

TECHNICAL REVIEW PANEL FOR THE PENSION INSURANCE MODELING SYSTEM (PIMS): AN OVERVIEW

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Introduction

The Pension Benefit Guaranty Corporation (PBGC) is a federal corporation founded under the Employee Retirement Income Security Act (ERISA) of 1974. Its goal is to protect benefits promised by the private sector defined benefit (DB) pension plans in the United States via two insurance programs covering, respectively, single employer and multi-employer plans. To carry out its work, the Agency has developed two simulation models over the past two decades, the Single Employer Pension Insurance Modeling System (SE-PIMS), and the Multiemployer Pension Insurance Modeling System (ME-PIMS). These use several input parameters regarding actuarial assumptions, capital market developments, the evolution of assets and liabilities, and plan terminations, to model how the Agency's financial status might unfold over the next decade or two. These models require running many simulations to derive a range of possible estimates of the PBGC's future financial status.

Our April 2013 Technical Panel followed up on an earlier Technical Panel review meeting in 1996 hosted by the Pension Research Council at the Wharton School. The earlier discussion offered expert commentary on an early version of the SE-PIMS model then just under development. For the 2013 Panel, we invited 10 experts to provide their views and judgment regarding the soundness and applicability of the current version of the PIMS models, regarding economic, finance, statistical, and actuarial principles, and reasonableness of key assumptions and program inputs. These experts also were asked to offer their assessments on how actuarial

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and statistical calculations are undertaken in the models, model calibrations, and presentation of output. The goal of this meeting, as in 1996, was to offer suggestions on how the PIMS systems could be made more useful for analysis and policy.

Background

The Pension Benefit Guaranty Corporation (PBGC) is, according to the 2012 Annual Report, a “federal corporation...[that] guarantees payment of basic pension benefits earned by nearly 43 million of America’s workers and retirees participating in nearly 26,000 private-sector defined-benefit pension plans. The Corporation receives no funds from general tax revenues. Operations are financed by insurance premiums paid by companies that sponsor defined-benefit pension plans or from the plans’ assets, investment income, and assets from terminated plans.” Its governance structure includes a Director appointed by the President and confirmed by the Senate; the Agency is overseen by a Board of Directors chaired by the Secretary of Labor and includes the Secretaries of Commerce and Treasury (ex officio).

The PBGC has two components to its pension insurance program. One covers defined-benefit pensions offered by employers in the private sector under the Single Employer Plan program (SE) involving almost 33 million active and retired workers in about 24,000 pension plans. The other covers so-called Taft-Hartley plans under the Multiemployer program (ME), which includes about 10 million active and retired employees in some 1,500 pension plans. In 2013,¹ single employer plans paid to the PBGC in insurance premiums a flat amount of \$42 per worker or retiree, and also a variable amount of \$9 per \$1000 of unfunded vested benefits. Multiemployer plans paid a flat premium of \$12 per worker or retiree and a variable premium identical to that of the single employers. Retiree benefits are guaranteed by the PBGC up to a cap: in 2013, covered employees claiming benefits at age 65 could receive a maximum of \$4,789.77/month (\$57,477.24/year). The guaranteed amount is reduced actuarially for earlier claimants (or for those having survivor benefits). The guarantee is increased for those who claim post-age 65.

For a variety of reasons, the PBGC’s finances are not in long-term balance.² The Agency’s 2012 Annual Report noted that the SE program had liabilities of \$112.1 billion and assets of \$83.0 billion, for a net underfunded status of \$29.1 billion. For the ME program, the Agency reported liabilities of \$7 billion and assets of \$1.8 billion, producing a net underfunded status of \$5.2 billion. The Agency also projects future income and payout streams for 20 years into the future, though it acknowledges substantial uncertainty regarding these projections. For the SE program, estimates of liabilities in FY 2022 range from \$86 billion to \$175 billion, with a middle estimate of \$130 billion. The ME liabilities in FY2022 are estimated to range from \$8.7 billion to \$42.9 billion, with a middle estimate of \$26.2 billion. These “long-term” estimates include “probable terminations” from plans that it is likely to have to take over during the projection period, but the Agency does not book as losses those plans it deems to be “reasonably probable” terminations.

Key Findings from the Technical Panel Review

The Technical Panel offered several comments and suggestions regarding the way the PIMS models assets and liabilities and the interactions between the two. Moreover, the Panel provided suggestions on how the PBGC might enhance the way it reports its status to policymakers and the public, so as to better communicate the risks and opportunities the Agency faces. We briefly discuss each in turn, and we refer interested readers

¹ All 2013 data are taken from www.pbgc.gov/res/factsheets/page/pbgc-facts.html

² All data in this paragraph are taken from the PBGC 2012 Exposure Report.

to the individual expert papers in MRRC WP 2013-290, Technical Review Panel for the Pension Insurance Modeling System (PIMS), for further details.

Modeling Defined-Benefit Pension and PBGC Liabilities

PBGC liabilities consist of the vested accrued benefits of already-terminated pension plans, as well as vested accrued benefits of insured underfunded plans that might terminate in the future. Several of the experts on the Technical Panel had comments and suggestions regarding how the PIMS models treat such liabilities.

