

# Issue Brief

JULY 2017

## KEY POINTS

- A single number often cannot comprehensively address an issue as complex as the obligation or funded status of a pension plan.
- The availability of multiple measurements can lead to a more robust understanding of the situation and more well-reasoned conclusions.
- The purpose, framework, and underlying assumptions used are critical when interpreting available information.
- Understanding that there is *more than one right number* is an essential step toward engaging in critical issues of retirement security.

## Assessing Pension Plan Health: More Than One Right Number Tells the Whole Story

Consider the following hypothetical case of unsettling news reports that indicate that a retirement plan of a major local employer is underfunded by \$50 million. Retirees are concerned that their pension benefits might not be paid. Other stakeholders in the company, such as investors, customers, and taxpayers, are also worried. But what does the \$50 million shortfall really mean? The employer's leadership reported in an interview last week that the plan was in solid financial shape and consistent with its financial plan. So what is the truth? What is the *right measure* of the shortfall?

The answer is that there is *more than one right number*. The issues facing some retirement programs can be emotionally charged and involve allegations of misdeeds. But despite seemingly contradictory information, it may be that none of the parties involved lack financial literacy or are intentionally misleading with their statements. In fact, they may be viewing the same situation from different perspectives.

Various actuarial "numbers" exist, each of which conveys different useful information and can lead to different conclusions regarding the financial health of a pension plan. This issue brief explains how a pension plan can, for instance, be both 70 percent and 100 percent funded at the same time, and that knowledge of both of those funded percentages (and perhaps others) may allow plan sponsors and other stakeholders to make better decisions than if they only considered a single measurement based on a single set of assumptions. This



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1850 M Street NW, Suite 300  
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202-223-8196 | [www.actuary.org](http://www.actuary.org)

Craig Hanna, Director of Public Policy  
Ted Goldman, Senior Pension Fellow

brief discusses some of these various measures on a conceptual level and provides examples of ways stakeholders may commonly use them.<sup>1</sup>

## An Analogy

Defined benefit pension plans are complex financial arrangements. Complicated rules and regulations affect their design and management. Technical language is often used to describe them. Many of the underlying concepts are intuitive, however, and can be more easily understood in the light of familiar situations. Consider one such familiar example: a case in which parents are trying to save for their 8-year-old daughter's college education.<sup>2</sup>

The parents are likely to first consider questions about the probability, timing, and amount of future tuition payments. How likely is their daughter to go to college? Where would she attend, and how much would it cost? Many of these questions will be difficult to answer with confidence, let alone certainty. Families on average have between two and three children, so there is not a great deal of comparable experience to rely upon in assessing these questions. And all children have different interests, aptitudes, and wishes.

Suppose that the parents would like for their daughter to attend college immediately after graduating high school in 10 years. Suppose

further they expect her to attend their alma mater, the local public university. She will be able to live at home while attending school, so only the cost of tuition will be considered.

Tuition now costs \$10,000 per year, but it will increase over time. The parents have decided that they should expect increases of 5 percent per year from now until graduation.<sup>3</sup> Our fictional parents are exceptionally disciplined about their personal finances. They want to calculate an "obligation" for their daughter's college to include in their financial planning.<sup>4</sup> Unsure about how this might best be done, they consult with several financial advisers. They receive the following three suggestions:

1. Their state offers prepaid tuition plans. Under these plans, parents can purchase shares that will increase at the same rate as state college tuition. In essence, these plans allow college tuition to be purchased at today's prices. The total outlay for the daughter's four years of college would be \$40,000.
2. Financial instruments called zero-coupon bonds provide for an investment to be repaid at a specific future date, often far in the future, at a fixed rate of interest. Suppose that zero-coupon bonds can be purchased with terms of 10, 11, 12, and 13 years at

<sup>1</sup> The Academy previously issued a more technical issue brief, "[Measuring Pension Obligations—Discount Rates Serve Various Purposes](#)," that explores different approaches for measuring obligations.

<sup>2</sup> This example has been provided only as an analogy by which to consider the application of actuarial concepts. It has been simplified and adapted to serve this purpose, and should not be considered an accurate depiction of college planning issues.

<sup>3</sup> The calculations are relatively straightforward, and they have been provided in Appendix 2.

