

# The Logic of Pension Valuation I

## A Response to Robert Novy-Marx

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*by Iliya Atanasov*

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# **The Logic of Pension Valuation I**

Iliya Atanasov

## **A Response to Robert Novy-Marx**

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### **1. Introduction**

The discount rate used to value pension liabilities has been at the crux of the raging debate over the cost and riskiness of public retirement systems, which manage trillions of dollars of financial assets. These systems carry even more trillions of liabilities with broad-reaching implications for public employees, governmental budgets, taxpayers and, ultimately, the health of the entire economy.

In a recently published article,<sup>1</sup> Robert Novy-Marx identifies what he believes are inconsistencies in the valuation methods espoused by the Governmental Accounting Standards Board (GASB). He advocates that current GASB methodologies for determining the discount rate be replaced by what some academic economists call a “fair-value” or “risk-adjusted” rate of return.

While economists do “almost unanimously disagree”<sup>2</sup> with GASB principles, it is by no means a foregone conclusion that the alternative endorsed by Novy-Marx is better. His implication that there is a consensus among financial economists on what should replace those principles is, at best, misleading. Contrarily, the valuation issue has been a subject of contentious debate in the discipline. Furthermore, a valuation technique cannot be judged a good valuation technique just on theoretical grounds. A valuation technique is good only when it works.

The purpose of the current paper is to show that:

1. The notions of risk on which Novy-Marx’s arguments are premised (to the extent that these notions are accurately defined at all) are self-contradictory and

antagonistic to the practice of effective risk management.

2. The inconsistencies he finds in GASB rules are mostly nonexistent, based on flawed reasoning and/or with little practical application in managing pension assets and liabilities.
3. The “solution” he proposes creates more problems than it solves.

In no way is the intention here to suggest that GASB has set forth terribly good accounting rules, let alone a cure-all for measuring the risks entailed by pension liabilities. Since GASB 67 and 68, the most recent updates to the actuarial standards used to account for public pension liabilities, will not come into full force until after mid-2014, the specific effects of their implementation are still up for debate. What can be claimed with some certainty, however, is that they are a step mostly in the right direction and will bring about substantial, albeit insufficient, improvements in both disclosures and valuation.

The next section summarizes and evaluates the measures of risk invoked by Novy-Marx to claim that GASB rules are “not really a valuation method.”<sup>3</sup> Section 3 discusses in detail the three flaws found in actuarial standards on the basis of those definitions. Section 4 compares the overall implications of the two competing methods to demonstrate that the solution proposed by Novy-Marx promises to cure the disease by killing the patient. The last section rounds up these findings.

In the text hereafter, GASB 27 as amended by GASB 67 and 68 is generally referred to as “the actuarial approach” or simply as “GASB 68” or “GASB rules.”<sup>4</sup> The

discussion centers on the comparison of these two positions in the debate and does not touch upon prior accounting rules or other alternative approaches.

## **2. First Principles and Faulty Ivory Towers**

Novy-Marx's introduction asserts that "GASB's rules allow plans to improve their GASB funding statuses simply by taking on more risk, despite the fact that doing so does not alter the nature of their liabilities."<sup>5</sup> This conclusion is spot-on true, but also reveals a fundamental misconception of what *unfunded* liabilities are. The funding status or unfunded liability of a pension plan is important as a measure of the cost of the plan to the governmental unit and of the fiscal impact of future funding flows. It is patently not intended to capture the *value* of the plan to employees or any third parties (e.g., as could be measured by packaging the plan as an annuity and selling it on the market).

Because the investment approach is a major determinant of a plan's performance, there is hardly anything more relevant to the cost of the plan and the size of the unfunded liability than fund managers' asset-allocation strategy. Without accounting for the latter, no measure of the liabilities can profess to capture the risk associated with the plan. For example, Novy-Marx's approach would value equally the cost and the unfunded liability of a plan which kept its assets in cash for 20 years (thereby generating no return) and that of a plan which invested in public companies or venture capital funds. Notably, holding cash is neither a costless nor a riskless strategy.

