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Portfolio Liquidity

The 2008 deterioration in asset values unveiled a host of new liquidity problems for many diversified portfolios. Even long-term oriented funds with sizable public equity and fixed income positions found themselves subject to significant liquidity problems.

Liquidity issues arise from both pre-existing sources such as prior capital commitments, concentration in illiquid holdings, various forms of contractual lock-ups as well as from new contingencies such as increased client needs, collateral/margin calls, stretch-out of anticipated redemptions, unexpected encumbrances on positions presumed liquid, functional illiquidity from unacceptable trading spreads, etc.

A portfolio's assets actually lie along a wide spectrum of liquidity levels and time horizons. However, over a given horizon, a simple "liquidity/beta matrix" might classify assets as being: 1) cash-like with lower returns and less beta-sensitivity, 2) beta-sensitive but potentially liquid through their "cashabillity", 3) illiquid but beta sensitive, and 4) illiquid and beta insensitive.

Only cash-like assets can fulfill immediate funding needs. Cashable assets can be transformed into cash through security sales, although such cash raising would lead to a higher concentration in illiquid assets and would also reduce the portfolio's beta sensitivity and expected returns.

Stress beta effects associated with severe market declines will lead to distortions in market-weighted allocations. To rebalance the portfolio back towards the original beta characteristics would require a major cash-consuming restructuring.

For portfolios with high percentages of alternative assets and low fixed income allocations, liquidity issues will continue to loom large as long as market volatility remains at elevated levels. For such portfolios, contingent cash needs and rebalancing reserves need to play an important role in their strategic planning.

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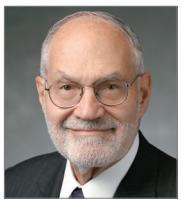

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Introduction

The 2008 market has devastated asset values across all types of institutional and individual portfolios. As if the loss of asset value were not enough, the 2008 experience has also brought forward an added problem of portfolio liquidity. The horrendous declines presented liquidity problems even for many portfolio managers who were long-term oriented, had modest payment schedules, and a seemingly ample percentage of liquid assets. This perfect liquidity storm, layered on top of a perfect asset storm, resulted from a toxic combination of: 1) a need to fulfill prior commitments to private equity, venture capital, real estate, and hedge funds, 2) reduced distributions from these asset classes, 3) existing lock-ups across a wide range of externally managed assets (including many long-only equity managers), 4) erection of gates and other barriers to redemptions, 5) devastation in value and tradability in large segments of the fixed income market, 6) additional encumbrances upon fixed income assets that were thought to be fully liquid, 7) a surge in collateral demanded for derivative hedges, swap exposures, and various forms of "portable alpha" arrangements, as well as the more standard types of margin calls, 8) the extraordinary loss in value in many asset classes where true unencumbered liquidity still resided, 9) heightened redemptions and higher payouts to accommodate the increased needs of fund clients, etc.

With some or all of these problems descending on a portfolio, it is little wonder that PMs are now more focused on the liquidity issue than ever before in the history of modern investment management.

The purpose of this paper is to set forth a basic framework for addressing this highly complex problem.

The Liquidity Portfolio

Liquidity problems can arise in virtually any portfolio, but they are clearly exacerbated in highly diversified portfolios that include a significant allocation to illiquid "alternatives." For this reason, we will use Portfolio C shown in Exhibit 1 as a representative allocation.

Exhibit 1: A Representative Diversified Fund: Portfolio C

Asset Class	Initial Portfolio
US Equity (USE)	$20.00
IE Equity (IE)	$15.00
EME Equity (EME)	$5.00
Subtotal	$40.00
Private Equity (PE)	$10.00
Venture Capital (VC)	$10.00
Absolute Return (AR)	$10.00
Real Estate (RE)	$10.00
Subtotal	$40.00
Total Fixed Income (FI)	$20.00
Total Portfolio	$100.00

Source: Morgan Stanley Research

Liquidity needs are highly dependent on the horizon in question. At the outset, it will be convenient to address a single horizon that encompasses both the needs for and sources of liquidity.

