



Liquidity: Finance In Motion Or Evaporation?

Liquidity: Finance In Motion or Evaporation?

transcript of a talk by
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at
Gresham College, Barnard's Inn Hall, Holborn, London EC1N 2HH
on
Wednesday, 5 September 2007 at 18:00

recording available at
<http://www.gresham.ac.uk/event.asp?PageId=4&EventId=640>



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"New Learning"

Liquidity: Finance In Motion Or Evaporation?



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Good evening Ladies and Gentlemen. I'm pleased to find so many of you intrigued enough about liquidity to drop by Gresham College for the first in my third season of Commerce lectures following the theme of "better choice". Having spent last week racing sailboats on the Baltic, I've had plenty of time to contemplate liquidity and hope to share some of those thoughts with you tonight.



Outline

- Fluidity in definition
- Time, value, probability and money
- Settled dis-equilibria
- Small holes
- Liquidity and lucidity
- Liquidity crises
- Black holes, white bubbles
- Trading on ice



*“Get a detailed grip on the big picture.”
Chao Kli Ning*

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As you know, it wouldn't be a Commerce lecture without a commercial. So I'm glad to announce that the next Commerce lecture will continue our theme of better choice next month in the Docklands. That talk is “What I Like About This Country Is That It Has A Nice Level Of Corruption!” at Allen & Overy's offices on Thursday, 4 October at 12:30. Reservations are required. Or you can slip Dawn a tenner at the door.

Well, as we say in Commerce – “To Business”.

Fluidity in Definition

Liquidity is a fluid concept (sic). While exploring fluidity tonight, I hope to share with you a dark secret at the heart of finance – when we discuss liquidity we're often not that sure what we're talking about. Liquidity drips into many financial discussions, but pinning down this watery concept is slippery. Part of the difficulty in pinning down liquidity is due to sloppy phrasing and some is down to different scales of time or size, but at heart, there is still a lot of mystery about some forms of liquidity. I hope to leave you with an overview of liquidity and some of the legitimate disagreements about timing and risk, while also giving you a handy taxonomy of various meanings of liquidity.



Fluidity In Definition

“the probability that an asset can be converted into an expected amount of value within an expected amount of time”

liquidity = certainty (value, time)

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A basic definition of liquidity is: **the probability that an asset can be converted into an expected amount of value within an expected amount of time.** If you know that you can sell your wristwatch for £100 within an hour, you could claim that your wristwatch is a liquid asset. If you are very uncertain how much your collection of special edition Gresham Commerce lectures is worth, let alone how long it might take to sell them? where? to whom? then that collection is, perish the thought, rather illiquid.

Going back to your wristwatch, and assuming it's rather expensive and waterproof, it might be a very liquid wristwatch at £100 but very illiquid at £1,000. Of course, if there is a watch-exchange your watch may be more liquid than you think despite the waterproofing. If every Wednesday there is a great watch-exchange market, say on Bow Lane beside St Mary le Bow of Bow Bells' fame, then you may have great liquidity if you know a week in advance you need some cash. If you can sell your watch on www.wwx.com (wristwatchxchange) or eBay, you may have greater liquidity still. And this is the key function of markets, they help people be more certain that an asset can be converted into an expected amount of value within an expected amount of time. Markets provide liquidity. Without liquidity transactions are less efficient because matching buyers and sellers (search costs) rise and prices may be wrong. Markets increase the probability that people can sell things when they need at the right price.