The several examples in Novy-Marx's paper are premised on a definition of "coherent measures of risk" suggested by Artzner et al.<sup>6</sup>

They propose that any such measure must have the following "desirable properties":

- 1) (*Translation Invariance*) Adding a dollar's worth of a risk-free asset to a portfolio reduces the portfolio's measured risk by a dollar.
- 2) (*Positive Homogeneity*) Doubling the size of every position in a portfolio doubles its measured risk.
- 3) (*Monotonicity*) Given two portfolios, one of which "dominates" the other in that its losses are never larger in any risk scenario, the measured risk of the dominated portfolio is at least as great as the measured risk of the dominant portfolio.
- 4) (*Subadditivity*) Diversifying the risks of two portfolios by combining them cannot increase the total measured risk.

Note that these are *necessary* attributes that every "coherent measure of risk" should possess, according to their proponents.

Not only is this framework flawed, but many of Novy-Marx's arguments openly contradict or implicitly ignore a core characteristic of Artzner et al.'s study. The latter paper's definition of risk and indeed its entire analysis is focused on future values and largely ignores current market prices:

[B]ecause risk is related to the variability of the future value of a position, due to market changes or more generally to uncertain events, it is better to consider future values only. Notice that there is no need for the initial costs of the components of the position to be determined from universally defined market prices (think of over-the-counter transactions). The principle of "bygones are bygones" leads to this "future wealth" approach.<sup>7</sup>

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Like GASB 68, Artzner et al. are interested in the question “How will portfolio asset values change in the future?” when attempting to grasp risk, rather than Novy-Marx’s “What is the price of the portfolio owner’s debt at present?” A critical purported contribution of Artzner et al. is that their definition of coherent measures of risk does not require complete markets or an assumption about the market participants’ knowledge of the future; they state expressly that they “do not assume completeness of markets.”<sup>8</sup> Novy-Marx’s approach does require, albeit implicitly, such assumptions to be a valid *risk-adjusted* metric. Thus, the discussion hereafter focuses on his representation of Artzner et al.’s definition, not necessarily on what was intended in their original work.

### 2.1. Translation Invariance

Even though Novy-Marx does not provide a specific definition of risk, it is reasonable to deduce from (1) that “risk” is intended to be equivalent to some specification of “dollar-value loss” (DVL). If this is the case, (1) seems to be a commonsense idea – adding a dollar to a stack of securities should decrease the DVL relative to some target portfolio value (in dollars) at some specified moment in the future.

There are at least three reasons why (1) is utterly irrelevant to measuring risk. First, every respectable financial manager – and everyone holding short-term US government bonds in their retirement account during the debt-ceiling fights of 2012 and 2013 – knows that there is no such animal as a risk-free asset. A risk-free asset should by definition provide the same value in any future scenario. The only such asset is the “non-asset” – the empty set. In other words, a portfolio can be risk-free only if it is empty, i.e., of no value,

which defeats the purpose of having a risk-free asset. The latter has a hard time surviving closer scrutiny even in mathematical models once those are properly specified (see next paragraph for an example). In any case, policymakers and taxpayers are interested in understanding risks in the real world. That is also the world in which GASB 68 will be applied beginning in mid-2014.

Secondly, the statement of this axiom leads to a contradiction in terms. Suppose a portfolio consists only of the risk-free asset, i.e., its risk is zero. Adding whatever positive amount of the risk-free asset to this portfolio would subtract from the risk, making it negative.

Finally, measuring risk only as *stock* DVL is far from exhaustive<sup>9</sup> in quantifying the risks that a pension manager or beneficiary is interested in: the probability of default at any given time and the volatility of the contributions (*cash flow*) necessary to keep the plan solvent and functioning. Indeed, inaccurate as they may be, the projections necessitated by the GASB valuation approach are much more helpful in understanding costs and the potential for future fiscal stress.

### 2.2. Positive Homogeneity

This is one of the two axioms that are patently *undesirable*. Suppose an investment manager has bought preferred equity valued at 10% of the total market capitalization of a bank. The fund then keeps doubling the investment until it accounts for about 40% of the bank’s capital. Both moral hazard and counterparty risk increase nonlinearly with this unwise concentration of investments.

On one hand, the bank’s management becomes incentivized to chase short-term profits in order to pay the dividend on the preferred stock or buy it back – so it can then

boost the common-stock price and get to see its bonuses and option grants. After all, given how much of the bank's equity it holds, the pension fund or the government are even more likely to step in and bail out the bank if it runs into trouble. This moral hazard may lead to overleveraging or accounting improprieties that ultimately erode the value of the investment for the pension fund; the associated risk likely increases *exponentially*, not linearly, in the size of the preferred investment.