The cash flows owed by the PBGC consist of pension benefits promised to active and retired workers under each plan's benefit rules. In terminated SE plans, these are relatively straightforward to model as they are fixed as of the date of the plan's termination. As Novy-Marx (2013) and others note, at plan termination, the PBGC takes over the plan's accrued benefit obligation (ABO), with benefits computed given known formulas and frozen wage, tenure, and age distributions as of the termination date.

Nonetheless, even here, an important unknown remains, namely how long participants (and their survivors) will live in the future. Thus, demographers and economists have modeled systematic mortality shocks that could pose substantial risk to PBGC solvency in the future. Maurer (2013) notes that this form of uncertainty can now be modeled and, accordingly, integrated into the future path of the Agency's payouts. The Agency could also cost out how expensive it would be to hedge stochastic mortality risk. And the PIMS model currently includes only single male mortality tables; these could be extended allowing for both female and survivor tables.

Greater uncertainty pertains to the possible time path of benefits associated with future terminations, inherently a more complex process, and one which, in the experts' views, may understate the size of the problem faced. One reason is that the Agency assumes that all plans will be terminated in distress, and hence it assumes no voluntary termination of healthy pensions managed by healthy companies. But, as several of the experts note, this is increasingly not the case. Fuerst and Bone point out that many single employer DB plans have recently de-risked by outsourcing their pensions to insurers. This reduces the future premiums payable to the PBGC, and it also diminishes the asset pool available to the Agency in the event of a future termination. Segal notes that allowing for newer plans of the hybrid and cash balance variety could also imply the need for different ways to model future liabilities.

In the case of ME plans, benefit payouts can be reduced under certain circumstances, and it is unclear whether this flexibility in benefit payments will be extended to SE plans in the future. Yet as Bone points out, the ME plan program appears to be in the worst condition, as terminating plans typically come to the Agency without assets to back the promised benefits. For this reason, legacy costs associated with the ME plans may pose more risk to the PBGC over the near term than does SE plan underfunding.

Much of the Panel discussion focused on how to bring an options-based approach into PIMS models. The goal of doing so would be to link the factors that drive plan sponsor terminations and plan underfunding to stock market risk. Lucas notes that such an approach could be usefully built on top of the plan-specific computations that the PIMS models already incorporate. The Congressional Budget Office in 2005 developed a somewhat simplified method of modeling the PBGC's problem that demonstrated proof of concept. This work focused on the joint probabilities of sponsor bankruptcy and DB plan underfunding, and it generated much larger estimates of funding shortfalls; these resulted from projected smaller asset recoveries, less premium income, and higher liabilities than the actuarial approach. That effort suggested that taking into

account risk in this way would roughly double premium costs. One important reason for this is that the distribution of liabilities is likely to be characterized by so-called “fat tails,” referring to the potential for large losses in the worst-case scenarios, as Segal, Bone, and Novy-Marx point out.

A related theme that the Panel debated was how to summarize the system’s liabilities at any point in time and over future time periods. Current practice is to report expected present discounted values (PVs) using Treasury rates to do the discounting. But, as Lucas notes, this approach has a fundamental but potentially fixable shortcoming: it cannot be used to answer questions about valuation of future streams of cash flows. Moreover, as Novy-Marx points out, which liability concept to use depends on the observer’s vantage point. From the perspective of the covered, insured, active, and retired pension plan participants, the guarantee embodies some risk: the system’s assets are insufficient to meet all future benefits that might be paid, and the PBGC’s guarantee is not backed by the full faith and credit of the Federal government. Absent a large transfer from Congress to cover liability costs, it is unlikely that all benefits can be paid in the long run.³ From an insurer’s perspective, the right way to measure possible liabilities is to measure the risk-neutral valuation of the insurance. An approach favored by some would be to have the PBGC provide the distribution of projected future cash flow paths it guarantees.

Modeling Assets

Next, we summarize the Panel’s key suggestions regarding how the PBGC models assets in the PIMS. Geczy notes that the current approach estimates risk and return patterns drawing on historical data, assuming fixed inflation and holding constant historical correlations. But having experienced the recent global financial crisis, we now know that tail risk is far more of a concern than previously anticipated. Accordingly, most of the experts felt that the PIMS model would benefit from stress testing in terms of its sensitivity to extreme events and time-varying returns, relaxing the ‘random walk’ approach to modeling risk.

A related point emphasized by Maurer was that the PIMS model currently relies heavily on a relatively simple model for a single interest rate — the 30 year U.S. Treasury rate. This is important since the interest rate model is used as an input for actuarial valuation of liabilities of terminated and ongoing plans; to determine minimum contribution rates; to specify the return on PBGC assets for terminated plans; to set the yield for corporate bonds; to set the inflation rate; to set the nominal benefit growth (since inflation is related to the nominal interest rate); and to calculate the present value of PBGC claims. Yet modern tools now exist for more complete and comprehensive models of the complete term structure of interest rates, and several experts felt this could be a fertile area for model development.