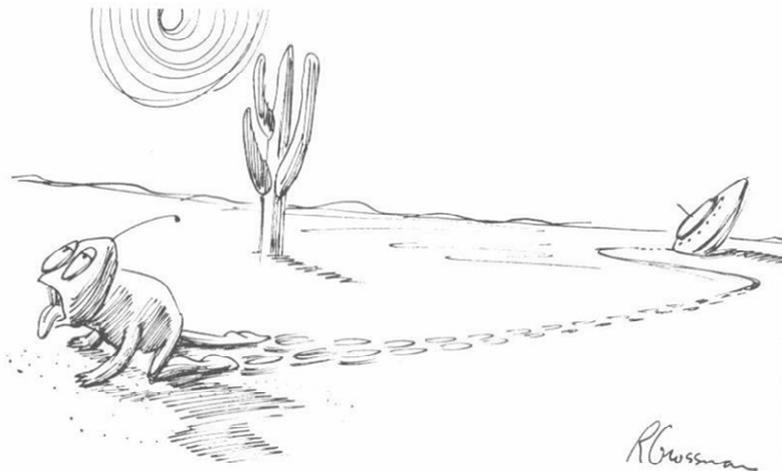
Cash is, normally, the most liquid asset because it has the most certainty of value. Liquidity would not be an important issue if the price of a share were constant. If a share was known to have a fixed price, the cost of liquidity would simply be the interest carrying cost less dividends received. Note that cash can be converted into itself. You can swap a £20 note with a friend and both of you have completely changed your physical assets with great ease and great certainty of value; neither of you lost a penny in this highly liquid asset transfer. Whereas, if you swap your watch with a friend, particularly a cheapskate like me, one of you may feel you lost something in the transfer.

An electronic bank account is a little, only a little, less liquid than cash. An equity share is still less liquid. A house is a bit less liquid; it can be difficult to sell and the value obtained can fluctuate, sometimes markedly. A share in a horse-racing syndicate is still less liquid. Assets that can only be sold after an exhaustive search for a buyer are illiquid. My wife and I own a Thames sailing barge. Despite being afloat, it's very illiquid as we could probably only sell it to a small group of interested people – though all offers from tonight's audience are welcome. Are hedge funds liquid? Michael Nystrom (<http://bullnotbull.com/bull/node/19>) points out that during the recent credit crisis, "Having money in such a fund can be even less liquid than a house in Detroit. Some hedge funds have suspended redemptions which is akin to saying, 'Yes, your money is here and it is (ahem) safe - but you can't have it just now...' When can you have it? Well, that depends. Maybe never..."

Of course, what's needed may not be cash. A lot of fairy tales have been built around liquidity. In these cases, liquidity is still **the probability that an asset can be converted into an expected amount of value within an expected amount of time**, but the value needed is not monetary. The conversion may need to be into gold, chocolate, enchanted rings, ensorcelled shoes or magic beans.



Who Needs Liquidity?



"Ammonia! Ammonia!"

Drawing by R. Grossman; © 1962.
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At a personal level, you can easily understand the importance of liquidity. If you owe money to someone and they choose the time of repayment, it is good to have liquid assets you can change to cash easily with certainty. If you can't raise money when it is needed, despite having a wealth of assets, you have a liquidity crisis. For the sake of liquidity, you're better off with equity shares than shares in a horse-racing syndicate. We have all met wealthy people, perhaps with great estates, who have too little of the "readies", "ready cash". Naturally, some people try to fill this commercial gap, for example, pawnbrokers who make their living by providing liquidity for less liquid assets, at a price. Liquidity has long featured in pop culture as "pop" used to be London slang for trading something into cash at a pawnbroker. "That's the way the money goes, pop goes the weasel".



Liquidity: Finance In Motion Or Evaporation?

Traders love to bandy the word “liquidity” and talk constantly about how liquid or illiquid are markets. To quote O’Hara, “as a starting point we might agree that liquidity relates to the ability to buy and sell assets easily. Elaborating on this further, a liquid market is one in which buyers and sellers can trade into and out of positions quickly and without having large price effects.” [O’Hara 2004, page 1] Intriguingly though, when a trader makes money on a deal, he or she picked the right market moment. Obviously, when he or she loses money on a deal, the complaint is that liquidity unfairly dried up.