The idea that positive homogeneity is desirable is also the result of a common bias in portfolio management – focusing on internal diversification, but neglecting the portfolio's impact on the sell side. Market participants such as pension funds can become so large that even though they are internally diversified, concentration occurs on the other side of the equation and they become market makers in a particular segment of the asset markets – concentration that reduces the liquidity of their corresponding holdings. When the portfolio is less liquid, it becomes riskier than just the multiple of the increase in securities held on account. A measure that is linear in the size of the holdings within the portfolio could not capture these risks and, therefore, positive homogeneity is anything but a desirable property for such a measure.

### **2.3. Monotonicity**

That risk-dominant portfolios are valued at least as high as dominated ones is the only truly desirable property defined in Artzner et al. In Appendix A.1 of his paper, Novy-Marx recognizes that GASB 68 provides valuation methods consistent with this requirement. Beginning in 2014, public pension plans will be allowed to discount only the funded portion of their liabilities using the expected returns

on their assets. Unfunded disbursements will be discounted at the much lower (for the moment) municipal bond yield, which supposedly reflects the creditworthiness of the plan principals responsible for funding that portion of the liabilities.<sup>10</sup> While this reasoning is flawed, as will become evident in the following sections, the new rules do work towards penalizing some riskier behaviors (e.g., leverage) in practice, but only as long as yields remain low.

### **2.4. Subadditivity**

Property (4) is not only unnecessary but also counterproductive. At face value, it presents a contradiction – how does one diversify portfolios by combining them? More importantly, it negates a core precept of professional risk management – the notion of counterparty risk.

Suppose a fund holds some amount of Security A at two custodial banks, which are perceived as equally stable in the marketplace and charge the same fees. According to axiom (4), a coherent risk measure would not indicate an increase in risk if the fund moved all the holdings to the same custodian. Meanwhile, financial advisors sometimes recommend that people split even their cash accounts between several banks to diversify the counterparty risk despite that those instruments are insured!

Counterparty risk is also an issue with the second “desirable” property – homogeneity. If two identical portfolios were merged together or identical derivatives contracts with different counterparties were consolidated, there would again be no way to account for the risk inherent in concentration using the so-called “coherent” measure.

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A metric that incorporates the increase of counterparty risks as a result of portfolio consolidation is not just desirable – it would make its inventor a whole lot of money.

### 3. Fishing for Red Herring

In the introduction, Novy-Marx purports to be able to show that “the GASB methodology is not a really a valuation method” and defines a valuation method as follows:

- (i) A valuation method should recognize that “more is more,” in the sense that adding a dollar to any given set of assets and liabilities increases the set’s value.
- (ii) It should also assign a unique value to any given set of assets and liabilities.
- (iii) The GASB methodology for accounting for net pension liabilities satisfies neither of these conditions. [numeration added]<sup>11</sup>

GASB 68 actually ensures both (i) and (ii), thus rendering (iii) a spurious claim. This is the case because Novy-Marx conveniently omits to mention the necessary assumption of *ceteris paribus* – that all else is kept equal – for (i) and (ii) to be valid. He then proceeds to violate this assumption in the examples he uses to support (iii).

#### 3.1. Risk, Risk-Free or Just Free?

Novy-Marx uses the sound foundations of Arztnr’s definition to critique three implications of GASB rules, the first of which is that a plan can reduce its unfunded liability by literally destroying low-yield assets such as cash equivalents. He incorrectly asserts that “[b]y destroying a dollar’s worth of [...] cash equivalents, a manager decreases a plan’s assets but increases the remaining assets’ expected returns.”<sup>12</sup> Under GASB rules, such a move would increase the discount rate used to value the liabilities – not the expected rate of return on the *remaining* assets, which would remain the same.

