The Ins and Outs of Investing in Illiquid Assets

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Introduction

The commonly held view is that investors should be able to harvest a liquidity premium from illiquid investments. We look into the fundamentals on which this view is based.

Investments in illiquid asset classes have become more common in recent decades. According to Ang (2014) the share of illiquid asset classes held by pension funds has risen from 5% in 1995 to 20% in 2011. There are a number of reasons for this increasing popularity including the perception that (expected) returns are higher as well as that they offer greater diversification potential. It is however not always clear what the required extra return or diversification benefits for the illiquidity should be. Additionally there are numerous reasons for illiquidity each with their own challenges.

The most widely known illiquid investments are probably hedge funds, real estate, private equity and infrastructure. However, examples can also be found in more liquid markets. For instance, on-the-run (newly issued) bonds are found to be more liquid than off-the-run (older) bonds with similar characteristics and the same remaining maturity. When a certain asset is illiquid it is usually more difficult to find counterparties to trade with at a reasonable price. Therefore, the costs associated with transactions in illiquid assets can become large. For some assets, legal impediments make it sometimes impossible to trade in a timely manner at all.

Investing in illiquid assets introduces additional risks. Probably the best known example of a situation where large positions in illiquid assets caused significant problems is the Harvard University endowment case (see Ang 2014). After a prolonged period of good performance, during the turmoil in 2008 the endowment's illiquid asset investments suffered heavy losses. The liquid part of the portfolio had become too small to meet the running expenses. In need of cash, the Harvard endowment tried to sell some private equity investments. Although

this was possible they faced having to sell at 50% discounts in the secondary market.[1] All in all, the Harvard case showed the world the dark side of having a large part of a portfolio invested in very illiquid assets.

In this note we will discuss theoretical and empirical findings on investing in illiquid assets. We look at why investors in illiquid assets should be compensated with higher returns (liquidity premium) than those on comparable liquid assets and whether this is actually the case. Moreover, we comment on the possible diversification benefits of investing in illiquid assets and address some of the associated problems and risks. Do the pros of investing in illiquid assets outweigh the cons?[2]

Sources of Illiquidity

Different assets have different liquidity characteristics. There are many explanations why some assets are more illiquid than others.

There are many effects that determine an asset's liquidity. Some assets like public equity can be traded within seconds, while municipal bonds may trade as little as twice a year and the average holding period for institutional real estate is a decade. The academic literature on liquidity related topics is extensive. Amihud, Mendelson and Pedersen (2005), Khandani and Lo (2011) and Vayanos and Wang (2012), among others, summarize and describe various sources of illiquidity.

Liquidity can be defined as the ease of trading a security. The liquidity of certain assets will be impacted by different factors (see e.g. Amihud et al. 2005) such as:

i. Exogenous transaction costs

ii. Demand pressure and inventory risk

iii. Private information

iv. Search frictions

Exogenous transaction costs are the most straightforward source and characteristic of illiquidity. These are the fixed costs that need to be made to process the trade. For institutional investors trading in public large cap equities these costs will be small, as all transactions are processed electronically in a highly regulated central market. However, for investments in certain alternative asset classes these costs can become substantial, as sometimes lawyers and solicitors need to be involved in the process. Higher costs make trading more expensive and thus the ease of trading is thereby reduced. In equilibrium, more liquid assets (i.e. assets with lower transaction costs) are held by investors who trade more frequently, while those assets that are more expensive to trade are held by investors with low trading frequency (see e.g. De Jong and Driessen 2013) .

Demand pressure and inventory risk are another source of illiquidity. When an investor wants to sell an amount of stock, there may not necessarily be any buyers. In many markets, a market maker will then buy the asset from the investor, but will also require compensation for the risks that he faces due to warehousing the stock.

Private information is also a potential cause of illiquidity (see for instance Vayanos and Wang, 2012). If some traders have different information to others, one party may enter a bad deal. This was first described by Akerlof (1970) as the market for lemons.[3] A buyer faces the risk that the seller has private information that the stock is expected to perform badly in the future. To compensate for the possibility of entering into a bad deal with an informed seller he therefore gives a bid price that is below the asset's fair value. A seller who might be dealing with an informed buyer on the other hand will quote a higher ask price. In regulated markets this leads to the well-known bid ask spreads. This phenomenon makes investors more hesitant to trade, leading to illiquidity.

Search friction is yet another source of illiquidity, as the lack of a centralized market may result in long waiting times before a counterparty can be found. In addition to the waiting period, the transaction price needs to be negotiated and the bid-ask spread may be very wide if there is little competition in these markets. This type of transaction may also be hampered by costs such as due-diligence and lawyer fees etc.

The sources of illiquidity outlined above have some overlap and might reinforce each other. The inventory risk for instance might have a larger impact if informed traders are involved. In markets where search frictions play an important role transaction costs are usually also higher. In addition, the above sources of illiquidity often also have a larger impact when the traded volume increases. While some assets can easily be traded in small quantities, it might be difficult or impossible to trade them in larger quantities due for instance to the price impact this will have.

Brunnermeier and Pederson (2009) and Driessen (2014) identify two types of liquidity: funding and market liquidity. They relate funding liquidity to the costs of generating cash, for example, to fulfil the demand for cash flows that can originate from currency or interest rate hedging positions for institutional investors. Market liquidity is related to the costs relating to transactions in both liquid and illiquid assets. The two types of illiquidity are positively related. In this study we will mainly focus on market liquidity, and refer readers interested in more information to the two articles cited above.