We shall return to this point later, but do note the key point of confusion, it is very difficult, if not impossible, to ascertain whether a market has moved against someone or whether the market has become less liquid. Despite talking about liquidity all the time, it is seldom factored into trading models, partly because major players ignore it, and partly because it is very difficult to do. Is liquidity’s absence a form of friction hampering position adjustment (a transaction cost)? A relationship between the size of a position and the market as a whole (a price cost)? A calculation of the trading volume afforded at particular price levels? A calculation of the volume whose information does not move price (normal market size)?

Time, Value, Probability and Money

Our definition of liquidity, “the probability that an asset can be converted into an expected amount of value within an expected amount of time” is a bit messy because we have to think simultaneously about three characteristics of liquidity– probability, value and time – along with a basic assumption about liquidity we made at the start – that we understand money. Let’s start with time.



Caught Short (In Time)

Accounts
receivable
turnover =

$\frac{\text{total credit sales}}{\text{average accounts receivable}}$

Accounts payable
turnover =

$\frac{\text{total credit purchases}}{\text{average accounts payable}}$

Inventory turnover
=

$\frac{\text{total cost of sales}}{\text{average inventory}}$

Acid-test =

$\frac{\text{cash + securities + accounts receivable}}{\text{current liabilities}}$

Current ratio =

$\frac{\text{current assets}}{\text{current liabilities}}$

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There are two valid meanings of liquidity in the phrase, “caught short”, and one of them has to do with tonight’s lecture, i.e. not having the necessary money when it’s needed. This is typically timing liquidity. Businesses, like people, need to keep a close eye on timing liquidity. The more liquid a business, the better able that business is to meet short-term financial obligations. Liquidity ratios are measurements used to estimate the degree of a company’s liquidity. Despite the appearance of mathematical certainty, businesses and people suffer liquidity crises often, especially when creditors are knocking at the door and debtors are late with payments. Again, some people try to fill this commercial gap, for example, banks which provide short-term credit facilities to firms or credit card companies who provide short-term facilities to people. Note that a bank increases its liquidity by shortening the average term of its loans. We don’t like timing surprises. Time to “go liquid” is a crucial part of understanding liquidity, but not the entire picture.



Caught Short (In Value)



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Moving on to value liquidity, we feel it’s ideal to be able to get a price from a market before we sell. Auctions are markets where, if we are using reserve prices, we would like to know the minimum we will get when we sell, but we remain very happy to get more. We are very disappointed when we expect to sell something for one price, but get much less, or buy something for one price, but pay much more. There are at least two reasons for our disappointment. First, we may have not anticipated the fees and charges in our market. Second, we may not have gotten the price we anticipated. If we return to buying or selling a house, you can be disappointed if, when selling, your estate agents’ fees seem high or the indicative price the estate agent gives you turns out to be too high. Lo, Mamaysky and Wang show that even small fixed costs can give rise to large ‘no-trade’ regions even for professional traders leading to significant effects on liquidity and asset values. We don’t like value surprises.



Caught Off-Guard (In All Probability)

Certainty = % likelihood [value fall/rise,
time fall/rise]

Example: liquidity of watch [value, time] =

[£1,000 – 50%(£500),
1 week + 50%(2 weeks)] =

[£750, 2 weeks]