Here is the set-up of the subsequent example:

Consider two pension plans, Plan A and Plan B. Plan A has a single member: a 35-year-old worker with 5 years of service who plans to retire in 30 years with a projected salary of \$105,000. The plan holds \$10,000 of stocks that have an expected return of 10%. Plan B also has a single member, identical in all ways to Plan A’s member. It holds the exact same stocks but also owns \$10,000 of T-bills that provide a risk-free yield of 4%. Common sense says that Plan B is better funded than Plan A by exactly \$10,000. Under the GASB’s methodology, however, Plan A appears better funded than Plan B.<sup>13</sup>

In this situation, (after some calculation) Plan A’s is fully funded, while Plan B has an unfunded liability of \$3,000.<sup>14</sup> It seems quite counterintuitive – indeed paradoxical – that the plan with more current assets is less funded given that the liability is the same.

Since the paper never specifies what “risk” and “risk-free” is, there is some difficulty in addressing the risk-free assumption. There are nonetheless several reasons why this terrifying valuation “problem” with GASB rules is actually an advantage.

First, the actuarial standard obviously, if unintentionally, penalizes funds for holding low-yield bonds. Research on long-term asset returns has conclusively shown that holding debt over extended periods is a decidedly poor investment decision regardless of the credit rating of the issuer (and so is cash as well).<sup>15</sup> While individual retirees may sometimes benefit from holding substantial allocations of such assets because of their shorter time horizons, this would make little sense for pension funds, which can endure market volatility better.<sup>16</sup>

If capital markets are “efficient” (another assumption implied by the analysis, but



conveniently unspecified in the example), the proverbial risk-free asset would not be just “free” as well. In such a model, a pension fund holding the risk-free asset would get a lower return than someone taking more risk, which would in turn increase the cost of the “more risk-free” pension plan. In other words, the holders of risk-free assets would incur a penalty for not taking more risk – in economist-speak, an opportunity cost. Thus, it would be far more bizarre if an actuarial standard measuring plan cost did not penalize a fund for holding such *costly* assets.

With the valuation methods advocated by Novy-Marx and some other economists, pension funds and their principals would have little incentive to invest in more lucrative asset classes such as stocks (a) because asset allocation would only have a very long-term impact on the costs of the plan and (b) because of the perceived (but not actual) safety of bonds relative to equity. If plan managers tried to match their discount rate and the return on their assets, they would end up buying government debt, whose long-term return rate is well under that of stocks (e.g., the 1900-2010 real annual returns were 1.5% for 30-year treasury bonds versus 6% for US stocks<sup>17</sup>). This would render pension benefits truly unaffordable – the perfect example of a self-fulfilling prophecy and a scenario which has already unfolded in the private sector.

Finally, it is important to realize that this issue is in fact inconsequential even in Novy-Marx’s own thought experiment. If a fund that held cash equivalents really wanted to whitewash its funding ratio, it would reach an even better funded level by investing the money in stocks rather than destroying it. In the language of “rational-choice” economics, burning the cash is a strictly

dominated strategy and one that is therefore irrelevant. The rational-choice assumption of independence of irrelevant alternatives is one of the fundamental axioms of the theories on which Novy-Marx’s “fair value” argument is based. Given the piles of burning cash one can witness on the streets almost daily, this is at least one way Novy-Marx’s theoretical speculation is consistent with reality.

### **3.2. Pizza Comes in Different Sizes**

The next section of Novy-Marx’s paper uses the same setup to show that if the two plans were merged, the combined unfunded liability would rise even further – to \$4,800 – thereby providing an incentive to keep plans separate (and also increase the attendant administrative overheads). The fallacies in this argument begin with the very analogy used as a background:

Yogi Berra, the famous former baseball player and manager, once told a waitress, “You better cut the pizza in four pieces because I’m not hungry enough to eat six.” The absurdity of this statement is self-apparent. A pizza is a pizza. How it is cut has no impact on the extent to which it satisfies a hungry diner.<sup>18</sup>

At first glance, this analysis seems as reasonable as they come. But every respectable consumer psychologist, behavioral economist and marketer on the planet would agree that Berra’s statement is just as true as it is absurd. The way the consumption item is presented has tangible and persistent perceptual effect on the consumer. In how many slices the pizza is served has absolutely everything to do with the amount of satiety rendered.

Similarly, it is not at all self-evident that keeping plans separate “does not increase the value of [the] assets or reduce payments [the government] has to make.”<sup>19</sup> The ultimate value of the assets and the payments that

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would need to be made as a consequence can be easily affected by the institutional setting if, for example, one of the plans is afflicted with fraud or managed by a particularly incompetent investment officer.