Additionally, several Panel members highlighted the fact that the DB plan asset mix is currently assumed in the PIMS model to be a 60/40 U.S. stock/bond split. But as Geczy, Maurer, and Fabozzi emphasize, today’s pension plans hold more alternatives and are more internationally diversified. Clearly, including additional and relatively illiquid assets in the PIMS model would be complicated. As Fabozzi notes, there is a tradeoff between the speed at which the model can be run, versus more complex assumptions about the assets held and the pattern of capital market returns.

Considerations Regarding the Modeling of PBGC Insurance Protection

Several presentations by Technical Panel members suggest that the PBGC would do well to integrate how

³ The PBGC’s projections suggest that the SE program will be able to cover promised benefits for the next decade given its assumptions, whereas the ME program is likely to run short.

risks affect both pension assets and liabilities jointly. Additionally, most felt that these could be fruitfully co-managed using an Asset/Liability Management framework. In the past, PBGC assets have generally been invested independently from the Agency's liabilities, with investment policy changing over time from maximizing expected returns to a liability-driven approach. Some Panel members argue that it would be important to model particular industries and sectors posing most risk to the Agency, in which case the PBGC could seek to align its investment policy with this broader attention to risks.

It is also worth emphasizing that, unlike a private-sector insurer, the PBGC's insurance premiums are set by Congress and the Executive Branch; that is, the PBGC has no statutory ability to set its own premiums or to deny coverage to extremely risky plans. As Babbel and several other Panel members note, this is problematic since the Agency faces large legacy costs and is unlikely to be able to close its funding gap with feasible premium increases. Additionally, the recently enacted Moving Ahead Program legislation again deferred premium hikes, thus exacerbating the problem. In the U.K., by contrast, the Pension Protection Fund (PPF) has substantially more flexibility and specific objectives. Thus, Clark reports that the PPF uses a stochastic approach to evaluate the risks and set risk-based premiums in a manner consistent with the Board's risk tolerance. As a consequence, the PPF's model is more cognizant of a variety of risks not currently embedded in the PBGC model, and the PPF prices for self-sufficiency in 2030.

A related issue is that the PIMS program does not incorporate potential moral hazard issues that could result from insured plans reacting to changes in PBGC or Congressional policy. The ME PIMS model does take into account the chance that mass withdrawals could result from a given plan, or that a plan could be rendered insolvent prior to a mass withdrawal. But the model does not permit the examination of how individual plan sponsors might respond, and a longer-term project would include the integration of such feedbacks.

Communication of Risk and Uncertainty

The Technical Panel also devoted attention to how PBGC risk is communicated. This is important since key stakeholders, including Congress, plan participants, plan sponsors, and possibly taxpayers, need to more clearly comprehend what might happen in bad states of the world — which have become more salient than previously.

One issue under discussion is the time period over which system assets and liabilities are reported. Currently, the PGBC reports mean values, along with what has been called the 'worst' and 'best' 15 percentiles of the 5,000 simulations carried out, for 10 years into the future. Of course, as projections are made further into the future, the degree of uncertainty grows. Yet focusing on only a decade ahead implicitly downweights the liabilities due to pensions in payment status over years thereafter. In fact, some plans today continue to accrue benefit promises that will need to be paid 100+ years into the future. Other government entities which pay benefit promises long into the future, such as the Social Security Administration, are required to offer projections 75 years into the future, as well as "in perpetuity." Additional sensitivity to longer payout periods in the PBGC context would offer additional perspective on future solvency considerations. Some Panel members also favor highlighting the "date of exhaustion" of the PBGC's assets backing benefit promises, since this is a concept that is relatively easy to explain.

Conclusions

In 2014, ERISA marks its 40th anniversary. Despite the fact that this law was designed to ensure that participants in private sector defined-benefit plans would have a secure retirement, concerns continue to

mark the debate over the future of U.S. defined-benefit plans. Few new DB plans are being created; many existing DB plans are frozen; some large plans continue to hover on the brink of termination; and the recent wave of de-risking suggests that fewer premiums and fewer assets will be flowing into the PBGC than anticipated. Moreover, many of the suggestions and recommendations outlined in the Technical Panel's comments would imply that a large transfer will be required, or insurance premiums raised substantially, and/or benefits curtailed, if the system is to be able to continue to provide some benefits to all of those who were promised retiree payouts.

The Technical Panel concurred that the PIMS models are an important and valuable tool in modeling the Agency's liability risk. To the best of our knowledge, there is no other model that can do a comparable job. Nevertheless, some improvements could be integrated in the Agency's approach. Among those deserving highest priority attention, in our Technical Panel's view, are the following:

- Incorporating systematic mortality risk;
- Including new assets increasingly found in defined benefit-plan portfolios;
- Developing an updated model for the term structure of interest rates; and
- Incorporating an option value approach to pricing the insurance provided.

The Agency could also do more to communicate the range of uncertainty and potential for problems associated with the PBGC's financial status. This could include additional information including the Conditional Value at Risk (CVar), and perhaps an "intermediate," "optimistic," and "pessimistic" set of projected outcomes, as well as the expected "date of exhaustion" for assets backing pension benefits insured by the PBGC.

References

See the MRRC Working Paper 2013-290 for the complete list of references.

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