Exhibit 2 displays an assumed "liquidity portfolio" that can be extracted from C within such a horizon. It can be seen that Portfolio C still has a large allocation to public securities that would normally be thought to be totally liquid. However, even these public securities may be less than fully liquid because of contractual arrangements or unacceptable trading costs. To account for this limitation, Exhibit 2 incorporates a liquidity "haircut" so that, for example, only 70% of IE is presumed to be functionally tradable (at acceptable spreads) within the horizon period.

Exhibit 2: Liquidity Portfolio

Asset Class	Initial Portfolio	Horizon Liquidity %	Liquidity Portfolio
US Equity	$20	80%	$16
IE Equity	$15	70%	$10
EME Equity	$5	40%	$2
Subtotal	$40	Cashable	$28
Private Equity	$10		
Venture Capital	$10		
Absolute Return	$10		
Real Estate	$10		
Subtotal	$40		
Total Fixed Income	$20	90%	$18
Total Portfolio	$100	Cash-like	$18
		Gross Liquidity	$46

Source: Morgan Stanley Research

Liquidity has many facets, but for sake of simplicity, it is useful to focus on just two components: 1) "cashable" risk assets and 2) a cash-like portion that is derived primarily from low-risk fixed income assets. This distinction is important in that it is the risky equity-like assets that are the prime determinant of portfolio volatility.

Many liquidity needs can only be satisfied with the second category of cash-like funds. But cash-like funds generally act as a return drag. Meanwhile, although cashable assets can, by definition, be used to create cash, such a transformation will deprive the portfolio of its return/risk "octane".

Exhibit 3 abstracts from Exhibit 2's standard allocation and depicts Portfolio C's liquidity structure in terms of 1) $54 in illiquid assets, 2) a $28 cashable component derived from the fully available portions of USE, IE, and EM, and 3) another $18 of fully cash-like funds derived from the fixed income component.

Exhibit 3: Liquidity Structure and Cash Needs

	Asset Value	Liquidity Value Gross		Net
Illiquid	$54	$0		$0
Cashable	$28	$28		$28
Cash-Like	$18	$18	Less $7 Cash Needs	$11
Gross Liquidity	$46	$46		
	$100			

Source: Morgan Stanley Research

The cash-like $18 is a gross number, in the sense that horizon needs may have a call on some of these funds. These cash needs include required outflows, payouts and collateral provisions after allowing for scheduled inflows from portfolio returns and external sources. Over the horizon period, the excess cash needs are assumed to amount to $7, so that the net free cash-like assets are only $11 (Clearly, a growing fund with significant exogenous inflows will have less liquidity problems than a mature fund with sizable payouts).

Similar Portfolio Volatilities

Portfolio C has been extensively discussed in our earlier writings as representative of the diversified portfolios seen in practice. In these analyses, a standard covariance matrix was applied to a wide range of allocations. The basic finding was that virtually the same volatility characteristics are present in all allocations seen in practice, ranging from the traditional 60% USE/40% USB to the highly diversified Portfolio C. Moreover, all the allocations studied had correlation-based beta values that fell into the range of 0.55 to 0.65, and it was this beta sensitivity to USE movements that accounted for over 90% of the common level of volatility [1–3].

While at first surprising, this result was confirmed by a subsequent analysis of historical performance. In a study based on 15 years of quarterly index prices from 1993 to December 30, 2007, the net result was highly supportive of the theoretical findings: Portfolios with vastly different asset allocations all had historical beta values that fell into the 0.55 to 0.65 range, and these betas accounted for 90% or more of the portfolio volatility [4–5].

Stress Betas

The preceding beta results apply to what might be broadly described as "normal times." In late 2007, we began to conjecture on how this relationship would be affected by severely adverse markets when, as the common saying goes, "all correlations move towards one." For this convergence to be literally true, all idiosyncratic risk would have to collapse — a most improbable event. However, it was certainly conceivable that correlations could generally tighten. For any given asset class, this would lead to higher correlations with equities and greater-than-normal equity betas. On the one hand, this tightening would have little impact on the two-asset 60/40 portfolio where the fixed income contributes only modestly to overall volatility risk. On the other hand, tightening correlations across the multiple asset classes of a diversified portfolio would theoretically lead to higher "stress betas." With most allocations found to have roughly similar betas under "normal times," it follows that this "stress beta" effect should render diversified portfolios even more sensitive to severe equity declines than traditional 60/40's.

