ($408bn versus $237bn).
- However, asset returns have lagged growth in the liability due to interest and discount rates changes ($1,063mm versus $1,257mm).
- Over this same period $955mm of benefit payments have been supported by plan assets.

Service Cost: Present Value of benefits accruing during the year, Asset Returns: Actual return on plan assets, Interest Cost: Interest accrued on the liability during the year, Contributions: Plan sponsor contributions, Actuarial G/L: Difference between assumption-based expectations and actual liability performance, Other: Plan acquisition/divestitures, FX translation, curtailments, employee contributions etc.

2020 Funded Status Changes Were Mixed

TOP 100 PLANS: FUNDED STATUS IMPROVE VERSUS DETERIORATE

- Funded status changes during 2020 were mixed with 2/3rds of plans improving their funded status. The difference between improvement and decline largely came down to contributions.

- Additionally, the range of funded status changes was fairly tight compared to history with a difference of 4% between the 75th and 25th percentile.

- The largest dispersion and most one-sided change in funded status came during 2013 in which the taper tantrum pushed discount rates up by almost 100bps and the S&P500 returned 32%.

Almost 75% of Plans Are Better Funded than 2010

The plot above charts the range of funded status levels as well as 2010 and 2020 levels for each of the top 100 plans. Plans are ranked by current funded status level.

Nearly 1/3rd of plans are at their peak post-crisis funding level, second only to 2013 which saw a large funded status boost from the taper tantrum.

Distribution of Funded Status Among Sponsors has Tightened

TOP 100 PLANS: 25TH TO 75TH PERCENTILE FUNDED STATUS RANGE

- The chart on the left plots the range of the 25th to 75th percentile funded status for the top 100 plans each year since 2009.
- The range of funded status levels is comparable to 2013, which represents the post-crisis funded status peak for many plans.
- The 25th percentile funded status level of 84.7% today is roughly in line with the 75th percentile funded status level in 2012.

Discount Rates Fell 100bps in 2019 and Another 75bps in 2020

TOP 100 PLANS: GAAP DISCOUNT RATE DISTRIBUTIONS

<table>
<thead>
<tr>
<th>5th to 25th</th>
<th>25th - 50th</th>
<th>50th to 75th</th>
<th>75th to 95th</th>
<th>Average</th>
<th>US Long Corp AA YTW</th>
</tr>
</thead>
<tbody>
<tr>
<td>95th%</td>
<td>5.00%</td>
<td>5.23%</td>
<td>4.33%</td>
<td>5.19%</td>
<td>4.30%</td>
</tr>
<tr>
<td>75th%</td>
<td>5.64%</td>
<td>5.00%</td>
<td>4.20%</td>
<td>5.00%</td>
<td>4.15%</td>
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<tr>
<td>50th%</td>
<td>5.50%</td>
<td>4.88%</td>
<td>4.06%</td>
<td>4.90%</td>
<td>4.06%</td>
</tr>
<tr>
<td>25th%</td>
<td>5.30%</td>
<td>4.60%</td>
<td>3.96%</td>
<td>4.75%</td>
<td>3.94%</td>
</tr>
<tr>
<td>5th%</td>
<td>5.00%</td>
<td>4.20%</td>
<td>3.70%</td>
<td>4.50%</td>
<td>3.75%</td>
</tr>
<tr>
<td>Average</td>
<td>5.42%</td>
<td>4.71%</td>
<td>4.00%</td>
<td>4.84%</td>
<td>4.01%</td>
</tr>
<tr>
<td>US Long Corp AA YTW</td>
<td>5.32%</td>
<td>4.52%</td>
<td>3.78%</td>
<td>4.74%</td>
<td>3.88%</td>
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</table>

GAAP discount rates hit all time lows the second year in a row, down 75bps for the year on average after a 100bps decline during 2019.

Pension Discount Rates: Near Record Declines, Again

Annual Evolution of Pension Discount Rates – Market Aa Yield Curve

Source: J.P. Morgan Asset Management, BAML ICE Mature Pension Index; data as of December 31, 2020
TOP 100 PLANS: 2020 GAAP DISCOUNT RATE SETTING

The dispersion in plan discount rate setting can only partially be explained by different liability durations. We plot 12/31/2020 discount rates versus estimated liability duration and compare to the FTSE Pension Discount Curve, a AA-rated market curve, and the FTSE Above-Median Pension Discount Curve.

- Discount rates that plot below the AA-market line are blended with international plans in lower-yielding countries like the UK, Switzerland and Canada.
- Discount rates plot far above the AA-market line may reflect bond models using only a subset of the highest yielding eligible issues.

