AVOIDING A Run for Your Money

Complacency in portfolio construction and asset allocation can lead to a liquidity crisis when defined benefit pension plans can least afford it.

BY ANTHONY TRIER

Defined benefit (DB) pension plans represent a specialized form of arrangement for financial risk intermediation. As recently as a decade ago, most DB plans were still growing rapidly through strong net contributions, which insulated them from the liquidity crises affecting other types of financial intermediaries (e.g., the Savings and Loan crisis, the Asian and Russian meltdowns in 1997 and 1998, the Long-Term Capital Management crisis, and so on). Indeed, reasonably funded DB plans were truly in a position to be able to provide "liquidity risk insurance" to other stressed market participants.

More recently, however, an increasingly mature demographic profile argues for greater attention to liquidity risk management issues within DB pension plans. Nowhere is this more needed than in analyzing the way traditional portfolio construction procedures persist. Traditional mean-variance optimization has been used in increasingly complex portfolio construction purposes without due regard to some of the basic simplifying assumptions that underlie such optimization. For instance, traditional mean-variance optimization does not directly take into account the growing relevance of higher moments of returns (i.e., skewness and kurtosis in returns distributions)[1] which are very pertinent as more of the alternative asset classes and complex dynamic trading mandates are introduced. However, an even more glaring omission is the failure to account for the significant liquidity risk that arises as unanticipated liquidity requirements begin to conflict with a client-sponsor absolute-returns-driven appetite which, in turn, drives the introduction of illiquid alternative asset classes and certain complex dynamic trading mandates. First-generation (mean-variance) optimization technique implicitly assumes that fluid, continuous and essentially costless rebalancing back to optimal portfolios can occur among all asset classes; however, this is entirely inconsistent with reality.

Liquidity risk and pension funds

Liquidity risk management in an asset-liability portfolio context relates to the possibility for distress over a relatively short horizon. This distress can result from any unanticipated period-by-period mismatch in cash flow needs which cannot be met in a timely or least-costly fashion by naturally generated (i.e., asset-based) cash flows. Inasmuch as liquidity risk, credit risk and market risk are intertwined, portfolio analysis must treat such risks comprehensively and consistently within the overall portfolio.

In well-developed financial markets, two major channels of liquidity are available to investors: the banking system, and capital markets. A corporate pension plan's sponsor also theoretically represents a source of extraordinary funding in times of stress; however, access to this extraordinary funding varies plan-by-plan, as those corporate sponsors might be unable or unwilling to provide such funding.

Faced with an unanticipated liquidity requirement, the absolute last course of action a mature DB plan would want to consider is the "trust-busting" alternative of altering the stream of promised benefits payments. In these circumstances, the single most important avenue for sourcing liquidity to meet immediate unanticipated cashflow requirements within the plan (without altering the benefits promise) will remain with secondary securities markets.

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Research on liquidity crises

Participants in theoretic-ideal competitive markets (after Duffie [1992] and Jarrow and Turnbull [1996]) presume an infinitely elastic supply of market liquidity for any time horizon. In such an ideal world, traders act as dispassionate price-takers, believing that they are able to buy or sell their securities in any quantity (and for immediate execution) without unduly impacting market price. This ideal, of course, does not correspond (even approximately) with the real world—even in highly liquid markets.

A large body of classic market microstructure theory deals with the idiosyncratic component of liquidity risk (see O'Hara [1995] and Madhavan [2000]), namely liquidity at the individual security or trade level. To varying degrees, all financial claims are less-than-perfectly liquid, even in "normal" markets. Idiosyncratic considerations dominating liquidity risk during "normal" markets include differing rates of market turnover, differing search costs, differing numbers, risk capacities, and information access of traders, as well as differing sizes or imbalance of individual trades being transacted.

A more recent body of literature has begun to examine a systematic (or market-wide) but time-varying component of liquidity risk (Chordia, Roll and Subrahmanyam [2001] and Bangia, Diebold, Schuermann and Stroughair [1999]). Even markets that usually exhibit great depth and near-continuous transactability have surprisingly become almost completely illiquid on an episodic basis (Persaud [2003] and Morris and Shin [2003]). Bid-ask spreads widen significantly or completely evaporate if the markets cease to trade entirely, and required transaction completion times lengthen significantly. The end result: liquidity may disappear when it is most required.