Thus, tightening correlations would have the paradoxical effect of rendering the typical diversified portfolio more vulnerable than the 60/40 to severe short-term market declines.

This theoretical conjecture was described in a December 2007 Morgan Stanley Note [6]. However, the search for historical confirmation was hampered by the lack of high-frequency quality pricing for the illiquid asset classes. Then 2008 arrived, and to all our dismay, the markets provided ample evidence of this diversified portfolio's short-term vulnerability [7].

Rise of Liquidity Issues

However, the stress beta effect was not the only problem afflicting such portfolios. In addition to a heightened beta sensitivity to equity declines, diversified portfolios found themselves to be subject to further stress in the form of liquidity problems.

Every fund has its unique characteristics, but we have seen how a severe market decline can create significant liquidity problems even for a portfolio that appeared to have comfortable liquidity characteristics at the outset. As an example, Exhibit 4 depicts how hypothetical stress beta values applied to a 40% downturn in USE might affect C's asset classes. The aggregate effect at the portfolio level results in an overall stress beta value of about 0.71, considerably higher than C's normal beta of 0.57. The overall decline in asset value would then amount to 28% (0.71 x [-40]).

Exhibit 4: Asset Values after Hypothetical 40% USE Decline (Stress Betas)

		After -40% USE Decline		
Asset Class	Initial Asset Value	% Change	Asset Value	as % of $72
US Equity	$20	-40%	$12	17%
IE Equity	$15	-44%	$8	12%
EME Equity	$5	-57%	$2	3%
Subtotal	$40	-44%	$23	32%
Private Equity	$10		$4	6%
Venture Capital	$10		$7	9%
Absolute Return	$10		$9	12%
Real Estate	$10		$10	13%
Subtotal	$40	-27%	$29	41%
Total Fixed Income	$20	0%	$20	28%
Total Portfolio	$100	-28%	$72	100%

Source: Morgan Stanley Research

In terms of the individual asset classes, the greater declines would be incurred by those assets with stress beta values higher than the 0.71 average. The cashable asset classes — USE, IE, EM — all fall into this higher beta category, and so would experience the worst declines. As shown in Exhibit 5, this leads to a 43% reduction in the cashable component from $28 to $16, i.e., a greater decline than C's overall 28% drop.

Exhibit 5: Liquidity Portfolio after Hypothetical 40% USE Decline

		After -40% USE Decline		
Asset Class	Initial Liquidity Portfolio	Assets Portfolio	Horizon Liquidity %	Liquidity Portfolio
US Equity	$16	$12	80%	$10
IE Equity	$10	$8	70%	$6
EME Equity	$2	$2	40%	$1
Subtotal	$28	$23	Cashable	$16
Private Equity		$4		
Venture Capital		$7		
Absolute Return		$9		
Real Estate		$10		
Subtotal		$29		
Total Fixed Income	$18	$20	90%	$18
Cash-like				
Gross	$18			$18
Needs	$7			$7
Net Cash	$11			$11
Gross Liquidity	$46			$34

Source: Morgan Stanley Research

On the other hand, the cash-like FI component in this example is assumed to remain essentially unchanged. Consequently, as long as the needs remain the same, there would be little shift in the cash-like component. The revised overall liquidity structure is summarized in Exhibit 6.

Exhibit 6: Liquidity Structure after Hypothetical 40% USE Decline

	Portfolio $		
	Initial	After -40% Move	% Change
Total Value	100	72	-28%
Cashable	28	16	-43%
Cash-Like			
Gross	18	18	0%
Needs	7	7	0%
Net	11	11	0%
Gross Liquidity	46	34	-26%

Source: Morgan Stanley Research

Beta Revisions

In addition to these liquidity effects, such a market move would materially alter the portfolio's market-weighted allocations. The $20 of FI would surge as a percentage of asset value from its initial 20% to 28%, while the riskier assets would fall from 80% to 72%. Without any rebalancing, these allocation changes would naturally lower the fund's responsiveness to subsequent market moves and also reduce its ability to generate expected returns over the long term.