<sup>4</sup> Other words could be substituted, such as "liability." These are used differently by various authors and in a variety of contexts, which can create considerable confusion. We have chosen to use "obligation" in this discussion.

**Members of the Pension Practice Council include:** William Hallmark, MAAA, ASA, EA, FCA—vice president; Tim Geddes, MAAA, FSA, EA, FCA—vice chairperson; Josh Shapiro, MAAA, FSA, EA, FCA—vice chairperson; Noel Abkemeier, MAAA, FSA; Stephen Alpert, MAAA, FSA, FCA; Michael Bain, MAAA, ASA, EA, FCA, FSPA; Bruce Cadenhead, MAAA, FSA, EA, FCA; Donald Fuerst, MAAA, FSA, EA, FCA; Kenneth Hohman, MAAA, FSA, EA, FCA; Eric Keener, MAAA, FSA, EA, FCA; Ellen Kleinstuber, MAAA, FSA, EA, FCA, FSPA; Timothy Leier, MAAA, EA, FSA; Thomas Lowman, MAAA, FSA, EA, FCA; Tonya Manning, MAAA, FSA, EA, FCA; Francis Ratnasabapathy, MAAA, FSA, FIAA; John Schubert, MAAA, ASA, FCA; James Verlutz, MAAA, FSA, EA, FCA; and Aaron Weindling, MAAA, FSA, EA, FCA.

6 percent interest.<sup>5</sup> The issuer of these bonds is considered to have very high credit quality, so the payments can be considered certain. The cost of purchasing these bonds in the amount necessary to provide the expected tuition payments would be \$35,871.

3. The parents' financial adviser counsels that he expects to generate 8 percent return over the next 10–15 years. He cannot guarantee this outcome, though he believes it is equally likely that the actual returns will be above or below this expectation. The diversified investment portfolio that he suggests would entail taking considerable investment risk. If he achieves the 8 percent return, then an investment of \$28,945 will generate the expected tuition payments.

Consider the following observations:

- If the parents purchase prepaid tuition, they do not need to estimate future tuition amounts. Whether their estimate of 5 percent tuition increases turns out to be too low, too high, or exactly right does not affect the outcome: Their daughter's tuition will be paid, but they will receive no money back.<sup>6</sup>
- Although the parents are affected by tuition increases if they purchase zero-coupon bonds, they do not need to worry about investment return. They will receive a fixed 6 percent. Despite this, they may still experience a shortfall or surplus relative to their needs if the actual tuition increase is more or less than 5 percent.<sup>7</sup>
- The obligation that reflects investing in a diversified portfolio is the lowest, but there is a significant risk that the investment won't actually earn 8 percent. In addition to this

risk, the uncertainty about actual tuition increases remains. These uncertainties could result in having more money than needed, but could also lead to significant shortfall.

The differences in these approaches relate to how the parents address the uncertainty of future outcomes. Our simplified model includes uncertainty related to two factors: tuition increases and investment return. In each case, there is a way to eliminate those uncertainties: Tuition can be bought in advance, and an investment approach without risk is available.<sup>8</sup> And in each case, eliminating this uncertainty increases the expected cost. Alternatively, the parents can make their best assumption about the future and accept the uncertainty. (To prudently accept that uncertainty, the parents must be willing and able to provide additional funding if necessary, or they must be willing to impose a shortfall on their daughter.)

Which of these figures correctly represents the obligation associated with the daughter's college tuition? The answer depends on what you want to know. If you want to know the amount that is necessary to cover the tuition with nearly complete certainty, the answer is \$40,000. At the other end of the spectrum, if you want to know the amount that is estimated to be sufficient if investment and tuition increase risks are borne by the parents, the answer is \$28,945. The difference between the \$40,000 and \$28,945 figures can be viewed as the savings from taking the investment and tuition increase risk. In the middle of these figures, \$35,871 would be enough to remove uncertainty regarding the investment returns, but may prove to be too low or too high depending on how tuition rates change. None of these figures is incorrect—they just convey different information.<sup>9</sup>

<sup>5</sup> Current mid-term interest rates are well below the illustrative 6 percent. Assumptions are intended only to illustrate the concepts and are not intended to reflect any given point in time.

