

Emerging Markets: The Case for Sub-Asset Class Diversification

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Your emerging markets ("EM") portfolio could be in dire need of more emerging markets exposure.

A quick query on one of the popular search engines will tell you that an emerging market can be simply defined as "a nation with social or business activity in the process of rapid growth and industrialization"¹.

In today's investment world however, such a precise definition of emerging markets appears to be elusive. Our industry's inability to universally define EM is best captured by looking at some of the most widely-used index providers; the table below highlights how they differ in their opinions on how one should define an emerging market. For example, MSCI, the company that brought us the first equity EM index in 1988, determines whether a country is emerging based on six factors, including the number of quoted companies of a certain size, free float² and openness to foreign ownership and capital. Under their rules-based framework, MSCI's EM index includes South Korea (arguably a relatively developed market by many conventional standards) while another major "core" equity index provider like FTSE does not view South Korea through the same definitional lens.

Exhibit 1: Economic Classification (Developed or Emerging Markets) by Core Index Provider

	FTSE	MSCI	S&P	Dow Jones
Economic Classification (developed or emerging markets)	<ol style="list-style-type: none"> 1. Wealth (GNI per capita) 2. Total stock market capitalization 3. Breadth and depth of market 4. Whether there are any restrictions on foreign investment 5. Free flow of foreign exchange 6. Reliable and transparent price discovery 7. Efficient market infrastructure 8. Oversight by independent regulator 	<ol style="list-style-type: none"> 1. Sustainability of economic development 2. Number of companies meeting predetermined market cap and liquidity requirement 3. Openness to foreign ownership 4. Ease of inflows/outflows 5. Efficiency of operational framework 6. Stability of the institutional framework 	<ol style="list-style-type: none"> 1. Macroeconomic conditions, political stability, and government restrictions 2. Relative market size large enough to affect overall portfolio 3. Market structure: >5 listed companies, float-adjusted market cap, minimum dollar value traded 4. Investment conditions: settlement and foreign exchange procedures, foreign exchange access, capital controls and restrictions, rules on trading 	Determined by International Monetary Fund (IMF) classifications

Source: Vanguard

¹ Entering "Emerging market definition" into Google yielded the following as a first entry:

An emerging market is a nation with social or business activity in the process of rapid growth and industrialization. The economies of China and India are considered to be the largest. According to The Economist many people find the term outdated, but no new term has yet to gain much traction. <http://en.wikipedia.org/wiki/Emerging-market>

² Percentage of shares available for ordinary investors to buy

⁴ Correlations utilize the MSCI EM Index

³ A search on Morningstar Direct produced approximately 370 core emerging market equity strategies.

While the increased correlations between core EM equity and the major developed market indices is a stark reality, many U.S.-based investors still think of emerging markets largely in terms of the BRICs: Brazil, Russia, India and China; for years these countries have enjoyed the bulk of consultant and investor attention. However, the recent bouts of volatility that we have seen in the return stream of broad based EM indices should serve as a reminder that our emerging market houses should not be solely built on BRICs, particularly as these and other large EM economies become increasingly interdependent with the U.S. and other developed markets. This trend is best illustrated in Exhibit 3 (next page), which shows the notable rise in trade between the U.S. and large EM countries.

Looking Beyond the BRICs

Source: Encore

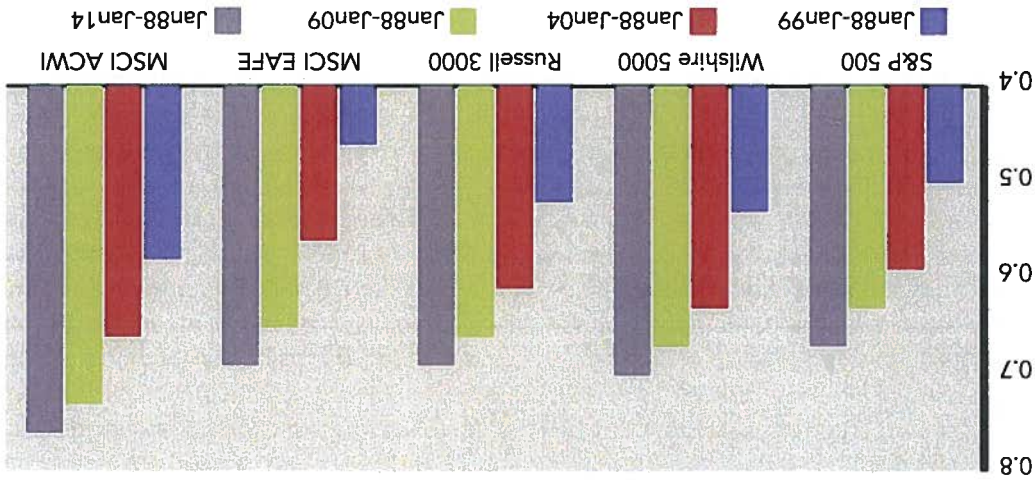


Exhibit 2: Rising Correlations⁴ Between Core EM and Developed Indices

Over the longer term, this exposure to mature economies can cause some emerging markets funds to behave much like developed market funds: such convergent behavior may reduce the benefits of diversification and could consequently increase the overall risk borne by an investor's portfolio. As shown in exhibit 2, correlations between developed market indices and emerging markets have risen significantly in the last 25 years, thus greatly diluting assumed diversification effects from investing in core EM funds.

It is not unheard of - in fact it is relatively common - to find that broadly-managed or core emerging market equity funds feature large exposures to markets that are culturally and politically diverse, but bear more economic resemblance to North America and Western Europe than to, say, Namibia or Peru. It is also not uncommon to find that broad equity EM mandates may tend to favor companies with global operations versus those with local ones.

We live in a world where service providers such as consultants, active managers, and index shops can differ freely in their opinions, and ultimately, how they attempt to create value for their clients: this diversity of thought and the existence of competing but credible solutions is philosophically a great thing. Thus, the purpose of this newsletter is not to debate whether one index provider's methodology is superior to another index provider's; there are several papers in the market place that expertly do this in great depth. Rather, we wish to highlight that given the broad choice of core equity EM mandates that are available in the marketplace³, investors should look to be on the same definitional page as their chosen or desired asset manager(s) as to what constitutes "emerging market" exposure.

Exhibit 3: Total Trade Between the Largest EM Countries and the U.S. (\$ Millions)

Country	2006	2007	2008	2009	2010	2011	2012	2013
South Korea	78,023	81,964	82,738	67,828	87,696	100,061	101,179	103,783
Taiwan	60,921	64,106	61,252	46,848	61,897	67,291	63,206	63,570
Brazil	45,254	49,817	62,752	46,165	59,376	74,675	75,929	71,669
Russia	24,529	26,598	36,118	23,532	31,685	42,904	40,080	38,126
South Africa	11,963	14,576	16,439	10,332	13,852	16,743	16,225	15,773
China	341,447	384,380	407,505	365,871	456,864	503,365	536,063	562,450
Mexico	331,975	346,632	367,162	305,547	393,650	460,943	493,501	506,608
India	31,504	39,042	43,387	37,557	48,782	57,659	62,620	63,704

Source: census.gov

Broadening Your EM Exposure

We are not recommending the fire-sale of core emerging markets funds from investors' portfolios, nor are we suggesting that core EM equity or the BRICs do not have a strategic role to play in a diversified investment framework. Instead, we are acknowledging that since the launch of the first broad EM index in 1988, many of the larger emerging countries have caught up with some of their developed cousins from an economic standpoint. As the return streams of these larger emerging economies are becoming increasingly correlated with the economic performance and/or consumer demand of our own U.S. economy (and other developed markets), it is important to consider diversifying within the emerging markets asset class. Doing so will provide investors exposure to some of the smaller EM countries and access to different sources of return that may not be captured by broad-based indices such as the MSCI EM index or FTSE EM index.

We think that investors can continue to use core equity EM mandates, particularly as a "Beta play" or for anchored exposure but where appropriate, can also look to complement these exposures with more targeted bets across the emerging markets spectrum. Some of the potential sources for alpha and/or further diversification include EM small cap equities, frontier markets, and EM debt.

Exhibit 4: Asset Class Correlations

Country	EM Small-Cap	Emerging Markets	U.S. Large-Cap Core	U.S. Small-Cap Core	U.S. Mid-Cap Core	Intl. Large-Cap Core	Intl. Small-Cap Core	U.S. High Yield	U.S. Core Bonds	EM USD Debt	EM Corporate Debt	EM Local Debt	Frontier Markets
EM SC	1.000												
EM	0.963	1.000											
U.S. LCC	0.764	0.803	1.000										
U.S. SCC	0.721	0.764	0.914	1.000									
U.S. MCC	0.797	0.826	0.958	0.960	1.000								
Intl. LCC	0.870	0.897	0.896	0.824	0.887	1.000							
Intl. SCC	0.881	0.881	0.814	0.793	0.851	0.945	1.000						
U.S. High Yield	0.725	0.704	0.695	0.677	0.751	0.712	0.722	1.000					
U.S. Core Bonds	0.113	0.071	-0.050	-0.106	-0.035	0.052	0.090	0.200	1.000				
EM USD Debt	0.664	0.666	0.562	0.492	0.582	0.640	0.628	0.744	0.587	1.000			
EM Corp Debt	0.625	0.581	0.458	0.411	0.512	0.560	0.611	0.679	0.642	0.883	1.000		
EM Local Debt	0.757	0.772	0.606	0.574	0.618	0.744	0.711	0.599	0.335	0.740	0.673	1.000	
Frontier Mkts	0.606	0.590	0.553	0.491	0.564	0.628	0.628	0.465	0.009	0.414	0.408	0.522	1.000

Source: Encore

As noted in our June 2012 newsletter, EM small cap equities should be considered as a diversifier to broader core EM exposures. Emerging market small caps provide additional exposure to the Asia-Pacific region, a part of the world where higher GDP growth is forecasted. In contrast to some of the larger return drivers of core equity EM mandates (namely commodities and export-focused companies), EM small cap strategies typically focus on consumption growth via greater exposure to the consumer discretionary, consumer staples, and industrial sectors. Additionally, the market efficiency hypothesis offers further support for an allocation to EM small caps. As is the case with developed market large cap stocks, many of the larger names that can be found in core EM mandates are more efficiently priced than their EM small cap counterparts. Consequently, the potential to deliver alpha via stock selection should be greater with EM small cap stocks.

Frontier Markets

Frontier markets are another subset of the emerging markets story, perhaps the EM equivalent of a microcap, i.e. investable but with lower market capitalization and liquidity than the more developed emerging market investments. Frontier markets are gaining increased attention today as they exhibit similar economic potential and unique investment opportunities to those provided by emerging markets investments in the early 1990s.

Exhibit 5: Frontier Market Countries

Americas	Europe & CIS	Africa	Middle East	Asia
Argentina	Bulgaria	Botswana	Bahrain	Bangladesh
Jamaica	Croatia	Ghana	Jordan	Pakistan
Trinidad & Tobago	Estonia	Kenya	Kuwait	Sri Lanka
Lithuania	Mauritius	Mauritius	Lebanon	Vietnam
Kazakhstan	Nigeria	Nigeria	Oman	
Romania	Tunisia	Tunisia	Qatar	
Serbia	Zimbabwe	Zimbabwe	Saudi Arabia	
Slovenia	United Arab Emirates	United Arab Emirates		
Ukraine				Palestine

Source: MSCI

Countries that currently hold the frontier markets label are expected to become more liquid and exhibit similar risk and return characteristics as the larger, more liquid developed emerging markets over time. Given their comparison with EM circa the late 1980s and 1990s, as an asset class frontier markets are in their relative infancy and should therefore be viewed as part of a multi-year investment theme in an investor's portfolio. Short term investors need not apply.

EM Debt

The EM debt universe is geographically diverse with issuers in Latin America, Eastern Europe, Asia, the Middle East and Africa. The types of EM debt that can be accessed by U.S. investors can be divided into 3 key categories or sub-sectors:⁵

- 1) U.S. dollar-denominated sovereign debt
- 2) Local-currency sovereign debt
- 3) U.S. dollar-denominated corporate debt

⁵ We do not include local currency corporate debt as an EM debt sub-sector. Compared to the U.S. dollar-denominated corporate debt market, the local currency corporate market is relatively illiquid, less transparent, and difficult for foreign investors to access due to taxation and settlement issues.



Creditworthiness is one of the main performance drivers for U.S. dollar denominated bonds while interest rates, inflation, and currency movements are the bigger performance drivers for local currency-denominated bonds.

EM debt, depending on whether it is U.S. dollar-denominated or in local currency, can be modestly to moderately correlated with emerging market equities. This suggests that emerging market debt may have a valuable role to play when it comes to portfolio diversification, particularly for EM portfolios that already have significant equity allocations. As the U.S. has experienced historically low rates since 2008, EM debt has in recent years been embraced by some investors as a source of higher yield and a diversifier against traditional U.S. fixed income exposures amidst a Fed policy of “easy money”. In addition to viewing emerging market debt as a partial substitute for traditional U.S. fixed income post-2008, we also encourage investors to consider EM debt as an essential piece in maintaining a diversified EM allocation and tapering the overall volatility of their EM exposures.

Conclusion: This Is Not Your Mother’s....or Father’s EM

When the term “emerging market” was first coined in 1981, it was accompanied by a straightforward definition that was universally applicable: a country with low-to-middle per capita income but on a realistic and transitional path to industrialization should be considered as emerging. Today, EM is more loosely defined, as countries that fall into the emerging category can vary drastically in size, GDP, and economic stature. So while China is commonly viewed as one of the world’s economic powerhouses, it can also be lumped into the same EM category as promising but smaller and less-resourced countries like Mauritius. Additionally, as we recently found out with Greece, industrialized countries can lose their economic status and return to emerging status.

Today, given the grayness of the term “emerging market” it is critical that investors take a step back and establish what EM investing truly means to them. If there is comfort in viewing larger, more mature economies like the BRICs, South Korea or Taiwan as an appropriate representation of the EM space, perhaps a single broad equity allocation to EM is adequate. However, if there are concerns around the increased correlations between the most widely used developed and emerging market indices, perhaps benchmark diversification, EM small cap, frontier markets, and EM debt are at least worth a serious discussion if not a second (or third) look. ■



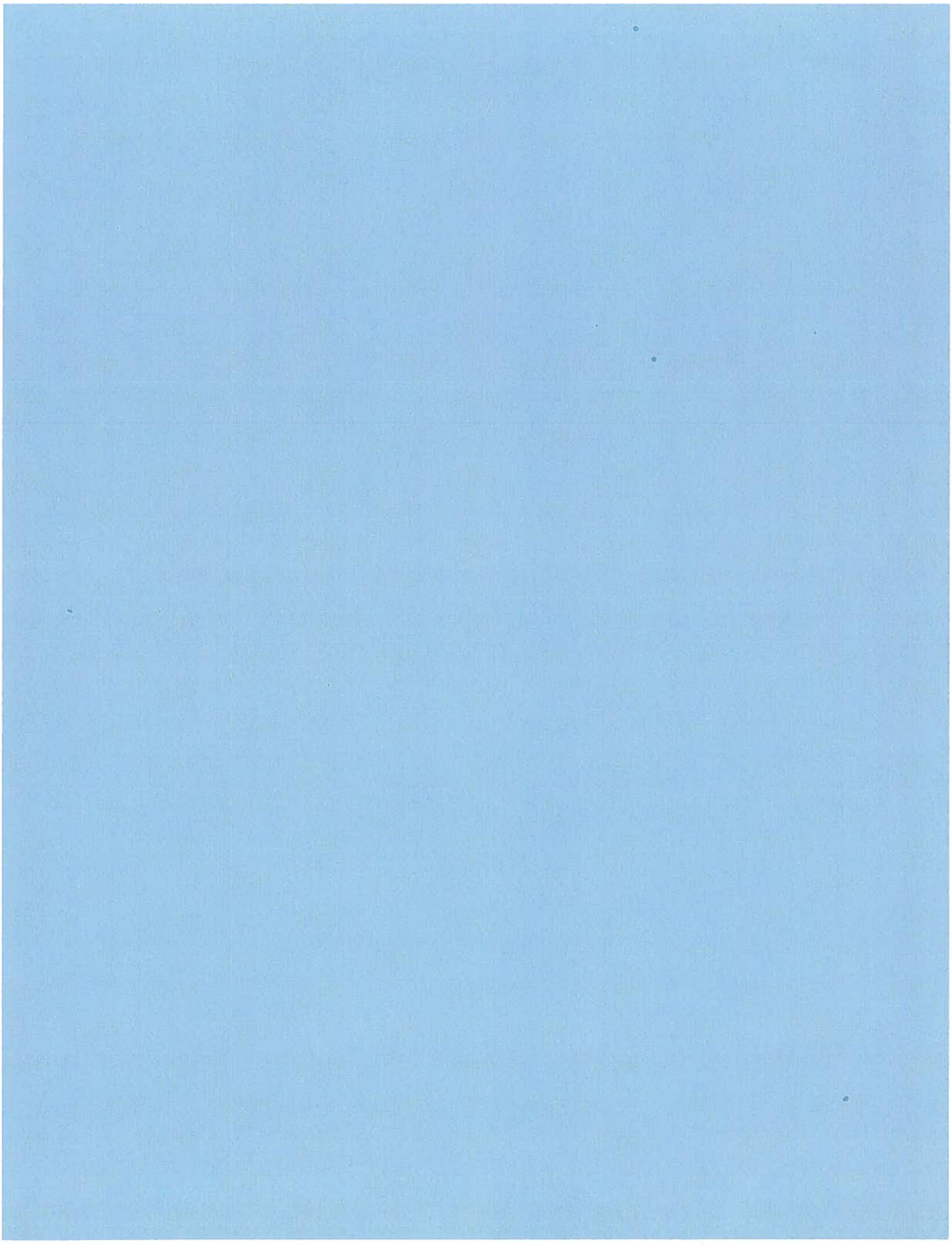
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High Yield, Bank Loans, and Non-Agency RMBS for 2014-2015

May 2014

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Abstract

Given the ongoing low interest rate environment, fixed income investors continue their unprecedented quests for yield. With the persistent slow growth in the U.S., necessary monetary easing in Europe and Japan, and the sustained slowdown in China, U.S. rates that were previously expected to rise moderately in 2014 and 2015 are now projected to rise at a much slower pace, if not remain range-bound. As a result, we expect continued strong interest in the fixed income sectors that have offered the most appealing yields and returns over the last five years: high yield, bank loans, and non-agency residential mortgage backed securities. The following paper analyzes current valuation levels as well as future return prospects over the next few years.

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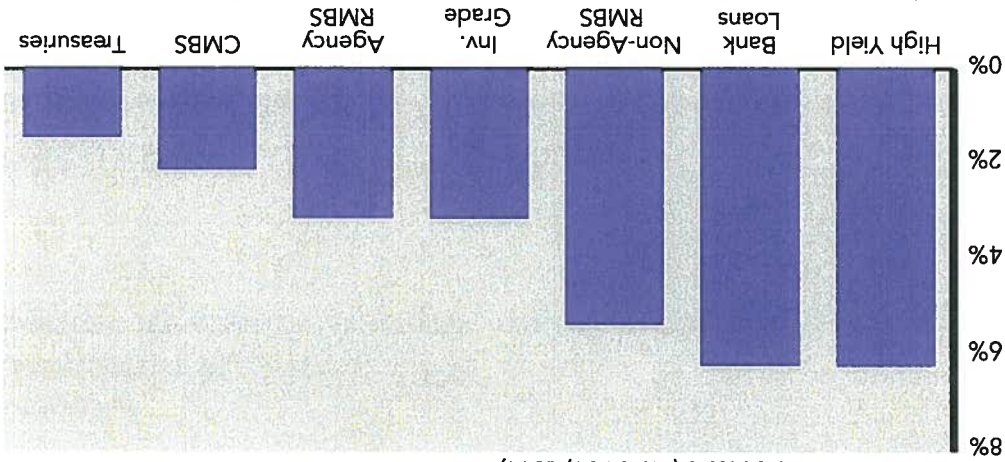


Introduction

Given the ongoing low interest rate environment, fixed income investors continue their unprecedented quests for yield. With the persistent slow growth in the U.S., necessary monetary easing in Europe and Japan, and the sustained slowdown in China, U.S. rates that were previously expected to rise moderately in 2014 and 2015 are now projected to rise at a much slower pace, if not remain range-bound. As a result, we expect continued strong interest in the fixed income sectors that have offered the most appealing yields and returns over the last five years: high yield, bank loans (also referred to as senior secured loans), and non-agency residential mortgage backed securities ("non-agency RMBS").

A quick snapshot confirms the hypothesis that high yield, bank loans, and non-agency RMBS continue to offer the most compelling yields to investors today, as shown below in Exhibit 1:

Exhibit 1: Yields of Fixed Income Sectors (March 31, 2014)



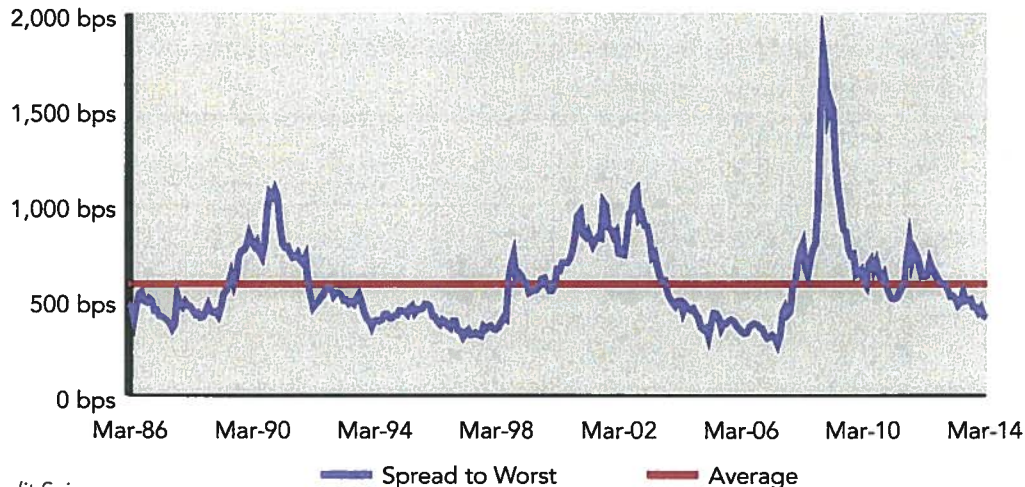
Source: Barclays, Credit Suisse

Of course, current yields are only one piece of the puzzle when analyzing future return prospects for each of these three sectors. In the following, we examine the pertinent data points to develop expectations for high yield, bank loans, and non-agency RMBS. Our preference is to be as granular as possible; therefore, our investigation includes a healthy dose of data and trend analysis, so as to best guide our clients and their investment decisions. We start with high yield, and then move onto bank loans and non-agency RMBS before comparing the three to identify relative valuations and expectations.

High Yield

The Credit Suisse High Yield Index was yielding 6.21% as of March 31, 2014 and had a total return of 7.53% in 2013. As shown on the next page, at 409 bps high yield spreads remain below the historical average of 583 bps. However, there is potential for further tightening into the 300 bps range as we saw in the mid-1990's and mid-2000's. The strengthening U.S. economy should continue to drive performance both in terms of price from investor demand and reliable income from low defaults.

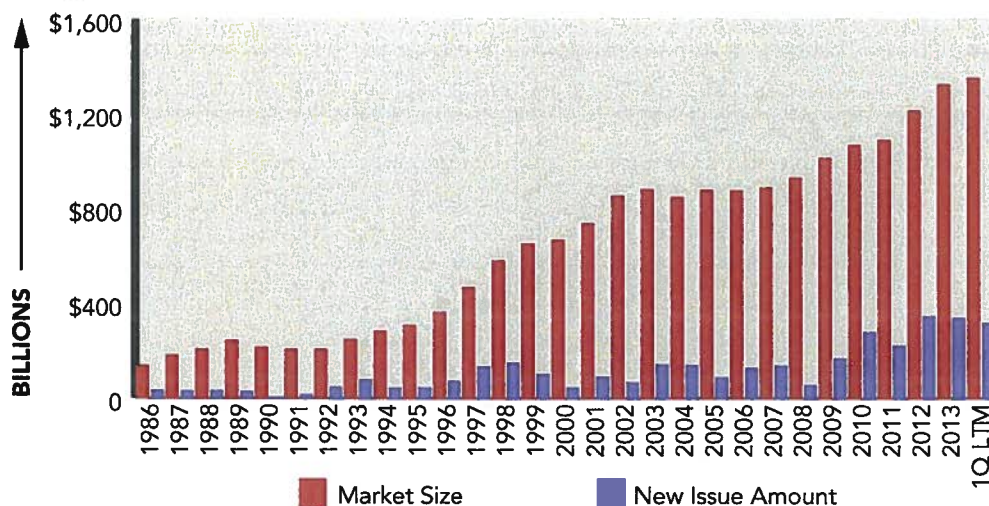
Exhibit 2: High Yield Spread



Source: Credit Suisse

The chart below shows the U.S. high yield market size and new issue amount. The market size has steadily grown since 2006, despite the credit crisis and Great Recession. New issues have risen since the credit crisis, driven by strong demand from yield hungry investors and strong supply from issuers with strengthening fundamentals and creditworthiness.

Exhibit 3: High Yield Outstanding and New Issues



Source: Credit Suisse

Considering its growth and record high level, it is fair to ask if the high yield market is in bubble territory. One way to address this concern is to examine the high yield leverage ratio,¹ which compares the debt of high yield issuers to their earnings and is a metric commonly used by the credit rating agencies. Since the credit crisis (Exhibit 4 next page), the leverage ratio bottomed in 2010, reached the same peak of 3.9x as the credit crisis in September 2013, but recently retrenched to 3.7x,

¹ Defined as high yield issuer high yield debt only/EBITDA, which is an important normalized gauge of the amount of debt a company has incurred and its ability to pay off this incurred debt. It approximates the time required for a company to pay off the debt. It is also commonly used by credit rating agencies and investment managers to assess the probability of default. A lower value suggests lower risk.

² Defined as high yield issuer EBITDA/high yield interest only, which is an important normalized measure of a company's financial durability and whether it generates enough profits to cover its interest expenses. A higher value suggests lower risk.

While leverage and coverage ratios are not the end-all, be-all for assessing creditworthiness, they are two useful pieces of the mosaic used in an investor's analysis. In this particular case, the fact that leverage has grown since 2009 initially suggests that investors should exercise caution in the high yield space.