Moral hazard is but one concern that ought to be close to Novy-Marx's heart. Having assets independently managed and/or disbursed by a multitude of providers could help diversify away some risk associated with embezzlement and poor investment decisions – issues that would be catastrophic if power is concentrated in the hands of a single manager. As with counterparty risk, putting the eggs in several baskets to avoid breaking them all at the same time may add value for the plan provider (although this is far from certain or universally true).

In no way should this be interpreted as an endorsement of the proliferation of pension plans with virtually identical benefit structures in states such as Massachusetts. More often than not, separate plans can cause problems which are much more important than “inaccurate” valuation: excessive spending on administration; lack of access and market power among investment managers; poor transparency and accountability; and inability to attract well-qualified staff. But in the real world, the issue singled out by Novy-Marx is of infinitesimal importance because, unfortunately, most plans are governed by the same flawed practices and have very similar asset allocations, thus little would be gained from valuing them separately.

Strangely enough, the empirical reality pithily captured by Yogi Berra does to some extent work out as an analogy to what happens with actual pension plans. Maintaining the “illusion” of separate liabilities could confer material political-economic advantages.

With smaller plans, policymakers may find it easier to cut benefits, increase employee contributions or improve plan administration piecemeal – which would also facilitate keeping their jurisdictions solvent and liquid. Political risks have every bit to do with funding valuations and credit ratings. In this sense, GASB rules appear superior to the measure advocated by Novy-Marx.

At any rate, the claim that GASB 68 does not assign the same value to a given set of assets and liabilities is vacuous. The two sets of assets and liabilities in the example simply are not the same. While the assets have the same current value, that is not true of the unfunded liability because the asset allocations reveal two very different approaches to funding it. The future values of the assets depend on the portfolio mix and its distribution of returns. If both plans were valued equally on all parameters, then there would truly be no proper account of their riskiness because their investment strategy would be ignored completely. The same reasoning applies to comparing the unfunded liabilities of the merged plan with the sum its parts' liabilities. Again, one can all too easily confuse valuing the assets with valuing the unfunded liability. In Yogi Berra's words, “[i]n theory, there is no difference between theory and practice. In practice, there is.”

### **3.3. Begging the Million-Dollar Question**

Novy-Marx's final objection regarding the actuarial approach is no objection at all, but a roughly equivalent reformulation of the method followed by begging the question. The premise is that GASB rules are:

completely equivalent to (iv) discounting a plan's liabilities at rates that reflect the liabilities' own risks, (v) valuing the plan's stock holdings at more than twice their

market values, and further (vi) crediting the plan roughly a dollar for each dollar of stock it plans to buy in the future.<sup>20</sup> [numeration added]

When deriving the alternative formulation, Novy-Marx simply states that the “intrinsic value” of a plan stems from discounting at the municipal-bond rate. In other words, he assumes the desired outcome – namely, that any other method is somehow not intrinsic and therefore fallacious. But there is not a single mention of the word “intrinsic” in GASB Statement 68.<sup>21</sup> The discounting of future cash flows at the municipal bond rate utilized by GASB rules reflects the *opportunity costs* to the government of contributing to the plan – its cost of borrowing. That opportunity cost has little to do with any purported “intrinsic” value of the plan’s liabilities or their riskiness. Thus, point (iv) is but a misplaced assertion.

Point (v) is an equally vacuous turn of phrase, as the technique under discussion is intended to quantify the unfunded liability of the plan, not to revalue its assets. This erroneous assertion entails the implicit assumption that assets must equal liabilities, which overlooks the value of the enterprise itself – in this case, the pension plan – to its owners, which is typically captured by the accounting term “equity.” This taxpayer value-added stems in large part precisely from the spread between the governmental unit’s bond yield and the return on the plan’s investments.

The final portion (vi) of the criticism has been addressed by GASB 68, which requires that unfunded cash outflows be discounted at the yield of the promisor’s bonds.

In sum, this objection is based on (1) the previously identified confusion between the value of the plan to the employees and its cost to the provider; and (2) an incomplete

view of accounting for risk in both of those cases. Beginning with the latter point, the risk-adjusted value to the employee should naturally include some measure of the long-term solvency of the plan, which involves not just the reliability of the provider, but also the protection offered by the collateral (the plan’s assets), among other factors. On the cost side, there should be a provision for the risk entailed by posting the collateral and the way it is allocated. Neither of those very significant considerations are captured by bond yields, which means they are not very useful even for measuring the plan’s value for the beneficiary, let alone its cost to taxpayers or the size of the corresponding unfunded liability.