With regard to the portfolio responsiveness, this beta concept can be useful as a rough guide. Exhibit 7 shows two "normal" beta values and two expected returns. The first pair of values relates to the portfolio's $72 post-move portfolio value, while the second set is stated as a percentage of the $100 asset value. Thus, focusing on the betas, a subsequent +10% USE move would lead to a +4.80% response relative to the portfolio's reduced $72 asset value, but only a +3.40% move in terms of the initial $100 asset value. This 0.34 beta value is well below the 0.57 initial sensitivity of the $100 portfolio.

While the decline in C's portfolio value was based on stress betas, the going-forward sensitivity is treated as being associated with the normal beta value. This choice was dictated by a desire to focus on the "rebound sensitivity" of the post-move portfolio. It could be argued that stress betas should also apply to a strong upward move. However, there is some (admittedly weak) evidence that just the opposite would occur, i.e., the correlations and the betas would weaken in the face of a powerfully rising market. Then again, one should not rule out the potential for further stress beta declines. As a middle ground, it was decided to use the normal betas for comparison of the portfolio's pre-move and post-move market sensitivity.

Exhibit 7: Normal Betas and Expected Returns

	Portfolio $		
	Initial	After -40% Move	% Change
Total Value	100	72	-28%
Cashable	28	16	-43%
Cash-Like			
Gross	18	18	0%
Needs	7	7	0%
Net	11	11	0%
Gross Liquidity	46	34	-26%
As % of Assets			
Beta (Normal)	0.57	0.48	-17%
Expected Return	7.08	6.51	-8%
As $ (% of 100)			
Beta (Normal)	0.57	0.34	-41%
Expected Return	7.08	4.65	-34%

Source: Morgan Stanley Research

A major restructuring would be required to move the portfolio back towards the beta (and return) characteristics of the original $100 portfolio. In Exhibit 8, an effort is made to restore the beta by deploying $8 in net cash-like funds into USE. This would indeed bring the beta back to the 0.57 value, but only relative to the $72 base. Quite apart from the precarious liquidity position that would result, it can be seen that this action would still leave the "dollar sensitivity" well below that of the original $100 portfolio.

Exhibit 8: Rebalancing to Restore the Portfolio Beta

	Portfolio $		Rebalancing	
	Initial	After -40% Move	Action ($)	Final ($)
Total Value	100	72		72
Cashable	28	16	+8	24
Cash-Like				
Gross	18	18	-8	10
Needs	7	7		7
Net	11	11	-8	3
Gross Liquidity	46	34	0	34
As % of Assets				
Beta (Normal)	0.57	0.48	+0.09	0.57
Expected Return	7.08	6.51	+0.38	6.89
As $ (% of 100)				
Beta (Normal)	0.57	0.34	+0.07	0.41
Expected Return	7.08	4.65	+0.38	4.93

Source: Morgan Stanley Research

Thus, under the onslaught of severe market conditions such as experienced in 2008, a fund with apparently ample liquidity can find itself suddenly subject to a variety of liquidity problems. This situation could compromise its ability to recoup losses, to maintain its original policy exposure, to recapture anything like its projected level of long-term return, or to comfortably discharge all its commitments.

Added Liquidity Problems

In the preceding examples, it was assumed that the liquidity characteristics remain stable even as the fund's assets decline. However, a severe market decline might incur a host of (probably adverse) changes in these liquidity characteristics. In Exhibit 9, the liquidity position is assumed to be subject to the following additional problems:

1) a more stringent liquidity haircut applied to IE and EME lowers the cashable component by an additional $3, to a level of $13;

2) the full liquidity of the fixed income component is also driven down by $2, reducing the gross cash-like component from $18 to $16;

3) the cash needs rise precipitously from a planned $7 to $14 — possibly as a result of reduced income receipts, greater operational needs, higher redemptions, etc.

Exhibit 9: Added Liquidity Problems

	Initial	With Initial Liquidity Assumption	Added Liquidity Problems	Revised Liquidity Structure
Total Value	100	72		72
Cashable	28	16	-3	13
Cash-Like				
Gross	18	18	-2	16
Needs	7	7	+7	14
Net	11	11	-9	2
Gross Liquidity	46	34	-5	29

Source: Morgan Stanley Research

These changes drive the net cash-like level down to $2 and the gross liquidity to $29. The $2 net cash is likely to be too low for comfort. The only way to restore the net cash position would be to sell some of the cashable assets, but this would further reduce the fund's beta levels and projected returns.