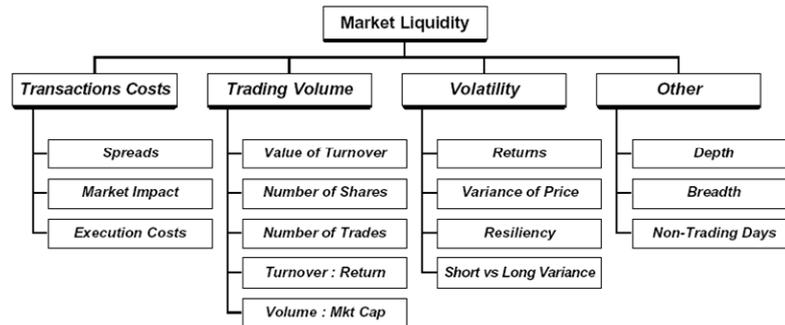
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Now, let's touch on probability. Risk is frequently defined as probability times impact. So the risk of not being able to sell something for the value we expect at the time we expect can be quantified. If you know you can probably sell your £1,000 watch for £1,000 with, at worst, a 50% chance of it selling for £500, your value at risk is £250. If you know you can probably sell your £1,000 watch in a week with, at worst, a 50% chance of selling it in three weeks, your timing at risk is two weeks, a week normally, but another week at risk on average. To combine the value and time into a single liquidity risk measure, we have to know the cost of *not* having the money during a possible extra week, perhaps broken kneecaps, then add it to the value at risk of £250. We don't like surprises. The traditional way of adjusting value-at-risk for the cost of liquidity is to ensure that a horizon for price movements is chosen that is at least greater than an orderly liquidation period, i.e. ignoring extreme events. This approach ignores trying to combine costs in a single measure. We can also develop very sophisticated ways of converting timing risk into cost in order to arrive at a single number. In summary, we have timing liquidity, value liquidity and market liquidity = certainty(value, time).



Liquid Measures

- Resilience
- Depth
- Tightness



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[Source: Holl and Winn, 1995]

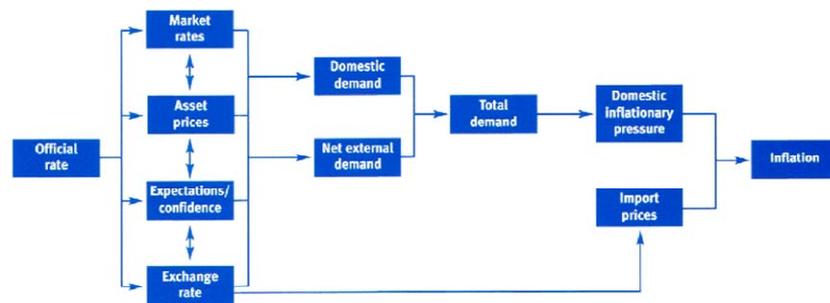
So how do we evaluate one asset or market as being more liquid than another asset or market? Typically we refer to three indicators of liquid markets – resilience, depth and tightness. These indicators relate quite closely to the characteristics of liquidity, viz. probability, value and time. Resilience is the speed at which prices return to a new equilibrium once the impact of a large trade has dissipated. Depth measures the volume of trading needed to significantly affect prices. How much do we need to sell or buy to change prices significantly? You can imagine a river or pond where you can take out a bucket of water or throw in a bucket of water, and not notice the difference. Tightness indicates the cost and speed of turning a position around, the ability to match supply and demand rapidly. Combining all three indicators, you can imagine throwing a rock into a rippling pond and measuring how quickly the pond returns to normal ripples (resilience), whether the pond is so shallow you see the bottom when the rock’s momentum is absorbed (depth), and how easily the rock enters the pond (tightness). You can equally ask, how soon will things return to a ‘normal fair value’, how much does a change in quantity affect price, and how much does a change in time affect price?

Tightness is typically measured by bid-ask spreads or the speed of order matching, i.e. immediacy. Depth is typically measured by price impact, i.e. the amount prices change based on the quantity traded. If a large trade doesn’t affect price much, then the market is assumed to have great depth. Resilience is often indicated by volatility or volume traded. There is also a concept related to liquidity called “normal market size”. The basic idea is often that there is a normal market size above which the size of the trade may move prices on its own. This is typically a percentage of the typical volume traded on a typical day, below which it is assumed that there will be no significant price movement due to a single trade. For instance, the London Stock Exchange currently sets normal market size at 2.5% of the average daily number of shares traded during the 12 months. Customer trades greater than six times normal market size (15% of average daily volume) begin to be eligible for some trade publication exemptions. Yet numerous studies on many exchanges have failed to prove conclusively one way or the other that normal market size can be predicted for any

particular share, or that trade publication rule exemptions help or hinder efficient markets. There is much more work to be done on liquidity measurement. Ideally, one could look at the total market, each firm's inventory and how much each firm wants to buy or sell when and where. Individuals try and discern a 'true price' using J Peter Steidlmayer's "market profile", regulators share their overviews of inventory, such as US Commodity Futures Trading Commission "Commitment of Traders" reports, yet it still seems that the best predictor is a trader's nose - traders seem to be able to sense what constitutes a market-moving trade, but agree that it varies substantially from day to day, security by security.