In this chapter we have shown that there are different effects at play that could result in one asset being more illiquid than another. We have elaborated on four main potential sources of illiquidity found in the academic literature (see for instance Amihud et al. 2005). The next chapter explains why investing in an illiquid asset theoretically should be rewarded

How is Illiquidity Reflected in (Expected) Returns

Investors should demand an extra reward for holding illiquid assets. This reward should at least compensate for the extra costs that the investor incurs.

This section uses two examples to look at a possible explanation of why illiquidity should result in an extra reward. All else being equal, it would be fair to assume that an investor would always prefer a liquid investment to an illiquid one. So why do some institutional investors make investments, sometimes in large volumes, in illiquid assets? The answer to this question is related to the fact that they might receive a reward for holding these less liquid investments. This reward is usually called the "liquidity premium" and its existence has been a lively subject of debate between practitioners and academics. Possible diversification benefits are also an argument for investing in illiquid assets.

However, this chapter focusses on reward in terms of expected return. In the next section we will discuss several components of the liquidity premium as we analyze the division between liquidity level and liquidity risk. Diversification benefits will be examined in a later chapter. Next we discuss two studies which explain why a liquidity premium could emerge.

Study 1: De Jong and Driessen (2013)

First we analyze a theory on why illiquidity could result in a liquidity premium. When investors expected trading horizons differ, for instance short horizon investors versus long horizon investors, the market is what is known as 'segmented'. The theory predicts that this segmentation gives rise to a liquidity premium over and above the expected transaction costs. It predicts that the required liquidity premium increases with the expected holding period.[4] We use a simplified numerical example from De Jong and Driessen (2013) to illustrate this theory. The model consists of the following settings and assumptions:

- short term investors with a 1 year investment horizon
- long term investors with a 10 year investment horizon
- liquid asset with normal transaction costs equal to 1%
- illiquid asset with high transaction costs equal to 5%
- both assets are risk-free
- the risk-free rate is set equal to 2%

The short horizon investors have no interest in the illiquid asset, as its transaction costs are too high, so they all hold the liquid asset. As the assets are risk-free, the gross return should be the risk-free rate plus a compensation for the trading costs. This equals 2% (risk-free) + 1% (trading cost) = 3%, which is summarized in column 2 of Exhibit 1.

If the long horizon investors decide to hold the liquid asset for 10 years they would also earn the gross return of 3%. However, the yearly trading cost is now 0.1% instead of 1%, as the long horizon investors only trade once every ten years. Therefore, they earn a yearly net return of 2.9% (=3% gross return – 0.1% transaction costs).

The illiquid asset needs to generate at least the same net return of 2.9% if long term investors are going to be encouraged to invest. The annualized transaction costs for the illiquid asset are equal to 0.5% (=1/10 * 5%). Thus, the gross return on the illiquid asset should be at least 3.4% to obtain the aforementioned net return of 2.9%.[5] Even in a stylized model like this we observe that illiquid investments must offer long term investors a liquidity premium (in the gross return) in order to remain on par with liquid investments.

Study 2: Ang, Papanikolaou and Westerfield (2014)

Another example of why a liquidity premium can exist is found in Ang, Papanikolaou and Westerfield (2014)[6]. They consider using a highly stylized model with an investor who consumes a certain amount of wealth and invests the rest in liquid and illiquid

	Short Term	Long term	
	Liquid	Liquid	Illiquid
Transaction Costs	1%	0.1%	0.5%
Gross Return	3%	3%	3.4%
Net Return	2%	2.9%	2.9%

Exhibit 1: Example of the Liquidity Premium Derived from Segmentation Theory
Source: Authors' Calculations

Expected period over which the asset cannot be traded	Required liquidity premium (Yearly)
10 years	6.0%
5 years	4.3%
2 years	2.0%
1 year	0.9%
1/2 year	0.7%
Always tradeable	0.0%

Exhibit 2: Required Annual Liquidity Premium for Various Horizons
Source: Ang (2014)

assets. The illiquid asset can only be traded (converted into liquid wealth) at random times. The more wealth that is invested in the illiquid asset the greater the probability that at a certain time the investor will not have enough liquid wealth to consume ("probability of having nothing to eat"). Therefore, the investor requires compensation for holding the illiquid asset.

Exhibit 2 shows this compensation derived under the specific model assumptions, which is denoted as the required liquidity premium. This is the premium the investor requires as compensation for not being able to trade for an expected period of time. The table clearly shows that investors require large premiums for holding an illiquid asset instead of a liquid asset. For holding periods of around 5 years, which is also the average holding period for private equity investments[7], the net required compensation is already over 4%.

It is important to note that these numbers result from specific model assumptions. The example above should only be viewed as an illustration as to why a liquidity premium should exist. More refined estimates of liquidity premiums could be quite different depending on the investment fund in question. This model for instance assumes that an investor has no intermediate income. For a very grey pension fund, which receives almost no contributions, the required premiums could be of the same order of magnitude as in Exhibit 2. However, for a younger pension fund with regular contributions the required premiums will be lower than the ones reported in this example.[8]

Final Remarks on How Investors are Rewarded for Bearing Illiquidity

Brunnermeier and Pederson (2009), who distinguish between market and funding liquidity, observe that there is no guarantee that there will be a substantial liquidity premium. It will depend on a number of factors including the level of illiquidity, the type of investor (e.g. long-term vs short-term investors) as well as time. In times of crisis, for example, both liquidity premiums will be higher.

Longstaff (2014) analyses the valuation of thinly-traded assets such as private equity and commercial real estate using an American option approach. He finds that the value of immediacy (i.e. the ability to sell immediately) is much higher than that of future liquidity; the value of the first day of illiquidity is much higher than that of the second day. Liquidity today is more valuable than liquidity tomorrow or next week. He confirms the findings of other studies that the value of illiquid assets can be heavily discounted in the market; the discount can be as high as 30% for an illiquidity period of 5 years. Finally he finds that the effects of illiquidity on asset prices are smaller for assets that pay higher dividends.