Expected Returns Have Continued Steady Decline

### TOP 100 PLANS: GAAP EXPECTED RETURN ON ASSETS ASSUMPTION (%)

- Aggregate expected return assumptions have declined each year since at least 2010 due to a combination of asset allocation de-risking and moderating forward looking asset class returns.
- Higher asset-weighted expected returns reflect larger plans tendency towards higher alternatives allocations and subsequently higher expected return assumptions.
- During 2020 25% of plans chose to drop their return assumption by 50bps or more year over year.
- Many plans have voluntarily disclosed further 2021 expectation in the range of 25-50bps.

The chart above calculates the average 2020 expected return for plans within defined ranges based on fixed income allocation sizes.

- On average, every 10% increase in fixed income allocation results in a 50bps reduction in expected return assumptions.
- There is room for further compression in expected returns as plans continue to de-risk and build larger hedge portfolios.

Assumptions

TOP 100 PLANS: 2020 GAAP EXPECTED RETURN ON ASSETS ASSUMPTION VERSUS ASSET ALLOCATION (%)

- Expected return assumptions are loosely related to broad asset allocation - differences in assumptions cannot be explained solely by differences in underlying asset allocation
- Comparing the 2010 and 2020 trend lines we see the reduction in forward looking return expectations across all allocations

*JPMorgan LTCMA estimates reflect geometric expected returns under JPMorgan's 2020 Long Term Capital Market Assumptions. Risk Assets are assumed to be 75% MSCI ACWI / 25% Private Equity. The balance is assumed to be in U.S. Long Government/Credit


The Long Term Market Capital Assumptions is our annual capital market estimates, where we incorporate more than 200 asset and strategy classes and our return assumptions are available in 16 base currencies for risks and returns over a 10- to 15-year time frame.
2020 was the first year since 2012 that more than half of plans enacted some level of decrease in the EROA assumption.

Plan sponsors with an 8.0% or greater EROA assumption have declined from 73% in 2010 to just 6% in 2020.

The EROA assumptions of largely de-risked plans can be more sensitive to market yield levels and thus may be more likely to experience when rates rise.

EROA assumptions are set by plan sponsors but subject to approval by plan auditors.

- We segment 2020 EROA assumptions across the four major accounting firms to see if any patterns emerge.
- Each of the auditors has at least one plan with an 8.0% or greater EROA assumptions.

<table>
<thead>
<tr>
<th>Auditor</th>
<th>Average</th>
<th>Max</th>
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<tbody>
<tr>
<td>Auditor A</td>
<td>6.46%</td>
<td>8.00%</td>
</tr>
<tr>
<td>Auditor B</td>
<td>6.65%</td>
<td>8.25%</td>
</tr>
<tr>
<td>Auditor C</td>
<td>6.80%</td>
<td>8.97%</td>
</tr>
<tr>
<td>Auditor D</td>
<td>6.17%</td>
<td>8.12%</td>
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</table>

Source: Company 10-K filings, J.P. Morgan Asset Management; data as of December 31, 2020. Numbers may not add up due to rounding. For illustrative purposes only.
The Top 100 plans have outperformed their return expectations by 140bps on average over the last decade.

85% of plan sponsors beat their expected return and 34% outperformed by 200bps or more, compound over the period.

The release of updated mortality tables (RP-2014) and longevity improvement projections (MP-2014) in 2014 drove a large spike in participant life expectancy and, correspondingly, liability values for plan sponsors.

Annual updates of longevity improvements, incorporating actual mortality experience, have continued to reverse this spike with each subsequent release.

Mortality updates have moved in sponsor’s favor. However, they may reverse trend and are impossible to hedge with traditional instruments. Importantly, COVID-19 impacts likely won’t be reflected in assumptions until 2022.

PV of $100/Month Annuity at Age 65 ($)

<table>
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<tr>
<th>Year-Over-Year Change</th>
<th>MP-2014</th>
<th>PRI-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Expectancy (months)</td>
<td>+25.1</td>
<td>-6.1</td>
</tr>
<tr>
<td>Liability Value</td>
<td>+6.7%</td>
<td>-1.6%</td>
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Life Expectancy at Age 65 (yrs)

Calculations use a 3.0% discount rate and reflect a male aged 65 under each table and corresponding generational mortality improvement scale projected to 2020. MP Scale projections use RP2014 base table adjusted to 2006.

Expected remaining lifetime for a male aged 65 under each table and corresponding generational mortality improvement scale projected to 2020. MP Scale projections use RP2014 base table adjusted to 2006.