<sup>6</sup> Again, this example is simplified. Most prepaid tuition plans are themselves complex actuarial structures requiring that the program realize a number of assumed outcomes in order to provide beneficiaries with the promised payments. One of those outcomes is that the daughter must indeed decide to attend the state school.

<sup>7</sup> For example, if college tuition increases instead are 4 percent per year, the parents would have around \$8,000 remaining after the final tuition payment is made.

<sup>8</sup> Other risks not addressed here can be harder to avoid.

<sup>9</sup> This analysis incorporates three possible ways to view the actuarial problem. Each of these approaches makes a single estimate of the key variables and develops a corresponding estimate of the "obligation." Actuaries can also use stochastic techniques in which many calculations are performed to produce a range of possible outcomes and associated probabilities. Such analyses are very often helpful in providing insight, but are beyond the scope of this paper.

Suppose the parents choose to set aside \$28,945 to cover future tuition. With the first suggestion, the purchase of a prepaid tuition plan, they have funded a little over 70 percent of the estimated tuition cost. With the second suggestion, the purchase of zero-coupon bonds, they have funded a little over 80 percent. However with the third suggestion, a diversified investment portfolio, they have funded 100 percent of the actual tuition cost.

In this simplified example, the ability of the parents to make appropriate decisions and reach informed conclusions is enhanced by the use of multiple obligation measurements. For example, it is impossible to know whether it makes sense to accept the uncertainties related to investment returns or tuition rates without understanding how much it costs to eliminate those uncertainties. If the parents want to evaluate their savings progress, it is helpful to know how their resources compare to each of the three obligation measurements.

## Different Meanings of Different Pension Measurements

The primary reason why there is *more than one right number* is that different measurements of actuarial obligations can communicate very different information. For example, some pension obligation measurements are designed to show how much it would cost a plan sponsor to transfer the responsibility of supporting a plan to an insurance company or other financial institution. A similar measurement might show the amount of assets that would be necessary to back the pension obligations with a dedicated portfolio of low-risk bonds with cash flows that are aligned with the projected pension benefit payments. Yet another would estimate the price at which pension obligations would trade, should

a market exist on which they could be bought and sold. All of these measurements incorporate the concept of “settling” the pension obligations.

Other pension obligation measurements convey information that is very different from a settlement measurement. Most notably, a pension obligation measurement could represent an estimate of how much money the plan would need to have in order for a projection to show that the assets are expected to be sufficient to cover projected benefit payments. Among the differences between this “budget” measurement and a settlement calculation is that the budget approach includes an estimate of the future investment returns that the plan assets will earn, including any expected incremental return from investing in risky assets. For most diversified investment portfolios, such an estimate is inherently uncertain. A settlement valuation relies only on financial information available in today’s financial markets.

Despite the fact that both are commonly referred to as “obligations,” settlement measurements and budget measurements do not convey the same information. Understanding the difference between settlement and budget measurements is a frequent source of confusion among the readers of pension actuarial reports, as a report could contain two very different sets of results for a particular pension plan, leading to the question of which is correct. The answer is that they simply communicate different information.

If one wants to know whether the assets are expected to be sufficient to pay certain benefits, it is correct to look at a budget valuation.<sup>10</sup> If a plan is 100 percent funded on a budget basis, it means that if all actuarial assumptions are fully realized,<sup>11</sup> the sum of the current assets and

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<sup>10</sup> In some circumstances, actuaries prepare budget figures that spread costs over time in a manner that does not match the actual accrual of benefits. A detailed discussion of these methods is beyond the scope of this issue brief, but they are addressed in the technical brief, “[Measuring Pension Obligations—Discount Rates Serve Various Purposes](#).”

<sup>11</sup> Just as the parents in the college tuition example consider a range of contingencies to arrive at their expected annual tuition expense, pension actuaries also consider a variety of factors that determine when plan participants will collect benefits, and how much those benefits will be. The particular assumptions selected will also determine the measurement of an obligation, and may vary for different purposes. In order to provide an unbiased estimate of the budget, the assumptions (including the expected return on assets) must be reasonable estimates of future experience. Unrealistically optimistic (pessimistic) assumptions will lead to an understated (overstated) budget obligation measure.