Whatever the cause of increased liquidity risk, empirical research has documented the presence of a common and increasingly important market-wide liquidity-related risk factor.[2] It is this prospect of episodic increases in potential for systematic market liquidity breakdown that will represent the insidious aspect of liquidity risk management for mid-sized corporate DB plans in the future. The heightened potential for substantial losses posed by investment management agents taking on undue amounts of liquidity risk (through their portfolio choice decisions) should be cause for some concern among fiduciaries.

From the perspective of any mid-sized pension plan, these "normal" idiosyncratic (security-specific) and systematic (market-wide) components of liquidity risk might or might not be appropriately priced in the capital markets at any given time. However, in the absence of pricing power and market segmentation, only one market price (with its implied liquidity premium) can prevail for each asset. At the same time, liquidity risk-taking capacity is unique to each client-sponsor. As such, the onus accordingly lies with the individual corporate DB plan to respond to its own unique liquidity risk management needs through its choice of appropriate asset mix.[3]

Controlled-simulation: the best tool?

In terms of tools for liquidity risk management, controlled-simulation provides the needed flexibility in defining unanticipated liquidity requirements. In contrast to traditional mean-variance optimization, controlled-simulation specifically forces plan sponsors and governing fiduciaries to be more thoughtful and explicit in their planning and portfolio construction efforts—particularly in terms of their unique period-by-period liquidity requirements. Specifically, the use of a multi-iterative, controlled-simulation approach allows client-sponsors to: map out their unique expected period-by-period liquidity requirements; precisely model the ability to rebalance among individual asset classes according to their underlying assets' marketability; precisely set out how much temporary overweighting in illiquid asset classes (due to relative market movements) they are willing to tolerate; take into account reasonable "haircuts" for transacting asset classes with differing marketability; accommodate multiple-volatility regimes in their modelling since high-volatility (market-stressed) episodes will impact the ability and cost to rebalance investment portfolios, and; test the liquidity cost-benefit trade-off directly by weighing liquidity risk tolerance within the plan against how much liquidity risk premia they might be able to capture by increasing exposure to less-liquid asset classes and mandates.

Gauging exposure to liquidity risk

In the strictest sense, the liquidity risk management problem—as well as the costing of liquidity risk insurance—arises in the context of unanticipated period-by-period net liquidity requirements within the plan. Periodic self-assessment should allow plan sponsors to approximately determine the level of expected liquidity requirements. Since only adverse unanticipated liquidity requirements

have potentially negative implications, this immediately casts the problem of liquidity risk management and the costing of liquidity risk insurance in an option-theoretic framework. Here, there are several possible situations, assuming that plan sponsors have either actually undertaken a realistic self-assessment—specifically in terms of their expected and worst-case unanticipated liquidity requirements—or they have avoided doing so:

• DB plans could deliberately (in the first case) or inadvertently (in the second case) be underwriting more liquidity risk than their period-by-period risk-taking capacity would allow. This represents an aggressively active bet by plan sponsors and requires some strong supporting rationale in its defence since such activity might be longer-term unsustainable. Such plans are actually better natural "buyers" of liquidity insurance (through portfolio choice decisions that involve more holdings of liquid reserves).

• DB plans are underwriting approximately only as much liquidity risk as their capacity allows. That capacity is uniquely defined for each plan by its level of expected plan liquidity requirements. The implicit "cost" of liquidity insurance for such plan depends on the distribution of unanticipated liquidity requirements and the expected welfare losses associated with those unanticipated (adverse) liquidity requirements. Such plans are only threshold "sellers" of liquidity insurance.

• DB plans are underwriting considerably less liquidity risk than their ample risk-taking capacity would allow. Such plans benefit from relatively low levels of expected plan liquidity requirements. This situation describes less mature DB plans (with or without consideration of any pre-existing accumulated plan surplus) with ample net cash inflows from a high proportion of active contributors. These ongoing normal-course cash inflows provide more-than-adequate cushion against unanticipated liquidity requirements within the plan during an upcoming planning horizon. Such plans are most clearly capable "sellers" of liquidity insurance.