Monnaie des Sources



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[Source: <http://www.bankofengland.co.uk/>]

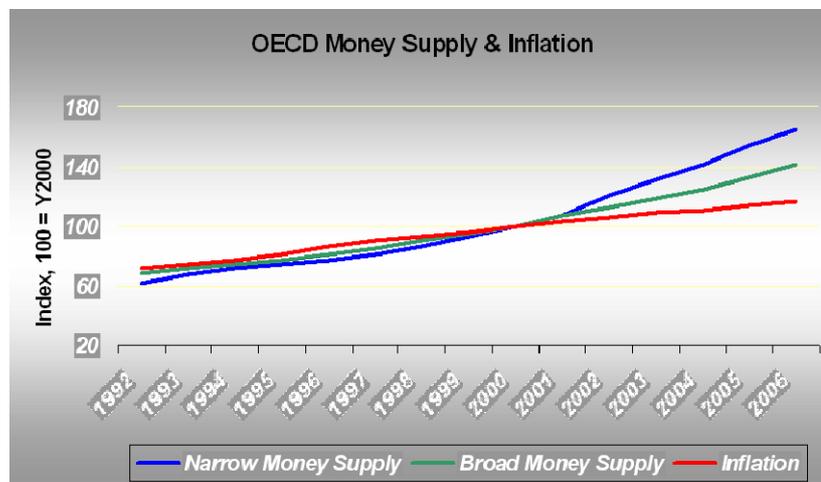
Finally, and rather importantly, we must examine our assumptions about money, monetary policy and global money supply. Christopher Brown-Humes relates: "In the early 19th century, the Bank of England's main policy tool was a weather vane. When the wind blew from the East, ships sailed into London and the Bank supplied money so traders could buy the goods being unloaded at the docks. If a westerly wind blew, it would mop up any excess money to stop too much money chasing too few goods, thereby avoiding inflation". ["Room for Manoeuvre", Securities & Investment Review, Securities & Investment Institute, July 2007] The old gold standard was abandoned, in part, to give more ability to governments to manage broad money supply. There is a lovely, apocryphal story about an analyst at the Bank of England realising that gilts went illiquid at 11:45am on most days. After much deeper analysis he realised that the illiquidity was due to Sweetings, the renowned fish restaurant. Sweetings doesn't book tables. If you're not in Sweetings by 12:00, you won't get a seat. So the gilt markets went illiquid at 11:45 because traders went for some fish and some liquid.

Our definition of liquidity assumes an expected amount of value and asserts that "cash is the most liquid asset", but money is an asset with its own supply and demand. For an asset generally acceptable as exchange, e.g. money, the demand function is not independent of its supply function. Excess supply is impossible, because additional supply should be accepted as long as it can be exchanged. In 1930 John Maynard Keynes set out the rudiments of his

liquidity preference theory of interest in his two-volume Treatise on Money. Keynes' definition of money as a means of contractual settlement connects money and the need for liquidity. He put forward the idea of 'liquidity preference' describing the demand for money as an asset preferred over other assets, and that this preference would vary inversely with the rate of interest. Keynes formalised the idea that investors demand a premium for securities with longer maturities. Today we recognise other factors that influence the preference for money, such as income levels and the yields of various forms of wealth, as well as the ability to meet unexpected or non-contractual obligations such as options or buying opportunities.



Where Has All The Money Gone?