## Assumptions Vary

For a given type of valuation (such as a budget or settlement measurement) a question remains as to what assumptions will be used. As with the second adviser to our parents seeking college saving counsel, two actuaries could each develop either a budget or settlement valuation for a plan, and still not agree on the valuation result because they are making different assumptions about future experience. These calculations require an element of professional judgment, and there are often multiple sets of assumptions that are reasonable to use for a particular purpose. In many cases, some or all of the assumptions may be prescribed to the actuary via legislation or client direction. Variations in assumptions are a separate issue from the more fundamental question of what information the measurement is intended to communicate, and a detailed description of those variations is beyond the scope of this issue brief.

future investment returns will be sufficient to pay those benefits. There is no guarantee that this obligation measurement will actually match the ultimate cost of the plan. A plan that is 100 percent funded on a budget basis is subject to the risk that experience may be less favorable than anticipated, which could cause the plan to become underfunded in the future and may jeopardize the security of participant benefits.

If one wants to know whether the plan has approximately sufficient assets to engage in a transaction that would effectively guarantee all future benefit payments, it is correct to look at a settlement valuation. Being 100 percent funded on a settlement basis means that the actuary has concluded that a plan holds sufficient assets to transfer the responsibility for supporting the plan's obligations to a third party. This suggests that it is possible, and perhaps likely, that a lesser amount of assets would be sufficient to pay all benefits if the plan sponsor were willing and able to take on risk. Therefore, the sponsor of a plan that is 100 percent funded on a settlement basis may have contributed more to the plan than was actually needed to pay all participant benefits.

Settlement numbers are also very useful for comparing the funded statuses of different plans. The calculations rely more on observation and less on predictions of the future, and they do not vary depending on the amount of risk that a plan sponsor has chosen to accept.

For plan sponsors that invest in a diversified portfolio containing equities or similar assets, settlement measurements often indicate plans are substantially less well funded than they appear under budget measurements. The difference between the settlement measurement and the budget measurement can be viewed as the savings that the plan sponsor expects to realize by accepting the investment risk of a diversified portfolio. These savings may reduce plan contributions, allow plans to pay larger benefits, or a combination of the two. The expected savings come with a trade-off, however, as investing in a diversified portfolio introduces the risks that the plan might require larger contributions in the future or may be unable to pay all participants' benefits.

Comparing budget measurement figures to settlement figures can provide insight into the level of risk being assumed. For a plan invested in a portfolio of high-quality bonds with cash flows matched to its projected benefit payments, a settlement measurement and budget measurement of the obligations will be approximately equal. In contrast, if the assets are instead invested in a diversified portfolio, the settlement and budget measurements will be different. The magnitude of the difference is related to the level of risk that is present in the plan's asset portfolio, with a larger difference corresponding to greater risk. All else being equal, a riskier asset portfolio reduces the security of participant benefits.

To illustrate, consider a hypothetical illustration of two identical plans sponsored by identical employers, each of which is 100 percent funded on a budget measurement basis. In both cases, the actuary expects that the plan has sufficient assets to pay all promised benefits. But if the first plan is 95 percent funded on a settlement basis while the second plan is 65 percent funded on a settlement basis, these figures indicate that participants' benefits in the first plan are more secure than participants' benefits in the second plan. A plan that is fully funded on a budget basis but significantly underfunded on a settlement basis may reasonably expect to be able to pay all participant benefits. Such an expectation, though, relies in part on inherent uncertain investment returns that may never materialize or on the ability of the sponsor to increase contributions to the extent necessary.

### **Purpose of Different Measurements**

A measurement provides no value if it does not answer a relevant question. This is true for the both college tuition example and pensions, and for any other financial analyses. Understanding the purpose of the measurement is a prerequisite for selecting the methodology or multiple methodologies most useful to satisfying that purpose. Some of the key questions to consider include:

- Can the plan sponsor afford the downside risk of increased cost if assumptions are not realized?
- Do participants expect there is 100 percent certainty that their benefits will be paid?
- Is it critical that there be no risk of an obligation being unmet?
- Is it more important that scarce resources are allocated between competing priorities?
- Is determining when resources will be allocated to a particular purpose most important?