The danger in the absence of ongoing rigorous self-assessment of liquidity risk-taking capacity is that rapidly maturing DB plans continue to underwrite liquidity risk (by increasing the proportion of illiquid asset types and strategies within their asset portfolios) as if they were still operating in the third region above, when their demographic profile has quietly evolved so that they have, in fact, drifted into the second, more solvency-challenged region. It is in this sense that governing fiduciaries of mature DB plans will need to develop a keener appreciation of how growing liability-servicing liquidity requirements are increasingly going to conflict with their desire to reach for promising absolute returns through increased allocations to less liquid alternative asset classes and complex dynamic trading strategies.

Insuring from within

Until a market for liquidity risk insurance develops (assuming adverse selection issues can be overcome), the onus will continue to lie with individual DB plans to self-insure against their unanticipated liquidity requirements. The portfolio choice decision, in effect, determines the cost of the liquidity risk self-insurance; as such, the cost of insurance will be sensitive to the usual factors that typically impact premia on a synthetic liquidity risk option: the length of time over which the unanticipated liquidity shortfall needs to be resolved (if and when it occurs), the prevailing volatility regime among marketable assets, the degree of returns drag posed by the liquid holdings within the overall fund, and so on. Further, the implied cost of liquidity risk insurance is actually shouldered by the liquid asset classes within the fund, implying the presence of uncompensated liquidity risk transfer among the various specialist mandates.

Since the typical traditional fund management architecture is built around these specialist mandates (rather than so-called "whole-fund" mandates), there tends to be a focus on either actively or passively managing specific asset types with a narrow set of market-directional or non-directional bets. These bets attempt to capitalize on varying market risk premia but, more importantly, represent differing demands for scarce liquidity risk-taking capacity within the overall fund that are not related in any direct way to the proportion of financial capital controlled within the mandate. The high priority placed on comparative performance measurement (i.e., specialist mandate performance against market benchmarks) with its emphasis on time-weighted rates of return further subtly dilutes the focus that ought to be brought to bear on liquidity risk management concerns.

Terhaar, Staub and Singer [2003] hint at the problem. After studying eight conventional and alternative asset classes, they note that certain alternative asset classes, in particular, would seem to provide "disproportionately high

return for their risk." However, this simply derives from the lack of frequent mark-to-market observations for these particular asset classes. With no rational means to calculate short-term volatility, the favoured measurement methodology (internal or dollar-weighted rate of return) among these asset classes understates true underlying volatility of asset returns. Not surprisingly, unconstrained portfolio construction across combinations of traditional and alternative asset classes using familiar mean-variance computation techniques against unadjusted risk-return data inputs will result in high allocations to alternatives. To mitigate these uncomfortably high concentrations, client-sponsors either arbitrarily tweak historical risk-return data or simply pre-impose essentially arbitrary or ad hoc constraints on maximum allocations on one or more asset classes.

In a traditional architecture spanning variously liquid conventional and alternative asset class mandates, any liquidity requirements are met unevenly from among various specialist mandates: near-immediate expected liquidity requirements are clearly met from near-cash holdings and current income, and unanticipated near-term liquidity requirements are met first from any residual precautionary near-cash holdings and then from second-tier liquid assets. As such, mandates that comprise conventional liquid assets typically bear primary responsibility for (adverse) unanticipated liquidity requirements within the plan, while illiquid mandates are left intact. This situation produces a fundamental disconnect between one set of mandates that are able to extract their full market and liquidity risk premia over time (alternative asset classes and complex dynamic trading mandates) and another set of (conventional) mandates whose ability to realize such premia will constantly be jeopardized by the prospect of untimely asset liquidations that result from unanticipated cash calls.