Vayanos and Wang (2012) analyze how asymmetric information and imperfect competition[9] can affect liquidity and expected returns. They show that expected returns are higher when information is not spread evenly between all market participants compared to those situations where information is widely known or when the private information is not observed. They identify two partly overlapping measures of illiquidity. The first one is related to transaction volume and is based on the idea that trades in illiquid markets usually have a large price impact. This measure can be seen as the more permanent component of the price effect. The other measure is related to the transitory component which is driven by the fact that trades in illiquid markets can result in large temporary deviations between the asset's price and its fundamental value. Moreover, they show that the relationship between liquidity or lack of it and expected returns is not always positive. It depends on several factors including the source of the illiquidity (asymmetric information or imperfect competition) and the measure of illiquidity. If the illiquidity is driven by imperfect competition the relationship can become negative.

In general the liquidity premium is a compensation for not being able to trade at a fair price at any given time. It is the interplay between many variables that determine the exact ex-ante reward required for bearing illiquidity risk. Although it is hard to derive the exact size of a liquidity premium the academic literature seems to agree that a liquidity premium should theoretically exist.

Liquidity Level and Liquidity Risk Premium

There are actually two types of liquidity premiums. First, a compensation for average illiquidity itself and second a compensation for the risk of illiquidity.

This split is for instance found in Khandani and Lo (2011), who divide the literature on the impact of liquidity on asset prices into two groups. The first group (liquidity level) focuses on liquidity as a deterministic characteristic of securities in the same way that transaction costs are. As investors prefer liquid assets to illiquid ones, all other things being equal, they will want to be compensated for holding an asset with low liquidity. Moreover, higher costs translate into higher gross expected returns for those assets. This premium should at least be sufficient compensation for the illiquid asset's transaction costs, but may extend beyond that, as seen in the previous section. The premium resulting from the liquidity level of an asset is called the liquidity level premium.

Secondly, the liquidity risk premium is a compensation for holding assets that perform poorly when there is a systematic liquidity shock.[10] This premium should be regarded as a systematic factor premium. Economic theory predicts that assets that have their lowest returns when the global financial markets encounter bad times should offer some compensation with respect to other assets.[11] Times of scarce liquidity can also fairly be categorized as bad times (see e.g. Brunnermeier and Pedersen 2009). Assets that perform badly during these periods should offer a liquidity premium, otherwise investors have no incentive to hold them. In this case liquidity is regarded as a risk factor.

Acharya and Pedersen (2005) show that in most cases there will be a positive relation between both premiums, which makes it difficult to attribute the premium to either the liquidity level or the liquidity risk effect. As Lou and Sadka (2011) observe, the liquidity level can be considered as the mean effect, whereas the liquidity risk is related to the volatility effect. In addition, Khandani and Lo (2011) state that even though the two approaches have an overlap, their effects on empirical analyses can be quite different. They state that this could explain why there is little consensus on how to measure liquidity risk.

Particularly for these reasons we will look mostly at the total liquidity premium, although we believe that the distinction outlined above is important for understanding why liquidity premiums exist. However, depending on specific investor

preferences, there may be more focus on one of the individual premiums rather than on the total liquidity premium.

Time Variation in Illiquidity and the Liquidity Risk Premium

The previous paragraph explained that the exposure to aggregate liquidity is regarded as a specific risk for which a premium is demanded: the liquidity risk premium. This premium is thus closely related to the time variation in illiquidity. Therefore, it is also important to understand how liquidity varies over time.

In tranquil times liquidity might be abundant, while in times of crisis it is often very scarce.[12] For instance, during the credit crisis even the usually very liquid money markets became illiquid (see e.g. Hanson, Scharfstein and Sunderam 2014). In the same period the liquidity of corporate bonds decreased dramatically which resulted in much higher transaction costs. Exhibit 3 shows the Barclays liquidity cost score[13], which shows how expensive it was to trade US high yield bonds and credits during the crisis.

Assets that have a strong liquidity risk exposure will be vulnerable to systematic shocks in aggregate liquidity (see Exhibit 4). A systematic liquidity shock here refers to the situation where the liquidity in global asset markets suddenly dries up. Thus, when a systematic liquidity shock happens, prices of these assets will plunge. Expected returns on these assets should therefore be higher. Exhibit 4 shows the monthly liquidity factor from Sadka (2014). He analyses whether the liquidity risk, defined as the exposure to the shocks in the liquidity factor shown in Exhibit 4, is a priced factor premium. He shows that even within the universe of liquid indices a higher exposure to the liquidity risk factor resulted in a higher (although not statistically significant) return over the period 1994-2010. Jensen and Moorman (2010) find that aggregate liquidity improves during expansive periods in monetary policy and deteriorates during restrictive periods. The prices of illiquid stocks increase relative to those of the more liquid stocks during periods of monetary expansion.