Source: Credit Suisse, Bank of America Merrill Lynch

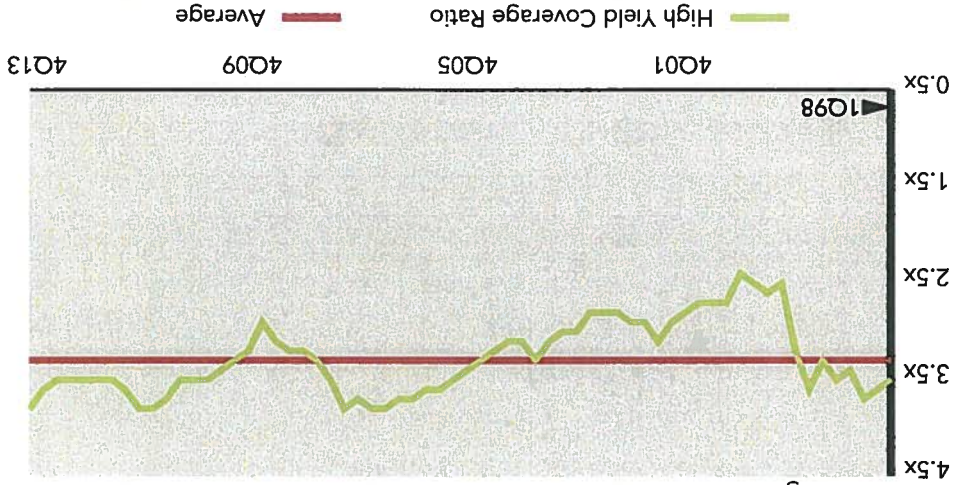


Exhibit 5: High Yield Coverage Ratio

Another useful measure to assess the health of the high yield market is the coverage ratio.² Shown below, it has steadily risen over the last few quarters, and the current reading of 3.8x is at the recent peaks achieved in 2007 and 2011. This makes sense especially since over the last few years companies have refinanced their debt with lower interest rates and longer maturities, thus improving their overall debt profiles.

Source: Credit Suisse, Bank of America Merrill Lynch

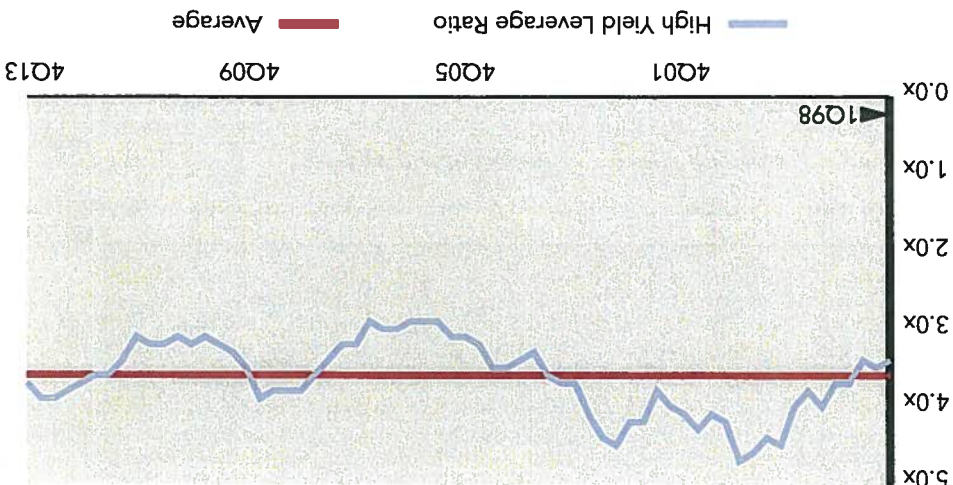


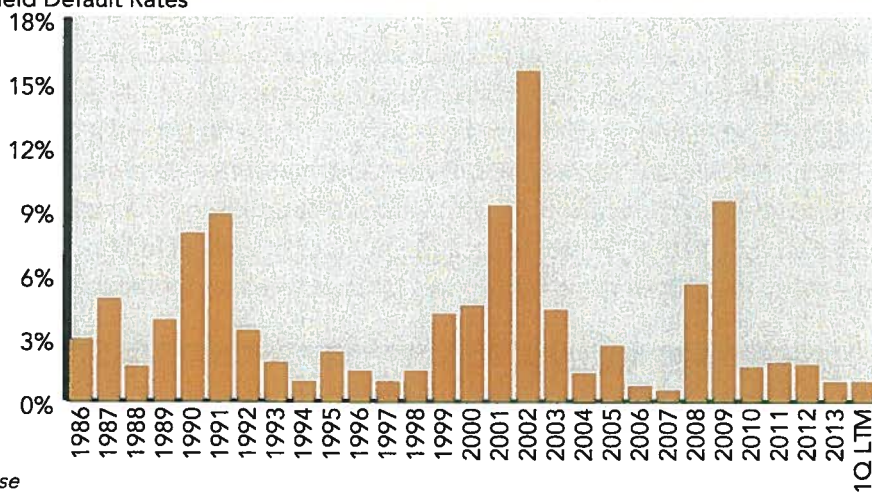
Exhibit 4: High Yield Leverage Ratio

just above its long term average of 3.6x. It is also worth noting that the current value is far below the 4.7x peak reached during the dotcom bubble. So while the size of the high yield market has steadily grown since the dotcom bubble burst, normalized for earnings (as measured by EBITDA), its leverage level is approximately at its long term average.

Moreover, while high coverage ratios demonstrate that issuers have enough earnings to service their debt, a look back at the 1999/2000 dotcom fall-out and 2007/2008 mortgage peaks shows that high coverage may be an indicator of general market frothiness. However, the periods of 2006-2008 show persistent high coverage, which may repeat in 2014 and 2015 as the economy continues to grow. Net and net, the growth in coverage over the last four years is a plus for the high yield market.

In 2013, 60% of new high yield issue proceeds were used to refinance existing debt, enabling companies to extend maturities, reduce interest expenses and improve liquidity profiles, which should help maintain low default rates, at least for the next few years. Exhibit 6 illustrates that U.S. high yield default rates have been low for each of the last four years, and trending lower. Of course, a low default rate is no indication of absolute safety. Even though the default rate steadily increased from 1997 through the bursting of the dotcom bubble in 2000 to the recent peak of 15.5% in 2002, witness how low the default rate was in 2007 prior to the subsequent jump in 2008 at the height of the credit crisis. So a low default rate does not necessarily mean a relatively safe market. That is not to say that we should expect another crisis in 2014, as sluggish growth in all corners of the global economy precludes any signs of exuberance that normally foreshadow a bubble burst. However, keeping a pulse on default rates is useful for detecting any early signs of deterioration in the credit markets.

Exhibit 6: High Yield Default Rates



Source: Credit Suisse

Diversification with Bank Loans and High Yield

Bank loans are positively correlated with high yield, but slightly negatively correlated with core bonds. Therefore, it makes sense from a diversification standpoint for investors to maintain allocations in both high yield and bank loans so as to diversify the risk in their fixed income portfolios.

Exhibit A: Correlation (2/28/1992 – 12/31/2013)

	BarCap Agg	BarCap High Yield	CSFB Leveraged Loan Index
BarCap Agg	1.00		
BarCap High Yield	0.22	1.00	
CSFB LL Index	-0.03	0.74	1.00

Source: Credit Suisse

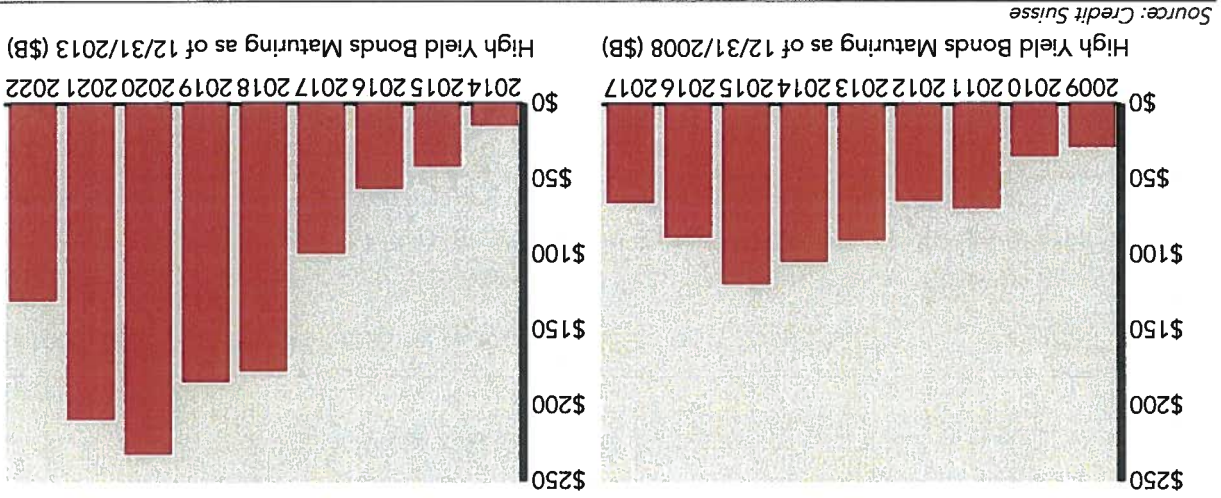


Exhibit 8 : Extension of High Yield Maturity Wall

The maturity profile of the U.S. high yield bond market is interesting to observe (Exhibit 8 below) as maturities are negligible until four years down the road, due to the recent wave of refinancings over the last few years. On the left, we see that as of 2008 year-end, maturities were negligible until 2014-2015. After the large amount of refinancings in recent years, we see that, on the right, the wall of maturity has been extended so that 2018-2021 will see a large number of high yield bonds come due. Critically, though, this expected "maturity wall" is well known by investors and has already been priced into the market.

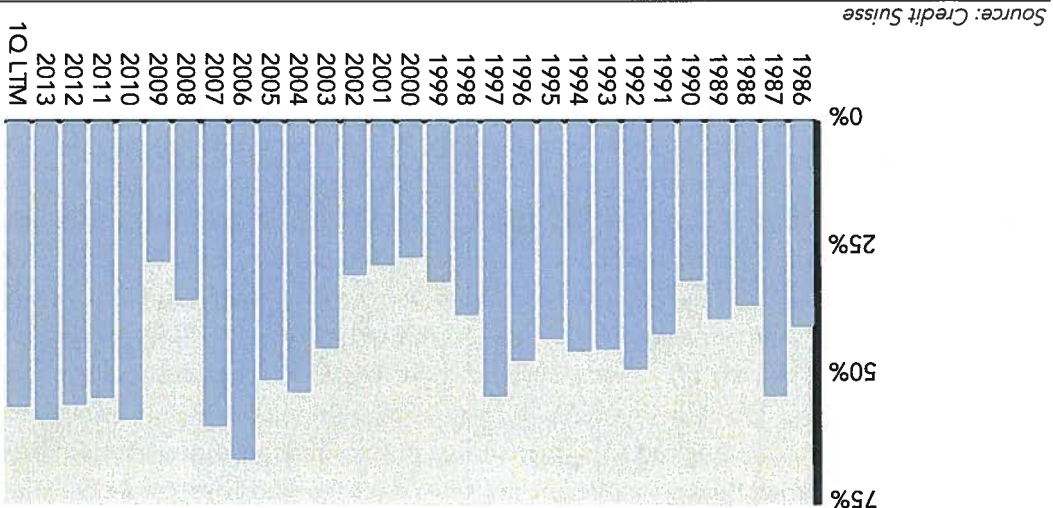


Exhibit 7: High Yield Recovery Rates

Perhaps more important than default rates are recovery rates, shown below for high yield. A decline in recovery rates appears to be a leading indicator of instability in the markets as recovery rates dropped from 1997 and 2006 peaks prior to the 2000 bubble burst and 2008 crisis, respectively. The fact that recovery rates have been relatively high and trending upwards over the last three years provides an indication of the relative safety in the current high yield market.

Source: Credit Suisse

Easier credit can also shed an early light on signs of quality deterioration. There has been a gradual uptick in payment-in-kind (“PIK”) toggle notes, which are more risky as in-kind payments create more debt and can be especially worrisome if companies do not have enough cash to service their debts. For comparative purposes, \$11.6 billion in PIK toggle notes was raised in 2013, compared with \$3.5 billion in 2011 and \$0.9 billion in 2009. But, as of now, PIK toggle notes represent less than 5% of bonds outstanding,³ a relatively small amount to prove worrisome for the overall market.

In summary, while average high yield spreads are tight and below their 20-year average, there is still about 100bps of further room for tightening. While high yield debt outstanding and new issuance continue to reach new highs, average high yield leverage ratios are at their long term average and coverage ratios have been strong and strengthening as companies have refinanced shorter maturity, higher interest debt with longer maturity, lower interest debt. Default rates remain low, recovery rates remain high and the maturity wall will not be reached until 2018. All in all, high yield still remains one of the best yielding and best total return segments of the fixed income market for 2014 and 2015.

Bank Loans

Bank loans feature floating rate coupons, which rise as rates rise. As such, they have a historical average duration of 0.25 and hence little to no interest rate risk, since their coupons are reset every three months. Coupon rates are generally pegged to the 3-month LIBOR, which tends to be closely correlated with short-term Treasury rates. Similar to high yield, the strengthening U.S. economy will continue to drive bank loan performance both in terms of price from investor demand and dependable income from low delinquencies. Bank loans are largely secured by first liens against assets, which provide downside protection. Their floating rate protects income in a rising interest rate environment and provides a hedge against inflation.

Returns in Rising Rate Periods

As we are expected to be in a long term rising rate environment, it may help to examine how the various fixed income sectors perform during periods of rising rates. The table on the next page shows the total return for high yield, bank loans, mortgage-backed securities, investment grade debt and the 10-year Treasury during each of the 13 periods when the 10-year Treasury rose throughout the last two decades. High yield and bank loans have outperformed the other sectors in all 13 periods, due primarily to their spread cushions mitigating the impact of rising rates. The amount of outperformance of high yield and bank loans over the other sectors is also strongly correlated to the amount of the rise in rates. Bank loans have been the lead outperformer prior to the crisis while high yield has been the lead outperformer after the crisis.

³ Standard & Poor's

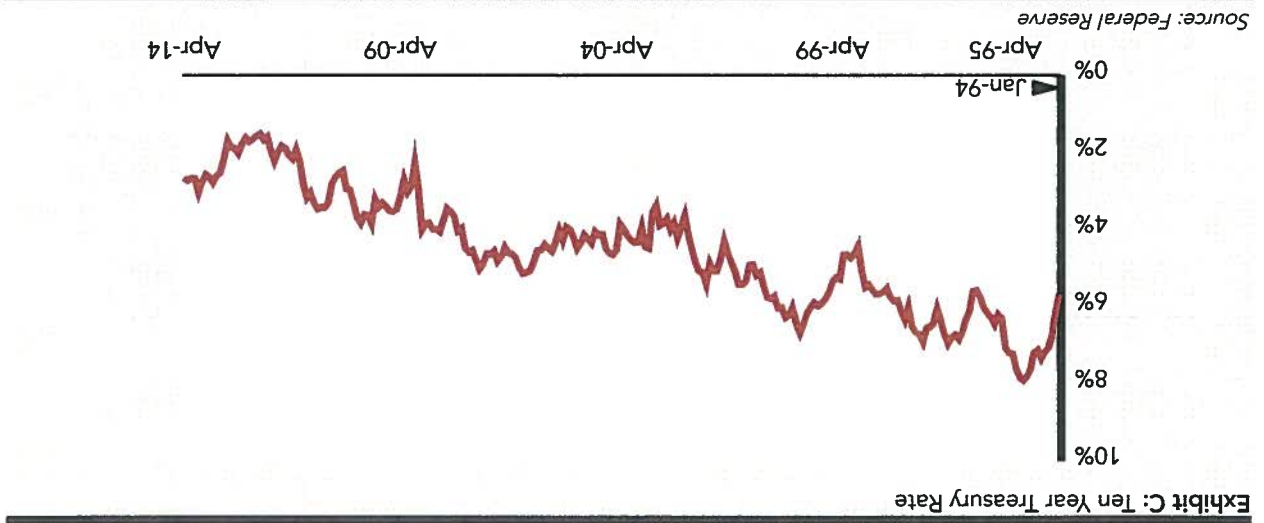


Exhibit C: Ten Year Treasury Rate

Note: Bolded numbers indicates best performing fixed income sector during period.
Source: PIMCO, Federal Reserve

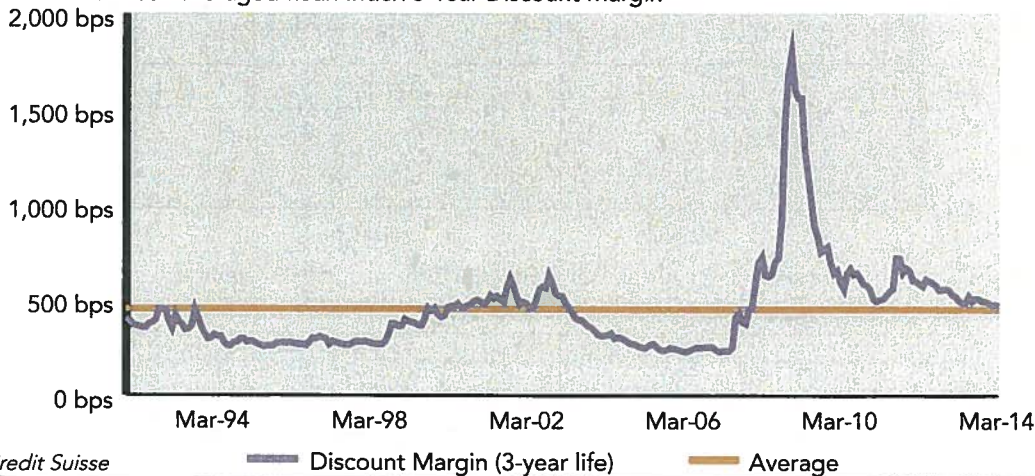
Start Date	End Date	Total Return %						10-Yr Treasury Rate %	
		High Yield	Bank Loans	MBS	Investment Grade	10-Yr Treasury	Start Rate		
Dec-95	Aug-96	4.8	5.6	0.7	-2.3	-5.5	5.6	6.9	1.4
Nov-96	Mar-97	1.7	2.5	-0.4	-2.4	-4.2	6.1	6.9	0.9
Sep-98	Jan-00	4.9	8.5	1.8	-1.7	-10.1	4.4	6.7	2.3
Oct-01	Mar-02	4.5	3.1	-0.3	-1.8	-6.8	4.3	5.4	1.1
May-03	Aug-03	2.7	1.8	-1.0	-3.8	-7.2	3.4	4.5	1.1
Mar-04	May-04	-2.2	0.6	-2.0	-3.8	-5.5	3.8	4.7	0.8
Jun-05	Jun-06	4.7	6.8	0.4	-2.1	-5.8	4.0	5.1	1.2
Post-Crisis									
Mar-08	May-08	4.6	2.9	-0.6	-0.4	-4.4	3.4	4.1	0.6
Dec-08	Jun-09	29.4	7.1	2.8	6.9	-8.7	2.3	3.5	1.3
Nov-09	Mar-10	8.1	4.9	0.1	1.3	-3.9	3.2	3.8	0.6
Aug-10	Mar-11	10.3	6.3	0.4	-0.3	-6.0	2.5	3.5	1.0
Jan-12	Mar-12	2.2	1.5	0.2	0.0	-3.0	1.8	2.2	0.4
Jul-12	Dec-13	13.8	9.6	-1.4	-0.2	-8.7	1.5	3.0	1.5

Exhibit B: Returns in Rising Rate Periods

Bank loan funds have enjoyed 95 consecutive weeks of net inflows through the first week of April 2014,⁴ reflecting investors' reach for yield and appetite for floating-rate products in an expected rising rate environment. Total inflows in 2013 were a record \$62.4 billion, over three times the inflows in 2010 of \$18 billion.⁵ As such, there are concerns about whether the market is over-levered, which we will address below.

The Credit Suisse Leveraged Loan Index was yielding 6.19% as of March 31, 2014 and had a total return of 6.15% in 2013. As shown in Exhibit 9, spreads at 473 bps are still above the historical average of 454 bps and have potential to tighten to mid-1990's and mid-2000's 230-300 bps levels. Spreads on bank loans are wider than spreads on high yield, and much wider than spreads on investment grade bonds.

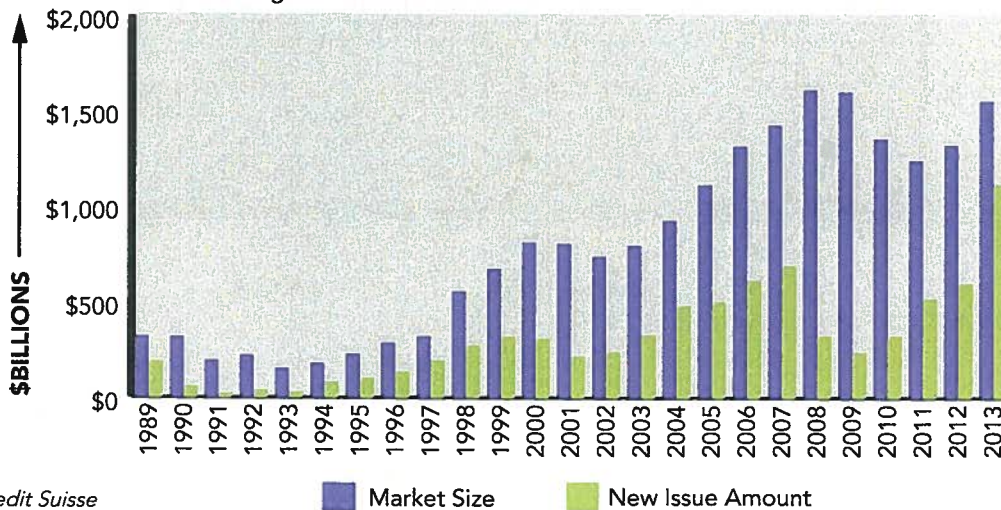
Exhibit 9: Credit Suisse Leveraged Loan Index 3-Year Discount Margin



Source: Credit Suisse

As shown below, the bank loan market size is currently \$1.5 trillion, having rebounded from the post-crisis trough of \$1.2 trillion but not yet at the \$1.6 trillion record reached in 2008. The decline in the bank loan market size from 2009 to 2011 was due primarily to high yield bonds issuances to retire existing bank loans, hence the continued growth in high yield market size in these years (shown in the previous section). However, the new issue amount has been steadily rising each year since 2009.

Exhibit 10: Bank Loans Outstanding and New Issues



Source: Credit Suisse

⁴ Financial Times
⁵ Prudential, TCW



⁶ Defined as bank loan issuer bank loan debt only/EBITDA
⁷ Defined as bank loan issuer bank EBITDA/total interest

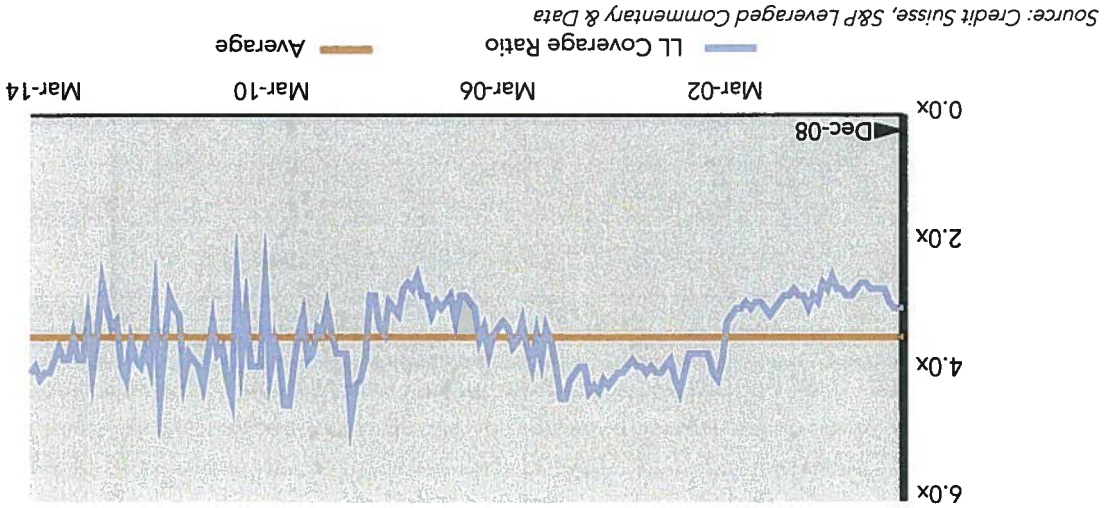


Exhibit 12: Bank Loan Coverage Ratio

The average bank loan coverage ratio⁶ (Exhibit 12) has been range-bound between 2.5x and 4.5x through the Great Recession and recovery due to a mixture of slow corporate growth and large amounts of debt refinancings at favorable interest rates to issuers. It is currently at 3.8x, above the long term average of 3.4x.

Source: Credit Suisse, S&P Leveraged Commentary & Data

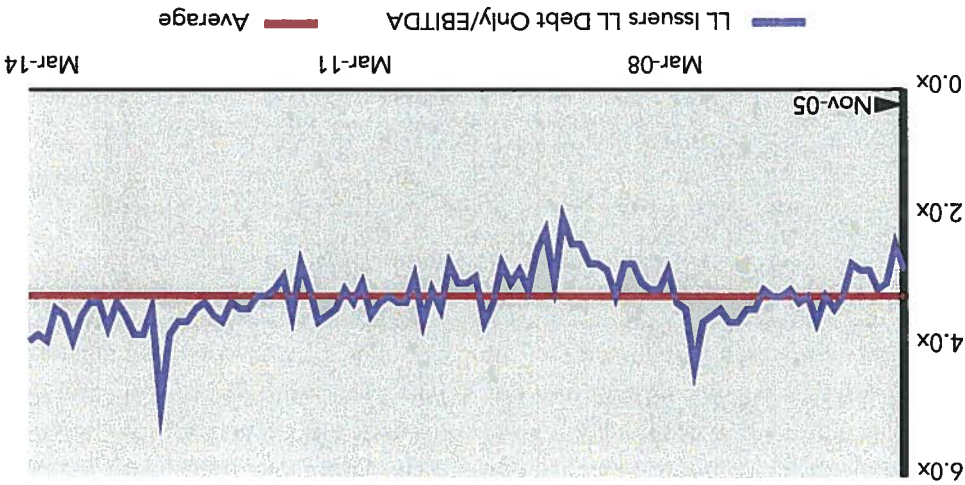
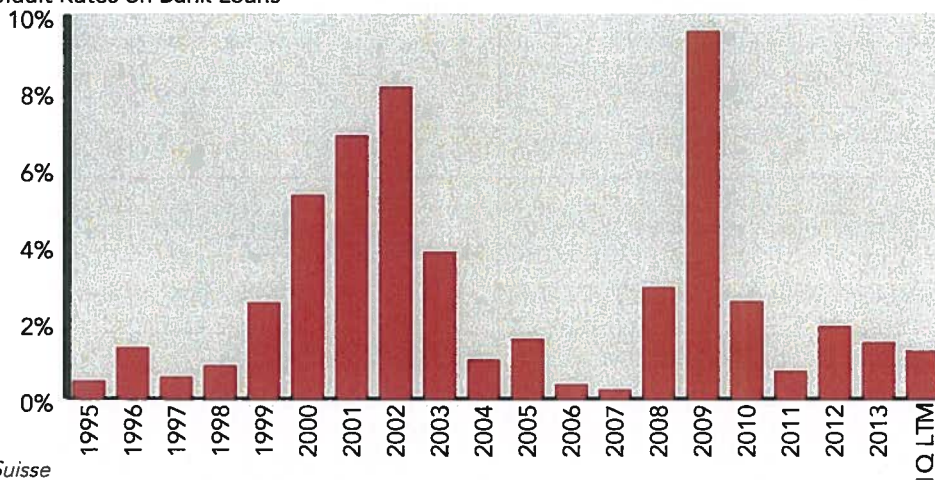


Exhibit 11: Bank Loan Leverage Ratio

Shown below in Exhibit 11 is the average bank loan leverage ratio⁷ since 2005. It peaked at 4.3x at the height of the subprime mortgage bubble in 2007 and troughed at 2.0x after the credit crisis in 2009. Since then, companies have been relieving, and a recent peak of 4.9x was reached in 2012. It has since dropped but then rebounded to the current level of 3.8x, which sits above the long term average of 3.2x.