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[Source: OECD]

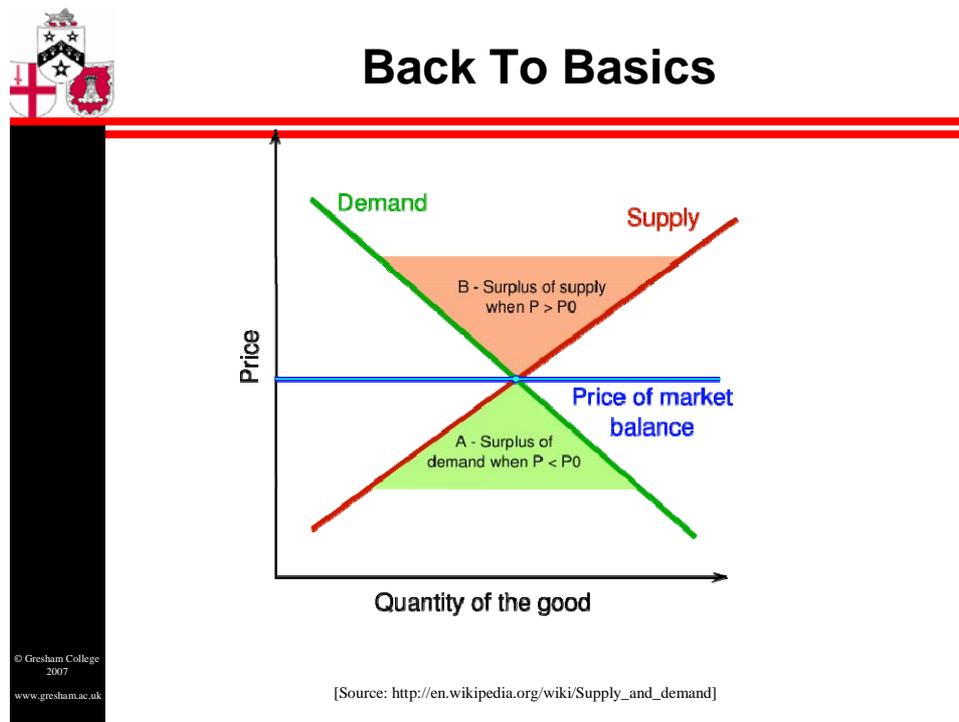
Many expectations affect our views of the future. Take inflationary expectations. If, during the time we hold an asset, inflation is rampant, our asset may sell for the nominal amount we expected, but we actually lost value measured in purchasing power. In today's floating exchange rate markets, we expect inflation at home to result in currency devaluation, i.e. to reduce our currency's purchasing power abroad. Further, we expect our central banks to control money supply so that there is no inflation. So it is interesting to note that while inflation has been under tight control for over a decade, broad money measures have been expanding at 13 per cent a year in the UK and 10 per cent a year in the eurozone. The Economist wonders if "everyone has become richer by lending money to everyone else". [The Economist, "Buttonwood: Ponzificating", 17 March 2007, page 100] Since 2001 money supply growth significantly outstrips inflation in the OECD.

The Financial Times was quite cutting last month [Financial Times, "Defining Liquidity", 10 August 2007] "Central bankers have drowned the world in it, oil producers are awash with it, while an excess of it distorts everything from treasury yields to the copper forward curve. Yet overnight this all-powerful force can vanish, causing markets to tumble. Is the word 'liquidity' at risk of joining 'more buyers than sellers' and 'profit taking' in the pantheon of vapid financial jargon? ... The confusion begins when this sensible concept of liquidity is used as the explanation for falling markets. Investors' shifting preferences for

liquid assets are clearly important for prices. But the observation that prices have fallen because it is hard to execute an asset sale at the expected price is a tautology.”