Finding answers in assets

What seems to be needed is a transfer pricing mechanism that somehow preserves whatever benefits attach to the specialist mandate approach while at the same time motivating an increased sensitivity to liquidity risk management needs that is a natural consequence of the "whole-fund" mandate approach. The urgency of the liquidity risk management problem within mature corporate DB plans argues for more attention to quantifying the liquidity risk premium in a plan context; however, such urgency also argues for a pragmatic first-approximation of such a liquidity risk premium. Even without actually undertaking a rigorous simulation to assess the impact of liquidity requirements on the liquidity risk posed by various proposed asset mixes, the following heuristic should be considered:

1. Plan sponsors should identify the best liability-mimicking set of investment assets (e.g., some particular combination of bills, conventional bonds, and real-yield bonds) to create a "base-reference" asset that exactly fulfils (or cashflow-immunizes) ongoing expected liquidity requirements against the plan;

2. Plan sponsors then introduce a proposed set of riskier mandates (comprising other traditional asset classes, alternative asset classes and mandates providing exposure to complex dynamic trading strategies) whose liquidity profile differs from that of the base-reference set and, at the same time, clearly pre-imposes an actual or notional burden that such riskier mandates are to be held fully responsible for their full and fair proportionate share of period-by-period expected and unanticipated liquidity requirements within the overall fund;

3. Plan sponsors also allow the managers of the riskier mandates at the beginning of each planning period to arrange for ongoing insurance against excess liquidity requirements that might be drawn against their mandate during the upcoming planning period as a consequence of these proportionate liquidity-providing responsibilities. Such (re)insurance, if it were market-available could be negotiated at arm's-length with third-parties or in the absence of market availability, could be negotiated internally, with the fund acting as notional intermediary, with the managers of the "base-reference" set. Alternately, it could simply be provided internally within the illiquid alternative asset classes themselves, if those managers choose to hold reserves of liquid assets to effectively self-insure for excess liquidity requirements within their own mandates.

By imposing the burden of period-by-period liquidity provision explicitly, fully, fairly and proportionately across all mandates, all managers are forced to take pains to: remain aware of, and properly align their interests with respect to, total-fund period-by-period liquidity requirements during the planning horizon; become active managers of liquidity risk, and; effectively unbundle and cost each source of risk within their mandate.

The liquidity-return tradeoff

As matters stand, less-liquid alternative asset classes are

introduced generously into pre-existing policy asset mixes without due regard for evolving plan liquidity requirements. Managers of liquid traditional asset management mandates are implicitly made responsible for shouldering a disproportionate share of liquidity requirements and providing liquidity on demand when required, not only against their share of plan financial capital but on behalf of capital committed within illiquid alternative asset classes. These managers thereby provide a valuable within-fund cross-subsidy at no explicit or implicit cost; this means the "free lunch" which alternative asset classes are sometimes touted as providing is to some extent just a "free lunch" provided by one set of specialist mandates in favour of another less liquid set within the fund. Ultimately, in terms of the potential for misallocation of scarce risk capital within the fund, these forced liquidity cross-subsidies come at the long-term expense of the fund itself.

What matters in the determination of the cost of liquidity insurance is not the type of asset per se or the type of realization (coupon and maturity proceeds versus market gains or losses) but the uncertainty of the cash flows underlying the particular investment. If some amount of current income within an otherwise illiquid asset class represents the primary insurance for unanticipated fund liquidity requirements, then the cross-subsidy provided by liquid mandates through their willingness to undertake untimely asset liquidation represents liquidity reinsurance provided to the manager of the illiquid asset class.

The agenda, then, in terms of motivating improved liquidity risk management for mid-sized mature corporate DB plans should proceed as follows:

• a further refinement of the theoretical framework for liquidity risk management in context of a unique type of risk intermediary—one whose liquidity risk-taking capacity varies and, specifically, diminishes unevenly through time (as is the case for DB plans facing a rapidly maturing demographic profile), or one whose access to alternative channels for liquidity-sourcing may be limited by institutional considerations (as is the case for smaller corporate DB pension plans), and;

• operationalization of such theoretical framework or, as a crude first approximation, applying an heuristic approach.