Exhibit 13 shows that the default rate on bank loans is still relatively low at 1.99%, and has been low for the last four years. Similar to high yield, the default rates steadily crept up prior to the 2000 bubble burst, but were low and steadily declined prior to the 2008 crisis, so a low default rate is not a reliable indicator of safety in the markets. As such, we need to rely on other market indicators to determine if we are currently in a bubble environment. However, given the sluggish growth in all corners of the economy, it is difficult to conclude that a credit bubble has formed in the bank loan market at this present time.

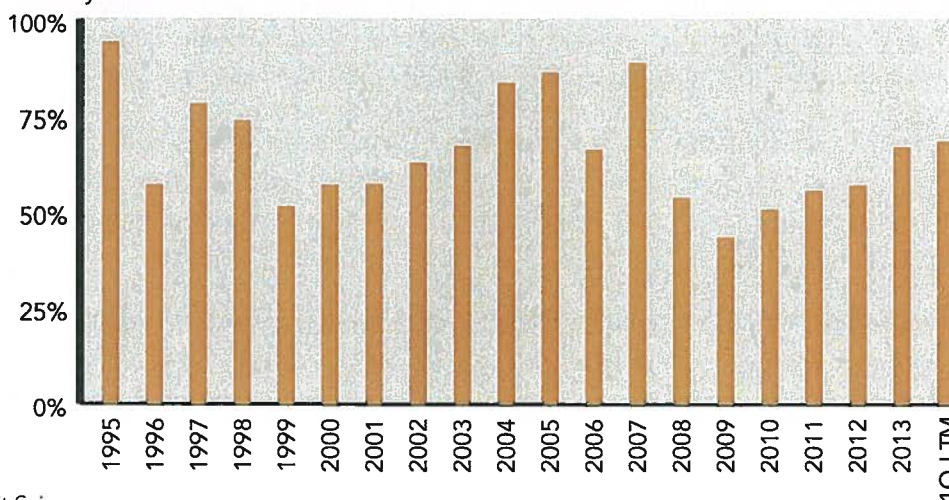
Exhibit 13: Default Rates on Bank Loans



Source: Credit Suisse

The recovery rate for bank loans has steadily increased since the crisis, as shown below. Because the recovery rate declined in the years prior to the 2000 dotcom bubble burst but jumped prior to the 2008 financial crisis, we cannot take it in isolation as a gauge for the strength of the bank loan market. Nonetheless, it is worthwhile to keep a pulse here as wide fluctuations and trends in one direction or another may shed some light on expectations for bank loans.

Exhibit 14: Recovery Rates for Bank Loans



Source: Credit Suisse

Given the recent surge of bank loan refinancings, their maturity profile is negligible until 2018.

⁸ Standard & Poor's
⁹ Standard & Poor's

The increase in cov-lite loans represents primarily a surge in demand as investors increase their risk appetite and reach for yield in this low rate environment, and secondarily a growth in the supply of borrowers as their credit fundamentals improve and they become more creditworthy.

Furthermore, it is typically the larger, more stable companies that can obtain cov-lite deals, as lenders are more comfortable with their risk profiles. A cov-lite bank loan from a large company with a positive outlook in a stable industry and a multi-decade long history might actually be more appealing than a traditional bank loan from a start-up company.

Cov-lite refers only to the replacement of maintenance covenants, e.g., the company must not exceed a stated leverage ratio or decline below a stated coverage ratio, with incurrence covenants, e.g., the company must not incur additional debt. While maintenance covenants are preferable to lenders, even cov-lite covenants can provide lenders a broad and thorough set of protections.

All bank loans, cov-lite or not, have standard positive covenants such as promptly notifying lenders of any material changes, providing regular financial statements and compliance certificates, allowing financial record and property inspections, paying taxes, complying with applicable laws and maintaining adequate insurance. Likewise, all bank loans, cov-lite or not, have standard negative covenants such as agreeing not to pay dividends, enter into additional liens, engage in M&A transactions and dispose of property.

Bank loans are still much higher in quality compared to high yield.

Bank loans have traditionally been considered safer than high yield bonds because of their higher position in the capital structure and stronger covenants. But 2013 has seen a surge in covenant-light ("cov-lite") loans, representing 57% of all loan issuance in the year, compared with 25% in 2011 and 9% in 2009.⁸ Cov-lite notes now account for 46% of all outstanding bank loans.⁹ Despite this new dynamic, bank loans are still much higher in quality compared to high yield.

Still Heavy Covenants in Cov-Lite Loans

Source: Credit Suisse

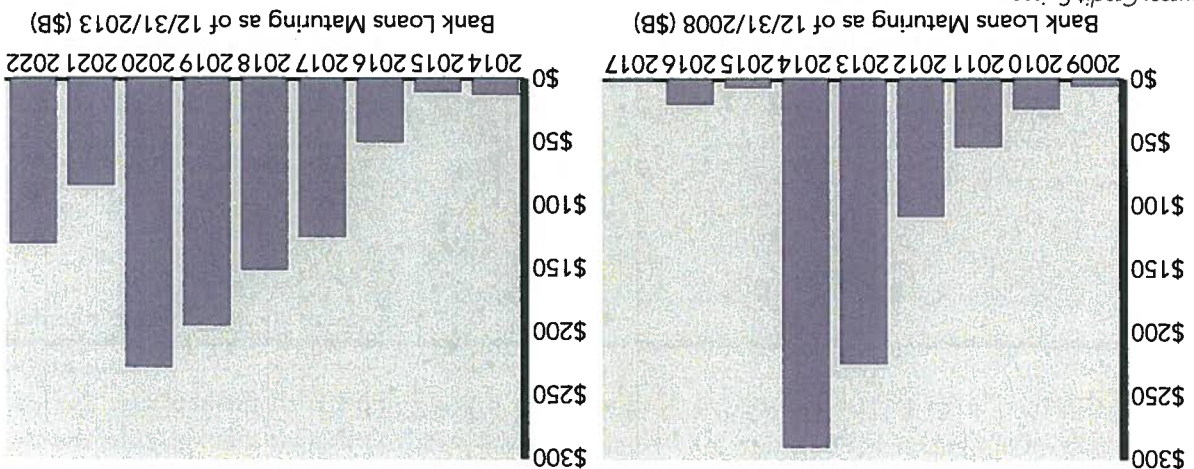


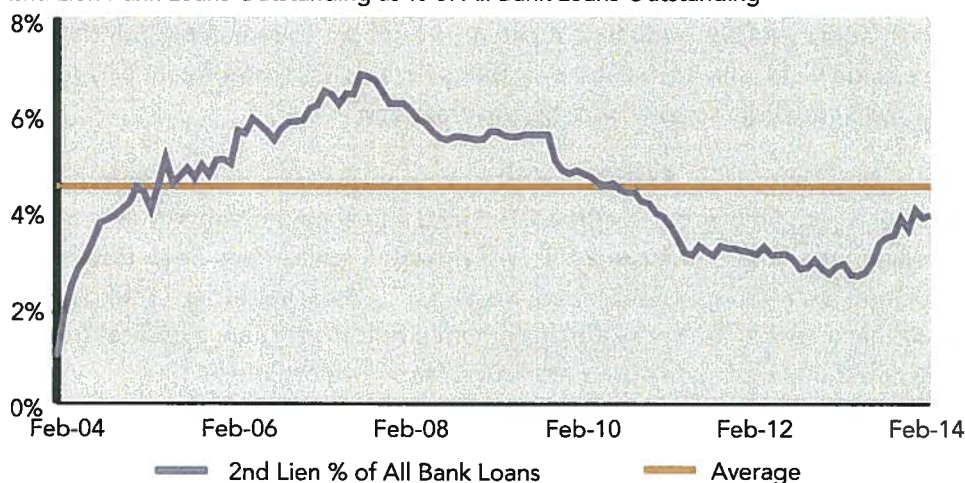
Exhibit 15: Bank Loan Maturity Wall Has Also Been Extended

The theme is very similar to that of high yield: as of year-end 2008 (shown on the left), issuers would have faced a growing mountain of maturities from 2012 through 2014. Since then (shown on the right), refinancings have pushed that mountain to the 2018-2021 timeframe.

With record net inflows, compressed spreads, rising levels of corporate debt and a dramatic increase in covenant-light loans, bank loan investors have become concerned about their investments. Beyond the metrics already discussed, another key indicator to examine is the amount of 2nd lien bank loans compared to the total bank loan market. 2nd lien loans outstanding as a percentage of the market is a useful gauge because it shows the amount of risk investors are willing to take just to hold senior secured debt that is subordinate to 1st lien holders in the event of a bankruptcy and/or liquidation. A primary concern about the amount of 2nd lien loans is that as the market heats up and investors reach more and more for yield or, as in the case of 2007, become enamored with the illusion of safety and superior yield offered by subordinated paper, companies will issue more and more 2nd lien loans to meet that demand, as was seen throughout 2006 and 2007.

The good news is that we are not yet in such an environment. As shown in exhibit 16, 2nd lien bank loans outstanding as a percentage of all bank loans outstanding is currently at 3.9%, well below the peak of 6.8% reached in 2007. While it has risen from its recent trough of 2.7% in March 2013, it is still below the 10-year average of 4.5%.

Exhibit 16: 2nd Lien Bank Loans Outstanding as % of All Bank Loans Outstanding



Source: Standard & Poor's

Although yields on bank loans have compressed over the last several years, the asset class still remains one of the most compelling fixed income investments available to institutional investors, especially relative to the much lower yields found in other sectors, as well as the expectation that rates will rise in the coming years. Overall, it appears there is still quite a bit of runway left, as spreads are still above their long term averages, coverage ratios remain high, default rates are low, recovery rates remain high and the maturity wall has been extended to 2018. Most importantly, 2nd liens outstanding are still below long term averages. Net and net, investors are best served to remain allocated to bank loans for their relatively high yields, floating rates and still-attractive fundamentals.

Non-Agency RMBS

Non-agency RMBS are backed (roughly) equally by three types of loans: prime, Alt-A, and sub-prime. Critically, all are types of mortgages so ultimately the overall health of the housing market will have an influence on the performance of non-agency RMBS investments. First though, a brief explanation of each type of loan is helpful to understand such investments:

- Prime loans¹⁰ are for very expensive homes that cannot be sold to an agency because of agencies' upper limits on mortgage size;

- Alt-A loans¹¹ are made to borrowers with average or above average credit scores but with looser loan documentation that does not conform to agency underwriting guidelines;

- Sub-prime loans¹² are for borrowers with the poorest credit rating. Underwriting is not as intensive, and consequently, interest rates are highest on this type of mortgage.

Prime mortgages' lifetime default rates typically average 10-25% with 50% recovery while, at the other end of the spectrum, sub-prime mortgages' lifetime default rates average 80-95% with a 20% recovery rate. As such, non-agency RMBS trade at a substantial discount to remaining principal, typically yield about the same as high yield, and are valued primarily on credit risk (default rate and recovery rate) and prepayment risk, with very little sensitivity to interest rate risk.

As of November 2013, there were \$830 billion of non-agency RMBS outstanding, dramatically down from the \$2.1 trillion just before the credit crisis,¹³ and there have been virtually no new issuances since 2008. Greater than 90% of the pre-2007, or "vintage," issues have been downgraded to below investment grade and are trading at deep discounts to par.¹⁴ Many investors are targeting the top AAA senior tranche of these issues, as it provides maximum credit protection, significant diversification (as each issue holds 500-2,500 mortgages) and attractive return opportunities.

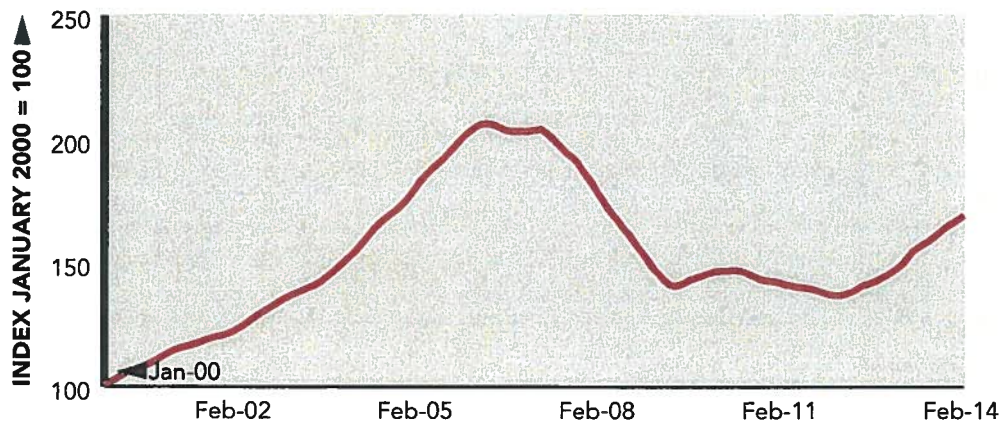
While there is no dedicated non-agency RMBS index, certain opportunistic MBS managers who maintained a high allocation to non-agency RMBS have attained roughly 20% in annualized returns over the last five years. The question is: can such outsized returns be expected over the next five years? We answer the question by examining home prices, the Fed's purchases of MBS, delinquencies, housing starts, existing home sales and mortgage rates. Collectively, the data will show that while such outsized returns are unlikely, non-agency RMBS remains an attractive segment of the fixed income market.

As mentioned at the outset of this section, non-agency RMBS valuations are positively correlated with home prices. While home price changes are often localized and can differ widely across states or even zip codes within a metropolitan area, the general home price index shown below has substantially improved since the beginning of 2012. Certainly, the Fed Reserve's Quantitative Easing ("QE") program has benefited non-agency RMBS valuations by keeping rates low, which in turn has boosted home

¹⁰ Mortgages made to the most credit-worthy borrowers with strong credit records. These mortgages meet stringent underwriting guidelines similar to those for agency mortgages by Fannie Mae and Freddie Mac.
¹¹ Includes option adjustable rate mortgages (option ARMs) that are a type of Alt-A mortgage with flexible repayment terms such as interest only, which can result in negative amortization, or an increasing outstanding loan balance over time.
¹² Extended to borrowers with the lowest credit ratings, due to limited credit history or damaged credit. These mortgages are extended with minimal asset and income verification. Because of the high default risk on these mortgages, they provide the highest interest rates.
¹³ Source: PIMCO
¹⁴ Source: Angel Oak

purchases and by extension, home prices and homeowners' ability to pay mortgages (which should reduce default rates).

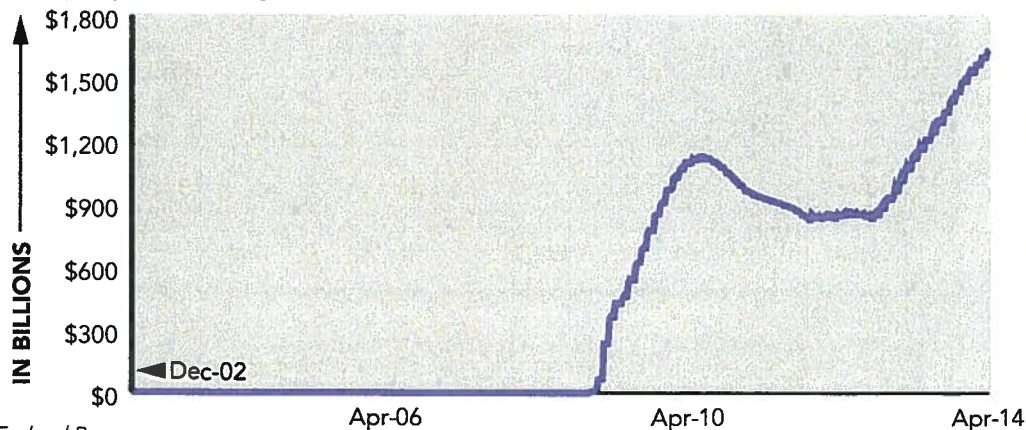
Exhibit 17: S&P Case-Shiller 20-City Home Price Index



Source: Federal Reserve

Through QE, the Fed has increased its ownership of agency MBS (not to be confused with non-agency RMBS) to over \$1.5 trillion since the Great Recession. However, the Fed's continued tapering of QE (down from \$85 billion a month in 2013 to \$45 billion per month in May) will mean the gradual exit of a large source of demand of agency MBS. As the rest of the market participants fill that gap, overall demand will naturally fall given the exit of the dominant buyer from the last five years. Consequently, prices of agency MBS should decline, with a spill-over effect to non-agency RMBS, putting a lid on their prices as well. However, much of the long term taper impact was priced into the market in 2013 when Bernanke announced, and then ultimately began, the taper.

Exhibit 18: Agency MBS Held by the Federal Reserve



Source: Federal Reserve

The delinquency rate on single-family residential mortgages, shown on the next page, has been exhibiting a downward trend due to the continued, albeit slow, improving U.S. economy, especially the decline in unemployment and improvement in personal wealth profiles. This bodes well for non-agency RMBS valuations and should continue as the economy continues to improve.

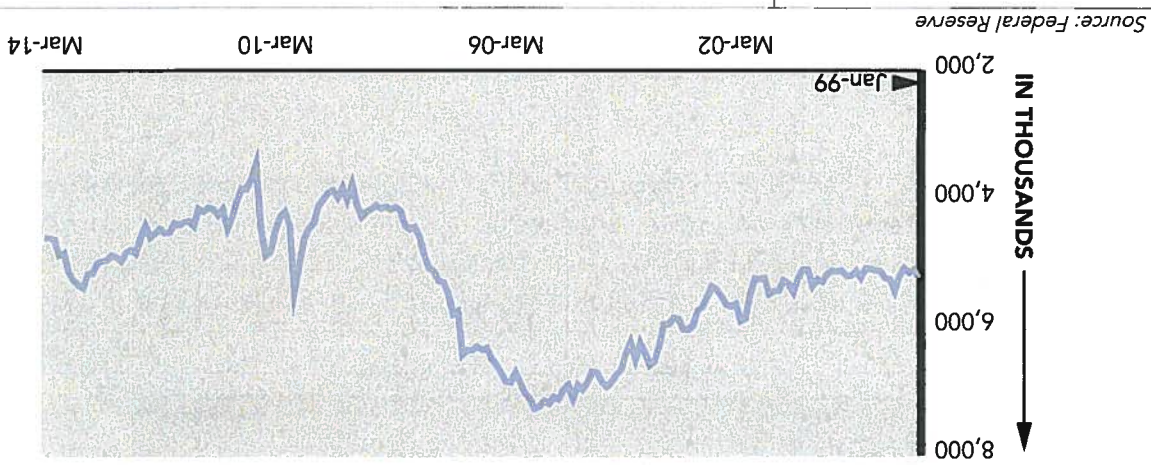


Exhibit 21: Existing Home Sales

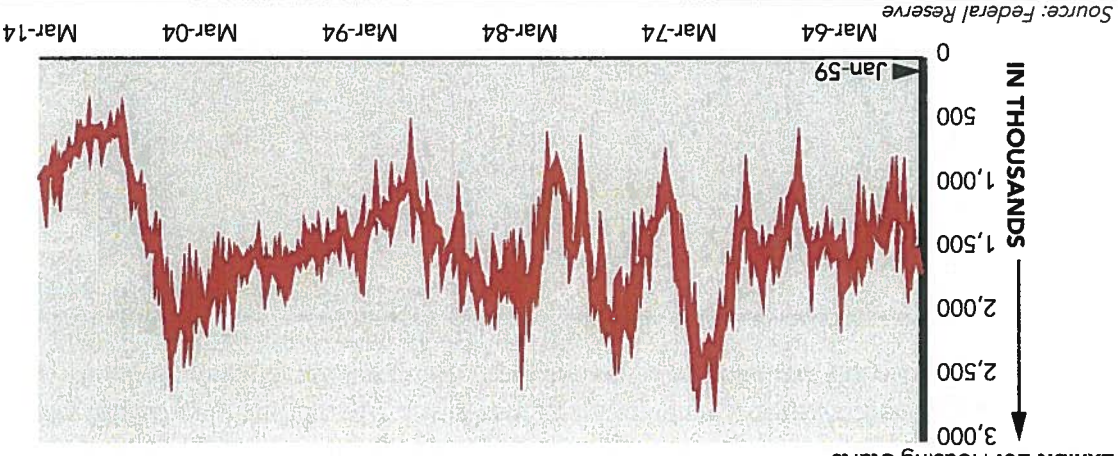


Exhibit 20: Housing Starts

Ultimately, non-agency RMBS pricing is more a function of credit and convexity and less so about rates. With GDP poised to rise, unemployment falling and home prices increasing, the current market environment should bode well for non-agency RMBS as all these optics lead to more financially sound homeowners who can make payments on their mortgages. Further momentum in the housing market is shown in the next two exhibits: housing starts and existing home sales have generally been on the rise since the end of the Great Recession, which have provided further tailwinds for RMBS security investments.

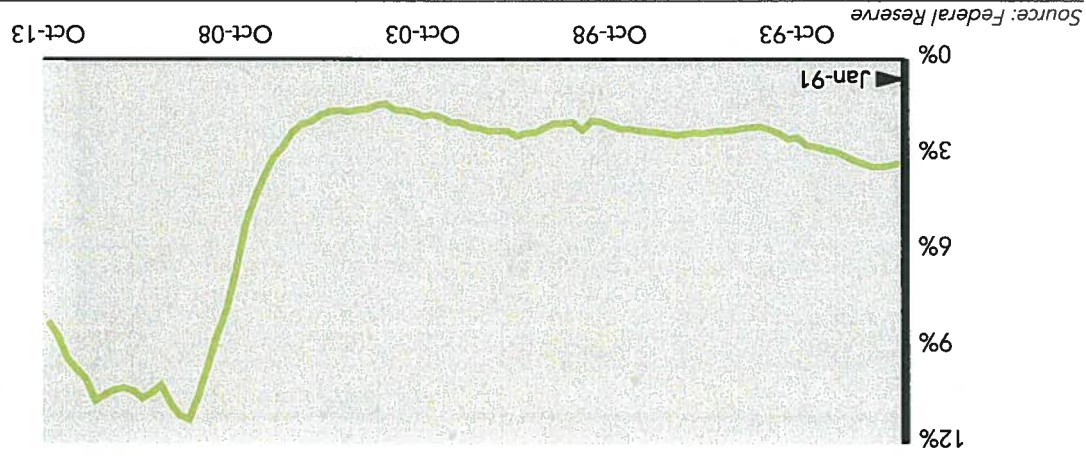
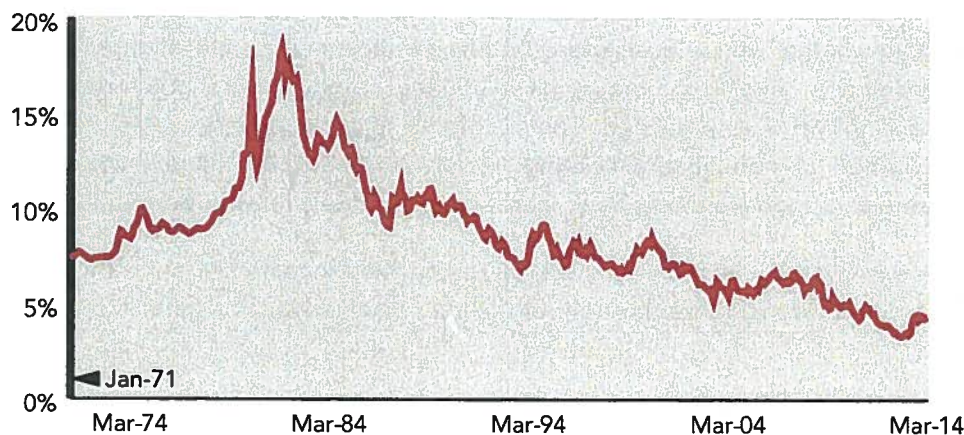


Exhibit 19: Delinquency Rate on Single-Family Residential Mortgages

Although not the primary driver of non-agency RMBS returns, mortgage rates can still have an impact on the market. The 30-year mortgage rate increased slightly over 2013 as rates rose throughout the year, and its continued rise will likely dampen new home purchases and refinancings. Prepayment risk comes into play if rates continue their downward trend from January, but rates were range-bound in February and are expected to remain range-bound throughout 2014. Thus, we do not expect prepayment risk to be a key driver to non-agency RMBS total returns.

Exhibit 22: 30-Year Mortgage Rate



Source: Federal Reserve

In summary, non-agency RMBS remains an attractive asset class for its fundamentals and as a positive economic growth play. Home prices are on an upward trajectory, delinquency rates continue to decline, housing starts and existing home sales have rebounded since the Great Recession, and mortgage rates, while slowly rising, remain well below historical averages. Moreover, the most recent data suggests that the cost of owning is still favorable to the cost of renting. Non-agency RMBS should exhibit strong relative yields of 5-6% in 2014 and 2015, along with low interest rate risk because non-agency RMBS are typically comprised of securities with floating rate coupons. Furthermore, non-agency RMBS also feature strong downside protection in the form of structural credit enhancement (via a focus on the higher tranches), diversification (non-agency RMBS are typically backed by a large pool of mortgages), low sensitivity to interest rate changes, and Yellen's continued dovish stimulus. Finally, non-agency RMBS feature strong upside potential given the recent improvement in credit performance. However, the outsized performance over the last five years cannot be expected to continue.

Recommendation

Among high yield, bank loans and non-agency RMBS, which is the most compelling U.S. fixed income sector to hold for the rest of 2014 and through 2015? High yield bonds offer better overall yield while bank loans offer better protection from duration risk. Non-agency RMBS returns will be heavily dependent on the state of the real estate market and the Fed's continued tapering of both agency RMBS and Treasury purchases. While there is still room for further tightening in both high yield and bank loan spreads (assuming a steadily recovering U.S. economy), the high yield story is closer to its finish as compared to bank loans. We recommend the most overweight position to bank loans as it is the most compelling sector with the widest spreads in the fixed income market.

We remain bullish on high yield, but not to the extent of bank loans. In terms of non-agency RMBS, we recommend that investors take advantage of it within core fixed income allocations or a dedicated opportunistic MBS manager.