Top 100 plans who disclosed detailed mortality assumptions, roughly 90% are using Pri-2012 table with MP-2020 mortality improvements, or some customized variant. Pri-2012 tables are the most recent base mortality tables published since RP-2006 and reflects data collected from 2010 through 2014.

The chart below compare actual deaths in each plan sponsor’s county (see methodology for details) in 2019, for the age group 65-74, to the deaths expected under the newest SOA tables.

There is a wide dispersion of around the assumption across plans. This has implications for insurance annuity pricing as well as structuring liability hedging portfolios.

**Methodology:**
Chart compares 2019 actual death rates to expected death rates based on actuarial assumptions for age 65-74. Actual death rates are sourced from the CDC Wonder database for 2018 by county. These are assigned to plan sponsors based on the 5500 filing zip code of the largest plan by assets. Note that in many cases the filing zip code may not be indicative of the geographic distribution of pension plan participants. Expected death rates are based on Pri-2012 base mortality table and MP-2020 mortality improvement scaled, projected to 2020. Expected death rate calculations assume a uniform distribution across each age from 65-74 and across each gender.
“Once In A Lifetime” - Cause of Death by Age Group

2019 Cause of Death: Proportion of Deaths by Age Group

- **Physiological cause of death predominates for older ages and external cause of deaths for younger ages**
- **While mortality rates increased for accidents and suicide, their lower rates compared to physiological causes muted their impact on overall cause of death increases**

*Assumptions*

COVID Mortality Impact – CDC Weekly Deaths

2020 Weekly Deaths by Age Group – All Causes

Source: J.P. Morgan Asset Management, National Center for Health Statistics, Data as of February 26, 2020. For illustrative purposes only.
Assets Returns: Another Year of Double-Digit Returns

TOP 100 PLANS: ESTIMATED ASSET RETURN DISTRIBUTIONS

- Over the last 10 years most plans have earned a compound return of between 7.0% and 9.0%, within the range of most expected return on assets assumptions. The tight range around 10-year compound returns is surprising given the wide range of strategies undertaken by these plans.

- Every plan has had strong calendar year returns the past two years, irrespective of asset allocation.

Asset Returns Have Not Kept Pace With Liability Growth

**TOP 100 PLANS: ASSET VERSUS LIABILITY RETURNS FROM 2011 THROUGH 2020**

- Only 36% of plan sponsors have outperformed their liabilities over the last decade.
- 31% of plan sponsors have underperformed their liabilities by 100bps or more.
- The average surplus return for the Top 100, defined as the difference between compound asset and liability returns, is negative 45bps over last 10 years.

Liability returns include interest cost and actuarial (gain)/loss and do not include the impact of service cost accruals.

Beating Liabilities Has Proved More Difficult Than Beating EROA

TOP 100 PLANS EXCESS RETURNS: ASSETS VS. LIABILITIES FROM 2011 THROUGH 2020

- 35% of plan sponsors have outperformed both return expectations and liability growth
- 12% have beaten neither benchmark
- The majority have outperformed return expectations while lagging behind liability growth
- Liability growth has exceeded return expectations for every Top 100 plan sponsor

Liability returns include interest cost and actuarial (gain)/loss and do not include the impact of service cost accruals

The correlation of the actuarial (gain)/loss, the liability impact due mainly to discount rates changes, with asset returns gives us a sense of how well assets and liabilities track one another.

Taking on liability tracking error should be compensated with excess surplus returns – asset returns in excess of liability returns.

Public Market 2020 Returns: Treasuries & Equities Come Out on Top

2020 Public Markets Total Returns

- **All Positive**: Despite significant intra-year volatility, all asset classes ended the year with positive total returns, including pension liabilities.

- **Diversifiers Shine in Q1**: At the end of Q1 diversifiers balanced risk assets with positive total returns and included:
  - STRIPS/Long Treasuries, A or Better Long Corporate, Long Agency/Muni and High Quality Securitized (CMBS/RMBS/CMO/CML)

Source: J.P. Morgan Asset Management, Barclays Live, Morgan Markets, Bloomberg. Durations as of 12/31/2020 for hypothetical pension liabilities are as follows: Average (19.8yrs), Mature (13.8yrs), Retiree (8.9yrs). For illustrative purposes only.
Credit spreads start the year at long-term lows, subsequently peaking around March 23rd for most investment grade sectors. While spreads are wider year-to-date, they have retraced much of the widening against a backdrop of magnified concerns around corporate credit.