In either case, the plan sponsor would gain a clearer sense of the implied cost of liquidity insurance that alternative portfolio choice decisions entail, but also whether or not it can realistically consider itself an able "seller" of liquidity insurance, or rather a needy "buyer" of liquidity insurance. Given a realistic self-assessment of underlying fund liquidity risk-taking capacity, the benefit of allocating more scarce fund capital to illiquid alternative asset classes and complex dynamic trading mandates with a premium for bearing liquidity risk can more accurately be assessed.

Further, inasmuch as a traditional fund architecture comprised of specialist mandate managers is relied upon to provide narrow value-added or risk-controlling outcomes, there will be a fundamental disconnect between the amount of scarce financial capital and the amount of liquidity risk-taking capacity consumed within each specialist mandate. Unlike "whole-fund" mandates, specialist managers shoulder disproportionate burdens for servicing expected and unanticipated liquidity requirements within the fund. In this sense, managers of more liquid specialist mandates are implicitly providing a valuable cross-subsidy (without compensation) in favour of managers of less-liquid alternative asset class mandates.

A full costing of a synthetic liquidity option comprising this cross-subsidy would ensure:

• an appropriate portfolio allocation between variously liquid specialist mandates by natural means rather than as a consequence of arbitrary pre-imposed constraints (in the sense described by Terhaar, Staub, and Singer [2003]), and;

• a motivation for more proactive and transparent liquidity risk management on the part of all managers of illiquid alternative asset classes and governing fiduciaries.

Acting to ameliorate liquidity risk

As urgent as the need is for more proactive liquidity risk management, several practical courses of action ought to be immediately considered:

• stress testing that occurs as part of asset-liability studies ought to require explicit consideration of at least the "normal" transactions costs on any asset liquidation accompanying asset rebalancing and liability-servicing requirements;

• sponsors of very mature corporate DB plans ought to draft a statement on liquidity risk management beliefs and also adopt some of the same standards[4] that are now routine for traditional financial intermediaries, which have long had to be sensitive to tight funding issues;

• move toward adopting more flexible or "whole-fund" mandates, each explicitly charged with a full, fair

and proportionate share of ongoing responsibility for liability-servicing liquidity requirements.

Several recent developments on both the asset and liability sides of the plan ledger among mid-sized corporate DB plans now necessitate their increased attention to liquidity risk management issues. These include rapid natural maturing of underlying demographic profiles as well as liability-maturity acceleration due to human resources initiatives which both serve to reduce the proportion of reliable cash inflows (cash contributions by active plan members). Recent asset market developments have further eroded funded status and, by implication, liquidity risk-taking capacity. Finally, competing demands for scarce capital within portfolio asset allocation between returns-poor traditional liquid mandates and promising (but liquidity-consuming) alternative mandates obscure the liquidity risk management requirement. Proactive and explicit consideration of period-by-period plan liquidity requirements now might be the only means to avoiding a "run for the money"—a pension system-specific liquidity crisis—down the road. ▮

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Endnotes

1. However, Davies, Kat and Lu [2003] recast optimization to reflect risk more comprehensively and so incorporate revealed investor preferences for higher moments of returns.
2. See, for instance, Bangia, Diebold, Schuermann and Stroughair [1999] who note that liquidity risk and market risk be treated jointly in some sort of liquidity-adjusted VaR framework since "extreme adverse events in [market] returns and extreme events in spreads [exogenous or market-wide liquidity shocks] happen concurrently."
3. On the investment asset side of the defined-benefit pension plan ledger, it was argued that lower expected returns would influence average funded status (surplus) within the plan, all else unchanged. Increased volatility and, specifically, episodic breakdowns in market liquidity contribute to the amount of welfare losses but only to the extent that there are unanticipated liquidity requirements that expose the plan to a need for an untimely asset liquidation. The extent of such welfare losses influences the "cost" of liquidity insurance.
4. The 14 principles set out by the Basel Committee on Banking Supervision (Bank for International Settlements) [2000] describe guidelines for implementing a liquidity management strategy with a particular emphasis on day-to-day perspective, ongoing measuring of funding requirements, stress testing of the liquidity risk management plan under varying market conditions, planning to allow for sourcing of alternative funding during distressed market conditions, and specific contingency planning for liquidity crises.

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