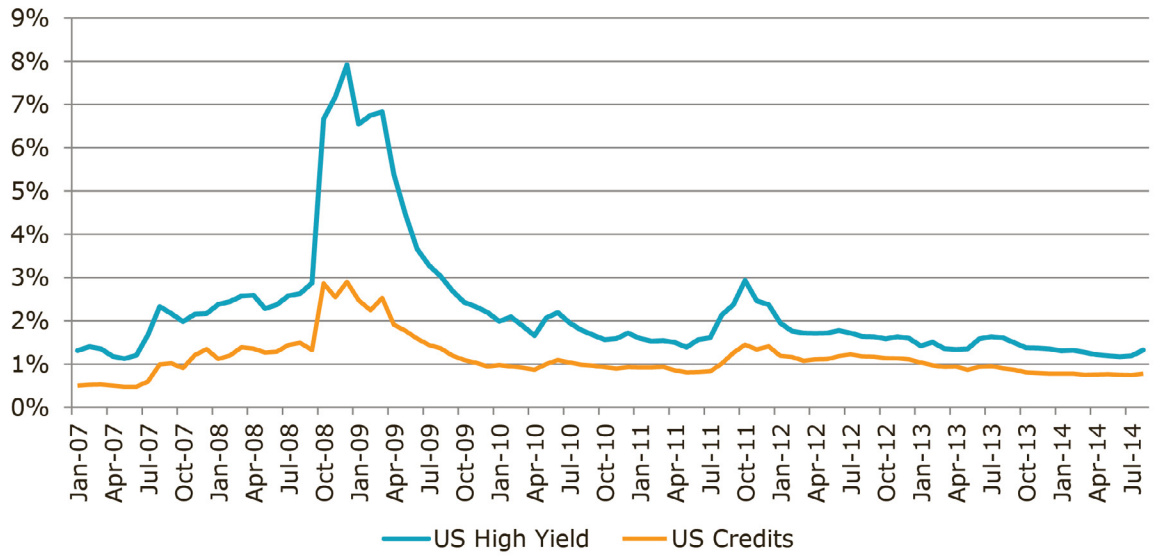

Exhibit 3: Barclays Liquidity Cost Score (LCS)
Source: Barclays POINT

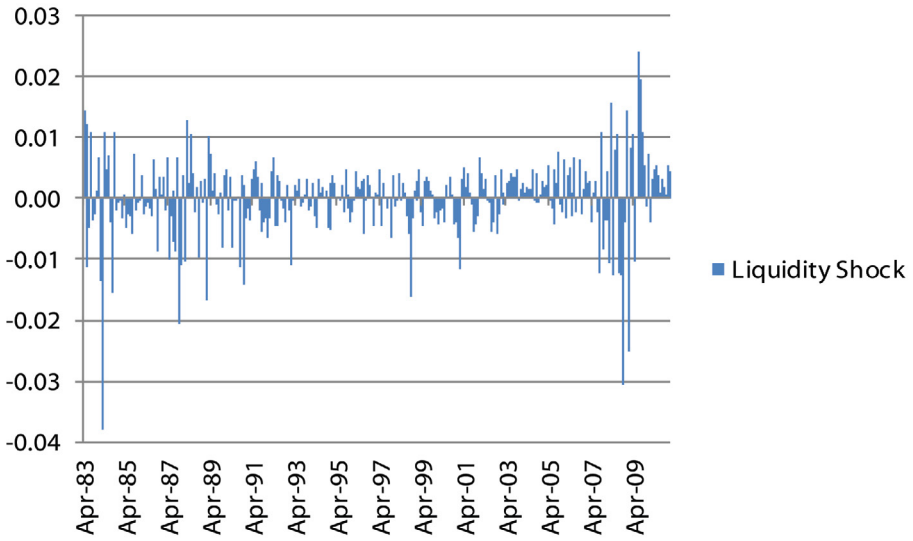

Exhibit 4: Changes in the Monthly Liquidity Factor
Source: https://www2.bc.edu/~sadka/

The time variation in liquidity suggests that long horizon investors might pick up liquidity premiums when these are at their highest (i.e. after systematic decreases in liquidity). De Jong and Driessen (2013) review the literature on dynamic trading strategies based on liquidity. They find that the exact timing of these liquidity events is difficult to predict and it is therefore hard to reap liquidity premiums using dynamic strategies. Ang (2014) states that rebalancing is the easiest way to earn liquidity premiums as this can be interpreted as providing liquidity to the markets. Rebalancing supplies liquidity because it is a countercyclical strategy. More specifically, the investor is actually selling assets when others want to buy at high prices and buying when prices are low and others want to sell, which generates liquidity. He states that an investor is thus rewarded for behaving in a contrarian way and providing this liquidity. It is important to also rebalance the illiquid assets when possible. It should be noted that these strict rebalancing rules are part of the strategic asset allocation decision.

Asset Allocation

Although it might be possible to earn liquidity premiums, one should also take into account the risk characteristics of the investments involved. Investing in illiquid assets can be risky as illiquidity is usually most prevalent when liquidity is most needed.

Investors can opt to allocate to illiquid assets for various reasons. In addition to the liquidity premium, investments in illiquid assets can also be selected because of the possible diversification opportunities. In the previous sections we have discussed the theoretical existence of liquidity premiums. In this section we will discuss some other important elements that need to be taken into account when investing in illiquid assets. These relate to the diversification opportunities and the consequences of not being able to adjust holdings in illiquid assets at times when rebalancing is required.

Diversification

Another reason for investing in illiquid rather than liquid assets, apart from the higher return expectations, could be the diversification offered through exposure to specific underlying return factors which are yet not available in liquid markets (infrastructure projects which invest in e.g. inflation generating projects).

A large part of these diversification opportunities are a direct result of appraisal based valuations. Exhibit 5 shows the cumulative returns for listed as well as non-listed real estate. Although the underlying assets are in theory comparable, the return patterns differ substantially. Investing in non-listed real estate would have had a less negative impact on a portfolio's performance in 2008-2009 than an investment in listed real estate. This is because the shocks in non-listed real estate are included in the prices with a delay. From our point of view this diversification is therefore mainly artificial, as it can largely be explained as a consequence of accounting practices. This results in apparently lower volatilities. In practice it is not possible to trade on the appraisal based valuation as the Harvard University's endowment case has shown. When comparing public listed stocks to private equity for instance we also expect to see a comparable lag in returns caused by appraisal based valuation.