However, it is true that growth in the money supply will lead to growth in asset values or goods values. The money supply can grow directly, through printing currency, or indirectly, such as through leveraged credit. In the UK, coin and bank notes in circulation are only about 3% of the broad money supply. If consumer goods values have remained stable, then is the growth in other asset values due to growth in the overall money supply? Recently, the Bank of England has developed, and publishes in its Financial Stability Report, a financial market liquidity indicator incorporating bid-ask spreads, return-to-volume ratios and liquidity premia. A continuing debate is whether, and how, to incorporate a wider view of asset valuation in controlling money supply than current consumer-price-index-biased views.

Settled Dis-Equilibria

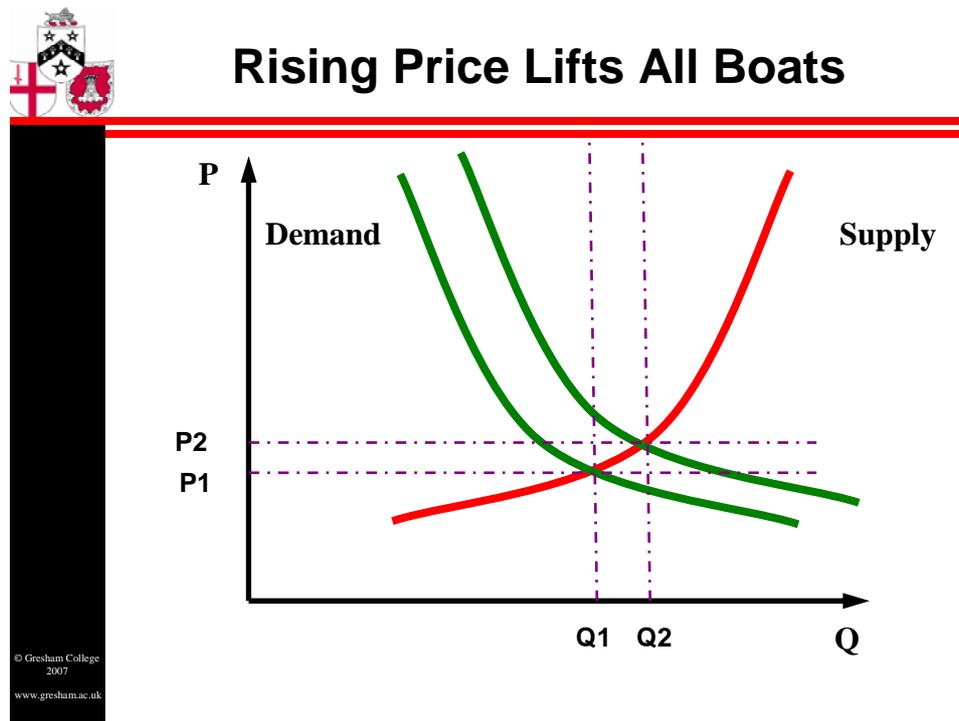


Is there a way we can start to pull these aspects of liquidity together? Rather simply, I think we can unify them using that basic economics tool, the supply and demand model. Supply and demand are mentioned in the 18th century and the model was largely developed during the 19th century. Many of you will have seen supply and demand curves before, but a quick refresher should help us all.

Supply and demand models are believed to apply under perfect competition, where no single buyer or seller affects prices and prices are known. The law of supply states that quantity supplied is related to price – the higher the price of the product, the more suppliers will supply. The law of demand states that demand is the opposite of supply – the lower the price of the product, the more consumers will demand. The supply curve slopes upward to

the right as quantity increases. The demand curve slopes down to the right as quantity increases. Taken together we have the overall supply and demand model.