Other factors may also be important when selecting a methodology. Let's revisit the college tuition example. One set of parents may not have significant other financial resources to fill any gap in funding. Those parents are most concerned about ensuring that their child's tuition at a selected school will be guaranteed and may well prefer the prepaid tuition option. Another set of parents might, instead, be most concerned with whether their plan is on track against their expectations. They may have other resources to fill gaps in the funding plan, but want to be aware of how well their plan is progressing. These parents may be comfortable with the third, budget-like measurement of the college tuition obligation.

Similar considerations can be readily expected for users of pension plan measurements. Some may focus on guaranteed benefit security, while also taking into consideration expected cash flow needs, a desire for level expenditures, and the ability to liquidate assets. In some cases, the continuing viability of the entity sponsoring a pension plan might be a concern, and thus ensuring the solvency of the plan to pay all promised benefits may be paramount. Accordingly, the measurement might use risk-free rates of return and the other conservative assumptions.

Alternatively, consider a sponsor that is economically healthy with strong growth prospects. In this case, creditworthiness and/or fluctuation in cash contributions to the plan may not be a significant concern. The measurements needed in these cases may focus on planning for how much will be contributed to the plan and for when those contributions will be made. Assumptions that reflect a higher level of risk may be acceptable within that context.

Finally, consider a situation in which investors are considering acquiring an enterprise that sponsors a pension plan. If they intend to terminate the plan, the measurement of the plan obligation that is most important is likely

to be a settlement measurement that considers the cost of placing the pension obligation with a third party. If they will continue sponsoring the plan, then determining future contributions in a manner that reflects their anticipated investment strategy may be appropriate.

In each case, the purpose of the measurement determines which number is “right” in that context for that particular user. However, considering other measurements may also be critical to understanding the potential risks and benefits of the decisions under consideration. In doing so, the user may also discover relevant information that had not been considered by looking at his or her primary question. Focusing on ensuring that the measurement meets the purpose is a critical component in understanding why there is *more than one right number*.

While sponsors and actuaries may design custom measurements tailored to a specific purpose or circumstance, in most cases the measurements used by sponsors are those that are prepared annually under regulatory or legal guidance. Often compromises in the policymaking or regulatory process mean that these figures are not calculated with a pure settlement or a strictly budget-oriented perspective. Appendix 1

provides additional detail on the most common measurements utilized by various types of pension plan sponsors to comply with their regulatory requirements. An understanding of the various types of plans and the most commonly associated measurements for each can help an observer interpret the originally intended purpose for the measurement and determine its appropriateness for the goal at hand.

## Conclusion

We learn very early in life that 2 plus 3 equals 5 (and we have enough fingers on one hand to help us). However, as illustrated with the example of saving for a child’s college education, a single number often cannot comprehensively address a complex issue. This is certainly the case when evaluating the obligation or funded status of a pension plan. Understanding the purpose, framework, and underlying assumptions used is critical when attempting to interpret available information. In many pension decision-making processes, the availability of multiple measurements can lead to a more robust understanding of the situation and, consequently, more complete and well-reasoned conclusions. Understanding that there is *more than one right number* is an essential step in engaging in critical issues of retirement security.

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## Appendix 1—Aligning Practice With Purpose

Faced with multiple measures of obligation and multiple measurement purposes, regulatory bodies have often structured their standards on different actuarial measures. While pension plans from diverse sectors of the economy share many similar characteristics, they are often subject to very dissimilar regulation and guided by different priorities.

### Public Sector Plans

Many pension-related news stories have focused on retirement programs sponsored by state and local governments. Historically, these programs have largely been measured by actuaries on a budget basis. A primary goal of such measurements has been to establish a reasonably stable contribution that promotes intergenerational equity among taxpayers.

GASB Statement No. 68<sup>12</sup> guidance, which became effective in 2014, requires that sponsors discount obligations on a budget basis to the extent that current contribution rates combined with existing assets are forecast to be sufficient to make payments. To the extent that assets are projected to be insufficient, those unfunded obligations are to be discounted using something more akin to a settlement basis (specifically, a municipal bond rate representing the cost to “borrow” that money from the public).

### Private Multiemployer (Collectively Bargained) Plans

Of late, multiemployer pension arrangements have also been in the news. Similar to public sector plans, most multiemployer plan obligations are also determined on a budget basis that forms the foundation for the amount of cash that must be contributed to the plans each year. Starting in 2008, the Pension Protection Act (PPA) has required multiemployer plans to use this budget basis to determine whether a plan is in *endangered* or *critical* status, which can subject the plan to additional reporting, contribution, and other reform requirements. Regulations governing these plans also specify the calculation and disclosure of a settlement-type obligation known as *current liability*.