Asset Allocation Models

Ang et al. (2014) develop an asset allocation model which takes illiquidity into account. Their main results are based on a scenario where an investor consumes a certain amount of their wealth in each period. The universe consists of three assets: a risk-free bond, a liquid and an illiquid risky asset. They analyze how much should be invested in the illiquid risky asset according to the different levels of illiquidity of this asset. The remaining, liquid wealth is allocated to the risk-free bond and the liquid risky asset. The investor consumes out of this liquid wealth. The analysis is performed for an investor with average risk aversion.

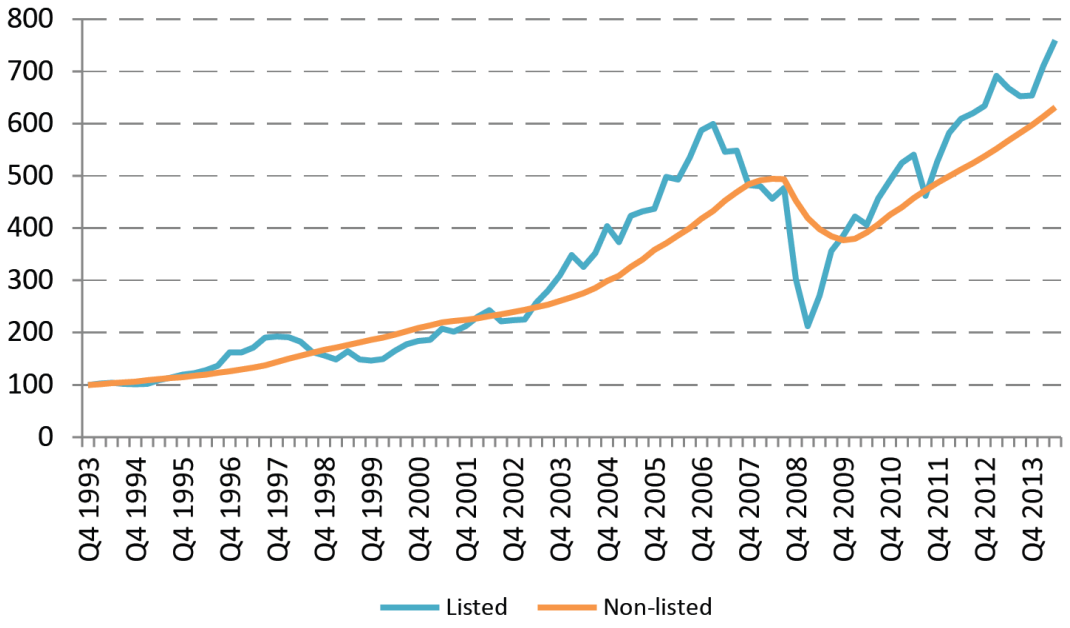

Exhibit 5: Cumulative Returns for US listed (NAREIT) and Non-listed (NCREIF) Real Estate
Source: NCREIF, DataStream

Expected period over which the asset cannot be traded	Optimal allocation with consumption	Optimal allocation without consumption
10 years	4.8%	51.8%
4 years	13.2%	52.0%
2 years	25.1%	52.3%
1 year	37.3%	52.7%
1/2 year	44.2%	53.5%
Always tradeable	59.3%	59.3%

Exhibit 6: Optimal Holdings of Illiquid Assets
Source: Ang et al. (2014)

Exhibit 6 reports the optimal holding of illiquid assets in their model for different expected periods during which the asset cannot be traded. Optimal holdings in the illiquid asset are shown in column 2. The optimal holding in the illiquid risky asset in case of intermediate consumption sharply decreases as its illiquidity rises. For instance, the investor's holding in the risky asset would decrease from 59% in case of full liquidity to 37% if the risky asset can only be traded once a year on average. If the risky asset can only be traded once every four years, which is close to the average effective duration of private equity and direct real estate investments, for example, they find an allocation of 13% to be optimal. Column 3 shows that the results depend largely on whether or not intermediate consumption is taken into account. If this is not the case the effect of illiquidity is much smaller. This is because if there is no need for immediate liquidity in intermediate periods, there is less risk attached to not being able to access the funds. The results in Exhibit 6 without intermediate consumption (i.e. column 3) are in line with the results of Driessen (2014). His study looks at terminal wealth after 10 years and does not take into account the intermediate pension payments that need to be made. In addition, he also assumes that illiquid assets cannot be traded during the period under consideration.

The results in Exhibit 6 without intermediate consumption and the findings of Driessen (2014) might underestimate the true impact of illiquidity as many funds do need immediate liquidity. On the other hand, the results in Exhibit 6 with consumption might overestimate the effect of illiquidity because funds in general receive regular inflows. Therefore, the optimal holdings in illiquid assets will depend on the balance between inflows and outflows and will probably somewhere between column 2 and 3 of Exhibit 6.