#### **4. Cost, Value and Price: Building Blocks of Markets, Capitalism and a Reason-Based Political Economy**

Almost every economic school in existence going all the way back to François Quesnay – mercantilist, neoclassical, Keynesian, Marxist as well as their various iterations and recombinations – draws a sharp distinction between the notions of cost, value and price. This commonality is not accidental, particularly in the context of a market economy.

Without these distinctions, capitalism itself would be impossible and markets would not exist because economic exchange would never occur. In a free market, individuals can assign different values to the same item according to their own circumstances. Cost is the sacrifice of value in order to produce, obtain and/or consume a scarce resource. Prices are the rates at which various goods and services can be exchanged in the marketplace given their costs and values to the market participants.

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In a market economy, producers aim to sell their output at a price greater than the cost of producing it. The difference, known in economics as a producer surplus, is the source of the firm's profit. In a profitless economy, capital accumulation cannot occur and so there can be no capitalism. Consumers similarly aim to purchase goods at prices lower or equal to the cost of payment, funded by rents, wages and forgoing other goods. This is the consumer surplus generated in the marketplace. Without consumer surplus, there cannot be broad improvement in the standard of living as a result of economic exchange in the free market.

An academic view that conflates any of these three notions is therefore neither a view of a capitalist economy nor one of a free market. Rather, it is a view of something else – and unsightly. If cost, price and value are identical in an economy, then exchange can occur only at the behest of a central planner. Furthermore, if all economic participants have the same values for every good and service, such a view is also manifestly totalitarian.

The valuation of public pension liabilities is a costing technique, not a method of price discovery or one of finding out what the benefits of the pension system are to the public (i.e., their “value” to the government or taxpayers). Using the municipal bond rate to cost liabilities funded by other means is tantamount to a business reissuing and rebooking its fixed-coupon bond liabilities at current yields every quarter – it defeats the purpose of effective cash-flow and risk management and therefore undermines the fundamental principles of free markets.

In effect, a pension plan is equivalent to both a bond and a leveraged investment vehicle. The government gets a portion of its employees'

services in exchange for promises of future benefits, thus effectively incurring debt as by issuing a bond. The employees “own” the bond in that they expect to and must be paid in the future. The pension plan is also a leveraged investment vehicle in that the government pays into the plan less than it expects to get from it (the value of services covered by pension allowances). The return on the leverage is the difference between what the government pays in and what it would otherwise have to pay directly to employees, which is to be made up by asset appreciation.

From the perspective of the government, the return on this arrangement must be *higher* than the cost of actual debt placed on the market – otherwise the government would be better off issuing bonds and paying employees in full with the proceeds. Historically, public pension plans have indeed earned a higher return on their investments than the yields of municipal bonds, even though the long-run returns on similar portfolios are not nearly as high as the discount rates used to value their liabilities before GASB 68.

From the perspective of the employee, the return on this arrangement must also be higher than being paid in full and investing the proceeds in almost “risk-free” assets such as municipal bonds. (Note that the main reason Novy-Marx adduces for the use of the municipal bond yield as a discount rate is the assumption that pension obligations and government bonds are nearly free of default risk. The recent experience of places as diverse as Greece and Detroit presents a cautionary tale towards the application of such an assumption with a broad stroke of the brush.) One possible explanation is that spot payments would be smaller than the present value of the future pension benefits

employees expect from the plan – perhaps because the government would not be able to use the leveraged investment vehicle to fund a portion of the compensation.

From both perspectives, using the municipal bond rate to value the benefits would also contradict the basic principles of financial economics. In a “credit event” (bankruptcy), the plan typically has a claim on the government’s assets and future tax receipts, but pension assets are shielded from other creditors. Therefore, the pension can be expected to return more to employees than holding a municipal bond of the same duration. On the other hand, municipal bonds tend to have an average duration of 10-15 years with long-term issuance rarely exceeding 30 years. Meanwhile, pension obligations would have average duration of 30-40 years or more for an employee entering at age 20-25, implying in the view of modern portfolio theory (MPT) that their discount rate (not counting the collateral) ought to be substantially higher than that on the average municipal bond with the same risk profile.