The general sentiment is that we are still in risk-on mode, and that we are roughly in the 6th or 7th inning of this credit rally. North American credit default swap spreads have dropped even lower since December 2013 to their lowest since November 2007, showing continued confidence in credit. The bubble bursts from 2000 and 2008 are still in the recent memory of investors and many are rightly concerned about whether we are close to any localized bubbles. That said, all three sectors are showing very early signs of approaching their maximal valuations, but investors should not pull back just yet as these levels have not yet been breached. The risk of pulling back too early would mean an unnecessarily overweight position in non-inflation-beating sectors such as core fixed income and not leaving enough allocations to high yield and bank loans, thus ultimately leaving potential return on the table. As always, we will continue to monitor these three key fixed income sectors, as well as other sectors, and will regularly provide updates throughout the year given any major shifts in the markets. ■



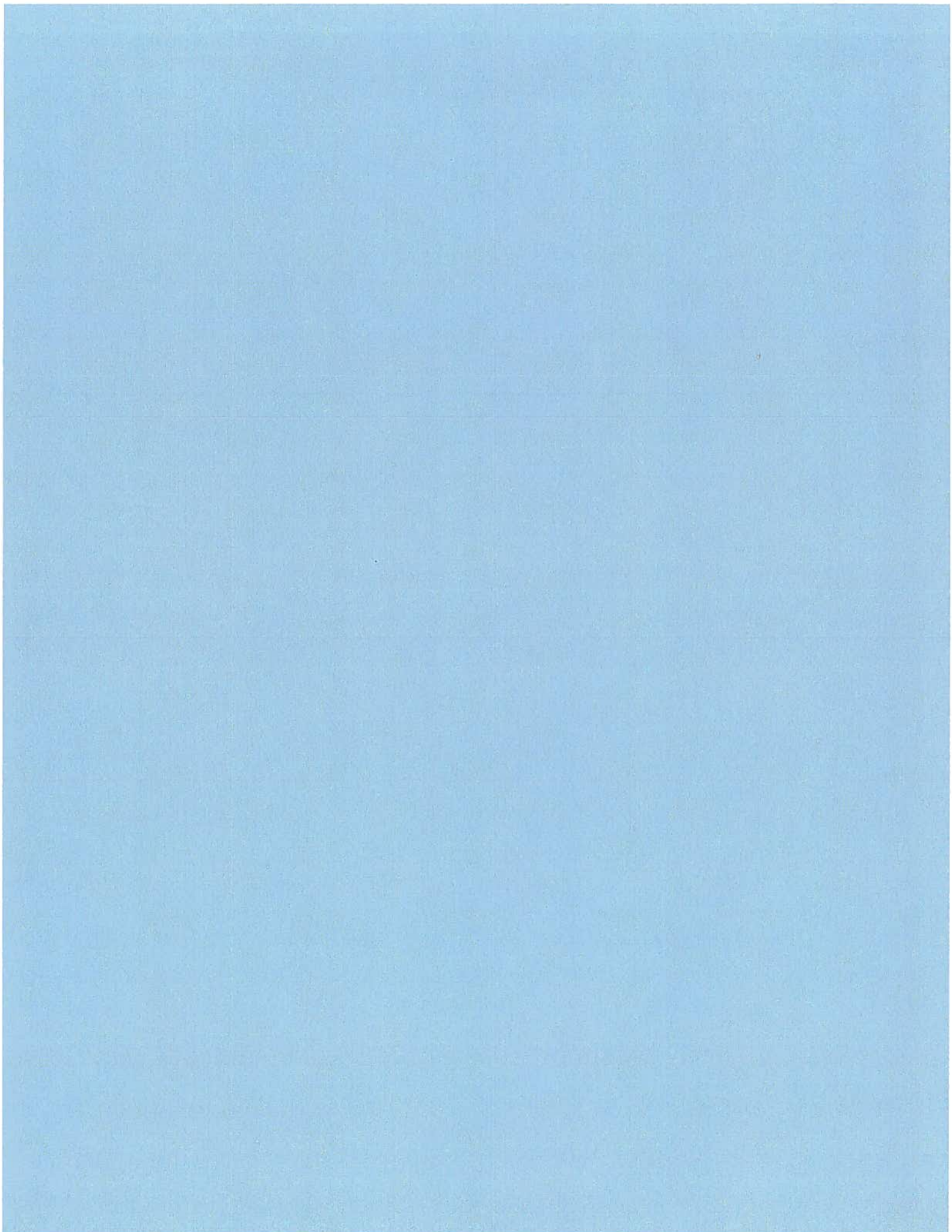
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Portfolio Rebalancing:

A Guide For Institutional Investors

May 2012

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Abstract

Failure to rebalance a portfolio can lead to a much different risk and return profile than suggested by the original asset allocation. Although straightforward in concept, the topic of rebalancing is not always understood, most especially its importance in times of market stress. In the following, we address the most common rebalancing programs utilized by investors, and investigate the advantages of each. Our analysis also covers the accretive value of rebalancing after market draw downs, along with rebalancing as it pertains to modern institutional portfolios. Finally, advice is offered for successful implementation of rebalancing programs for all institutional investors.

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Introduction

Regularly rebalancing portfolios is one of the key duties of trustees and other fiduciaries responsible for managing institutional portfolios. Asset allocations are set to provide a predetermined risk/reward profile that fits a fund's objectives and constraints. Portfolios are rebalanced when they drift away from policy target in order to maintain the risk/reward profile implicit in the original asset allocation. How often should clients rebalance their portfolios? What guidelines should clients use to determine when to rebalance? What are the costs and benefits associated with rebalancing? This paper takes a rigorous look at rebalancing, and provides some guidelines for implementing a rebalancing policy.

Methodology

We examined two approaches to rebalancing:

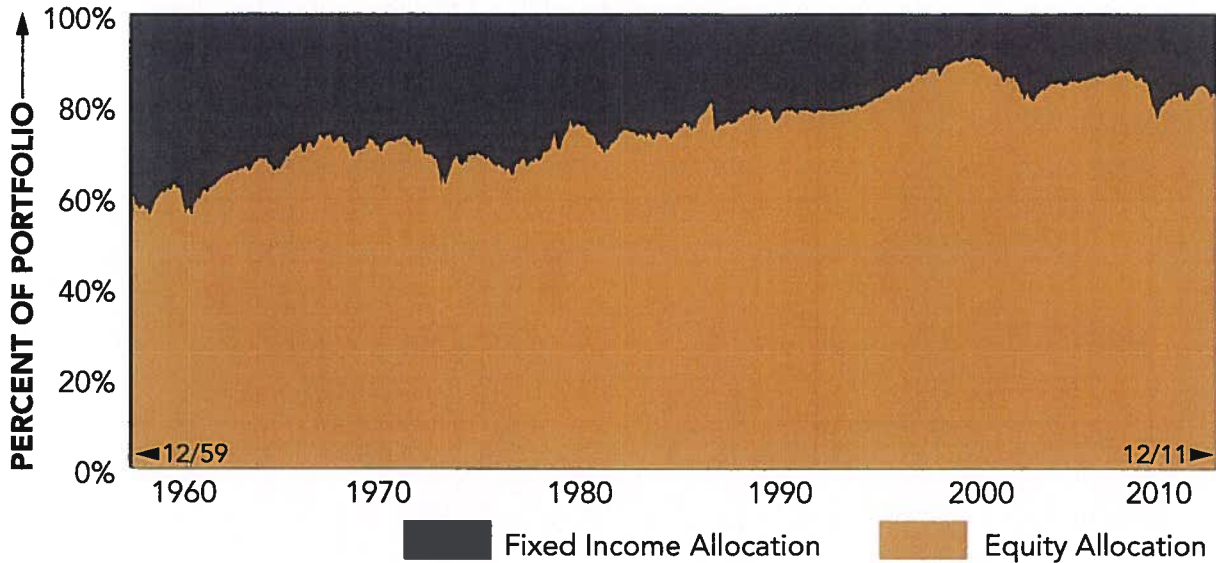
- Calendar rebalancing: Also called "time dependent" rebalancing, this strategy rebalances based on a predetermined time frame, regardless of the allocations. The most basic form of calendar rebalancing is often used by 401(k) participants, when plans are set to automatically rebalance on a monthly, quarterly, or annual basis.
- Deviation from policy target: This type of rebalancing is used by most institutional clients where predetermined ranges around policy targets are established and portfolios are rebalanced once one of the ranges is breached.

For the purposes of this paper we analyzed monthly returns for the S&P 500 (including dividends) and the BarCap Aggregate Index going back to 1926 assuming a conventional 60/40 stock/bond portfolio. We believe historical data is more instructive than simulated returns for this analysis. The time frame we analyzed includes periods of outperformance for both asset classes and is a sufficiently long time period to draw general conclusions about rebalancing. We looked at both returns and risk for portfolios that are rebalanced regularly based on predetermined parameters. Ten year rolling-return data is primarily used to examine performance and risk. The goal of this analysis is to develop guidelines around the optimal approach to rebalancing.

Why Rebalance?

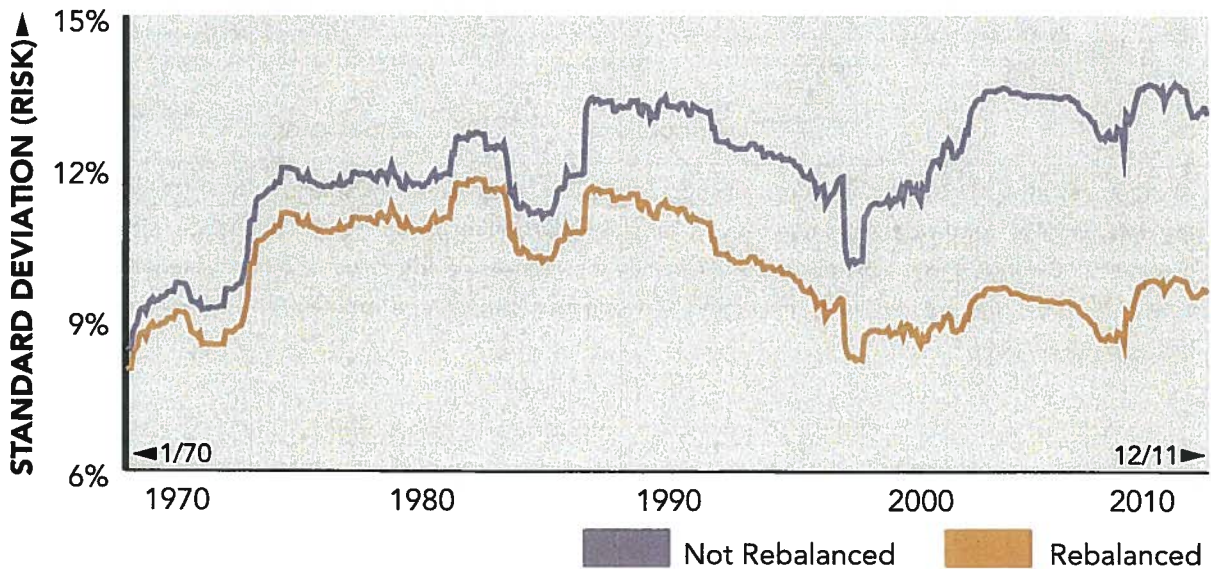
Despite the poor performance of equities over the last decade, stocks are a higher risk asset class and over long periods of time expected to generate higher returns for investors than bonds. Investors seeking to maximize returns allocate the majority of their assets to the highest risk asset class to achieve the highest possible return. However, institutional investors are not simply concerned about returns but also must take into account the amount of risk in their portfolios. Assuming too much risk in a portfolio increases the chance that the portfolio does not meet its target objective. As a result, it is important for an institutional investor to periodically rebalance his portfolio. Without periodic rebalancing, risk assets will eventually come to dominate the portfolio. For example, Exhibit 1 illustrates a 60% stock/40% bond portfolio on December 31, 1959. Without rebalancing, it would grow to 82.6% stocks and just 17.4% bonds by December 31, 2011, thus creating a very different risk profile in 2011 than the original constructed in 1959. If portfolios are not rebalanced, their risk profiles will change materially over time.

Exhibit 1: Allocation Since 1960 for a Portfolio That Is Not Rebalanced



In almost all cases, a portfolio that is not rebalanced will eventually hold a much larger allocation to equities and by extension, grow increasingly risky over the holding period. This is precisely why it is so important for clients to rebalance. As shown in Exhibit 2, a portfolio that is not rebalanced eventually becomes much riskier than a portfolio that is regularly rebalanced. Failure to rebalance exposes portfolios to greater equity risk, and leads to more volatile performance.

Exhibit 2: 3-Year Rolling Standard Deviation



Thus, the importance of rebalancing a portfolio to maintain a target risk profile should now be clear. This paper looks at what type of rebalancing program clients should implement, and the tradeoffs between different programs. For the purpose of this analysis we will discuss two types of rebalancing programs: calendar (rebalanced monthly, quarterly, or annually) and deviation from policy targets (2.5%, 5%, 7.5%, or 10% deviation).



Another way of illustrating the minute differences between monthly, quarterly, and annual rebalancing is to chart the differential in returns between quarterly vs. monthly rebalancing (Exhibit 4) and annual vs. monthly rebalancing (Exhibit 5). Exhibits 4 and 5 demonstrate that while the relative performance of different rebalancing strategies varies over time, they are very small, averaging between four (quarterly vs. monthly) and seven (annual vs. monthly) basis points annually.

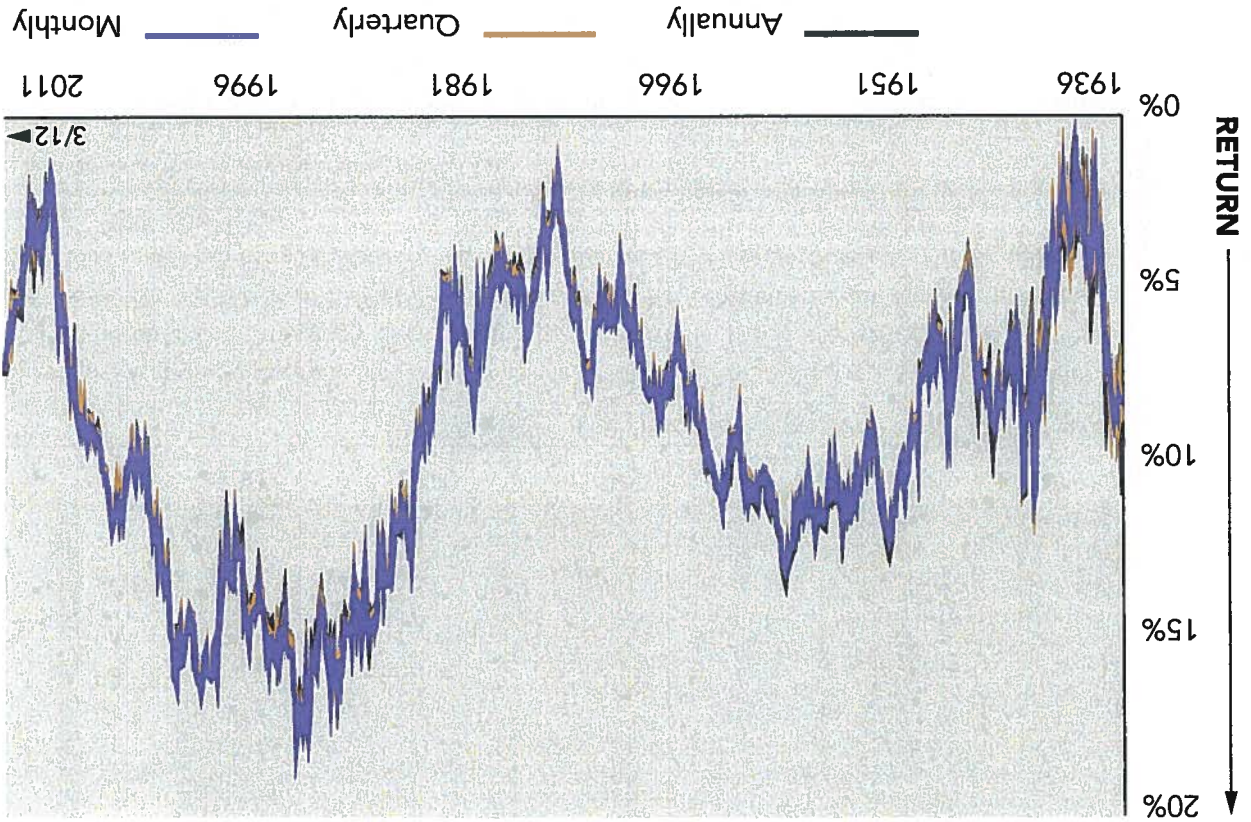


Exhibit 3: 10-Year Rolling Returns for Different Frequencies of Calendar Rebalancing

Examining rolling ten year returns since 1926, the differences in returns between monthly, quarterly, and annual rebalancing are surprisingly small. Exhibit 3 shows that the differences are almost indiscernible when shown graphically.

Calendar Rebalancing

Exhibit 4: Relative Performance of a Quarterly Rebalanced Portfolio (Compared to Monthly)

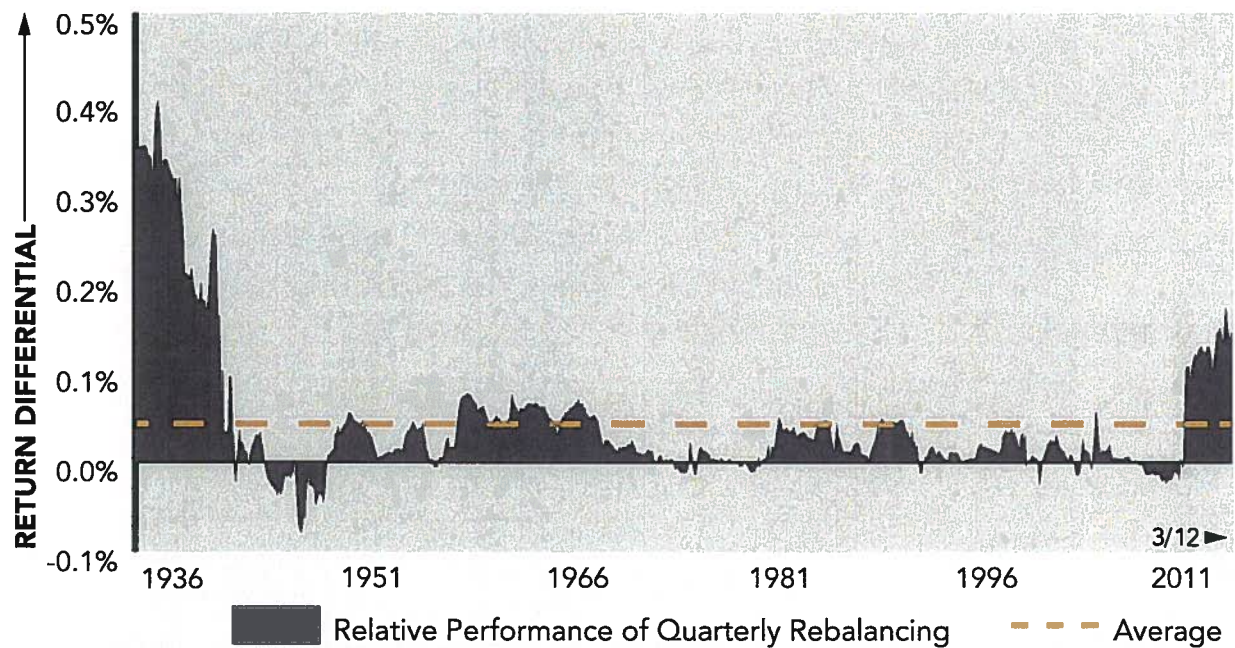
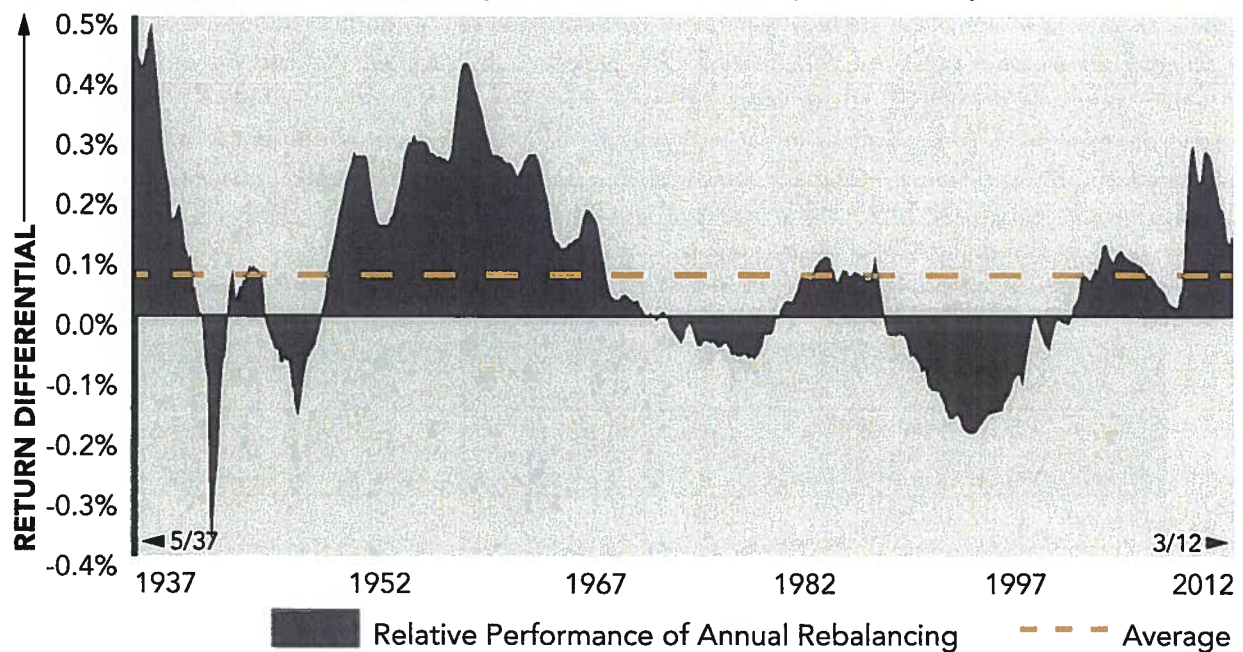


Exhibit 5: Relative Performance of an Annually Rebalanced Portfolio (Compared to Monthly)



If we assume that monthly rebalancing is the baseline against which to evaluate all other rebalancing programs, the tracking error for a portfolio that is rebalanced quarterly or annually is also quite small. Not surprisingly, as shown in Exhibit 6, tracking error increases the less frequently portfolios are rebalanced. However, since the end of the Great Depression, the tracking errors of portfolios rebalanced quarterly or annually are minimal.

Annual rebalancing appears to offer the best rolling ten year return most often. Intuitively, this makes sense since less frequent rebalancing should on average lead to a larger equity allocation, which in turn should lead to a slightly higher return. Surprisingly, annual rebalancing also tends to generate slightly lower risk portfolios over time. However, the magnitude of these differences is not large enough to be predictive about the future. The average difference in return between monthly and annual rebalancing is just seven basis points annually, while the average difference in risk is only eleven basis points.

Rolling 10 Years		Frequency			
Percentage of observations with the best Sharpe	Percentage of observations with the best return	Percentage of observations with the lowest standard deviation	Number of rebalancing events	Average equity allocation	
16.0%	19.9%	26.5%	119	60.08%	Monthly
32.4%	25.8%	22.5%	40	60.17%	Quarterly
51.6%	54.3%	51.0%	10	60.54%	Annually

Exhibit 7: Calendar Rebalancing Outcomes

The differences between various calendar rebalancing strategies are small, so to better demonstrate the tradeoffs we looked at how often each strategy generated the best outcome. To do this, we looked at rolling ten year periods ending each month since 1926 (there are 910 periods in this sample). We then analyzed how often each strategy produced the highest return, lowest risk, or highest Sharpe ratio for each of the 910 data points. For example, over the 910 observations in our analysis, monthly rebalancing produced portfolios with the highest Sharpe ratio 16% of the time. Exhibit 7 summarizes the results of different calendar rebalancing programs on a rolling ten year basis since 1926. These results do not describe the magnitude of the performance, but help to illustrate the tradeoffs inherent in different rebalancing strategies.