### Private Single-Employer Plans

Private-sector single-employer pension plans are also occasionally in focus—most notably when their corporate sponsors find themselves in financial difficulty. For many years, private-sector funding rules were based on a set of standards similar to those described for multi-employer plans. Beginning in 1987, a second calculation based on a settlement-type approximation was introduced that provided a secondary, overriding minimum contribution amount. In 2008, the system was overhauled with the introduction of the PPA, which eliminated the budgeting calculation from the funding standards and moved much closer to using a settlement-type basis. Nonetheless, intervening financial circumstances and other factors have led Congress to in several instances to provide relief against these standards, which has, for many sponsors, brought the calculation back toward a budget basis in practice.

Private-sector plans are also frequently subject to valuation under Financial Accounting Standards Board guidance in accounting standard codification (ASC) 715.<sup>13</sup> These calculations measure actuarial obligations on a settlement-like basis but require projection of pay increases into the future for covered participants. Expenses are calculated reflecting an offset for the expected performance of the plan assets in the upcoming year, which makes the profit-and-loss determination somewhat of a hybrid between budget and settlement methods.

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<sup>12</sup> [Accounting and Financial Reporting for Pensions](#); Governmental Accounting Standards Board; June 2012.

<sup>13</sup> [Compensation—Retirement Benefits \(Topic 715\)—Practical Expedient for the Measurement Date of an Employer’s Defined Benefit Obligation and Plan Assets](#); Financial Accounting Standards Board; April 2015.

## Application

Retirement plans often affect a large number of participants, shareholders, and taxpayers. Consequently, many economists take a keen interest in their financial status. Economists typically cite obligations measured on a settlement basis regardless of plan type or governing regulatory regime. These calculations are often not required by any rules or regulations, but are considered by some to be a more objective measure of financial health.

The variety of methods considered by different observers should highlight a few important points:

- For many plans, multiple obligation measures must be calculated and used in different ways to assess plan funding levels;
- Regulators do not always agree on the best measurement type for a given purpose; and
- The type of measurement used for a given calculation can, and often does, change over time.

Because there is *more than one right number*, an informed follower of pension issues would want to become familiar with the measures commonly used in each area. Furthermore, when presented with adjusted figures<sup>14</sup>—as might be done for news articles—those figures will be more useful if the reader makes an effort to understand the original basis and the purpose of the adjustment.

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<sup>14</sup> Such figures are often taken from actuarial results produced on one basis and adjusted in some way to approximate one of the other measures.

## Appendix 2—Calculations for Tuition Example

The following illustrative calculations rely on assumptions for tuition increases and for investment return. Some readers might believe that these assumptions are too aggressive, others that they are too conservative, and still others that they are just about right. Moreover, these reactions will change over time. Tuition increases of 5 percent are unlikely to appear correct if inflation has increased to 10 percent by the time that you are reading this document. Please keep in mind that this example was created to illustrate the fact that different calculation approaches can serve different purposes. The specific assumption choices are secondary.

Future tuition levels have been calculated by projecting today's \$10,000 tuition into the future with 5 percent increases:

Freshman	$\$10,000 * (1.05^{10}) = \$16,289$
Sophomore	$\$10,000 * (1.05^{11}) = \$17,103$
Junior	$\$10,000 * (1.05^{12}) = \$17,959$
Senior	$\$10,000 * (1.05^{13}) = \$18,856$

The three obligation alternatives have been calculated as follows:

Prepaid tuition is 4 years at today's levels  
 $4 \times \$10,000 = \$40,000$

Investment using zero-coupon bonds discounts each year's tuition at today's interest rates  
 $\$16,289 / (1.06^{10}) + \$17,103 / (1.06^{11}) + \$17,959 / (1.06^{12}) + \$18,856 / (1.06^{13}) = \$35,871$

Investment using a diversified asset mix discounts each year's tuition at expected rates of return  
 $\$16,289 / (1.08^{10}) + \$17,103 / (1.08^{11}) + \$17,959 / (1.08^{12}) + \$18,856 / (1.08^{13}) = \$28,945$