Observe that the valuation method implemented by GASB 68 does provide for cash-flow matching in accounting for the implicit risk of the liabilities, as prescribed by MPT. According to MPT, markets are “efficient” so that the yield of an asset perfectly reflects its riskiness: two assets can only have the same returns if they are also equally risky; riskier assets must provide higher returns. In discounting the funded portion of the benefits at the rate of return of the existing assets, GASB 68 matches the riskiness of those cash flows with their return. By definition, the unfunded portion of the liabilities has to be paid down by the plan principal – a governmental unit – so it is

discounted at the municipal bond rate, which provides a handy approximation to the yield of the debt of the specific principal.

In the MPT view, this approach is more consistent with good budgetary practice than Novy-Marx’s. Every budget cycle, policymakers face a variety of choices as to how to pay for public services. They can tax, borrow or promise benefits to employees. Because new benefit promises would be a priori unfunded, it makes sense to discount them at the cost of borrowing (because the borrower is the same and markets are perfect, both types of debt must yield the same return). However, discounting the *funded* portion at the same rate would not only be wrong – it would contradict the monotonicity property (3) so ardently espoused by Novy-Marx. According to his method, the funded portion of the liabilities (however it may be defined as long as there is a positively valued asset to claim against it) must be valued at the same discount rate as the unfunded obligations. In that view, collateralized debt (funded cash flows) must be valued at the same yield as uncollateralized debt (unfunded cash flows)! This contradicts MPT, the monotonicity axiom and, most importantly, common sense.

Novy-Marx finds that under the new GASB rules stocks held by a plan are valued at 2.5 times their market price on a future cash-flow basis. His outrage at this fact is based on a misunderstanding of the time value of money and a confusion between present values and future cash flows. The purpose of the actuarial valuation is to compute a *risk-adjusted present value of the shortfall in future disbursements*, not to revalue the plan’s currently booked assets. Ignoring inflation concerns and minimal returns on cash accounts, \$1 in cash will provide exactly

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\$1 towards retiree allowances regardless of their duration. Using Novy-Marx's "typical liability duration" of 20 years, \$1 invested in stocks would generate a cash flow of  $1.05^{20} - 1 = 1.65$  additional dollars over that period if the proceeds are reinvested or  $.05 \cdot 20 = \$1$  if they are not.<sup>22</sup> Thus, it is quite reasonable that \$1 in stocks today is worth \$2.65 in future disbursements (this falls well within his "overvaluation" range), whereas \$1 held in cash is worth exactly \$1.<sup>23</sup> Again, this is perfectly consistent with MPT, where stocks are generally considered riskier than cash and so must provide better returns than packing money under the mattress.

### **5. Implications and Conclusion**

But all of these theoretical concerns pale in the face of the financial apocalypse which would ensue if current municipal bond yields were applied as a universal discount rate for public pension liabilities. In the short-run, the doubling or tripling of the unfunded liability advocated by Novy-Marx and some of his colleagues<sup>24</sup> in that scenario could lead to a wave of municipal bankruptcies unprecedented in history. Jurisdictions which could endure the transition shock without going through Chapter 9 would be burdened with huge payments towards their pension plans, leading to tax increases, cuts in core services and mass layoffs of public employees, which would, in turn, trigger another recession. The subsequent credit-rating downgrades and across-the-board devaluation of trillions of dollars of debt would gut the municipal bond market and the private retirement accounts of tens of millions of Americans. The few remaining defined-benefit plans in the private sector would be severely impaired, triggering further restructurings and the shifting of even

more private debt onto the government's balance sheet.

Unfortunately, the ramifications of this "short-term adjustment" would extend far into the future, as underinvestment in infrastructure, education and public order will damage the economy's long-term growth potential and exacerbate structural unemployment. Other than Social Security, which is essentially a pay-as-you-go system, most Americans would only have their home equity to rely on for their retirement. Boomers' liquidation of their realty and the overall poor management of 401(k) accounts, which would be additionally impaired by a municipal-bond crisis, would tank the reviving housing market. Coupled with the lack of demand, which would follow from record-high household indebtedness and falling incomes and employment rates, this would consign the economy to decades of depression.