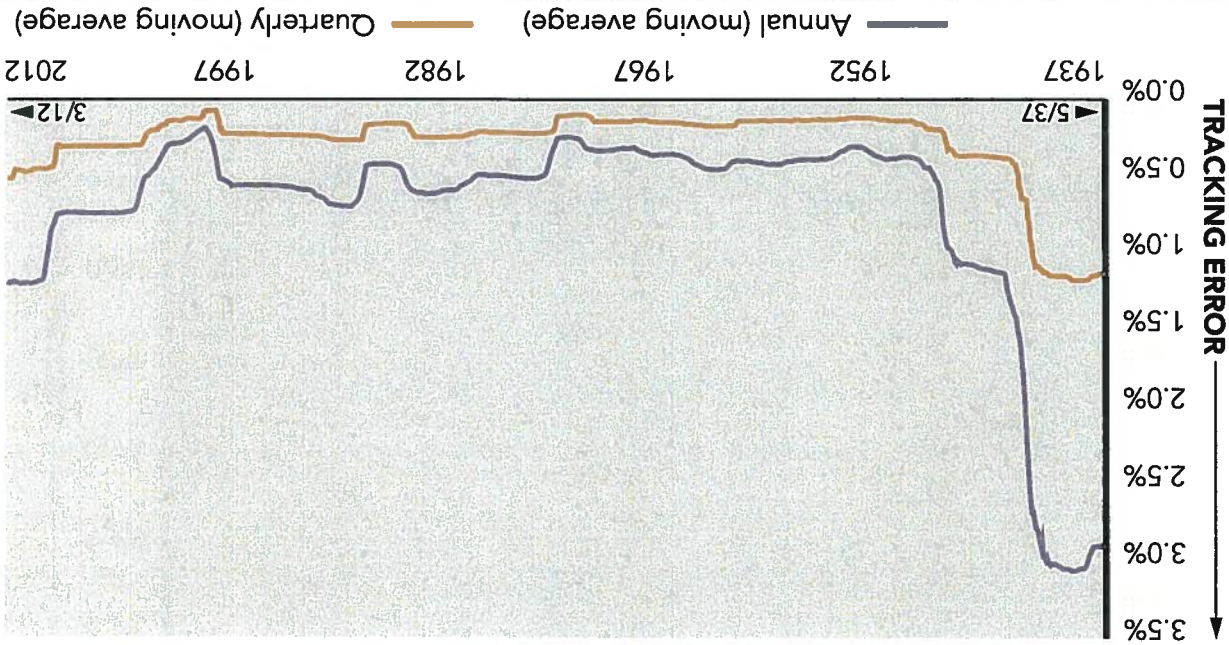
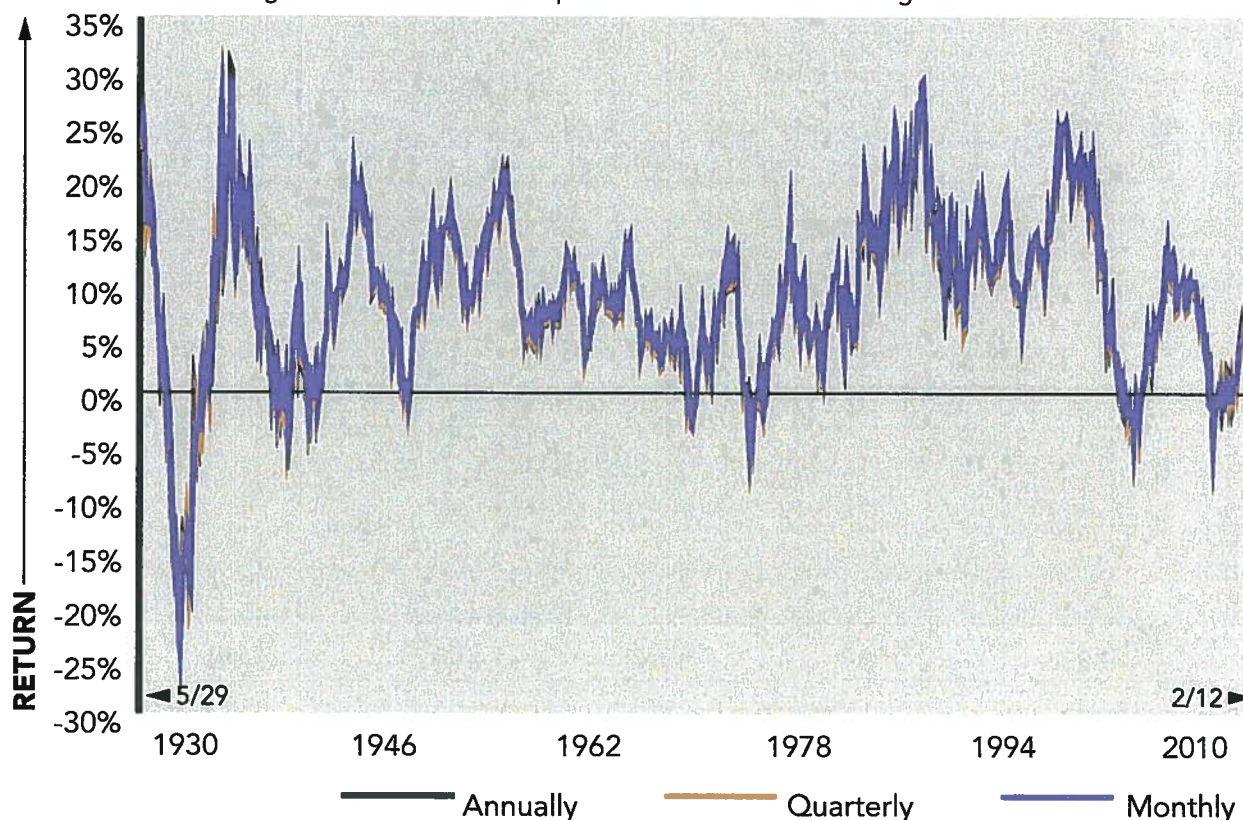


Exhibit 6: Tracking Error of Portfolios Rebalanced Quarterly and Annually

Under shorter timeframes, the same pattern emerges: annual rebalancing equates to slightly higher returns because of a higher average allocation to equities. As shown in Exhibit 8, the differences in returns over a rolling three year period also show a negligible margin between the assorted frequencies of rebalancing.

Exhibit 8: 3-Year Rolling Returns for Different Frequencies of Calendar Rebalancing



In aggregate, the analysis demonstrates that infrequent rebalancing is very effective, which is all the more notable because we do not attempt to include any estimation of the costs¹ associated with rebalancing. The costs of rebalancing will vary based on the investor, the asset classes in the portfolio, and the market environment. However, regardless of these variables, it is certain that there are costs to rebalancing. As demonstrated by the data, investors do not need to rebalance their portfolios all that often to maintain policy targets and risk profiles. Between the costs associated with rebalancing and the extremely thin margins of return and risk metrics for the different frequencies, annual rebalancing appears to be the most optimal frequency if a calendar rebalancing program is chosen.

Deviations from Policy Target

Although calendar rebalancing is appealing from an intuitive perspective, most institutional clients do not use calendar rebalancing, but instead focus on rebalancing when asset class allocations deviate substantially from policy targets. The primary benefit of range² based rebalancing is that portfolios are only rebalanced when they deviate from policy targets. Consequently, clients do not incur transaction and operational costs when unnecessary (as can be the case with calendar rebalancing). Instead of selecting a frequency by which to rebalance, clients must decide on appropriate target ranges to optimize risk and return. For the purposes of our analysis, we examine four

¹ This paper does not attempt to incorporate rebalancing costs because they can differ considerably, depending on the portfolio. However, all clients typically incur two types of costs when they rebalance: direct transaction costs (commissions) and indirect transactions costs (bid-ask spread of the security being traded).

² In this paper we define the range as the percentage of the allocation. So a 10% range around a target allocation to equities of 60% is +/-6% (i.e. 10% of the allocation).

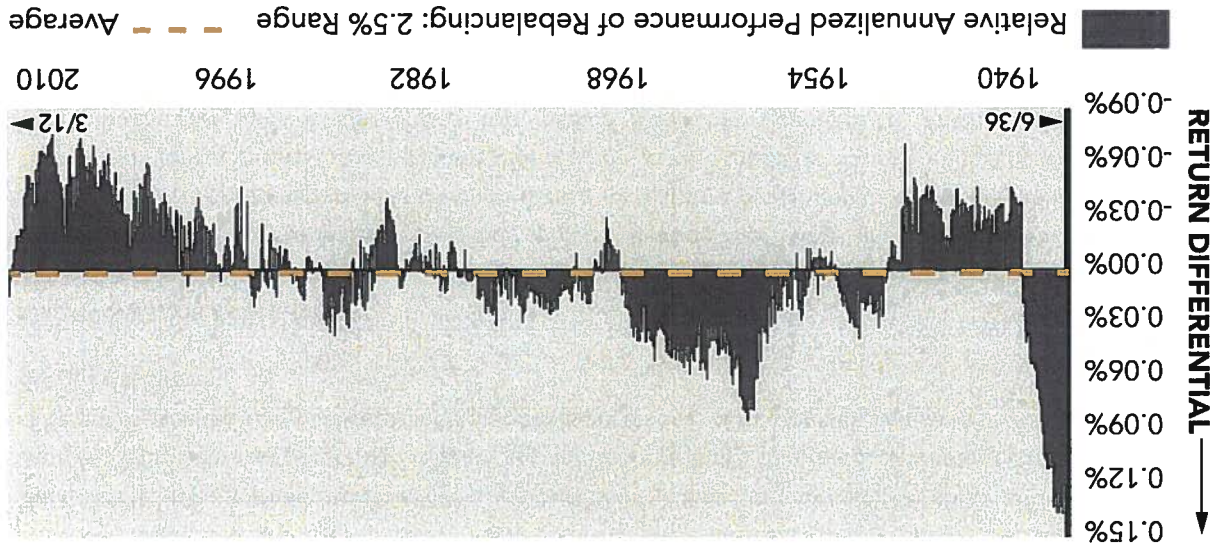


Exhibit 10: Relative Performance of a Rebalanced Portfolio: 2.5% Range (Compared to Monthly)

Similar to how we compared the different frequencies for calendar rebalancing, we now compare the relative performance of each range to the baseline case of a portfolio that is rebalanced monthly. Again, the results are favorable, with the average return of each range-based rebalancing program greater than zero (as shown by the dotted yellow line in each chart).

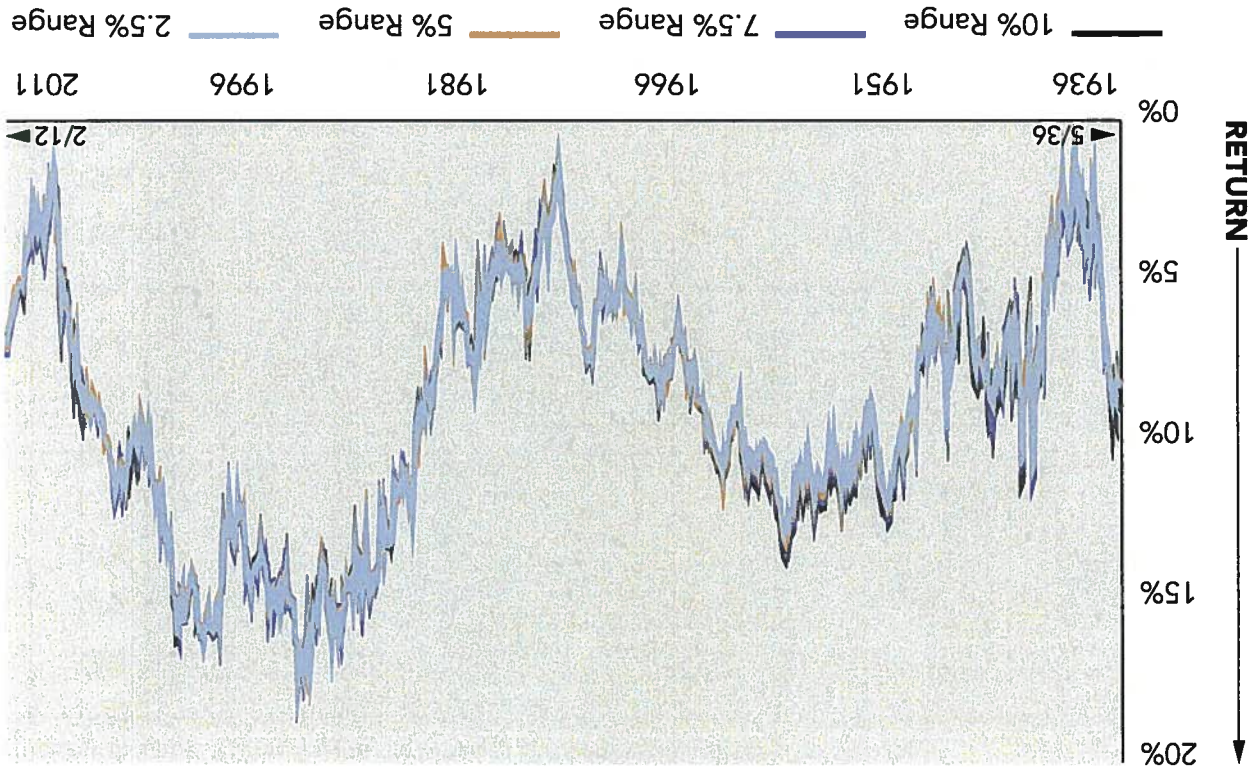


Exhibit 9: 10-Year Rolling Returns for Different Ranges of Rebalancing

ranges: 2.5%, 5%, 7.5%, and 10%. As the chart in Exhibit 9 shows, the differences in returns between the different rebalancing ranges are minimal.

Exhibit 11: Relative Performance of a Rebalanced Portfolio: 5.0% Range (Compared to Monthly)

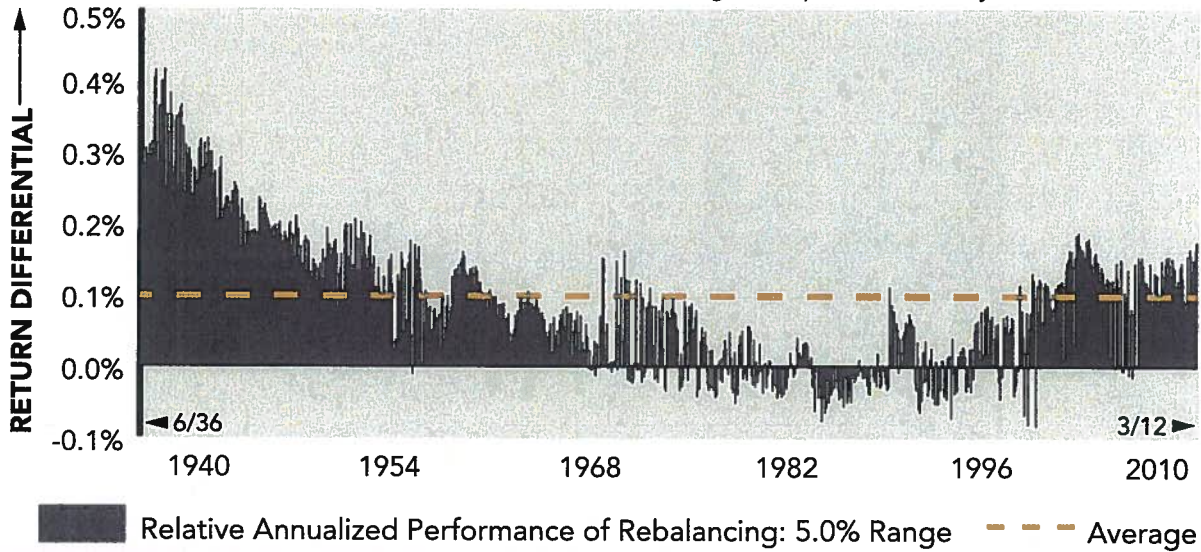
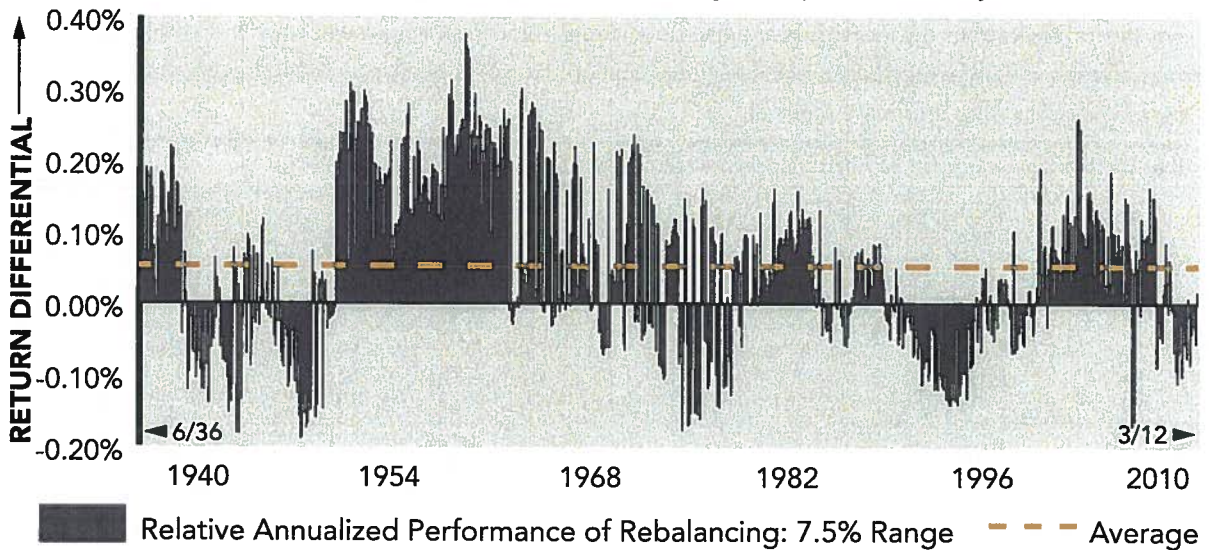


Exhibit 12: Relative Performance of a Rebalanced Portfolio: 7.5% Range (Compared to Monthly)



Clearly, there is a notable correlation between the width of the rebalancing range and tracking error. This is largely due to the average equity allocation, shown in Exhibit 15. Portfolios that are rebalanced less frequently tend to exhibit slightly more volatility driven by the higher allocation to equities. Wider ranges also lead to fewer rebalancing events and higher average returns. Conversely, portfolios with a narrow range consistently exhibit the lowest volatility, but at the expense of lower returns.

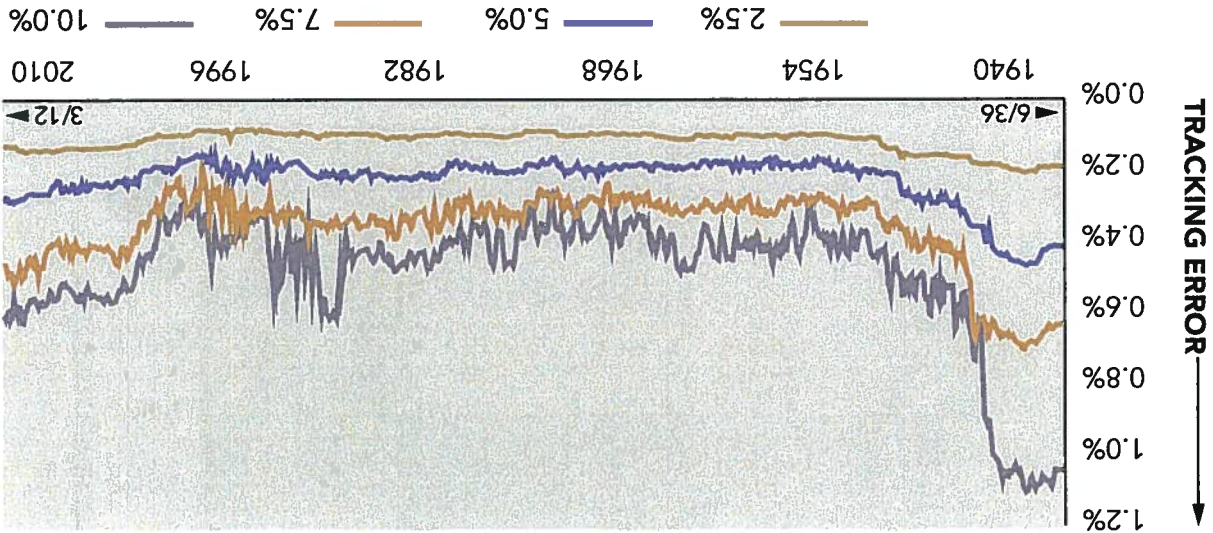


Exhibit 14: Tracking Error of Portfolios Rebalanced Based on Deviation from Target

If we again assume that monthly rebalancing is the baseline for comparison, the tracking errors of portfolios rebalanced for various target ranges are also quite small. Not surprisingly, as shown in Exhibit 14, tracking error increases the wider the range around the target allocation. However, similar to calendar rebalancing, the differences between the tracking errors are minimal.

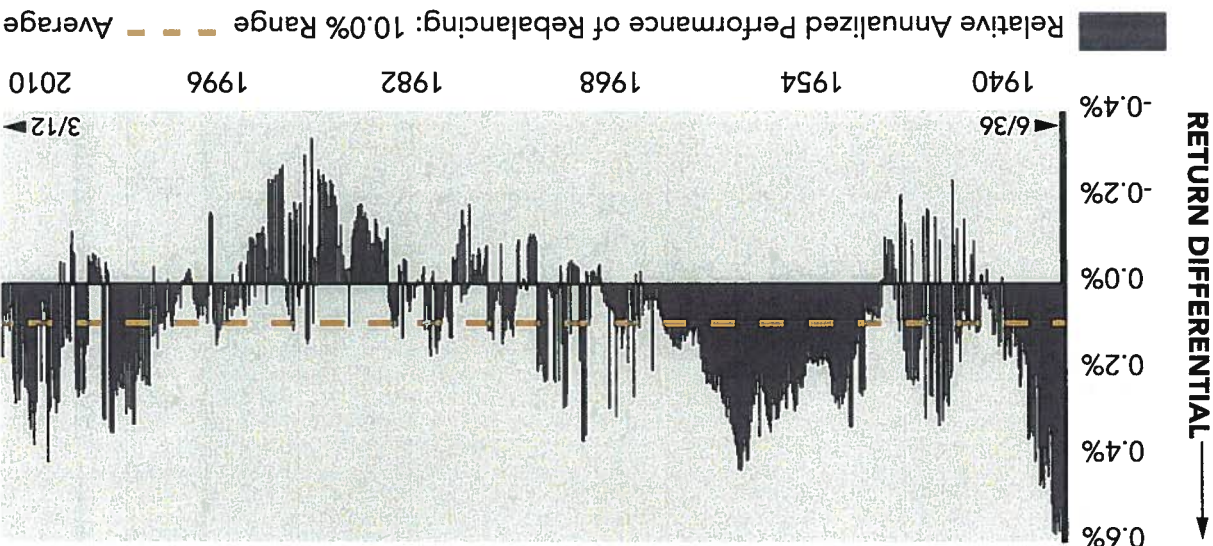


Exhibit 13: Relative Performance of a Rebalanced Portfolio: 10.0% Range (Compared to Monthly)

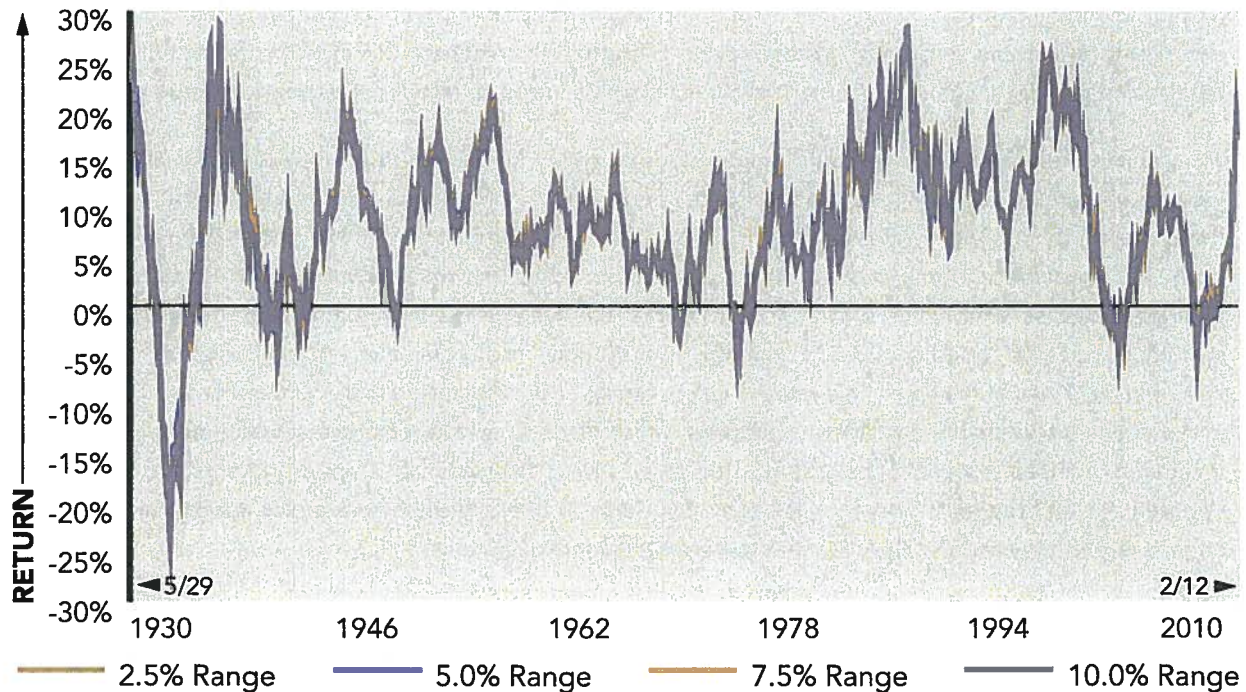
Exhibit 15: Range Based Rebalancing Outcomes

Range	Rolling 10 Years				
	Percentage of observations with the best Sharpe	Percentage of observations with the best return	Percentage of observations with the lowest standard deviation	Number of rebalancing events	Average equity allocation
2.5%	27.3%	16.5%	41.9%	30	60.19%
5.0%	16.0%	9.5%	15.4%	14	60.48%
7.5%	28.6%	27.7%	21.4%	7	60.77%
10.0%	28.0%	46.3%	21.3%	5	61.18%

Exhibit 15 depicts a clear tradeoff between the risk and return of portfolio rebalancing ranges. More frequent rebalancing generally leads to a lower risk portfolio. However, over longer time periods the reduction of risk usually comes at the expense of slightly lower returns, thus the best Sharpe ratios are fairly evenly distributed. It should be noted that - as we demonstrated earlier - the differences in return and risk, while quantifiable, are very small and may be irrelevant to many investors. Over a ten year period, the annualized average difference in returns is between zero and nine basis points, depending on which range is utilized. Ultimately, the type of rebalancing program an investor implements is likely to have a far smaller effect on the realized performance of the portfolio than transactions costs, management fees, and the timing of cash flows into and out of the fund.

These same themes are apparent when looking at shorter time periods as well. As shown in Exhibit 16, the differences in returns between the various rebalancing strategies over a rolling three year period are also small.

Exhibit 16: 3-Year Rolling Returns for Different Ranges of Rebalancing



The benefit of rebalancing is also evident after the bond market has performed poorly. Looking at the bottom 5% of monthly bond market returns (monthly return less than or equal to -3.17%) since 1926, rebalanced portfolios outperformed portfolios that were not rebalanced over the subsequent three year period 79.2% of the time. The average outperformance of the rebalanced portfolios was 0.26% annually. However, unlike rebalancing after equity market stress, rebalancing after poor bond market returns led to lower risk portfolios over the subsequent

To examine the effect of rebalancing during periods of equity market stress we looked at the subsequent three year annualized returns after poor equity market performance. We define poor equity market performance as the bottom 5% of monthly returns (monthly return less than or equal to -7.88%) since 1926. The subsequent three year annualized returns were equal or better for portfolios that were rebalanced 74% of the time. Looking at all periods that fall into the bottom 5% of returns, the average outperformance (including when rebalanced portfolios underperformed) was 0.62% annually. Interestingly, rebalancing also led to a higher portfolio standard deviation (risk) 70% of the time. This actually makes sense, since rebalancing into equities after poor equity market performance increases the allocation to equities, which leads to greater portfolio volatility over the subsequent timeframe (compared to not rebalancing). Increased risk in this instance is appropriate as there is a tradeoff between risk and return. If portfolios are too "low risk" (i.e. the allocation to equities is significantly below the original target) they are less likely to meet investors' return expectations.

Intuitively, investors already know that rebalancing is the key to maintaining target asset allocations. Earlier analysis has demonstrated that portfolios which are not rebalanced typically become riskier since historical equity market outperformance (relative to bonds) translates to a higher overall equity exposure and hence, risk. Despite this pattern, the topic of rebalancing comes up in board rooms most often when equity markets have underperformed and investors are more sensitive to further losses. It is at these moments when investors are tempted to abandon rebalancing programs due to concerns that rebalancing will increase the risks and lower the returns of portfolios.