Considerations for Allocation to Illiquid Assets

The above implies the importance of the specific setting in which the effect of illiquidity is analyzed. Therefore, it is important to know the liquidity risks the investors face. Pension funds, for instance, might have an additional source of liquidity risk when they hedge their interest rate or currency risk mostly using derivatives. If interest rates will start to rise sharply from the current low levels, losses on the swap positions might have to be financed if there are not sufficient assets to serve as collateral. In this case, liquid assets are needed. As illiquid assets cannot be rebalanced during a given time period, the position in the illiquid asset may deviate from the strategic portfolio (see e.g. Driessen 2014). Siegel (2008) shows that in certain economic scenarios, the share of illiquid assets in the portfolios of institutional investors can become undesirably high. An institutional investor with large positions in direct real estate, hedge funds, infrastructure and private equity could then end up with a very unbalanced portfolio. In the worst case scenario the fund might not even have enough liquid assets to be able to pay out their obligations (e.g. pensions). This is exactly what happened in the Harvard endowment case we described in the introduction.[14] Moreover, the deviation from the strategic portfolio can be costly as the new portfolio might have sub-optimal risk-return characteristics. To compensate for this sub-optimal profile an investor should demand a liquidity premium. Note that the risks also depend on the demography of the fund: a young fund with large contributions could take on more liquidity risk than an old fund with mostly retirees.

Empirical Evidence

The existence and size of liquidity premiums is difficult to determine due to the subjectivity of illiquidity definitions and data issues.

Although theory predicts an ex-ante liquidity premium, in this section we look at whether this is also the case in practice. There is extensive academic literature that empirically investigates the existence of liquidity premiums and there seems to be some empirical evidence that such premiums exist (see Amihud et al., 2005, Ang 2014 and De Jong and Driessen 2013, for a summary of the literature). This evidence is however mixed in the sense that it is only found in certain markets and it depends on the liquidity measure used. In order to keep this report short, we are not going to discuss every liquidity premium found, but rather show some examples of these premiums to clarify the findings of both studies.

Government Bonds

Within fixed income, the yield on government guaranteed agency bonds can be substantially higher than the yield on otherwise comparable government bonds, while the (default) risk is the same because the agency bond is backed by the same government. As the default risk is the same, the yield difference should be a result of differences in liquidity only. Government bonds are generally regarded as more liquid as they are more widely traded, serve as eligible collateral for many derivative transactions and offer relatively easy access to cash via the repo market. According to Longstaff (2004) and Schwarz (2010) yield differences between

these agency bonds and government bonds are usually around 20 to 30 bp. Ejsing, Grothe and Grothe (2012) find that during crisis periods the agency-treasury bond spreads could widen to 80 bp. Another liquidity premium in this market is found between on-the-run (newly issued) and off-the-run (older) bonds with the same remaining maturity and similar characteristics. The newly issued bonds are usually more liquid and carry a lower yield. The yield difference is however small and short selling the on-the-run bonds and buying the off-the-run bonds is not a profitable arbitrage strategy due to the shorting costs (see Amihud et al. 2005, and, Krishnamurty, 2002). Finally there is an indication of a liquidity premium for inflation linked bonds (TIPS) too, although the premium seems too high to be solely due to liquidity effects (see e.g. Fleckenstein, Longstaff and Lustig 2014).

Corporate bonds

Within the corporate bond world there is evidence to suggest that bonds that are less liquid often have a higher return. Dick-Nielsen, Feldhutter and Lando (2012) show that the liquidity level premium before the financial crisis was 4 bp for investment grade and 58 bp for high yield. After the crisis these premiums were found to be 40 to 90 bp for investment grade and 200 basis points for high yield. Bongaerts, De Jong, and Driessen (2011) take into account both liquidity level and liquidity risk and find that substantial liquidity premiums were already present before the crisis. They report premiums up to 100 bp for investment grade bonds and up to 200 bp for high yield bonds. The largest part of total liquidity premium in this market, comes from the liquidity level premium rather than the liquidity risk premium. This liquidity premium in corporate bond markets varies considerably over time, and there may be significant differences in bull and bear markets. In general it is however not easy to distinguish between the different premiums (for default and liquidity risks, for example).

Public Equity

In equity markets, stocks with low liquidity levels appear to earn higher returns than liquid stocks. It is noteworthy that this group of more illiquid stocks also comprises microcap stocks. For instance, Brennan and Subrahmanyam (1996) find that low liquidity stocks outperform high liquidity stocks by 6.6% per year. In a more recent study, Acharya and Pedersen (2005) find this premium in equities to be 3.5%. These premiums are observed over a longer time span, but have diminished in the recent past according to Ben-Rephael, Kadan and Wohl (2015). Lou and Sadka (2011) show that liquidity risk rather than liquidity level can help explain the cross section of equity returns during the crisis in 2008; some liquid stocks had larger drawdowns during this period than the more illiquid stocks with lower exposure to liquidity risks. Acharya and Pedersen (2005) find the liquidity risk premium to be 1.1%. This total liquidity premium on equities according to Acharya and Pedersen (2005) is thus 4.6% (3.5% level +1.1% risk).

Premiums Within Illiquid Asset Classes

There also seems to be some evidence that illiquidity (for instance longer lock-up periods) results in higher returns for private equity (Franzoni, Nowak and Phalippou 2012), hedge funds (Khandani and Lo 2011) and real estate (Liu and Qian 2012). With respect to hedge funds, Khandani and Lo (2011) show that the risk adjusted liquidity premiums for illiquid categories such as convertible arbitrage were sometimes as high as 10% per year in the period 1986-2006.[15] Even more liquid strategies such as managed futures have premiums of 5%. It is however somewhat puzzling that the risk adjusted liquidity premium for global macro funds is almost -6% (although the premium is not statistically significant). There is not much evidence for a liquidity premium for equity market neutral funds. Over the period 2002-2006 the premiums have declined significantly for a number of reasons including lower volatility for the major asset classes and greater demand for hedge funds.

Premiums Across Illiquid Asset Classes

It is however much harder to find conclusive research evidence for the existence of liquidity premiums particularly across alternative asset classes. This might sound surprising as they are 'known' for their high returns. Ilmanen (2011) for instance relates the average returns of a set of both liquid and illiquid asset classes to a (subjective) illiquidity measure. As can be seen in Exhibit 7 there seems to be a relation between the average return and the illiquidity measure. Ilmanen (2011) notes however that the return differences can also be due to exposures to risk factors which are not related to liquidity. Also the various biases in the databases of especially illiquid assets can explain part of the return differences.