The severely deficient actuarial discount method suggested by Novy-Marx and some academic economists is the byproduct of tunnel vision induced by an unsavory focus on oftentimes long-discredited theories. Experts are sometimes prone to losing sight of the big picture – and, in this case, of the imperative to apply only *empirically tested* and *logically sound* methods and theories.

The unfunded liability of a pension plan is a measure of cost – not one of price or value. The plan's value to the participants and the market price of an equivalent plan are irrelevant as long as they are higher than the cost of the plan to the provider (otherwise the latter could just substitute a more valuable or less pricey plan and improve value or save money). The price that is relevant is that of the assets committed to the plan – and, more specifically, their return until liabilities come

due – because they are a core determinant of the overall cost of the plan. Even if one accepted the premise that bond yields are a good measure of risk, the riskiness of the plan to the provider is determined much rather by the riskiness of the plan’s assets, than by the riskiness of the provider’s other debt.

The proper response to rising retirement costs is not one that threatens to tear the social fabric or make governmental budgeting nearly impossible. Further reforms in accounting rules and pension-investment regulation would go a long way to providing a gradual adjustment to new economic realities and putting the public fisc on a firmer footing in the longer run. Those reforms should include even stronger disclosure rules for all types of retirement benefits, not just public pensions, as well as rigorous controls on pension funds’ costs and asset-allocation strategies.

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### *About the Author*

**Iliya Atanasov** is Pioneer’s Senior Fellow on Finance, leading the research tracks on pension portfolio management, infrastructure and municipal performance. Iliya is a PhD candidate in Political Science and Government and MA candidate in Statistics as well as a former Presidential Fellow at Rice University. He also holds BAs in Business Administration, Economics and Political Science/International Relations from the American University in Bulgaria.

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## **Endnotes**

1. Novy-Marx, Robert. 2013. “Logical Implications of GASB’s Methodology for Valuing Pension Liabilities,” *Financial Analysts Journal* 69 (1): 26-32.
2. Ibid., p. 26.
3. Ibid., p. 27.
4. Novy-Marx’s approach is commonly termed the “fair-value” method, but that is a misnomer.
5. Ibid., p. 27.
6. Artzner, Philippe, Freddy Delbaen, Jean-Marc Eber and David Heath. 1999. “Coherent Measures of Risk,” *Mathematical Finance* 9 (3): 203-228 as quoted by Novy-Marx 2013.
7. Artzner et al. 1999, p. 205.
8. Ibid., p. 203.
9. To their credit, Artzner et al. do mention, albeit in passing, that collapsing a multidimensional portfolio problem into a single metric destroys a lot of the risk-relevant information regarding the portfolio’s properties.
10. See Section 4 for a further discussion of the implications of this method.
11. Novy-Marx 2013, p. 27.
12. Ibid.
13. Ibid.
14. Ibid.
15. Reid, Jim & Nick Burns. 2010. Long-Term Asset Return Study. London, UK: Deutsche Bank.
16. Holding large quantities of government bonds also has the negative effect of lowering government bond yields, which encourages even more borrowing, thereby increasing the leverage of the government. The pension fund ends holding a lot of low-yield but high-risk securities, while the financial soundness of the principal responsible for the unfunded liability is undermined by mounting debt. This harks back to the pay-as-you-go arrangements of the good old days by deploying a financial manoeuvre worthy of the Bernie Madoffs of the world – the government formally contributes towards the pension liability, only to lend the money back to itself.
17. Reid & Burns 2010.
18. Novy-Marx 2013, p. 28.
19. Ibid., p. 28. This is an instance of the many *ceteris paribus* assumptions that do not hold up on close inspection.
20. Ibid., pp. 28-29.
21. The GASB preliminary view from 2010 cited by Novy-Marx is no longer available online, but repeated searches using the word “intrinsic” and/or the exact quoted text did not yield any informative results.

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22. Assuming a long-run real return on stocks of 5% annually applied in a zero-inflation environment.
23. Without loss of generality, inflation is assumed to be negligible for the purposes of this example.
24. E.g., Novy-Marx, Robert, and Joshua Rauh. “Public Pension Promises: How Big Are They and What Are They Worth?” *Journal of Finance* 66 (4), 1207-1245; cf. Biggs, Andrew G. “Public Sector Pensions: How Well Funded Are They Really?” State Budget Solutions White Paper, July 2012.