Rebalancing during "Higher Moments" in the Capital Markets

Rolling 10 Years					
Range	Percentage of observations with the best Sharpe	Percentage of observations with the best return	Percentage of observations with the lowest standard deviation	Number of rebalancing events	Average equity allocation
Annual	32.5%	16.0%	46.0%	10	60.54%
2.5%	22.8%	16.8%	33.5%	30	60.19%
7.5%	23.2%	23.4%	6.1%	7	60.77%
10.0%	21.5%	43.8%	14.4%	5	61.18%

Exhibit 17: Rebalancing Outcomes

Exhibit 17 illustrates the relative benefits of target versus calendar rebalancing. The results point to some of the same conclusions already discussed: there appear to be tradeoffs between the frequency of rebalancing, higher returns, and lower risk. Portfolios that are rebalanced more frequently tend to exhibit slightly less volatility, while less frequent rebalancing usually leads to higher returns. However, a range based approach appears to be the most effective way to limit the number of rebalancing events and generate attractive returns. By comparing Exhibits 6 (calendar rebalancing) and 14 (deviation from target rebalancing) we see that the tracking errors tend to be lower for portfolios that are rebalanced based on deviations from target. This allows investors to more closely track the returns of their target asset allocations with fewer rebalancing events.

three years 56% of the time. Although the benefit of higher returns was smaller, rebalancing back into bonds usually led to a less risky portfolio.

These results demonstrate that during periods of capital market stress it is important to continue to rebalance. Rebalancing achieves the appropriate risk and return objective implicit in the original asset allocation and usually adds to total portfolio return.

Multi-Asset Class Portfolio

To this point, our analysis has focused on a two asset class portfolio because there is significantly less historic data for other asset classes. However, modern institutional portfolios typically have more than two asset classes. It is reasonable to wonder whether the results we have found for a two asset class portfolio hold as more asset classes are added to the portfolio. To do this, we split the equity allocation into U.S. (S&P 500) and non-U.S. (MSCI EAFE) stocks, while leaving the bond allocation unchanged at 40%.

Exhibit 18: Rebalancing Outcomes for a Multi-Asset Portfolio

Rolling 5 Years				Rolling 3 Years			
Range	Best Sharpe	Best Return	Lowest Standard Deviation	Range	Best Sharpe	Best Return	Lowest Standard Deviation
2.5%	28.9%	21.6%	40.9%	2.5%	43.7%	36.4%	51.9%
5.0%	28.0%	31.9%	24.1%	5.0%	26.0%	22.5%	20.8%
7.5%	16.4%	14.7%	17.7%	7.5%	16.0%	19.9%	13.9%
10.0%	26.7%	31.9%	17.2%	10.0%	14.3%	21.2%	13.4%

Not surprisingly, many of the same themes we observed in the two asset portfolio appear here as well. Over a longer time frame (five years) there does appear to be some tradeoff between risk and return as portfolios that have wider ranges tend to have higher returns, but slightly higher risk. It should also be noted that as we mentioned previously, the differences in returns (i.e. the magnitude of these results) are not significant.

Going one step further, we evaluated a diversified portfolio that more closely resembles a modern institutional portfolio, with allocations to thirteen distinct asset classes. Notably, performance data only goes back to 1990 so historical data is limited.

Exhibit 19: Average Allocations for a Multi-Asset Portfolio

Asset Class	Agg Bond	High Yield	Large Value	Large Core	Mid Growth	Small Value	Intl SC
Target	20.0%	10.0%	5.0%	9.5%	6.5%	5.5%	5.0%
2.5%	19.3%	9.9%	5.1%	9.5%	6.6%	5.7%	5.0%
5.0%	18.8%	9.8%	5.1%	9.6%	6.7%	5.8%	5.0%
7.5%	18.7%	9.7%	5.2%	9.7%	6.7%	5.9%	5.0%
10.0%	18.9%	9.8%	5.2%	9.8%	6.7%	5.9%	4.9%

Asset Class	Intl Core	EM	REITs	GSCI	Eq Hedge	FoF	Avg. # Rebalance Events
Target	10.5%	4.0%	10.0%	4.0%	3.0%	7.0%	
2.5%	10.4%	4.3%	10.4%	3.9%	3.1%	6.9%	2.2
5.0%	10.2%	4.4%	10.6%	3.8%	3.3%	6.8%	0.7
7.5%	10.2%	4.4%	10.7%	3.8%	3.3%	6.8%	0.3
10.0%	10.0%	4.4%	10.6%	3.8%	3.4%	6.8%	0.1



- Target ranges should also account for the liquidity of the asset class; rebalancing should be driven
- Clients that have significant concerns about overall portfolio volatility should use narrower ranges, keeping in mind that less frequent rebalancing is preferable.

Size of Allocation	Percentage Range (+/-)	Absolute Range (+/-)
Up to 5%	+/- 20%	+/- 1.0%
6% to 19%	+/- 15%	+/- 1.5%
Greater than 20%	+/- 10%	(variable)

- Marquette recommends the following ranges based on the size of the allocation:
 - For clients that focus on target ranges to guide rebalancing, wider is better. However, less frequently rebalanced portfolios do exhibit slightly higher risk.
 - Target ranges are the optimal way to rebalance because they minimize rebalancing events and tracking error compared to the target asset allocation.
 - The differences in risk and return between various types of rebalancing are minimal.
- Investors should implement a rebalancing program that leads to relatively infrequent rebalancing in order to minimize transaction costs.

conclusions from the paper:


The material presented in this paper demonstrates that the portfolio outcomes from different rebalancing strategies are relatively similar. As such, there is a considerable amount of room for investors to implement a rebalancing program that best suits their constraints. However, all rebalancing programs should incorporate the following

Implementation

Rolling 5 Years			
Range	Best Sharpe	Best Return	Lowest Standard Deviation
2.5%	66.3%	38.0%	66.3%
5.0%	16.3%	36.1%	16.3%
7.5%	7.7%	13.4%	7.7%
10.0%	9.5%	12.4%	9.5%

Exhibit 20: Rebalancing Outcomes for a Modern Institutional Portfolio

What stands out is the small number of rebalancing events. Even with the tightest range (2.5%) around the asset classes, the portfolio is diverse enough that there are just over two rebalancing events every five years. For portfolios with wider ranges, portfolios can often go years without rebalancing. Looking at portfolio outcomes, Exhibit 20 demonstrates the consistent relationship between the risk of the portfolio and the range around the target. While the return data also indicates that tighter ranges led to better outcomes, this is misleading; because the portfolios are rebalanced so infrequently, the portfolios with ranges of 5.0% or more generated the same return. As a result, the frequency with which wider ranges generate the best performance is understated. Transaction costs are not included in this example, but would undoubtedly add sufficient costs to the narrower ranges to make them less efficient than larger ranges for rebalancing. The limited historical data also makes this analysis less robust than the analysis based on data going back to 1926. However, many of the themes that were apparent in our analysis hold true as more assets are added to a portfolio. Similar to rebalancing the two asset portfolio, the differences between these strategies are very small, ranging from zero to five basis points annually.



primarily by the large, liquid allocations. Less liquid allocations should have wider target ranges since they are difficult and costly to rebalance.

- For clients that find it difficult to regularly monitor portfolio allocations, annual rebalancing is simple, minimizes transaction costs, and achieves an appropriate amount of risk reduction.
- When rebalancing, clients should rebalance back to target.³
- Cash flows are a very effective tool for rebalancing, and help to limit explicit and implicit transaction costs incurred when portfolios are rebalanced.
- The most important component of a rebalancing program is to adhere to it consistently over time to ensure that the portfolio is rebalanced, regardless of the prevailing market environment.

Rebalancing is really about reducing risk in a portfolio by maintaining an asset allocation that meets an investor's objectives. Portfolios do not need to be rebalanced very often to benefit from significant risk reduction (compared to a portfolio that is not rebalanced). The data is not conclusive about the best type of rebalancing to implement, therefore, clients should select a rebalancing program that fits their needs. Clients unable to monitor portfolios regularly may prefer annual rebalancing. Clients that want less volatile portfolios may set tighter ranges around asset class target allocations. Most importantly, clients should adopt a rebalancing program and adhere to it during various market cycles. The only rebalancing mistake that investors could make is when they abandon their rebalancing policies.

³ A considerable amount of ink has been spilled over exactly how a client should "rebalance". Arnott and Lovell (1993) argued that clients rebalance back to target, which is what Marquette recommends. Leland (2000) then recommended that portfolios should only be rebalanced back to within the target range. Masters (2003) attempted to better account for transaction costs and argued portfolios should be rebalanced back to the "mid-point", halfway between the target allocation and the current allocation. Both Leland and Masters make a number of assumptions about transaction costs, client risk tolerance, and asset classes that are not constant across different clients. The primary objective of rebalancing is to maintain a predetermined asset allocation, thus Marquette recommends rebalancing portfolios all the way back to target.



About Marquette Associates

Marquette Associates is an independent investment consulting firm that guides institutional investment programs with a focused three-point approach and careful research. For over 25 years Marquette has served this mission in close collaboration with clients – enabling institutions to be more effective investment stewards. Marquette is a completely independent and 100% employee-owned consultancy founded with the sole purpose of advising institutions. For more information, please visit www.marquetteassociates.com.

guarantee future results.

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CGFA

Commission on Government Forecasting and Accountability

Analysis of Fee Savings and Transaction Costs
due to the Potential Consolidation of the
Downstate Police and Firefighters' Pension
Funds

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PROJECT OVERVIEW & SCOPE

The Commission on Government Forecasting and Accountability (“the Commission”) has retained Marquette Associates, Inc. (“Marquette”) to conduct a study that examines the projected costs and potential fee savings associated with a potential consolidation of the independently-invested downstate police and firefighters’ pension funds (“the Downstate Pension Funds”) into a single, unified investment pool.

In accordance with the request of the Commission and the scope of the project Marquette has proceeded under the assumption that all downstate pension funds would relinquish investment authority to a newly-created investment pool or an existing statewide investment pool, with all investment assets of the downstate pension funds to be commingled into a unified investment pool at the earliest plausible future date.

The goal of the study is to observe the various investment expenses associated with the creation of the unified investment pool, such as investment management fees, custodial fees, legal fees, investment consulting fees, and other functions impacted by the creation of an investment pool. Also included is an analysis of the anticipated transition costs of liquidating and merging all of the downstate pension fund assets into a unified investment pool. To the extent possible, Marquette provided a projection of cost savings in each fiscal year for a statistically representative sample of municipalities during which transition costs and other related costs are expected to be incurred, as well as a projection of long-term costs/savings (30-40 years), both statewide and also for the sampled municipalities. As part of the analysis, Marquette has observed examples of statewide investment pools from Illinois and other states as a template for projecting the incremental costs and savings associated with the creation of a statewide investment pool for the downstate pension funds in Illinois.

EXECUTIVE SUMMARY

Marquette has performed a cost analysis and fee savings study associated with a potential consolidation of the assets of the downstate police and firefighters' pension funds under newly-created, unified investment pool. The following is a summary of the findings:

- There are three primary sources of ongoing management costs associated with the downstate pension funds: trustee-related, operational, and investment-related. According to the Illinois Department of Insurance, investment-related expenses are the largest cost to the downstate pension funds, representing 61.6% of all expenses which is low compared to an average of comparable consolidated funds (65%-70%) of all expenses. Costs associated with investment-related professionals vary based on the pension fund's size, asset allocation, and use of retail or institutional investments. A potential consolidation could provide economies of scale and potential cost savings to the underlying municipalities. However, executing a potential consolidation of assets entails initial transition costs which while not ongoing, are highly impactful in nature.

- In reviewing the structure of retirement systems with consolidated investment pools, Marquette identified three structures for which the analysis was performed: full consolidation, partial consolidation, and discretionary consolidation.

- Based solely on the data provided to the Illinois Department of Insurance by the individual downstate pension funds, the total expenses of the downstate funds are in-line with other retirement systems. However, upon further review, Marquette believes that certain investment-related costs (i.e. management fees for mutual funds and mortality/risk fees for separate accounts of life insurance companies) may not be accurately reflected in the Illinois Department of Insurance data based on the knowledge that certain investment-related costs are netted out of investment performance rather than physically invoiced.

- Based on the estimation of expenses, savings from a consolidation, transition costs, and investment performance a full or discretionary consolidation were suboptimal.

- Marquette's analysis indicates that a partial consolidation of the downstate pension funds with assets under \$10 million would be the optimal consolidation structure that harvests a cost savings relative to transition costs. Under this consolidation structure the most likely present value of net savings over 30 years would be approximately \$210.6 million. The potential payback period of savings

versus costs could be one year. In the partial consolidation, it is unlikely not to realize a long-term savings, however, based on the unknown and potentially high cost structure of the transition which depends almost entirely on market volatility; there is no guarantee (See Appendix 4). Nevertheless, there is clearly a lower and more predictable payback period relative to the other consolidation options. Furthermore, the resulting investment pool would also significantly benefit from the increased investment authority resulting in more savings to the underlying municipalities for participating in the partial consolidation.

TYPES OF COSTS FOR DOWNSTATE PENSION FUNDS

According to the Department of Insurance, in 2009, there were 638 separate downstate pension funds, consisting of 288 firefighter pension funds and 350 police pension funds. The downstate pension funds range in size from as small as \$6,000 to as large as \$130 million. As of 2009, the combined assets of the downstate pension funds totaled \$8.0 billion with \$3.4 billion in fire pension funds and \$4.6 billion in the police pension funds. There are three primary sources for ongoing costs associated with these pension funds: Trustee-related, operational, and investment-related.

Trustee-related – Each downstate pension fund has a Board of Trustees established to oversee the operation of the Plan as mandated under the provisions of the Illinois Pension Code (40 ILCS 5/3 128 and 5/4 121). Of the three aforementioned primary expenses, Trustee-related expenses are generally the smallest. In general, the largest Trustee-related expense involves education for the Board of Trustees. Trustees are required to participate in a minimum of 16 hours of continuing education each year after the first year that the Trustee is elected or appointed (40 ILCS 5/1-109.3 (b)). The costs associated with this education typically covers travel, hotel, meals, conference fees, educational materials, and association dues. Beyond expenses generated from mandatory educational expenses, reimbursements for other costs of performing more general duties as a Trustee are also typical.

Operational – Each Board of Trustees is free to retain professionals (i.e. administrators, auditors, actuaries, attorneys, etc.) to assist the Trustees in fulfilling their fiduciary responsibilities for the smooth operation of the pension fund. The scope of the services rendered by these professionals is often dictated by Illinois Pension Code, and the cost of performing certain functions may vary across retirement systems beholden to different statutory requirements. For instance, the cost of granting a disability pension for a participant of a downstate police and fire fund may be different from another retirement system based solely on the statutory differences for granting and, if applicable, monitoring such a benefit. On average, operational costs comprise the second largest type of costs for the downstate pension funds. However, many downstate pension funds, particularly the smaller funds, elect not to retain these types of professionals to control costs, and they often perform these functions internally or utilize the assistance of municipal staff.

Investment-related – The individual board of trustees are free and sometimes required by the Illinois Pension Code to retain investment professionals (i.e. investment consultants, custodians, broker/dealers, investment managers, etc.) to assist the Trustees in fulfilling their fiduciary responsibility of prudently managing a pension fund's assets. On average, investment-related costs account for 61.7% of all downstate pension fund expenses and, therefore, represent the largest expense. Costs associated with

investment-related professionals vary based on a pension fund's size, asset allocation, the philosophy of the Board of Trustees, as well as the use of retail or institutional investments. Again, many Boards of Trustees elect not to retain some of these types of professionals to control costs, and they perform these functions internally or utilize the assistance of municipal staff to perform these functions.

However, some professionals such as custodians and investment managers (i.e. investment advisors) are required to be retained to perform certain functions. The fees for these services are typically charged on the fund's or account's asset size. Therefore, while pension funds with larger account sizes for a given asset type may incur higher total investment-related fees, they generally have the ability to pay a lower percentage of total assets relative to fees. This is resultant from the willingness of many investment professionals to offer more competitive pricing for big accounts.

Asset allocation is a significant driver to the investment-related expenses as it impacts investment management fees. Typically, asset classes such as fixed income have lower investment management expense ratios than U.S. or non-U.S. equities. The Illinois Pension Code designates four different levels of the investment authority for the downstate police and fire pension funds based on the net asset size that can impact a pension fund's asset allocation. The primary differentiator in the investment authority at each level is the allowable level of exposure to equities. Funds meeting minimum asset sizes are permitted greater exposure to equities.

- All downstate pension funds are permitted to invest in a defined set of fixed income and money market instruments (40 ILCS 5/1-113.2). Additionally, all downstate pension funds are permitted to invest up to 10% of the pension fund's assets in equities through separate accounts managed by life insurance companies and qualified mutual funds (40 ILCS 5/1-113.2 (13)).
- Downstate pension funds with over \$2.5 million in assets are permitted to invest up to 35% of the pension fund's assets in equities through separate accounts managed by life insurance companies and qualified mutual funds (40 ILCS 5/1-113.3).
- Downstate pension funds with over \$5.0 million in assets are permitted to retain an investment advisor to invest up to up to 35% of the pension fund's assets in qualified equities in a separately managed account (40 ILCS 5/1-113.4).
- Downstate pension funds with over \$10.0 million in assets, they may invest up to 50% effective July 1, 2011 and up to 55% effective July 1, 2012 of the pension fund's assets in equities through separate accounts managed by life insurance companies, mutual funds, and separately managed accounts utilizing an investment advisor (40 ILCS 5/1-113.4a).

Because of these distinctions in investment authority, larger downstate pension funds typically allocate more of their investment costs to more expensive asset classes (i.e. equities or publicly-traded real estate investment trusts) in an effort to enhance returns. Such allocation decisions are also dependent on the philosophies of the individual Board of Trustees as well as the actuarial return targets of the pension funds. Some Trustees may also exhibit a higher tolerance for incurring higher investment-related fees if they believe it is likely to result in greater investment performance. In addition, Pension funds with higher actuarial return targets will generally seek higher returns through increased allocations to higher cost asset classes.

The costs associated with retail investments such as retail share classes of mutual funds or separate accounts managed by insurance companies are higher than their institutional counterparts. Institutional investments typically have higher account size minimums or tiered fee schedules making them impractical or difficult for smaller pension funds to gain access and cheaper for larger pension funds.

PEER COMPARISONS

According to publicly available data, there are 1,511 public pension plans in the United States. With 657 public pension plans, Illinois has the largest number of public pension funds in the country. The next largest is Pennsylvania with 137. These figures are a reflection of the local level structure in Illinois. There are 14 states that have adopted segregated statewide police and fire plans, combined statewide police and fire plans, or defined contribution/rollup plans.

In reviewing the structure of retirement systems with consolidated investment pools, Marquette identified three feasible structures for which the analysis was performed: full consolidation, partial consolidation, and discretionary consolidation.

- **Full Consolidation¹** – Under this structure, all of the investments of the downstate pension funds would be consolidated into a single investment pool. Due to the size of the resulting investment pool, fund professionals and staff would need to be established (i.e. Executive Director, CFO, CIO, investment analysts, etc.) The liabilities associated could be pooled or segregated so each underlying municipality would be responsible for funding its own police pension and firefighter pension obligations. There would be one Board of Trustees. Existing plans using this structure typically split equally the Board representation between trustees representing police or firefighters. For statewide plans commingling assets of non-police or firefighter assets typically allot less representation to those groups (ex. Only 1-3 trustees from these trades) and maintain segregated liabilities. At the local level, authority to control the actuarial return target is usually conceded. Examples of full consolidation include Illinois Municipal Retirement Fund, Illinois State Board of Investment, and Wisconsin Board of Investments.
- **Partial Consolidation¹** – Under this structure, a portion of the downstate pension funds would be consolidated into a single investment pool while others continued to operate independently. There would be one Board of Trustees for the consolidated pool. Similar to the Full Consolidation structure, there would need to be the establishment of fund professional staff. The liabilities associated could be pooled or segregated so each underlying municipality was responsible to funding its own police and fire obligations. Participation in the consolidated asset pool under this structure could allow each downstate pension fund the discretion to opt in, relinquishing investment authority or opt out, retaining investment authority. Alternatively to this opt-in model, pension funds could be forced or prohibited to enter the consolidated pools based on relevant factors such as asset size or funded status. For the purpose of this study, Marquette chose to analyze the Partial Consolidation structure, because the smaller downstate pension funds may benefit more from the economies of scale and

lifting of statutory restrictions on investments than larger pension funds. To test this hypothesis, Marquette considered the Partial Consolidation structure for all downstate funds with \$10 million in assets or less. Examples of partial consolidation include the municipal retirement systems for the State of Michigan and the Commonwealth of Pennsylvania, the Police and Fire retirement systems of Missouri.

- **Discretionary Consolidation** - Under this structure, assets of the downstate pension funds would be mandated to invest in state-created commingled funds. The Boards of Trustees would have the autonomy to determine their own asset allocations, and each pension fund would be responsible for their own liabilities. Each of the downstate pension funds would retain its individual Board of Trustees. The discretionary consolidation structure and the establishment of large commingled accounts at the state level could create savings of the investment-related costs that could be passed down to the local level. Trustee-related and operational costs would be largely unchanged as the Boards of each downstate pension fund would continue operating independently. Participation in the discretionary consolidation structure could be either voluntary or mandated by law. The structure could also allow pension funds to invest all or a portion of assets to the state-created commingled funds. For the purpose of this analysis, Marquette considered a mandated consolidation of all downstate pension funds. Examples of discretionary consolidation include Massachusetts Public Retirement Investment Trust and a number of private religious organizations.

¹ For the purposes of this analysis, Marquette assumed that the full consolidation pool would be considered to be a downstate pension fund with assets over \$10 million; hence, the pool would have the same investment restrictions as that of an individual fund.

ESTIMATION OF SAVINGS OF TRUSTEE-RELATED AND OPERATIONAL EXPENSES

To estimate the savings of the trustee-related and operational expenses, Marquette compared the expenses associated with the downstate pension funds in their current structure with the expenses associated with each of the three structures.

Full and Partial Consolidation Structures - Marquette assumed that a single Board of Trustees would administer the consolidated investment pool which would eliminate the trustee-related expenses of the participating current downstate pension funds. Additionally, Marquette assumed that the consolidation would result in redundancies in other professionals (i.e. administrators, auditors, actuaries, attorneys, etc.) assisting in the pension funds' operations. Under partial consolidation, all funds over \$10 million in size were assumed to be non-participants in the consolidated pool, continuing to incur the same levels of trustee-related and operational expenses. Eliminating these redundancies and their associated costs reduce these existing expenses.

However, like other large pension funds, the consolidated structures would require larger staffs, dedicated space, office supplies, phones, and other miscellaneous items that would offset some of the trustee-related and operational savings. Under a full consolidation, a merger with the Illinois Municipal Retirement Fund could be a potential option, in which case, current efficiencies are already in place, but would require additional resources to those efficiencies (i.e. more investment staff, trustees, administration).

Discretionary Consolidation Structure - Marquette assumed that there would be no savings of trustee-related and operational expenses under this model, because the downstate pension funds would continue to operate separately without eliminating their individual Boards of Trustees or operational service providers.

Furthermore, this structure would impose added operational costs and potentially trustee-related costs associated with the creation and management of the statewide commingled funds. Similar to larger public pension funds, the statewide commingled funds would require staff, dedicated space, office supplies, phones, and other miscellaneous items. Under this structure, staff at the statewide level would not be responsible for paying benefits and retirement counseling. However, the average staff salary under the Discretionary Consolidated structure would be higher, and there would need to be staff dedicated to providing services and data to the participating Boards of Trustees at the local level.

ESTIMATION OF SAVINGS OF INVESTMENT-RELATED EXPENSES

Investment-related fee savings represent the greatest potential for savings in a consolidation. For investment management fees, the larger asset base could create economies of scale and greater access to institutional pricing but also allow a higher proportion of assets to be allocated to expensive asset classes. For other investment-related professionals, Marquette assumed that the consolidation would result in the elimination of some redundancies (i.e. custodial services, investment consulting expenses, broker/dealers, etc.) to realize cost savings. Therefore, Marquette attempted to determine the level of expenses of the current structure and contrast that to estimated levels of expenses for each of the three consolidation structures.

Current Structure's Investment-Related Expenses - To estimate the investment-related expenses associated with the downstate pension funds in their current structure, Marquette evaluated of the data from the Illinois Department of Insurance annual report.

The data provided by the downstate pension funds to the Illinois Department of Insurance posed an additional challenge to this cost analysis. Based on industry experience and review of the data, Marquette hypothesized that the data may not fully reflect all of the investment-related expenses of the downstate pension funds. Marquette suspected that some investment-related expenses, such as management fees for mutual funds and separate accounts of life insurance companies, may not be fully captured in the data being reported to the Illinois Department of Insurance. Our theory is based on the knowledge that certain investment-related costs are netted out of investment performance rather than physically invoiced.

To test this hypothesis, Marquette estimated an expected range of investment-related expenses by applying investment and quality specific industry average fee schedules to the assets of the downstate pension funds, taking into account asset classes, number of accounts, sizes of accounts, and other factors. This exercise supported the hypothesis that the reported investment-related expenses were understated.

To further test the hypothesis, Marquette attempted to survey a sample of downstate pension funds. Consequently, Marquette utilized the data captured from the surveys and the FOIA requests to affirm the 2009 Department of Insurance data. Further analysis was conducted on five randomly selected downstate pension funds. Marquette observed that the investment-related expenses reported to the Illinois Department of Insurance for the five downstate pension funds were understated. Marquette did not obtain a statistically significant number of data points to make any definitive conclusion as to the size of the understatement on all of the downstate pension funds.

Consolidated Structures' Investment-Related Expenses - To estimate the investment-related expenses associated with each of the three consolidated structures; Marquette performed a review of the Annual Reports of existing consolidated public retirement systems and estimated an expected range of investment-related fees using the asset allocation of the downstate pension funds and applied asset class, size, and investment- and quality-specific industry average fee schedules.

ESTIMATION OF TRANSITION COSTS

Transition costs are the implicit and explicit costs associated with consolidating the assets into a single investment pool with an organized investment program. Transition costs are the single largest material factor that could offset or outweigh any fee savings from a consolidation. **One important concept to remember is that any transition costs would be incurred immediately whereas as any savings of consolidation would be realized in the future.**

To estimate the transition costs of moving the relevant assets of the downstate pension funds into a consolidated, institutional-quality investment pool, Marquette used an implementation shortfall analysis. Implementation shortfall analysis attempts to measure of the full cost of the transition process, incorporating both explicit fixed costs (i.e. commissions, taxes) and implicit variable costs (i.e. unknown market impact). The explicit costs are driven primarily by commissions which are the fixed charges for buying and selling securities. The implicit costs or market impact is resultant from the unknown price movement of the investment securities during the transition which represents the largest risk in total cost variance. Market impact can affect the value of the assets either positively or negatively and can be large or small, though negative impacts are considerably more probable than positive. Therefore, implicit cost represents a major, unknown risk and probable cost of consolidation.

In performing the implementation shortfall analysis, Marquette made the following assumptions to establish reasonable estimates for the cost to transition the downstate pension fund assets to each of the structures:

- There would be no change to the current investment authority.
- All assets of participating downstate pension funds would be unified in a single transition comprised of an institutionally designed portfolio consistent with the current Illinois Pension Code.
- The target portfolio of the consolidated structures will have the maximum equity exposure currently allowed by law. Since the Full and Partial Consolidation structures will have assets in excess of \$10 million, there maximum equity exposure will be 55%. Under the Discretionary structure, each fund will maintain their own assets and will have maximum equity exposures that commensurate with their respective sizes.
- The fixed income portion of the consolidated investment pool will consist of a core bond portfolio. The equity portion of the consolidated investment pool will be 75% U.S. equity and 25% non-U.S. equity.