Research on returns of illiquid asset classes is hampered by lack of good quality data. Ang (2014) gives a clear description of these data issues. This largely explains why it is so difficult to find conclusive evidence on whether liquidity premiums exist or not (see also De Jong and Driessen 2013) in these asset classes. For instance, there is a large ongoing debate on whether private equity outperforms risk-adjusted public equity or not (see Driessen et al. 2012).

Ang (2014) gives two possible explanations why liquidity premiums are found within asset classes but not between them. The first reason could be limited integration of asset classes where investors tend to look at asset classes individually rather than together as one group. This might result in imperfections for the market as a whole, which could lead to mispricing from the perspective of a completely integrated market. It is difficult to distinguish between price differences based on illiquidity and price differences caused by mispricing due to institutional constraints or slow-moving capital.

Secondly, Ang (2014) poses that investors may simply pay too much for illiquid assets in their desire to achieve higher returns. Prices are then bid up high enough to substantially reduce the liquidity premium that should theoretically exist.

Manager Selection

Finally an important element of investing in illiquid assets is the manager selection. Exhibit 8 shows that the dispersion between managers is much higher for investments in hedge funds than for investments in listed equities (see also e.g. Malkiel and Saha 2005). Due to the high dispersion and the lack of 'objective' high quality benchmarks within illiquid asset classes it is hard to draw a clear conclusions regarding the existence and level of liquidity premiums within those asset classes.

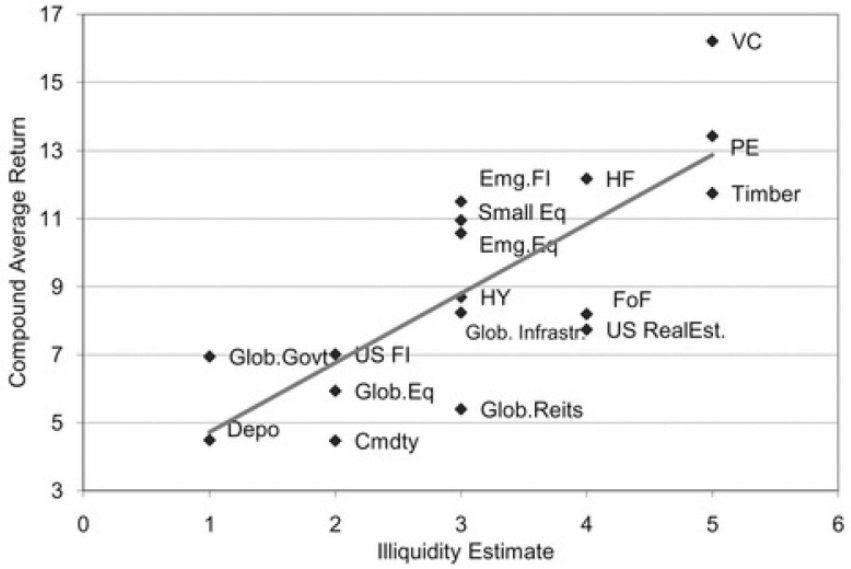

Exhibit 7: Average Return (1990-2009) vs. Illiquidity Measure.
Source: Ilmanen (2011)

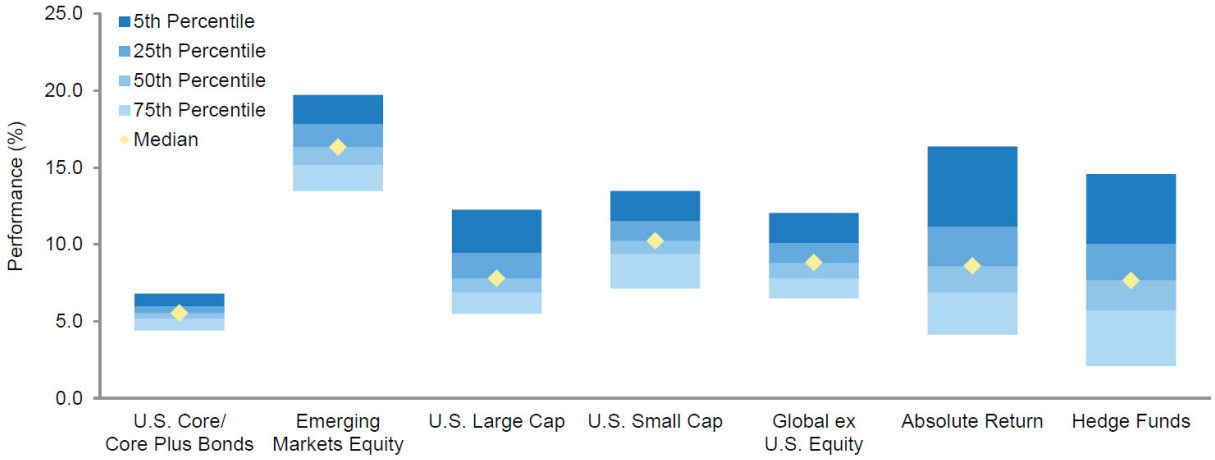

Exhibit 8: Dispersion Between Managers for Various Asset Classes
Source: Cambridge Associates

As there is no clear consensus on the existence of a liquidity premium, the decision to invest in an illiquid asset to capture this premium is mainly supported by investment beliefs. Firstly the belief, supported by theory, that the premium is out there and more importantly the belief that the investor is capable of capturing this premium. In our view, the decision to invest in illiquid asset classes and how successful this is depends mainly on the ability to select top-performing managers. This is in line with Swensen (2009)[16], who argues that the reason for investing in illiquid asset classes should not be higher risk-adjusted returns. He suggests that alpha opportunities are greater in illiquid markets than in liquid ones, as information in illiquid markets is much more difficult to gather and analyze. Skilled investors in these illiquid markets are able to use this information to distinguish between good and bad investments.