Required Return Hurdles Continue to Decline

TOP 100 PLANS: REQUIRED RETURN TO MAINTAIN DOLLAR SURPLUS/(DEFICIT)

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<tbody>
<tr>
<td>Return Hurdle (%)</td>
<td>1.9%</td>
<td>1.9%</td>
<td>1.9%</td>
<td>1.8%</td>
<td>1.7%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.5%</td>
<td>1.3%</td>
<td>1.3%</td>
<td>1.3%</td>
<td>1.3%</td>
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</tbody>
</table>

- **Service Cost**: PV of benefits accruing during the year as a % of PBO liability
- **Interest Cost**: Interest accrued on the liability during the year as a % of PBO liability
- **Leverage**: Additional / (Reduction in) required return due to (underfunded) / overfunded position

- Return hurdles represent the required asset return needed to maintain the beginning of year dollar surplus or deficit
- In aggregate service cost as a percentage of liabilities has been declining as the defined benefit system matures, reaching 1.3% in 2020
- Leverage represents the additional return a plan needs due to being in an underfunded position
- 5% of plans still have a return hurdle in excess of 7.0%, a target which is increasingly difficult to achieve according to JPMorgan's Long Term Capital Market Assumptions
- Return hurdles for 2021 should decline as lower discount rates lead to reduced interest costs on the liability

TOP 100 PLANS: 2020 RETURN HURDLES VERSUS RETURN TARGETS

- **Req Return: Reach 100% in 10yrs** defined as required return to achieve 100% funded on a GAAP basis over 10 years with zero sponsor contributions.
- **Req Return: Maintain Funding** defined as (Service Cost + Interest Cost) / Beginning of Year PBO and represents required return on assets to maintain funded status level in the absence of sponsor contributions and other liability changes (i.e. discount rates, mortality, etc.).
- Negative required returns to reach 100% indicate the surplus is sufficiently large to support benefit payments and expected liability growth over 10yrs without any investment returns.

Illustrative Impact of Rebalancing Strategies During 2020

TARGET PORTFOLIO: 50% ACWI / 40% U.S. LONG CREDIT / 10% U.S. LONG TREASURY

- Return dispersion between various rebalancing strategies during 2020 was wide – rebalancing monthly versus not at all generated 80bps of additional return while rebalancing just once at 3/31 generated 230bps off additional return.

- The two bookends reflect the best/worst performance for 5% tactical ranges around our baseline allocation. They reflect the potential dispersion generated from active tactical allocation.

The aggregate asset allocation of the Top 100 plans was largely unchanged over the year but there has been a clear de-risking trend since 2010.

During 2020, very few plans exhibited a 10%+ shift into fixed income year-over-year.

We, conservatively in most cases, define liquidity needs as the next 5 years of expected benefit payments plus the proportion of the liability attributable to deferred vested participants who may be entitled to commence benefits or be offered lump sums.

Comparing liquidity needs to liquid assets we find that most plans sponsors have a significant liquidity buffer with potential to add more illiquid alternatives.

Source: J.P. Morgan Asset Management, Company 10-K filings, Capital IQ, 5500 Schedule SB. For illustrative purposes only.
Asset Allocation

Stripping Down Pension De-Risking

STRIPS Activity ($bn) & Pension Funded Status (%)

Monthly Change - STRIPS Outstanding ($bn)

GAAP Funded Status (%)

Source: J.P. Morgan Asset Management, Bloomberg; Data as of December 31, 2021.
Many institutional investors are contemplating migrating away from fixed income and US treasuries due to a lack of potential returns.

The chart on the left estimates "remaining returns" by calculating in instantaneous change in each index yield to zero.

While the US Treasury index overall has very little "ballast" remaining, longer duration treasuries still offer significant protection without assuming negative yields.

Source: J.P. Morgan Asset Management, Barclays. As of 12/31/2020. For illustrative purposes only.
US GAAP fair value disclosures are not standardized across peers and vary significantly across corporate filings. For plans where allocation transparency permits, we looked at the sub-allocations within fixed income and public equity. All figures are asset-weighted.

- Fixed income portfolios are dominated by traditional government/credit issues with only a small portion (<3.0%) identified as dedicated securitized allocations.
- The identifiable public equity assets have a slight home bias.

Sponsors Are Increasingly Disclosing Asset Classes at NAV

TOP 100 PLANS: GAAP FAIR VALUE LEVEL DISCLOSURES

<table>
<thead>
<tr>
<th>GAAP Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Fair values are based on unadjusted quoted prices in active markets for identical assets</td>
</tr>
<tr>
<td>Level 2</td>
<td>Fair values are based on inputs other than quoted prices within Level 1 that are observable for the asset, either directly or indirectly</td>
</tr>
<tr>
<td>Level 3</td>
<td>Fair values are based on significant unobservable inputs for the asset (includes assets held in insurance company separate account)</td>
</tr>
<tr>
<td>NAV</td>
<td>Fair values hierarchy may exclude certain investment which are valued using Net Asset Value (NAV) as a practical expedient</td>
</tr>
</tbody>
</table>

The charts above plot the average physical fixed income duration (left) and the distribution of fixed income duration buckets across plans in each year (right) according to regulatory filings data.