- Per the current Illinois Pension Code, non-U.S. equity would be accessed through mutual funds.
- All existing mutual funds would be liquidated to cash and the cash would be used in the purchase different assets.
- CD's (certificate of deposits) and Annuity contracts (general and separate) would be transferred in-kind, and therefore, be excluded from the transition, because of their inherent illiquidity and potentially high exit costs.
- Portions of the liquid asset pool would be transferred in-kind as well, thereby incurring no transition costs: For this analysis Marquette assumed 30% of the U.S. Equities would be transferred in-kind, 50% of the government/agency fixed income securities would be transferred in-kind, and 50% of the agency mortgage-backed fixed income securities would be transferred in-kind.

IMPACT OF ASSET ALLOCATION

For the purpose of this study, Marquette assumed that there would be no changes in investment authority for the downstate pension funds and the consolidated pools would be invested in the maximum equity allocation allowed by law. Even without any change to the investment authority, the three potential consolidation structures all present opportunity for the participating pension funds to increase their expected return. This increase in the downstate pension funds' expected return could potentially translate to additional savings associated with the consolidated structures, but would expose the consolidated funds to greater market volatility. To investigate the impact of the additional potential savings, Marquette conducted an asset allocation study comparing the expected risk/return profile of current aggregate downstate pension fund asset allocation to those possible under various consolidated structures. Savings from increased expected returns would not be guaranteed and increased allocations to more expensive assets classes could increase the average investment management expenses. For the purposes of the asset allocation study, Marquette assumed that illiquid assets such as CD's, General Accounts of Insurance Companies and the Separate Accounts of Life Insurance Companies would take several years to unwind before they could be invested in other investment security types.

OTHER FACTORS IMPACTING POTENTIAL SAVINGS

Marquette believes the following elements could impact the analysis of the potential savings created from consolidation:

- Potential changes to the investment authority with respect to increasing or decreasing the allowable percentages in bonds and stocks, as well as, including additional permissible investments (i.e. alternative investments).
- Opportunity costs – There is opportunity costs associated with the long-term transition to a consolidated model. This relates to the unknown maturity of the illiquid assets such as CD's and Annuity Contracts which would delay the consolidated pool from fully implementing a strategic asset allocation.
- Start-up costs - These are relatively minor costs that only impact the payback period marginally. Marquette anticipates start-up would most likely involve retaining an investment consultant(s), investment managers, custodian, actuary, staff, attorney(s), and auditing services.

FINDINGS

Marquette evaluated the full range of possible, long-term (i.e. 30 years) future cost savings levels associated with the each of the consolidated structures and compared that estimated range of transition costs associated with consolidation. Cost savings include any operational, trustee-related, or investment-related fees savings. Additionally, cost savings include any additional expected return associated with increasing equity exposure. The effects of compounding interest were modeled and the future cash flows were discounted using the expected rate of return of the downstate pension fund assets. This is a vital exercise in accurately comparing short-term transition costs against long-term savings.

The tables that follow reveal Marquette's main cost projections. The low estimates assume that the current fees of the downstate pension funds are the low end of Marquette's estimates and under a consolidated structure would be at the high end of our estimates for a consolidated structure (see Table 8). The high estimate assumes the assets would move from the highest estimated level of current expenses to the lowest estimated of expenses for a consolidated structure. Note: that the low and high estimates represent extremely unlikely outcomes, but Marquette wanted to illustrate the entire range of possibilities. The middle estimates below assume both Marquette's best estimates for current expense levels and potential expense levels and are, therefore, the most relevant data here.

To summarize the middle estimates, Marquette projects in the event of full consolidation without problems, it would take 11 years to break even and begin realizing any cost savings in excess of transition costs. Under the partial consolidation structure, the estimated breakeven point is approximately one year. Under the discretionary consolidation structure, Marquette projects that cost savings would never surpass transition costs over a 30 year period, making that structure completely unviable as indicated by the "N/A".

Estimated 30-Year Aggregate Savings with Full Consolidation (\$000,000)

	All Downstate Pension Funds ↓ Full Consolidation		
	Low Est.	Middle Est.	High Est.
30 Yr. PV of Saved Expenses	-\$228.6	\$156.7	\$542.2
Est. Transition-Related Costs	\$149.4	\$108.8	\$68.3
Total Present Value of Net Savings	-\$378.0	\$47.9	\$473.9
# of Years for Expense Savings to Offset Transition Costs	N/A	11	2

Estimated 30-Year Aggregate Savings with Partial Consolidation (\$000,000)

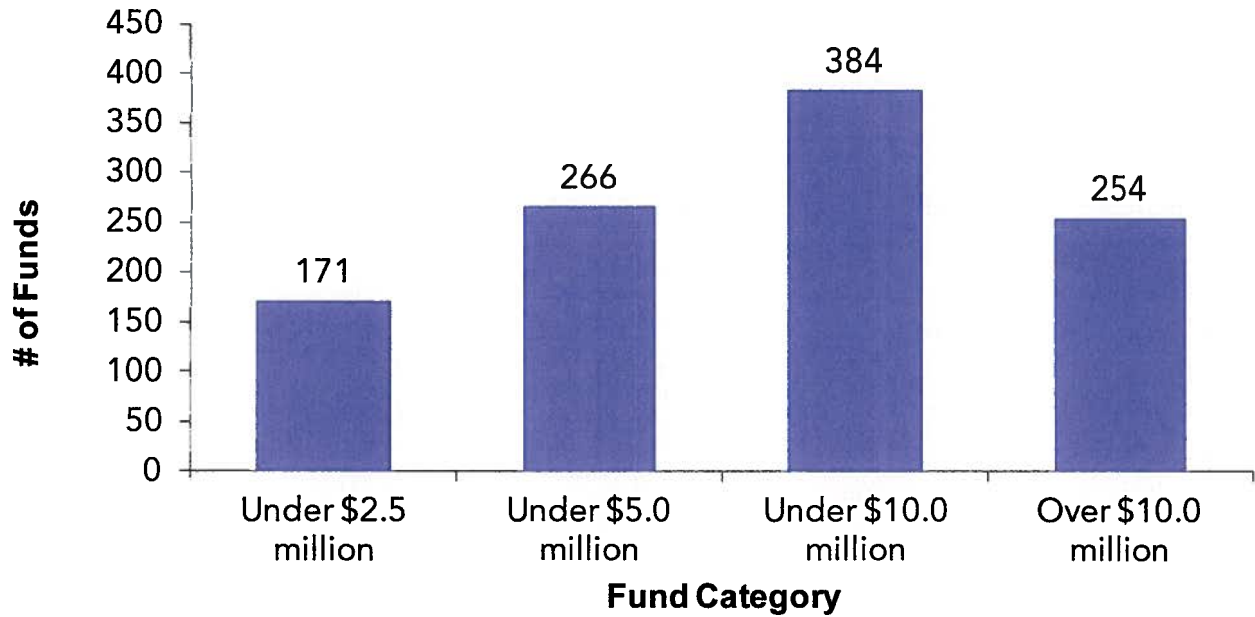
	All Downstate Pension Funds Under ↓ Partial Consolidation		
	Low Est.	Middle Est.	High Est.
30 Yr. PV of Saved Expenses	-\$208.1	\$232.6	\$554.6
Est. Transition-Related Costs	\$32.6	\$22.0	\$11.3
Total Present Value of Net Savings	-\$240.8	\$210.6	\$543.3
# of Years for Expense Savings to Offset Transition Costs	N/A	1	1

Estimated 30-Year Aggregate Savings with Discretionary Consolidation (\$000,000)

	All Downstate Pension Funds ↓ Discretionary Consolidation		
	Low Est.	Middle Est.	High Est.
30 Yr. PV of Saved Expenses	-\$225.8	\$45.5	\$532.6
Est. Transition-Related Costs	\$133.9	\$118.5	\$15.5
Total Present Value of Net Savings	-\$359.7	-\$73.0	\$517.1
# of Years for Expense Savings to Offset Transition Costs	N/A	N/A	1

APPENDIX

CHART 1: NUMBER OF DOWNSTATE PENSION FUNDS BY SIZE¹



¹ Source Department of Insurance

¹ Source Department of Insurance

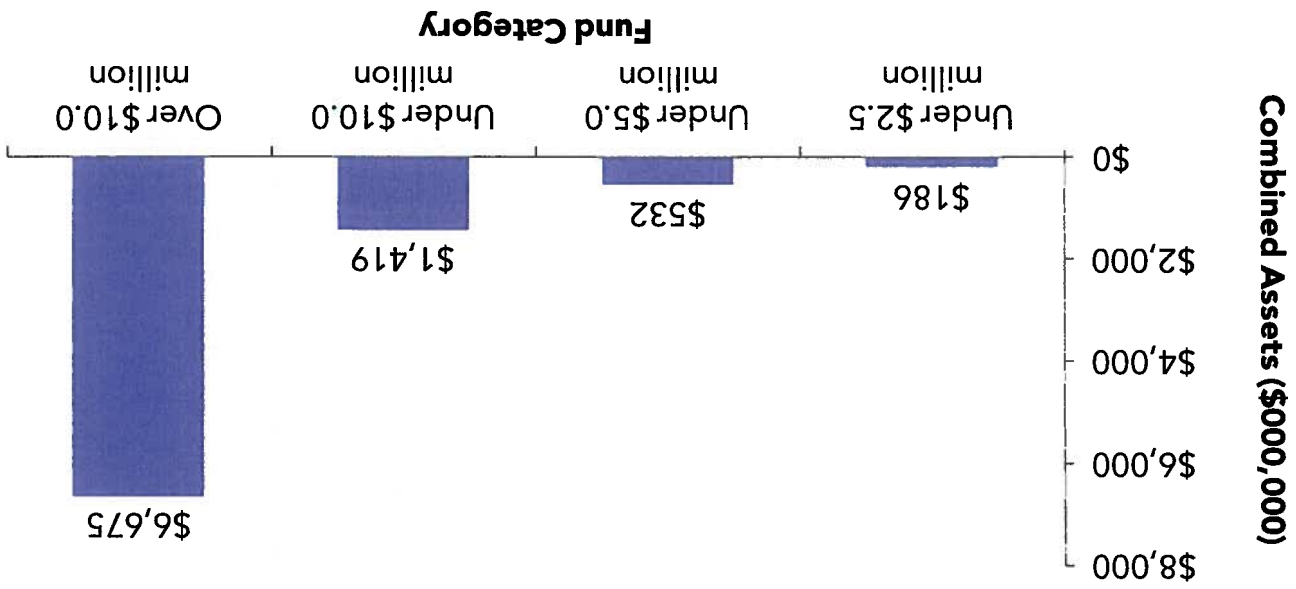


CHART 2: ASSETS OF DOWNSTATE PENSION FUNDS BY SIZE¹

CHART 3: FULL CONSOLIDATION MODEL

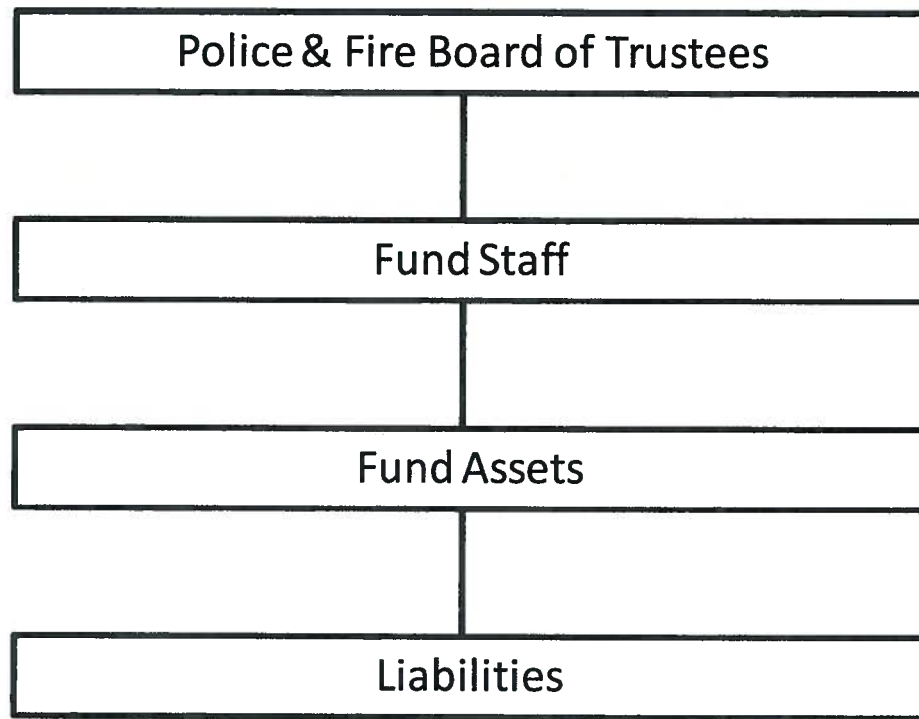


CHART 4: PARTIAL CONSOLIDATION MODEL

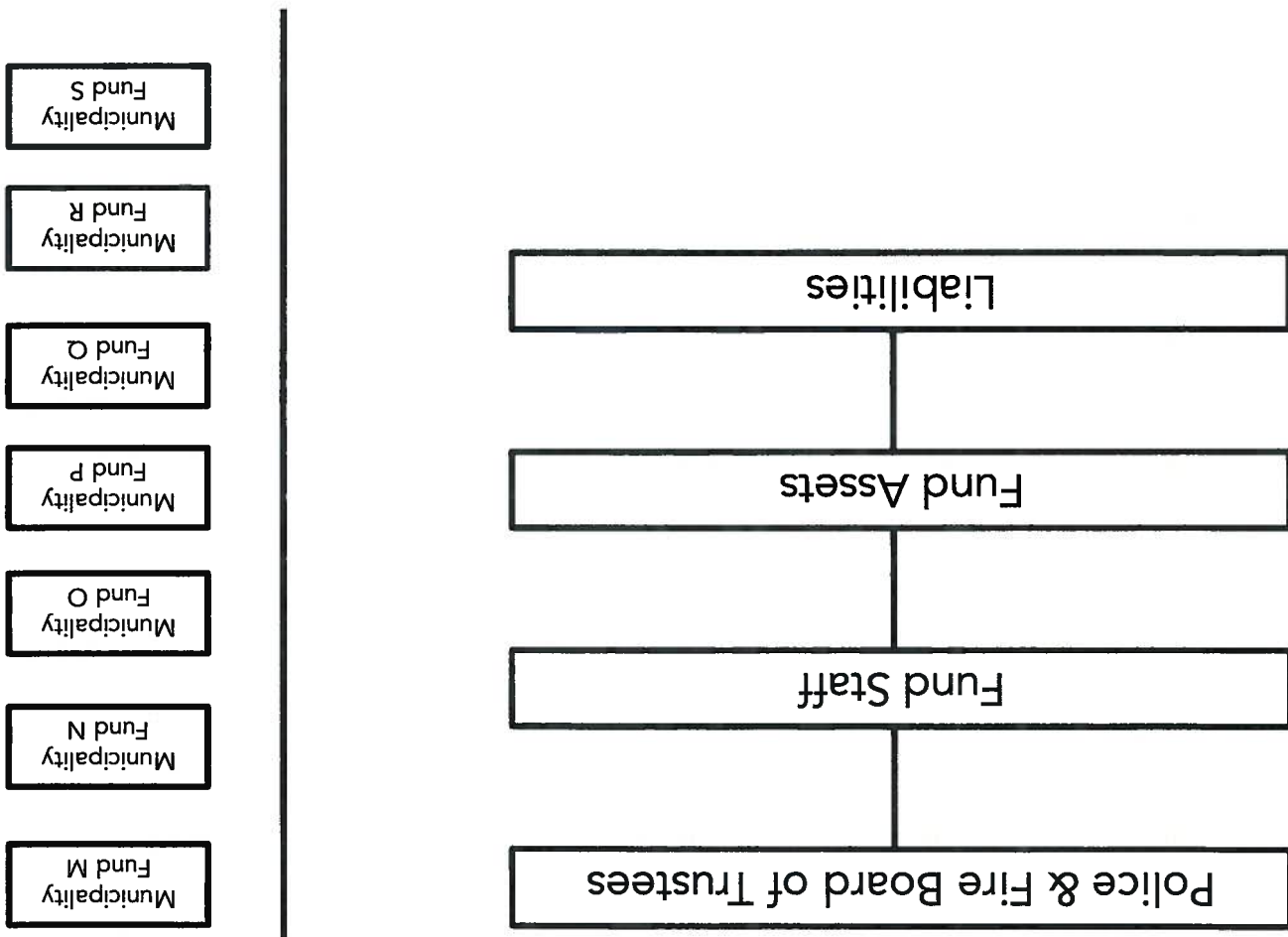


CHART 5: DISCRETIONARY CONSOLIDATION MODEL

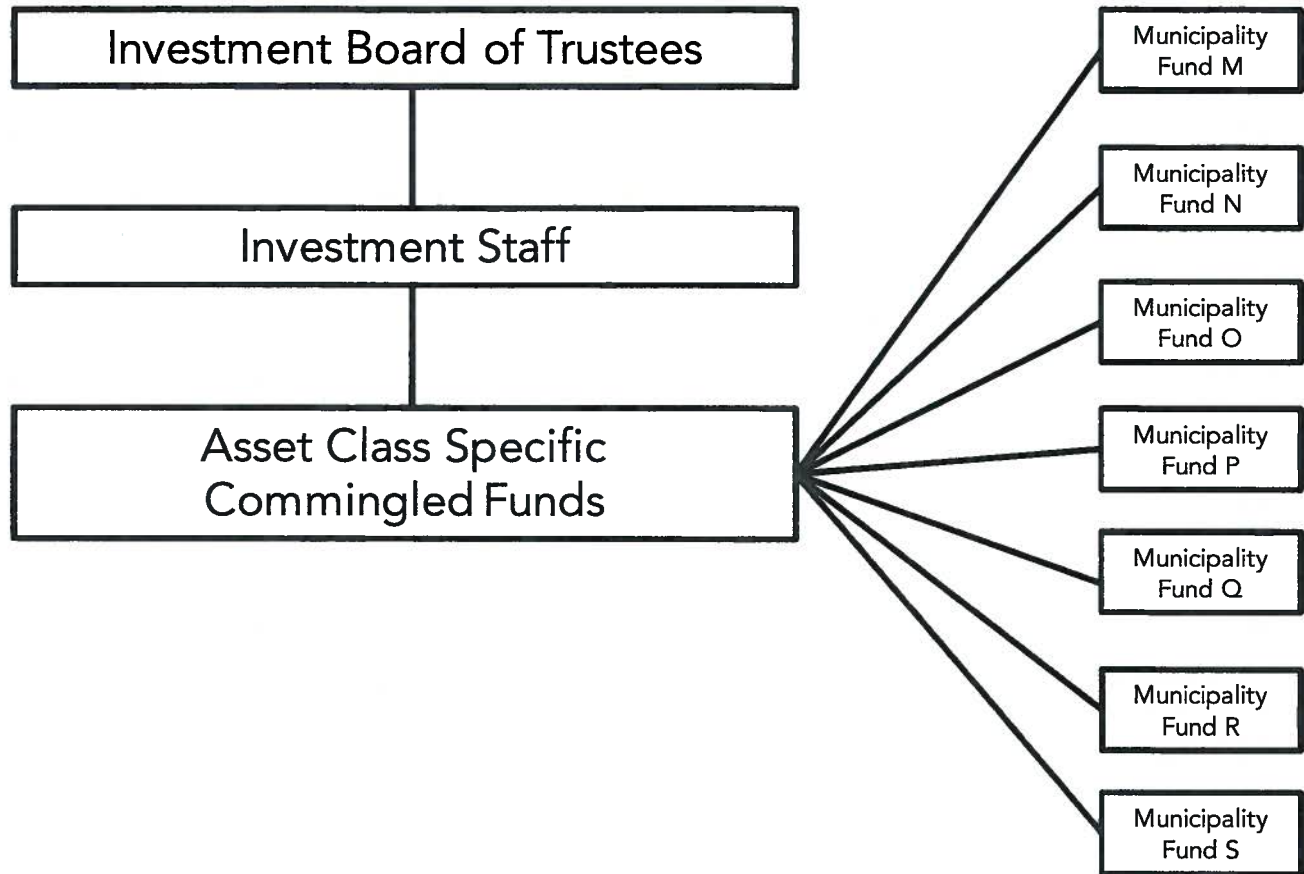


TABLE 1: DOWNSTATE PENSION FUNDS ASSETS - FY09¹

Aggregate Market Value of Assets (\$000,000)	# of Funds	
		Fire Pension Funds
\$87.7	100	Under \$2.5 Million
\$116.0	32	\$2.5 Million - \$5.0 Million
\$418.6	55	\$5.0 Million - \$10.0 Million
\$2,786.1	101	Over \$10.0 Million
\$3,408.4	288	Total Fire Pension Funds
		Police Pension Funds
\$98.2	71	Under \$2.5 Million
\$229.8	63	\$2.5 Million - \$5.0 Million
\$468.3	63	\$5.0 Million - \$10.0 Million
\$3,888.9	153	Over \$10.0 Million
\$4,685.2	350	Total Police Pension Funds
\$8,093.6	638	Total Downstate Pension Funds

¹ Source Department of Insurance

TABLE 2: BREAKDOWN OF DOWNSTATE PENSION FUNDS UNIVERSE BY ASSET SIZE – FY09¹

	Universe of Fire Pension Funds	Universe of Police Pension Funds	Universe of Police & Fire Pension Funds
Smallest	\$6,049	\$64,000	\$6,049
75th Percentile	\$1,328,924	\$2,982,645	\$2,283,432
Median	\$6,499,750	\$8,202,502	\$7,254,698
25th Percentile	\$15,012,342	\$16,074,312	\$15,996,087
Largest	\$132,897,990	\$147,021,113	\$147,021,113

¹ Source Department of Insurance

TABLE 3: ALLOCATION OF DOWNSTATE PENSION FUNDS – FY09¹

	Cash	Insurance Co.	Municipal Bonds	Govt. & Commingled Funds	Separate Accts. Of Life Insurance Co.	Preferred Stocks	Mutual Funds
Under \$2.5 Million	\$30,374,339	\$78,317,313	\$59,288,562	\$937,528	\$5,404,325	\$1,120,373	\$10,419,611
\$2.5 Million - \$5.0 Million	\$35,912,432	\$93,695,968	\$132,892,576	\$840,328	\$7,552,104	\$4,007,388	\$70,925,317
\$5.0 Million - \$10.0 Million	\$71,131,518	\$106,217,498	\$411,997,454	\$2,637,393	\$38,380,627	\$53,895,026	\$202,663,050
Total Funds Below \$10 Million	\$137,418,289	\$278,230,779	\$604,178,592	\$4,415,249	\$51,337,057	\$59,022,788	\$284,007,979
Over \$10.0 Million	\$498,755,790	\$269,959,320	\$3,168,479,975	\$226,374,819	\$135,224,949	\$780,400,315	\$1,595,775,693
Total Downstate Pension Funds	\$636,174,079	\$548,190,099	\$3,772,658,566	\$230,790,068	\$186,562,007	\$839,423,102	\$1,879,783,671
Under \$2.5 Million	16.3%	42.1%	31.9%	0.5%	2.9%	0.6%	5.6%
\$2.5 Million - \$5.0 Million	10.4%	27.1%	38.4%	0.2%	2.2%	1.2%	20.5%
\$5.0 Million - \$10.0 Million	8.0%	12.0%	46.5%	0.3%	4.3%	6.1%	22.9%
Total Funds Below \$10 Million	9.7%	19.6%	42.6%	0.3%	3.6%	4.2%	20.0%
Over \$10.0 Million	7.5%	4.0%	47.5%	3.4%	2.0%	11.7%	23.9%
Total Downstate Pension Funds	7.9%	6.8%	46.6%	2.9%	2.3%	10.4%	23.2%

¹ Source Department of Insurance

TABLE 4: ANNUAL COSTS FOR DOWNSTATE PENSION FUNDS – FY09¹

	Trustee- Related & Operational Expenses (\$)	Investment- Related Expenses (\$)	Total Expenses (\$)
Under \$2.5 Million	\$931,899	\$226,409	\$1,158,308
\$2.5 Million - \$5.0 Million	\$734,832	\$744,693	\$1,479,526
\$5.0 Million - \$10.0 Million	\$2,266,291	\$2,848,011	\$5,114,301
Total Funds Below \$10 Million	\$3,933,022	\$3,819,113	\$7,752,135
Over \$10.0 Million	\$10,792,844	\$19,758,385	\$30,551,230
Total Downstate Pension Funds	\$14,725,866	\$23,577,498	\$38,303,364

	Trustee- Related & Operational Expenses Ratio (%)	Investment- Related Expenses Ratio (%)	Total Expenses Ratio (%)
Under \$2.5 Million	0.50%	0.12%	0.62%
\$2.5 Million - \$5.0 Million	0.21%	0.22%	0.43%
\$5.0 Million - \$10.0 Million	0.26%	0.32%	0.58%
Total Funds Below \$10 Million	0.28%	0.27%	0.55%
Over \$10.0 Million	0.16%	0.30%	0.46%
Total Downstate Pension Funds	0.18%	0.29%	0.47%

¹ Source Department of Insurance

TABLE 5: INDUSTRY AVERAGE INVESTMENT MANAGEMENT FEES¹

Investment
Mgt.
Expenses
Ratio (%)

Cash	0.30%
Fixed Income (\$1 Million Account)	0.55%
Fixed Income (\$5 Million Account)	0.40%
Fixed Income (\$15 Million Account)	0.30%
Annuity Contract	2.25%
Equity (\$1 Million Account)	0.85%
Equity (\$5 Million Account)	0.78%
Equity (\$15 Million Account)	0.65%
Mutual Fund (Retail - Equity)	1.00%
Mutual Fund (Institutional - Equity)	0.77%
Mutual Fund (Retail - Index)	0.50%
Mutual Fund (Institutional - Index)	0.27%

¹ Source: Morningstar and eVestment Alliance databases.