Exhibit 10 presents a conservative rebalancing where $9 of cashable assets is deployed to fully restore the $11 level net cash position. Any such cash-raising will naturally change the portfolio's performance characteristics. In this specific liquidity-motivated rebalancing, the performance impact is quite dramatic, with the portfolio's beta sensitivity declining to 0.37 and the expected return declining to 6.07% as a percentage of the $72 post-move asset value. Relative to the initial $100 portfolio, the "dollar beta" sensitivity of 0.26 is less than half that of the original portfolio, while the expected return is lower by more than 270 basis points.

Exhibit 10: Conservative Rebalancing to Restore Cash Position

	Initial	With Initial Liquidity Assumption	Added Liquidity Problems	Revised Liquidity Structure	Rebalancing	
					Action	Final $
Total Value	100	72		72		72
Cashable	28	16	-3	13	-9	4
Cash-Like						
Gross	18	18	-2	16	+9	25
Needs	7	7	+7	14		14
Net	11	11	-9	2	+9	11
Gross Liquidity	46	34	-5	29	0	29
As % of Assets						
Beta (Normal)	0.57	0.48		0.48		0.37
Expected Return	7.08	6.51		6.51		6.07
As $ (% of 100)						
Beta (Normal)	0.57	0.34		0.34		0.26
Expected Return	7.08	4.65		4.65		4.35

Source: Morgan Stanley Research

Exhibit 10 may represent an extreme case, but it illustrates the intrinsic tension between maintaining ample liquidity and sustaining the portfolio's return-generating objectives. Under some other circumstances, these functions may be closely aligned, e.g., when a tilt towards a more defensive position coincides with a desire for more liquidity.

In general, the need for a comfortable level of liquidity will almost always act as the predominant constraint. The desired aggressive or defensive allocation would then be determined subject to this minimal liquidity constraint.

Coverage Ratios

Coverage ratios provide another view of a portfolio's liquidity structure. A coverage ratio can be defined as the gross liquidity component divided by the cash needs. Thus, in our example, the pre-move cashable coverage ratio is 4.00, i.e., $28 divided by the $7 cash needs. In Exhibit 11, one can see how this ratio can decline rapidly to 2.29 with the 40% USE down-move, and then fall to 0.93 when additional liquidity problems are present.

Exhibit 11: Coverage Ratios Before Rebalancing

	Initial	After -40% Move	
		Initial Needs Base Case	With Added Liquidity Problems
Total Value	100	72	72
Cash Needs	7	7	14
Coverage Ratios			
Cashable	4.00%	2.29%	0.93%
Cash-Like	2.57%	2.57%	1.14%
Total Liquidity	6.57%	4.86%	2.07%

Source: Morgan Stanley Research

In any down move, the portfolio's beta will decline and the higher beta assets will decline even more precipitously. When the high-beta assets are among the most liquid, any cash-raising would tend to drain the portfolio's beta and expected return (as well as create a high concentration of illiquid assets). These issues tend to be less important under modest market moves, especially for more traditional portfolios with higher cash-like buffers. As one moves towards more diversified portfolios with less liquid assets, the challenge is to maintain enough low-beta liquidity so that the portfolio's basic performance objectives are not compromised by surges in liquidity needs.

Illiquid assets and long-term management should theoretically offer the promise of higher returns. However, as we have seen in this simple example and in practice, excess illiquidity can force costly portfolio distortions in declining markets. The goal is to try to strike the right balance between illiquidity, cashable assets, cash-like assets, and possibly other backup sources of contingent liquidity.

Costs and Benefits of Illiquidity

The preceding sections focused on liquidity as a virtue and illiquidity as only being a problem. While few investments are *totally* illiquid even in today's markets, there is certainly a relative scale of practical illiquidity (as noted above, even formally liquid investments may become functionally illiquid should the cost of trading become excessive).