The pension industry has been steadily increasing fixed income duration every year since at least 2010.

These figures do not include duration exposure obtained through synthetic instruments like interest swaps or treasury futures.

Filings for the 2020 plan year are not yet available but we expect the trend to continue.

The Tax Cut and Jobs Act provided many plan sponsors a high ROI opportunity to lock in the 35% corporate tax rate deduction before the 21% rate took effect after September 2018. For this reason many accelerated contributions to the 2017 and 2018 calendar years.

2019 employer contributions dropped to their lowest level since 2015, delivering a modest 2.0% to aggregate funded status.

A deeper dive into contribution timing suggests the bulk of 2020 contributions were made in Q4 once market dislocations had largely normalized.

Additionally, the CARES Act permitted contribution deferrals until the beginning of 2021, shifting some contributions to the next GAAP fiscal year.

“Funding Secured” – Pension Contributions through Sep’20

Few sponsors made outsized contributions through the first three quarters of 2020

### 2020 Calendar Year Contributions Allocated to 2019 Plan Year Through 9/15/2020

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<tbody>
<tr>
<td>Kaiser Permanente</td>
<td>232</td>
<td>230</td>
<td>395</td>
<td>262</td>
<td>-</td>
<td>838</td>
<td>73</td>
<td>200</td>
<td>305</td>
<td>2,534</td>
</tr>
<tr>
<td>Pfizer</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,250</td>
</tr>
<tr>
<td>ExxonMobil</td>
<td>-</td>
<td>147</td>
<td>147</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>106</td>
<td>101</td>
<td>503</td>
<td>1,004</td>
</tr>
<tr>
<td>UPS</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,000</td>
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Source: J.P. Morgan Asset Management, Form 5500, Schedule SB, Part 4, Question 18. Data as of September 2020. For illustrative purposes only.
Defined Benefit Calendar Year Contributions

Evolution of Calendar Year Contributions

- Regulatory data through 9/15/2020 show $30bn of YTD contributions, significantly trailing historical contribution levels over similar time frames.

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<tr>
<td>Through 4/15</td>
<td>22</td>
<td>38</td>
<td>36</td>
<td>29</td>
<td>24</td>
<td>24</td>
<td>25</td>
<td>31</td>
<td>25</td>
<td>16</td>
<td>TBD</td>
</tr>
<tr>
<td>Through 7/15</td>
<td>35</td>
<td>54</td>
<td>57</td>
<td>46</td>
<td>38</td>
<td>38</td>
<td>39</td>
<td>48</td>
<td>42</td>
<td>28</td>
<td>17</td>
</tr>
<tr>
<td>Through 9/15</td>
<td>59</td>
<td>72</td>
<td>79</td>
<td>72</td>
<td>54</td>
<td>53</td>
<td>67</td>
<td>82</td>
<td>79</td>
<td>49</td>
<td>30</td>
</tr>
<tr>
<td>Full Year</td>
<td>88</td>
<td>98</td>
<td>107</td>
<td>87</td>
<td>69</td>
<td>64</td>
<td>85</td>
<td>105</td>
<td>86</td>
<td>67</td>
<td>TBD</td>
</tr>
</tbody>
</table>

Employer Contributions During March

- Contributions during the March of 2020 were at the lowest level in at least a decade
- Note: March contributions are usually a small portion of the total annual amount since it is not a regulatory contribution due date

Source: J.P. Morgan Asset Management, Form 5500, Schedule SB, Part 4, Question 18. Data as of March 2020. For illustrative purposes only.
Share buybacks and dividends have been garnering attention in both financial and political spheres.

To better understand these competing uses of corporate earnings, we analyzed how much cash has been returned to shareholders vs. contributed to underfunded pension plans.

We found that since 2010, the amount this peer set contributed to pensions was about 11% of the amount dedicated to dividends and buybacks.

More and More Plans in Negative Net Cashflow Position

TOP 100 PLANS: NET CASHFLOW AS PERCENT OF ASSETS & NET NEGATIVE PLANS (%)

- We define net cashflow as employer contributions less benefit payments and settlements and quote the metric as a percentage of average assets.
- Since 2010 the percentage of top 100 plans with negative net cashflow has increased by over 30% from 55% to 90%. Plans with large cash outflows need to balance liquidity risk with the need for income and returns to close the funding gap.