Conclusion

We have evaluated the common view that investors should be able to harvest a liquidity premium from illiquid investments. Unfortunately it is hard to find evidence of such a premium, which makes the decision to invest in illiquid assets one of the tougher challenges for investors.

We have looked at several aspects of investing in illiquid assets. On theoretical grounds we would expect a liquidity premium to exist. However, the historical evidence for this is mixed. Within some asset classes more illiquid assets appear to deliver higher returns than liquid alternatives. In contrast, academics struggle to find evidence on liquidity premiums between asset classes. For example, it is hard to find evidence of such premiums for direct real estate versus listed real estate or private equity versus listed equity.

Even if liquidity premiums exist, it is questionable whether these premiums can be exploited in practice and whether they are large enough to compensate for the extra risks involved. These risks include the risk of deviating too much from the optimal strategic portfolio as a result of the inability to rebalance and the probability of not being able to cover running expenses caused by too great an allocation to less liquid assets.

Allocation to certain illiquid asset classes however may have a significant effect on a portfolio's return as it is a top-down allocation decision. Research on the existence of a liquidity premium in illiquid asset classes is hampered by the lack of good quality data. In practice there are many examples of both good and bad results of investing in illiquid assets. The difference in performance in these markets depends for a large part on the managers that are selected. Therefore, in our view investing in illiquid asset classes could form part of a portfolio strategy, if it is combined with the capability of selecting top-performing managers.

If a fund decides to invest in illiquid assets we recommend that it set a maximum allocation to illiquid assets based on a stress test. In the worst case scenario there should still be enough liquid assets to meet obligations. We emphasize that investing in illiquid assets is a decision that has long-term consequences. The strategy will need support not just today but also in the future.

Endnotes

1. Harvard endowment finally solved their liquidity problems by borrowing.
2. We abstract from more detailed analyses of the various illiquid assets. For these, we refer the reader to specific Robeco white papers on:
   - Real estate (Onroerend goed in portefeuillecontext, 2012)
   - Private equity (De rol van Private Equity in een beleggingsportefeuille, 2013)
   - Hedge funds (De toegevoegde waarde van hedgefondsen in een pensioenportefeuille ,2014)
3. A bad quality second hand car in the US is called a lemon. If the car that is being sold is of bad quality, the seller is probably aware of it, while the buyer is not able to determine the quality of the car. This information asymmetry leads to the probability of "buying a lemon".
4. If there is no heterogeneity in the expected trading frequency, investors in illiquid assets will be only compensated for the expected trading cost according to this theory.
5. In the example the net returns on the liquid and illiquid asset are equal. In practice however the turnover in the liquid asset might be higher than once every ten years (i.e. long term investors need to rebalance their portfolios etc.). In this case the net return of the illiquid asset will exceed that of the liquid asset.
6. Ang (2014) describes the model and the results from Ang et al. (2014) in simpler language. Ang defines the illiquidity premium as the certainty equivalent.
7. Private equity contracts usually span a 10-year period. The effective average holding period is shorter, because dividends and capital are returned to the investor before the end date of the investment (see for instance Driessen, Lin, and Phalippou, 2012).
8. Ang et al. (2014) also consider a case without consumption. In this case they find that the required liquidity premiums are much lower, as there is no intermediate risk of not being able to consume.
9. This source of illiquidity is an additional source to the main ones described in the previous section and in Amihud et al. (2005).
10. We define a systematic liquidity shock as an event during which liquidity suddenly dries up. Investors and other liquidity suppliers such as banks are then reluctant to trade. Liquidity shocks can lead to price volatility, which can increase expectations of future volatility. This will lead to higher margin requirements as was the case for S&P 500 futures during the liquidity crises of 1987, 1990, 1998 and 2007 (see e.g. Brunnermeier and Pedersen 2009).
11. Investors are generally prepared to pay a premium for assets that pay-off in bad times. This is considered to be insurance. This is one of the reasons why pension funds still invest in high quality fixed income instruments. Another reason is their need to comply with the requirements of the Dutch financial assessment framework (FTK).
12. Liquidity can be measured in different ways. Measures based on turnover or autocorrelation in returns are widely used.
13. The Barclays LCS is an indication of the cost of trading a bond, measured as a percent of the bond's price.
14. Harvard decided not to liquidate part of its endowment but to issue bonds and to reduce its payout in 2009.
15. Khandani and Lo (2011) relate the level of illiquidity to the autocorrelation of the returns; the higher the autocorrelation the more illiquid the hedge fund strategy is. The liquidity premiums are lower if they are based on the raw returns. Their approach first ranks each of the funds in the specific asset class into five quintiles based on the autocorrelations. Subsequently the average (risk adjusted) returns of the equal weighted portfolios is calculated. Finally the spread between the most and the least liquid portfolios is estimated in order to derive an estimate for the liquidity premium.
16. David Swensen has been chief investment officer of the Yale Endowment Fund since 1985. His views on asset allocation caused many endowment funds to start investing in illiquid alternative asset classes.

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Important Information

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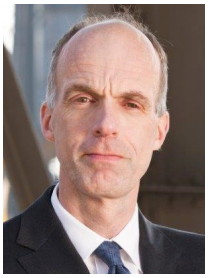

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