There are additional "costs" to illiquidity beyond the inability to service immediate cash needs. Illiquid assets hamper the fund's ability to maintain its overall return/risk targets, especially in the face of market declines. On a more micro level, an illiquid subportfolio cannot be easily rebalanced to maintain the desired distribution of managers, strategies, or asset classes. New information cannot be readily acted upon. Deteriorating

performance must often be endured over a painfully long horizon, while superior or accelerated performance cannot be redeployed into the better going-forward prospects. Adjustments cannot be made for the evolving character of management styles or the asset classes themselves. In particular, illiquidity may prevent adaptive responses to "fashionability surges" or other trends leading to excessive growth in assets or strategies.

The term "illiquidity premium" has been around for a long time, tempting some market participants to believe that some extra return was an automatic byproduct for virtually any investment in illiquid assets. The recent market experience has vividly demonstrated that illiquidity premiums can be far lower than anticipated — and may not even be "premiums" at all.

At the same time, it should be recognized that there is also a positive case to be made for illiquid investments. It can be argued that today's landscape is dominated by investment entities that are either intrinsically focused on short-term performance or are essentially forced to such an orientation. Such overriding short-termism might provide special opportunities for those investors who are truly able — and truly willing — to take a long-term view.

In particular, there are palpable advantages in not having to worry about short-term contingencies such as unscheduled redemptions or escalating payouts, especially when those payouts are correlated with temporary bouts of relative or absolute underperformance. In addition, there are situations where longer-term outcomes could arguably be more amenable to analysis than shorter-term ones. There are also investments with such high near-term volatility that they can only gain the attention of longer-term funds.

For all investors, it is paramount to maintain whatever level of liquidity is required for foreseeable cash needs. However, for the long-term investor, an illiquid component can — in theory — provide special opportunities with higher expected returns. At the same time, even long-term investors need a certain degree of liquidity to maintain their diversification goals. The challenge is to find the right tradeoff between interim needs for liquidity and a structure that promises the best possible risk/return prospects over the relevant horizons.

The Liquidity/Beta Matrix

With power of hindsight, it is now easy to say that the past approaches to allocation strategies were overly simplistic — and dangerously so. Such methodologies were often too focused on just expected return (over the long term) and volatility risk (over the short term). There was all too little attention to liquidity issues.

Most would agree that required liquidity should act as a primary constraint, but defining that minimum level is a daunting task. The problem is that liquidity is used not just to service direct cash needs, but also to provide resources for portfolio rebalancing, and both needs are highly dependent on subsequent market movements.

The liquidity/beta matrix depicted in Exhibit 12 may help frame this multi-faceted problem. A portfolio's assets can be simplistically categorized as being 1) cash-like with low return and low beta-sensitivity, 2) beta-sensitive but potentially liquid through their "cashability", 3) illiquid and beta sensitive, or 4) illiquid and beta insensitive.

Exhibit 12 describes the salient characteristics of assets that fall within each quadrant. The positive features are listed first, while the negative aspects are cited below in italics. Thus, the high liquid/high beta assets in the NW quadrant would generally participate in market advances, provide some return premiums, and would be cashable if needed. On the other hand, in adverse markets, they would participate on the downside, some of their cashability might become impaired, and they would require a cash-consuming rebalancing to re-establish their initital allocation.

Exhibit 12: Liquidity/Beta Matrix

Market Sensitivity (Beta)	Liquidity: High	Liquidity: Low
High	Market Participation Some Return Premium Cashability *Market Risk* *Cashability Loss* *Downside Rebalancing*	Appropriate Return Premium Market Participation *Market/Vehicle Risk* *Locked-In Assets* *Limited Rebalancing Potential*
Low	Satisfy Cash Needs Market Defense Downside Rebalancing *Return Drag* *Reduced Market Participation*	Market Defense Long-Term Diversification Potential *Locked-In Assets* *Limited Rebalancing Potential*

Source: Morgan Stanley Research

As an example of how this matrix might facilitate thinking about various liquidity situations, consider a portfolio comprised of just two components: 1) cash (falling into the highly liquid/low beta quadrant) and 2) market sensitive but very illiquid assets (in the low liquidity/high beta quadrant). Now suppose the initial cash allocation was just sufficient to minimally service the funding needs. In a market decline, the portfolio beta would fall and it would be impossible to rebalance the portfolio so as to restore the initial beta target.