Under the originally enacted 2012 MAP-21 legislation, pension discount rate relief would’ve reached its terminal phase (the maximum corridor width of +/-30%) in 2016.

Sitting now in 2021, not only are we not at the terminal phase, but the corridor widening is slated only to initiate.

The new legislation, EPPRA-2021, narrows the corridors even further and pushes the terminal phase out to 2030. If enacted, the series of pension relief will have given us 15 years of extensions.

Source: J.P. Morgan Asset Management, Emerging Pension Plan Relief Act (EPPRA) of 2021 (H.R. 423). For illustrative purposes only.
Potential Legislative Relief: Discount Rate & Liability Valuation Impact

- Discount rates under either provision fall dramatically over the projection period.
- The provision to extend corridors is more impactful in the near term but over the long term the 5% floor on 25yr average rates keeps regulatory discount rates elevated (+70bps higher by 2031).
- For an 80% US GAAP funded plan, the EPPRA-21 legislation pushes full funding on a regulatory basis out 5 additional years.

Source: J.P. Morgan Asset Management, Emergency Pension Plan Relief Act of 2021. Reflects published discount rates through December 2020. For illustrative purposes only. Forecasts, projections and other forward looking statements are based upon current beliefs and expectations. They are for illustrative purposes only and serve as an indication of what may occur. Given the inherent uncertainties and risks associated with forecasts, projections and other forward statements, actual events, results or performance may differ materially from those reflected or contemplated.
This chart shows annual minimum required contributions for a plan that is 80% funded on a US GAAP basis with a GAAP PBO of $1bn in each year.

The 5% discount rate floor and amortization extension reduce contribution amounts, whereas the corridor extension defers the start of contribution requirements.

In aggregate, the provisions together significantly reduce contribution requirements and could increase risk tolerance.

Source: J.P. Morgan Asset Management, Emergency Pension Plan Relief Act of 2021. Reflects published discount rates through December 2020. For illustrative purposes only. Forecasts, projections and other forward looking statements are based upon current beliefs and expectations. They are for illustrative purposes only and serve as an indication of what may occur. Given the inherent uncertainties and risks associated with forecasts, projections and other forward statements, actual events, results or performance may differ materially from those reflected or contemplated.
2020 Buyout Activity Made Up For Earlier Slowdown During Q4

- Buyout activity slowed through Q3’20, down roughly 30% compared to the same period during 2019, but picked up pace with nearly $14bn completed in Q4’20

- More recent PRT activity appears to have been used as one of several levers for pension risk management rather than narrowly focused solely on PBGC premium optimization

Although PRT’s Are Still Small in Aggregate

**ALL PLANS: BUYOUTS VERSUS BENEFIT PAYMENTS**

- Prior to 2012 annuity buyouts relative to total benefits disbursed were de minimis
- Even with the recent uptick, annuity buyouts are still averaging only 11% of total benefit paid over the previous five years
- When viewed as a percentage of total single-employer DB assets, annuity buyouts account for close to 1.0%

**ALL PLANS: BUYOUTS VERSUS PLAN ASSETS**

*Total disbursements and assets from 2010 through 2017 are sourced from DOL 5500 filings for all single-employer DB pension plans. Total disbursements for 2018 and 2019 are estimated using the 10-year CAGR of 3.9% per annum. Total assets for 2018 are estimated from ICI Retirement Statistics and 2019 total assets are estimated by using the year-over-year change observed in our Top 100 plans data.*

More Plan Participants Than Employees, But Decreasing

**TOP 100 PLANS: PLAN PARTICIPANTS & CORPORATE EMPLOYEES**

- Plan participants have decreased over time, albeit slowly as participants expire, accelerate their benefits through lump sums or are transferred to an insurer in an annuity buyout.
- There are currently more pension plan participants in the Top 100 than employees, although this has been consistently declining.
- Sponsors may approach risk transfer differently depending on what proportion of current employees are pension plan participants.

Source: J.P. Morgan Asset Management, Company 10-K filings, 5500 Filings, Capital IQ. Data as of December 31, 2021. For illustrative purposes only.
Lump sum windows were attractive for most of 2020 in the sense that they were below prevailing spot values. However, costs were notably higher than 2019.

2021 lump sum costs are slated to increase, although they may still be attractive relative to balance sheet carrying costs if pension discount rates decline during the year.