TABLE 6: MODELLED PRODUCT EXPOSURE FOR DOWNSTATE PENSION FUNDS

	Under \$2.5 Million	\$2.5 Million - \$5.0 Million	\$5.0 Million - \$10.0 Million	Under \$10.0 Million	Over \$10.0 Million	All Funds
Cash	16.3%	10.4%	8.0%	9.7%	2.4%	3.8%
Fixed Income (\$1 Million Account)	32.4%	38.7%	0.0%	13.7%	0.0%	2.5%
Fixed Income (\$5 Million Account)	0.0%	0.0%	46.8%	29.3%	0.0%	5.4%
Fixed Income (\$15 Million Account)	0.0%	0.0%	0.0%	0.0%	53.8%	43.9%
Annuity Contract	2.9%	2.2%	4.3%	3.6%	2.1%	2.4%
Equity (\$1 Million Account)	0.6%	1.2%	0.0%	0.4%	0.0%	0.1%
Equity (\$5 Million Account)	0.0%	0.0%	6.1%	3.8%	0.0%	0.7%
Equity (\$15 Million Account)	0.0%	0.0%	0.0%	0.0%	12.4%	10.1%
Mutual Fund (Retail - Equity)	5.6%	15.5%	12.8%	12.5%	0.0%	2.3%
Mutual Fund (Institutional - Equity)	0.0%	0.0%	0.0%	0.0%	15.3%	12.5%
Mutual Fund (Retail - Index)	0.0%	5.0%	10.0%	7.5%	0.0%	1.4%
Mutual Fund (Institutional - Index)	0.0%	0.0%	0.0%	0.0%	10.0%	8.2%
Other Asset	42.1%	27.1%	12.0%	19.6%	4.0%	6.9%
Total Portfolio	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE 7: ESTIMATED COSTS FOR DOWNSTATE PENSION FUNDS AND CONSOLIDATED STRUCTURES

	Est. Investment Management Expenses Ratio (%)	Est. Other Investment Expenses Ratio (%)	Trustee- Related & Operational Expenses Ratio (%)	Est. Expenses Ratio (%)
Under \$2.5 Million	0.35%	0.15%	0.50%	1.01%
\$2.5 Million - \$5.0 Million	0.48%	0.15%	0.21%	0.85%
\$5.0 Million - \$10.0 Million	0.53%	0.10%	0.26%	0.89%
Total Funds Below \$10 Million	0.50%	0.11%	0.28%	0.89%
Over \$10.0 Million	0.44%	0.06%	0.16%	0.66%
Total Downstate Pension Funds	0.45%	0.07%	0.18%	0.70%
Full Consolidated Structure	0.36%	0.02%	0.13%	0.51%
Partial Consolidated Structure	0.39%	0.02%	0.13%	0.54%
Discretionary Consolidated Structure	0.35%	0.03%	0.28%	0.66%

TABLE 8: RANGE OF SAVINGS OF EXPENSES ASSOCIATED WITH CONSOLIDATIONS

	All Downstate Pension Funds ↓ Full Consolidation		
	Low Est.	Middle Est.	High Est.
Total Range of Expense Ratios for All Downstate Pension Funds	0.47%	0.59%	0.70%
Total Range of Expenses for Full Consolidation	0.33%	0.42%	0.51%
Total Range of Savings for Expense Ratio for Transition	-0.04%	0.17%	0.37%

	All Downstate Pension Funds Under \$10 Million ↓ Partial Consolidation		
	Low Est.	Middle Est.	High Est.
Total Range of Expense Ratios for All Downstate Pension Funds Under \$10 Million	0.55%	0.72%	0.89%
Total Range of Expenses for Partial Consolidation	0.33%	0.42%	0.51%
Total Range of Savings for Expense Ratio for Transition	0.04%	0.30%	0.56%

	All Downstate Pension Funds ↓ Discretionary Consolidation		
	Low Est.	Middle Est.	High Est.
Total Range of Expense Ratios for All Downstate Pension Funds	0.47%	0.59%	0.70%
Total Range of Expenses for Discretionary Consolidation	0.44%	0.48%	0.51%
Total Range of Savings for Expense Ratio for Transition	-0.04%	0.11%	0.26%

TABLE 9: EXPENSE DATA FOR LARGE PUBLIC PENSION FUNDS

Fund Name	Fund Size (\$'000,000)	Operating Expense Ratio	Investment- Related Expense	Total Expense Ratio
1 ISBI	\$11,528	0.04%	0.29%	0.33%
2 PMRS	\$1,500	0.21%	0.38%	0.60%
3 IMRF	\$25,547	0.10%	0.23%	0.33%
4 Illinois Teachers	\$37,471	0.12%	0.51%	0.63%
5 Illinois SURS	\$12,122	0.13%	0.42%	0.55%
6 Missouri State Empl	\$7,867	0.11%	1.23%	1.34%
7 Mich. State Police	\$1,004	0.16%	0.33%	0.49%
8 Mich. State Employ	\$9,040	0.17%	0.32%	0.49%
9 Mich. Public School Empl	\$36,855	0.18%	0.32%	0.50%
10 Penn Pub. School Employee	\$51,433	0.14%	0.97%	1.11%
11 Wisc Board of Investments	\$76,726	0.05%	0.27%	0.32%
12 Indiana PRS	\$13,894	0.21%	0.53%	0.74%
13 PRIT	\$50,200	0.02%	0.50%	0.52%
14 Tennessee CRS	\$33,663	0.04%	0.07%	0.12%
15 Alaska PERS	\$6,265	0.02%	0.63%	0.65%
16 Arizona PSPRS	\$5,089	0.21%	0.28%	0.49%
17 New Hampshire NHRS	\$5,820	0.17%	0.30%	0.47%
18 South Carolina PORS	\$23,871	0.12%	0.29%	0.41%
19 Maine PERS	\$10,739	0.11%	0.18%	0.29%

Average Expense Ratio

0.12% 0.42% 0.55%

TABLE 10: ESTIMATE TRANSITION COSTS PER ASSET CLASS (IN BPS)

Below is an estimation of transition cost per asset class in basis points.

Asset Class	Commission	Taxes	Bid/Ask	Market Impact	Total
U.S. Equity	3	0	2	16	21
non-U.S. Equity (mutual funds)	0	0	0	16	16
Government Bonds	1	0	2	1	4
Municipal Bonds	6	0	50	5	61
Agency Mortgage Backed	5	0	20	5	30

TABLE 11: ASSET ALLOCATION FOR CONSOLIDATION STRUCTURES

Target Portfolio		Asset Class		
	Discretionary Consolidation	Full Consolidation	Partial Consolidation	Consolidation
Cash	7%	7%	20%	7%
Fixed Income	43%	38%	25%	43%
U.S. Equity	37%	42%	41%	37%
non-U.S. Equity	13%	13%	14%	13%
Total	100%	100%	100%	100%

APPENDIX 1: DESCRIPTION OF IMPLEMENTATION SHORTFALL ANALYSIS

Implementation shortfall is, in trading terms, the difference between the prevailing price or value when a buy or sell decision is made with regard to a security and the final execution price or value after taking into consideration all commissions, fees and taxes. As such, implementation shortfall is the sum of execution costs and the opportunity cost incurred in case of adverse market movement between the time of the trading decision and order execution. Below are the components of the transition using implementation shortfall.

- **Legacy Portfolio:** is the current allocation of the asset being considered for transition.
- **Target Portfolio:** is the desired allocation of the asset being considered for transition.
- **Assumed In-Kind Transfer:** portion of the legacy portfolio that will be transferred to the target portfolio “in-kind” or without being sold or crossed.
- **Assumed Total Trade:** the sell plus the buy from legacy portfolio, minus in-kind transfers, to the target portfolio.
- **Assumed Explicit Cost:** fixed costs (i.e. commission, taxes)
- **Assumed Implicit Cost:** determined by finding the weighted volatility using the difference in variance and covariance of the indices mirroring the assets classes in the transition then factoring the number of trading days for each piece of the transition by the number of trading days in the year (260).
- **Assumed Trading Days:** the number of trading days for each asset class is applied into the implicit costs by factoring the weighted volatility by the number of trading days per asset class.
- **Estimated Total Transition Cost:** the explicit plus the implicit expressed in a range of estimates during a low and high volatile market.

APPENDIX 2: SUMMARY OF FULL CONSOLIDATION TRANSITION ANALYSIS

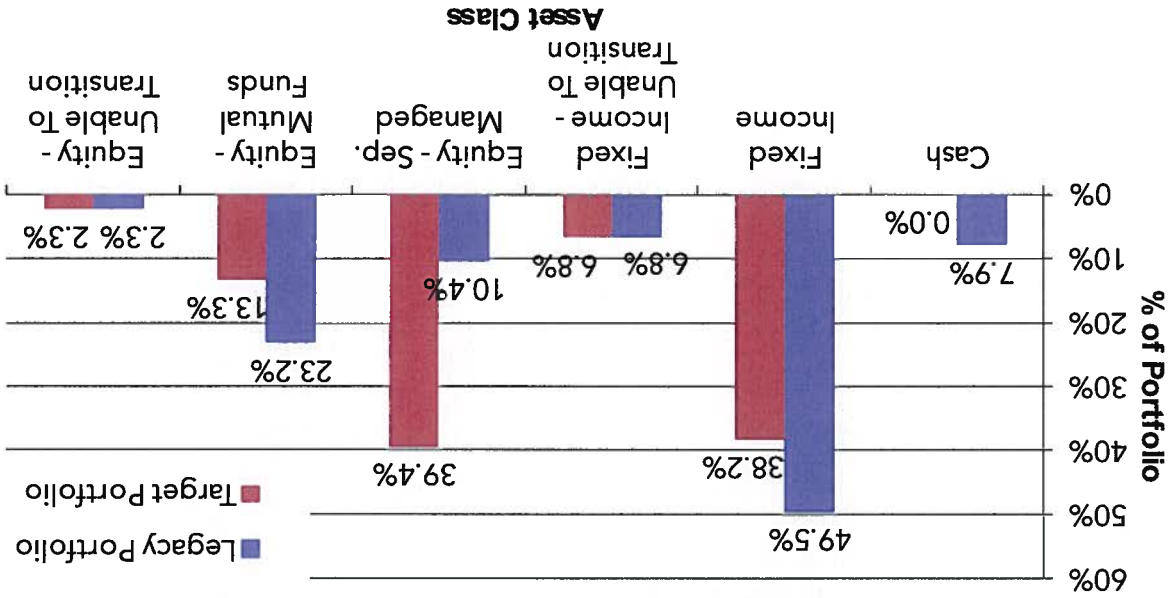
For this transition, all of the downstate pension funds are consolidated into a single investment pool. The following is a summary of the full consolidation transition:

- The Legacy Portfolio is the current allocation of the combined assets of all downstate pension funds. The Legacy Portfolio consists of 638 downstate pension funds with \$8.1 billion in combined assets.

- The Legacy Portfolio is invested in CD's and General Accounts of Insurance Companies (i.e. Fixed Income – Unable to Transition) and Separate Accounts of Insurance Companies (i.e. Equity – Unable to Transition). For this analysis, these will not be transitioned due to the high costs of selling these assets.

- The Target Portfolio is maximum allowed equity exposure for downstate pension funds with over \$10 million in assets and consists of 45.0% Core Bonds, 41.25% U.S. Equity, and 13.27% non-U.S. Equity. For this analysis, non-U.S. Equity will be represented as Equity – Mutual Funds.

Asset Allocation of Legacy vs. Target Portfolios



To perform the implementation shortfall analysis, the following assumptions were made:

- In-Kind Transfer: 33.9% of the Legacy Portfolio would be transferred in-kind to the Target Portfolio in the following manner:
 - 22.3% Fixed Income – Able to Transition
 - 6.8% Fixed Income – Unable to Transition
 - 2.5% Equity – Able to Transition
 - 2.3% Equity – Unable to Transition

- Total Trade: \$9.662 billion would be traded, bought and sold, and would be broken down the following way:
 - Fixed Income - \$3.253 billion
 - Equity - \$3.457 billion
 - Sell Mutual Funds - \$1.879 billion
 - Buy Mutual Funds (non-U.S. Equity) - \$1.074 billion

- Trading Days:
 - Fixed Income – 5 days
 - Equity can be traded – 2 days
 - Mutual Funds – 1 day

- Trading Costs

	Commissions	Bid/Ask Spread	Market Impact
U.S. Govt. /Agency Bonds	0.01%	0.02%	0.01%
Municipal Bonds	0.06%	0.50%	0.05%
Agency – MBS	0.05%	0.20%	0.05%
Equities	0.03%	0.02%	0.16%
Mutual Funds	0.00%	0.00%	0.16%

The results of the Full Consolidation transition using implementation shortfall analysis are in the below table.

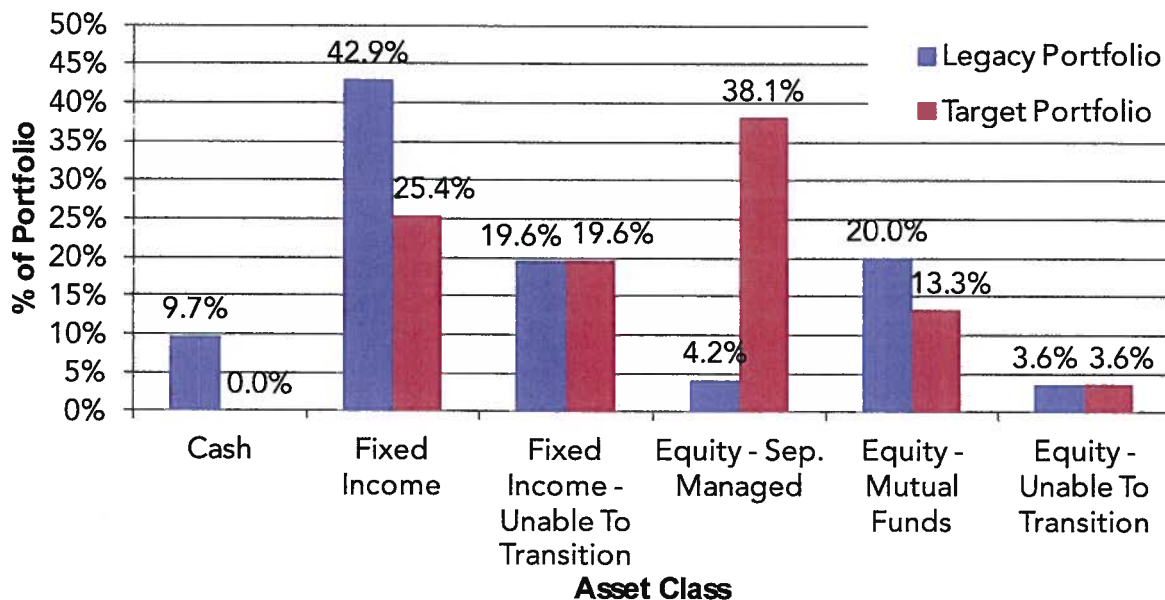
	Lower Volatility Markets	Average Volatility Markets	Higher Volatility Markets
Cost	\$15.2	\$15.2	\$15.2
(% of total legacy Assets)	0.19%	0.19%	0.19%
Cost	\$53.1	\$93.6	\$134.2
(% of total legacy Assets)	0.66%	1.16%	1.66%
Cost	\$68.3	\$108.8	\$149.4
(% of total legacy Assets)	0.84%	1.34%	1.85%
Explicit Costs	\$15.2	\$15.2	\$15.2
Implicit Cost	\$53.1	\$93.6	\$134.2
Total Costs	\$68.3	\$108.8	\$149.4

APPENDIX 3: SUMMARY OF PARTIAL CONSOLIDATION TRANSITION ANALYSIS

For this transition, only the downstate pension funds with \$10 million in assets or less are consolidated into a single investment pool. The following is a summary:

- The Legacy Portfolio is the current allocation of the combined assets of the downstate pension funds with \$10 million in assets or less. The Legacy Portfolio consists of 384 downstate pension funds with \$1.4 billion in combined assets.
- The Legacy Portfolio is invested 19.6% in CD's and General Accounts of Insurance Companies (i.e. Fixed Income – Unable to Transition) and 3.6% Separate Accounts of Insurance Companies (i.e. Equity – Unable to Transition). For this analysis, these will be transferred in-kind and used as alternatives for their broad asset classes.
- The Target Portfolio is maximum allowed equity exposure for downstate pension funds with over \$10 million in assets and consists of 45.0% Core Bonds, 41.25% U.S. Equity, and 13.27% Non-US Equity. For this analysis, non-U.S. Equity will be represented as Equity – Mutual Funds.

Asset Allocation of Legacy vs. Target Portfolios





- To perform the implementation shortfall analysis, the following assumptions were made:
 - In-Kind Transfer: 26.5% of the Legacy Portfolio would be transferred in-kind to the Target Portfolio in the following manner:
 - 3.1% Fixed Income – Able to Transition
 - 19.6% Fixed Income – Unable to Transition
 - 0.2% Equity – Able to Transition
 - 3.6% Equity – Unable to Transition
 - Total Trade: \$1.504 billion would be traded, bought and sold, and would be broken down the following way:
 - Fixed Income - \$0.469 billion
 - Equity - \$0.564 billion
 - Sell Mutual Funds - \$0.284 billion
 - Buy Mutual Funds (Non-U.S. Equity) - \$0.187 billion
 - Trading Days:
 - Fixed Income – 5 days
 - Equity can be traded – 2 days
 - Mutual Funds – 1 day
 - Trading Costs

	Commissions	Bid/Ask Spread	Market Impact
U.S. Govt./Agency Bonds	0.01%	0.02%	0.01%
Municipal Bonds	0.06%	0.50%	0.05%
Agency – MBS	0.05%	0.20%	0.05%
Equities	0.03%	0.02%	0.16%
Mutual Funds	0.00%	0.00%	0.16%

The results of the Partial Consolidation transition using implementation shortfall analysis are:

	Lower Volatility Markets		Average Volatility Markets		Higher Volatility Markets	
	Cost (\$000,000)	Cost (% of total Legacy Assets)	Cost (\$000,000)	Cost (% of total Legacy Assets)	Cost (\$000,000)	Cost (% of total Legacy Assets)
Explicit Costs	\$1.9	0.14%	\$1.9	0.14%	\$1.9	0.14%
Implicit Cost	\$9.4	0.66%	\$20.0	1.41%	\$30.7	2.16%
Total Costs	\$11.3	0.80%	\$22.0	1.55%	\$32.6	2.30%

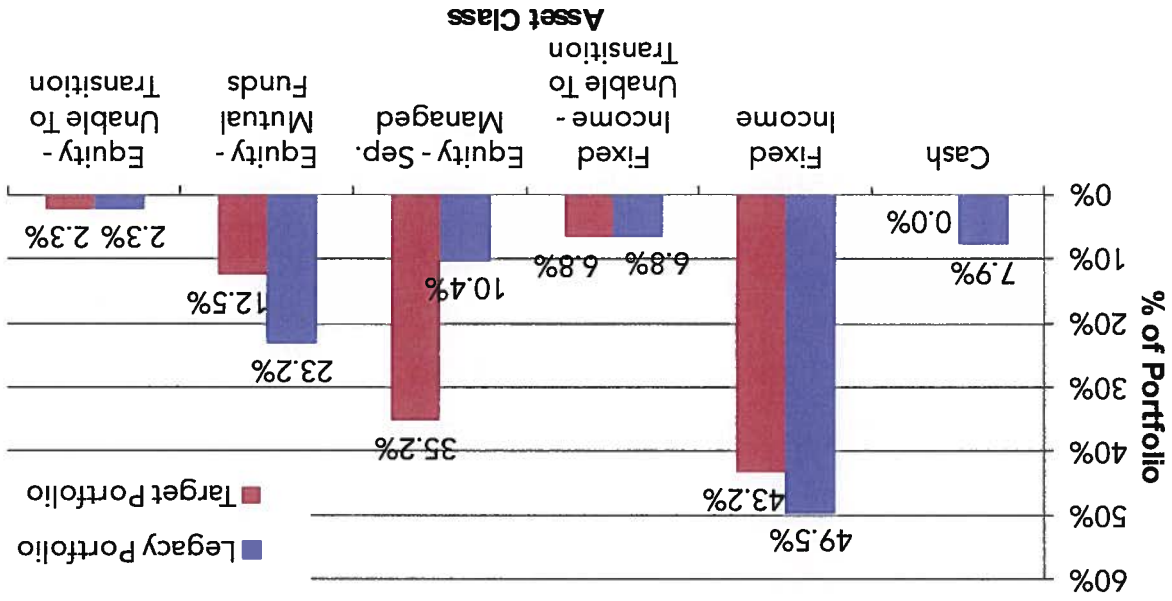
APPENDIX 4: SUMMARY OF DISCRETIONARY CONSOLIDATION TRANSITION ANALYSIS

For this transition, all of the downstate pension funds are consolidated into a discretionary consolidated investment pool. The following is a summary:

- The Legacy Portfolio is the current allocation of the combined assets of all downstate pension funds. The Legacy Portfolio consists of 638 downstate pension funds with \$8.1 billion in combined assets.
- The Legacy Portfolio is invested 6.8% in CD's and General Accounts of Insurance Companies (i.e. Fixed Income – Unable to Transition) and 2.3% Separate Accounts of Insurance Companies (i.e. Equity – Unable to Transition). For this analysis, these will be transferred in-kind and used as alternatives for their broad asset classes.

- The Target Portfolio is a dollar weighted average of the maximum allowed equity exposure for the downstate pension fund and consists of 50.00% Core Bonds, 37.50% U.S. Equity and 12.50% non-U.S. Equity. For this analysis, non-U.S. Equity will be represented as Equity – Mutual Funds.

Asset Allocation of Legacy vs. Target Portfolios



To perform the implementation shortfall analysis, the following assumptions were made:

- In-Kind Transfer: 30.9% of the Legacy Portfolio would be transferred in-kind to the Target Portfolio in the following manner:
 - 19.0% Fixed Income – Able to Transition
 - 6.8% Fixed Income – Unable to Transition
 - 2.8% Equity – Able to Transition
 - 2.3% Equity – Unable to Transition

- Total Trade: \$10.239 billion would be traded, bought and sold, and would be broken down the following way:
 - Fixed Income - \$4.196 billion
 - Equity - \$2.622 billion
 - Sell Mutual Funds - \$1.879 billion
 - Buy Mutual Funds (Non-U.S. Equity) - \$1.011 billion

- Trading Days:
 - Fixed Income – 5 days
 - Equity can be traded – 2 days
 - Mutual Funds – 1 day

- Trading Costs

	Commissions	Bid/Ask Spread	Market Impact
U.S. Govt. /Agency Bonds	0.01%	0.02%	0.01%
Municipal Bonds	0.06%	0.50%	0.05%
Agency – MBS	0.05%	0.20%	0.05%
Equities	0.03%	0.02%	0.16%
Mutual Funds	0.00%	0.00%	0.16%

The results of the Discretionary Consolidation transition using implementation shortfall analysis are:

	Lower Volatility Markets	Average Volatility Markets	Higher Volatility Markets
Cost			
(% of total)			
Legacy			
Cost			
(\$000,000)			
Trading Costs	\$15.5	\$15.5	\$15.5
Volatility Cost (+/-)	\$49.7	\$84.1	\$118.5
Total Costs	\$65.1	\$99.5	\$133.9
	0.19%	0.19%	0.19%
	0.61%	1.04%	1.46%
	0.80%	1.23%	1.65%

APPENDIX 5: ASSET ALLOCATION IMPACT ANALYSIS

Marquette's asset allocation studies are conducted using proprietary software designed to simulate and assess potential risk and return characteristics of total portfolios. The software is based on a Markov-chain Monte Carlo simulation of macroeconomic factors, which are used to model monthly return outcomes of capital markets. The macroeconomic environment is based on two variables which have been shown to reasonably chronicle the movement of capital markets: the BBB spread and the 10-year U.S. Treasury curve yield. Data is simulated on a monthly basis; the simulation is based on historical monthly figures going back to 1919 (BBB spread) and 1926 (10-year U.S. Treasury). The following study was conducted using a sample size of 1,000 and used the following asset allocation weights to model portfolios the projected performance of portfolios re-balanced on a monthly basis. For the purpose of the study, CD's and General Accounts of Insurance Companies were considered to be cash and Separate Accounts of Life Insurance Companies included in U.S. Equity.

Legacy and Target Portfolio's Asset Allocation Weights

Asset Class	Legacy Portfolio		Target Portfolio		
	All Downstate Pension Funds	All Downstate Pension Funds Under \$10 Million	Full Consolidation	Partial Consolidation	Discretionary Consolidation
Cash	15%	30%	7%	20%	7%
Fixed Income	50%	43%	38%	25%	43%
U.S. Equity	26%	20%	42%	41%	37%
Non-U.S. Equity	9%	7%	13%	14%	13%
Total	100%	100%	100%	100%	100%

Using the current 10-year Treasury yield and BBB spread and the above asset allocation weights, the software simulated projected monthly portfolio returns the next 10 years for 1,000 different macroeconomic scenarios. The following table summarizes the 10 year projected annualized returns and volatility for those portfolios.

Legacy and Target Portfolio's 10 Year Projected Annualized Returns and Volatility

	Legacy Portfolio		Target Portfolio		
	All Downstate Pension Funds	All Downstate Pension Funds Under \$10 Million	Full Consolidation	Partial Consolidation	Discretionary Consolidation
Proj. 10 Yr. Ann. Return					
25th Percentile	4.0%	3.4%	4.2%	4.5%	4.5%
Median	5.7%	4.8%	6.9%	6.8%	6.8%
75th Percentile	7.4%	6.1%	9.4%	9.3%	9.3%
Proj. 10 Yr. Ann. Volatility					
Average	7.4%	5.8%	11.3%	11.1%	10.3%

		25th Percentile	\$2.9	\$16.6	\$34.7
		Median	\$27.8	\$27.8	\$50.2
		75th Percentile	\$5.5	\$16.4	\$31.9
			Consolidation	Consolidation	Consolidation
			↑	↑	↑
			All Downstate Pension Funds	All Downstate Pension Funds Under \$10 Million	All Downstate Pension Funds
			Full	Partial	Discretionary

Difference in Average Annual Market Value Increase Over 10 Year Resulting From Moving From Legacy to Target

By creating arithmetic averages from the geometric averages, Marquette was able to estimate a range of projected annual additional increase in the market value of the combined assets of the downstate pension funds by moving to the respective consolidated structure due to the anticipated change in asset allocation.

		Proj. 10 Yr. Ann. Return	0.2%	1.0%	0.5%
		25th Percentile	1.2%	2.1%	1.2%
		Median	2.1%	3.2%	1.9%
		75th Percentile	3.9%	5.3%	4.5%
		Proj. 10 Yr. Ann. Volatility	Consolidation	Consolidation	Consolidation
			↑	↑	↑
			All Downstate Pension Funds	All Downstate Pension Funds Under \$10 Million	All Downstate Pension Funds
			Full	Partial	Discretionary

Difference in 10 Year Projected Returns and Volatility Moving From Legacy to Target

By comparing the return and volatility statistics of the legacy portfolios, Marquette was able to estimate the projected increase in the compounded annualized return and in the annualized volatility associated with moving to the three consolidated structures.

APPENDIX 6: ECONOMIC IMPACT & TIMEFRAME

- Consideration of the economic impact a merger, in any form, could have on the various not-for-profit organizations and professionals supporting the downstate pension funds (i.e. investment consultants, advisors/managers, attorneys, actuaries, custodians, and auditors).
- A plausible timeframe to complete this consolidation could be anywhere from twenty-four to forty-eight months depending on fund structure and investment authority. Furthermore, if the investment authority is expanded the timeframe would increase given the illiquidity and unknown maturity of certain underlying assets (i.e. annuity contracts and CD's) which have long term structures and high exit costs prior to term maturity.