Now consider another two-component fund with again 1) just sufficient cash for funding needs, but now with 2) a market-sensitive component that is fully liquid in the sense of being

"cashable" (i.e., falling into the high liquidity/high beta quadrant). A rising market would present little problem since selling some of the cashable assets could restore the target beta. After a market decline, the target beta might be restored by having lower-beta cashables swapped into higher-beta assets. However, if the allocation within the market-sensitive component had to be kept fixed because of pre-existing asset class constraints, then the only way to "purchase" more beta would be to tap into the cash component. For this to be feasible, the cash-like component would have to include some "rebalancing reserve" beyond that required for funding needs. Unfortunately, any such added cash reserve would act a drag on the fund's long-term return.

One might be tempted to argue that the cash level in this example should just be set so as to cover both funding and probable rebalancing needs. Here, once again, major complications arise when the cash needs, rebalancing reserves, and the revised target beta all depend on the nature of the market decline. In such cases, which may be more typical than not, the interaction of liquidity and portfolio structure can be quite complex.

The liquidity problem has been exacerbated by the trend towards diversified portfolios. Traditional portfolios comprised of mostly liquid assets and large fixed income allocations could readily accommodate both payout and rebalancing needs. Even with more diversified portfolios, modest market moves would probably not result in excessive liquidity strains. However, liquidity issues are likely to remain front and center as long as one has increased market volatility and "modern" portfolios with high percentages of alternative assets and low fixed income allocations.

The challenge — and it is a sizable challenge — is to find a tradeoff between ongoing liquidity needs and the best possible return/risk prospects over the relevant horizons.

References:

1) Leibowitz, Martin L. "The β-Plus Measure in Asset Allocation." *Journal of Portfolio Management,* Spring 2004
2) Leibowitz, Martin L. and Anthony Bova. "Allocation Betas." *Financial Analysts Journal,* July/August 2005
3) Leibowitz, Martin L. and Anthony Bova. "Gathering Implicit Alphas in a Beta World." *Journal of Portfolio Management,* Spring 2007
4) Leibowitz, Martin L. and Anthony Bova. "The Endowment Model Theory and Experience." *Portfolio Analysis Note,* August 20, 2008
5) Leibowitz, Martin L. and Anthony Bova. "The Endowment Model Theory and More Experience." *Portfolio Analysis Note,* October 9, 2008
6) Leibowitz, Martin L. and Anthony Bova. "Stress Betas and Correlation Tightening." *Portfolio Analysis Note,* December 10, 2007
7) Bova, Anthony and Martin L. Leibowitz. "Diversification Performance Under Stress (2008) and Over the Long-Term (03–07)." *Portfolio Analysis Note,* November 10, 2008

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Global Stock Ratings Distribution
(as of December 31, 2008)
For disclosure purposes only (in accordance with NASD and NYSE requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

	Coverage Universe		Investment Banking Clients (IBC)		
Stock Rating Category	Count	% of Total	Count	% of Total IBC	% of Rating Category
Overweight/Buy	**811**	**34%**	**240**	**40%**	**30%**
Equal-weight/Hold	**1060**	**45%**	**271**	**45%**	**26%**
Not-Rated/Hold	**33**	**1.4%**	**8**	**1.3%**	**24.2%**
Underweight/Sell	**463**	**20%**	**87**	**14%**	**19%**
Total	**2,367**		**606**		

Data include common stock and ADRs currently assigned ratings. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations. Investment Banking Clients are companies from whom Morgan Stanley or an affiliate received investment banking compensation in the last 12 months.

Analyst Stock Ratings
Overweight (O). The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12–18 months.

Equal-weight (E). The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12–18 months.

Not-Rated/Hold (NA or NAV). Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12–18 months. Please note that NA or NAV may also be used to designate stocks where a rating is not currently available for policy reasons. For the current list of Not-Rated/Hold stocks as counted above in the Global Stock Ratings Distribution Table, please email morganstanley.research@morganstanley.com.

Underweight (U). The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12–18 months.

Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

Analyst Industry Views
Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12–18 months to be attractive vs. the relevant broad market benchmark, as indicated below.

In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12–18 months to be in line with the relevant broad market benchmark, as indicated below.

Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12–18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America—S&P 500; Latin America—relevant MSCI country index or MSCI Latin America Index; Europe—MSCI Europe; Japan—TOPIX; Asia—relevant MSCI country index.

Other Important Disclosures

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