Source: J.P. Morgan Asset Management, IRS. Data as of December 31, 2021 For illustrative purposes only.
Lump Sum Expected to Be More Expensive During 2021

LUMP SUM COSTS: PRESENT VALUE OF $1,000 MONTHLY ANNUITY

Analysis calculates lump sum values under 417(e) mortality and interest rate assumptions varying by year. For each year the applicable prescribed IRS Static Unisex mortality table and 417(e) Minimum Present Value Segment Rates from November of the prior year. Value represents a $1,000/month annuity deferred to age 65. Actual lump sums costs will depend on the plan’s specific stability and lookback periods, which may differ from this analysis.

- Lump sum windows continued as a popular form of risk transfer during 2020 despite an increase in costs relative to 2019
- 2021 lump sum costs are slated to increase, although they may still be attractive relative to balance sheet carrying costs if pension discount rates decline during the year

Source: J.P. Morgan Asset Management, IRS. Data as of December 31, 2021 For illustrative purposes only.
PBGC Premium Costs Decline to 17bps of Assets on Average

TOP 100 PLANS: PBGC PREMIUMS PAID

PBGC premiums paid by the top 100 plans declined from 23bps to 17bps of assets. Sponsors may refile to reflect CAREs act delayed contributions, potentially bringing this estimate down further.

- Sponsors have attempted to reduce these outlays by improving funded status, reducing headcount, offloading small balance participants to minimize the variable rate cap, and other “actuarial engineering” transactions, such as the reverse spinoff (which prompted some negative PBGC staff guidance).

- About 60% of plan sponsors paid no variable rate premiums during 2020, up from 45% in 2019.

# TOP 100 PLANS: AGGREGATE METRICS BY SECTOR

## The top left chart plots the aggregate funded status by sector as of 12/31/2020

- Financials are the best funded sector and have a surplus in aggregate while Energy & Materials have the lowest funded status at 81.7%

- The Industrials sector accounts for almost 60% of the Top 100 plan aggregate deficit

### TOP 100 PLANS: AGGREGATE METRICS BY SECTOR

<table>
<thead>
<tr>
<th>Plan Sponsor</th>
<th>Industrials</th>
<th>Consumer</th>
<th>Telecom &amp; Info Tech</th>
<th>Energy &amp; Materials</th>
<th>Healthcare</th>
<th>Financials</th>
<th>Utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets ($mm)</td>
<td>504,510</td>
<td>179,790</td>
<td>173,150</td>
<td>102,233</td>
<td>126,777</td>
<td>156,877</td>
<td>162,412</td>
</tr>
<tr>
<td>Liabilities ($mm)</td>
<td>607,008</td>
<td>191,970</td>
<td>189,685</td>
<td>125,174</td>
<td>142,596</td>
<td>145,496</td>
<td>180,130</td>
</tr>
<tr>
<td>Surplus/(Deficit) ($mm)</td>
<td>(102,498)</td>
<td>(12,180)</td>
<td>(16,536)</td>
<td>(22,941)</td>
<td>(15,819)</td>
<td>11,380</td>
<td>(17,719)</td>
</tr>
<tr>
<td>Funded Status (%)</td>
<td>83.1</td>
<td>93.7</td>
<td>91.3</td>
<td>81.7</td>
<td>88.9</td>
<td>107.8</td>
<td>90.2</td>
</tr>
<tr>
<td>Expected Return (%)</td>
<td>6.9</td>
<td>6.2</td>
<td>6.0</td>
<td>6.4</td>
<td>7.4</td>
<td>5.9</td>
<td>6.9</td>
</tr>
<tr>
<td>Service Cost / PBO (%)</td>
<td>1.1%</td>
<td>0.8%</td>
<td>1.0%</td>
<td>2.0%</td>
<td>2.5%</td>
<td>1.3%</td>
<td>1.9%</td>
</tr>
<tr>
<td>2020 Asset Return (%)</td>
<td>14.7</td>
<td>13.8</td>
<td>11.7</td>
<td>14.4</td>
<td>14.6</td>
<td>14.0</td>
<td>14.9</td>
</tr>
<tr>
<td>Fixed Income (%)</td>
<td>44</td>
<td>67</td>
<td>52</td>
<td>49</td>
<td>34</td>
<td>59</td>
<td>40</td>
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<tr>
<td>Public Equity (%)</td>
<td>35</td>
<td>17</td>
<td>21</td>
<td>33</td>
<td>50</td>
<td>27</td>
<td>40</td>
</tr>
<tr>
<td>Alternatives (%)</td>
<td>18</td>
<td>15</td>
<td>20</td>
<td>14</td>
<td>12</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Other (%)</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

*Source: J.P. Morgan Asset Management, IRS. Data as of December 31, 2021 For illustrative purposes only.*

*Consumer includes Consumer Discretionary and Consumer Staples. Energy & Materials includes Real Estate*
30% of Top 100 Plans Remain Open to Some Participants

### TOP 100 PLANS: PLAN STATUS: OPEN/CLOSED/FROZEN

- **Open**: 31%
- **Closed**: 27%
- **Frozen**:
  - All Pay & Service Frozen: 42%
  - Partially Frozen: 14%

Plan status based on the largest plan of each plan sponsor by size of liability.

- 30% of the top 100 plans remain open to at least some new participants.
- Many plans are closed and frozen to salaried and non-bargaining participants while remaining open to bargaining employees.
- Of the plans that are frozen, about half are completely frozen while half froze either some pay, some service or some pay and service.
- Many sponsors have disclosed future plan freezes, including FedEx (2023), UPS (2023), General Electric (2021) and General Mills (2027).

“Pension Mentions” as Materiality

**RUSSELL 3K “PENSION” MENTIONS ON SHAREHOLDER CALLS**

- We track the number of mentions of the term “pension” on public calls (earnings, guidance, special situation, shareholder meeting, etc.) for Russell 3000 companies as an objective measure of plan materiality.

- The vast majority of “pension” mentions come from a subset of plan sponsors with high balance sheet/income statement materiality and/or significant events during the year such as a large risk transfer transaction or discretionary contribution.

* Data excludes insurance companies that are active in the pension risk transfer market.

Cash Balance Plans are Increasingly Prevalent

**TOP 100 PLANS: CASH BALANCE LIABILITIES AND INTEREST CREDITING RATES**

- Out of the top 100 plans, 55% have some form of cash balance liability
- The most popular interest crediting rates are based on US Treasury yields with the 30yr Treasury by far the most popular
- Almost 60% of plans with Treasury-based crediting rates had a minimum guarantee in place while about 20% added a spread to the crediting rate (mostly plans with crediting rate tenors below 10 years)

Many Sponsors Have Adopted Some form of MTM Accounting

As plan sponsors have de-risked, more have switched to some mark-to-market accounting framework which can dampen income statement volatility by better aligning the impact of asset and liability movements.

We define the following categories:

**Traditional:** Use of a smoothed market-related value of assets (MRVA) and a 10% corridor, although we include instances where the corridor is < 10%

**Modified mark-to-market (MTM):** Use of fair value MRVA for either all assets or a subset of assets while simultaneously using a non-zero corridor

**Pure mark-to-market (MTM):** Use of fair value MRVA and no corridor – all gains and losses are recognized at least annually

Source: J.P. Morgan Asset Management, IRS. Data as of December 31, 2021 For illustrative purposes only.
Over 1/3rd of Plans Are Generating Pension “Income”

- Pension expense has averaged ~$30bn/year for the Top 100 Plans over the last decade.
- Costs dropped dramatically in 2013 due to large funded status gains, but rebounded in 2014 as those gains reversed.
- Despite the dramatic drop in EROA assumptions, the dollar amount of EROA income (purple bars) has actually increased since 2010 as asset pools have grown.
- More than 1/3rd of plans are actually generating income from the pension, which is accretive to earnings.

Over 1/3rd of Plans Are Generating Pension “Income”

Accumulated Other Comprehensive Income (AOCI) measures historical pension losses (or, theoretically, gains) that have not yet been recognized in the income statement. These are amortized into earnings over time, or in the case of mark-to-market accounting, immediately.

Most plans (40%) have AOCI less than 0.5x of estimated earnings, meaning that unrecognized pension losses are equivalent to 6 months of earnings or less.

However, nearly 20% of plans have either negative expected earnings or AOCI exceeding 2yrs worth of earnings.

Appendix
Pension Discount Rates – December 2020

### GAAP Discount Rates

<table>
<thead>
<tr>
<th>GAAP Rate (%) / Change Relative to Current Level (bps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.23% / 2bps</td>
</tr>
</tbody>
</table>

Dec-2020 1 month ago YTD 1 year ago 5 years ago

### Regulatory Discount Rate

- **Upper Bound**: 6.53%
- **Lower Bound**: 5.35%

### Historical GAAP & Treasury Rates

- **Spread**
- **Treasury**
- **GAAP AA**

### Historical Regulatory Rates

- **HATFA Range**
- **Unsmoothed Rates**
- **24-month Smoothed**
- **Effective Rate**

Source: J.P. Morgan Asset Management, FTSE Pension Discount Curve, Morgan Markets, IRS. Effective liability discount rates based on typical liability with a duration of 12 years. For illustrative purposes only.
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