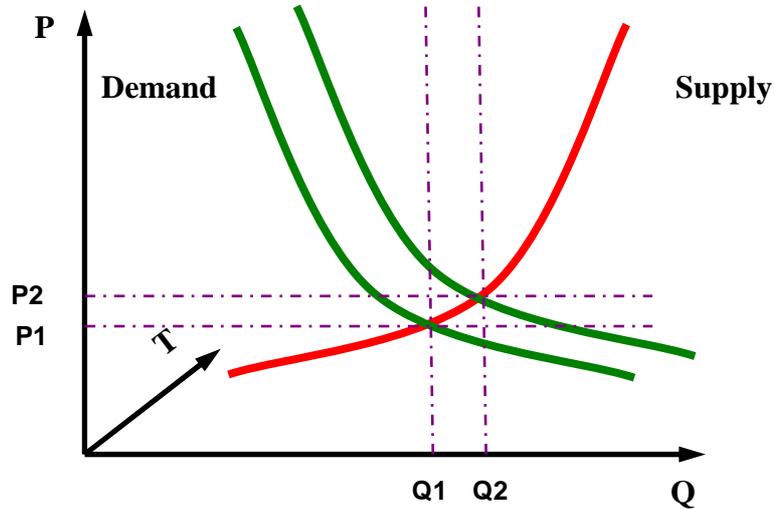
At the intersection of consumer demand and producer supply there should be an equilibrium price. At the intersection, the quantity supplied equals the quantity demanded, equilibrium. If the price for a good is below equilibrium, consumers demand more of the good than producers are prepared to supply; there is a shortage; either prices rise or consumers consume less, or both. Conversely, if the price for a good is above equilibrium, consumers demand less of the good than producers produce, there is a surplus; either prices fall or producers produce less, or both. The presence of buyers attracts sellers, and the presence of sellers attracts buyers.



This slide shows demand moving from D_1 to D_2 , i.e. demand is increasing. Thus, the price must move from P_1 to P_2 and the quantity from Q_1 to Q_2 in order to keep things in equilibrium. Notice that the total market, the square formed by P_2 multiplied by Q_2 , is now larger than P_1 multiplied by Q_1 . Supply and demand curves are part of an elegant and useful model, but the model must be used with care. In reality there are no equilibria because information is neither perfect nor stable. We cycle endlessly between prices rising and quantities rising, then prices falling and quantities falling, only to bring prices up again. Actually, the term dis-equilibrium might be more accurate because no price ever settles down.



Liquidity P's, T's & Q's

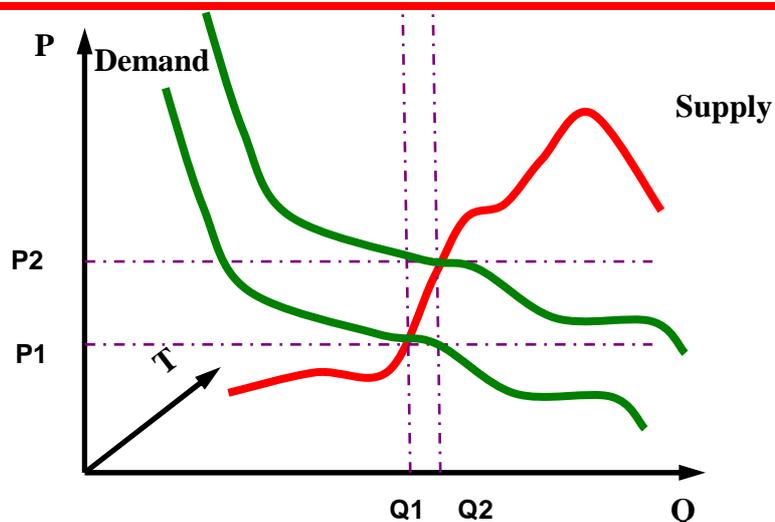


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We have to enrich this model by pointing out that liquidity involves both time and quantity, so I have added an orthogonal axis showing time. What makes a liquidity change more special than a normal price movement and return to equilibrium? Let's start with the definition of liquidity. On either the Price or the Time axis, the problem is that supply and demand curves are not as smooth or as continuous as the model might suggest. In any market, certain size lots emerge to be more or less liquid. Who wants a one bedroom mansion or a twenty bedroom flat/apartment? Who wants to buy a 5,060 bushel wheat future if the Chicago Board of Trade 5,000 bushel wheat contract is most common? Supply and demand curves in real life are very messy. Perhaps something like this.

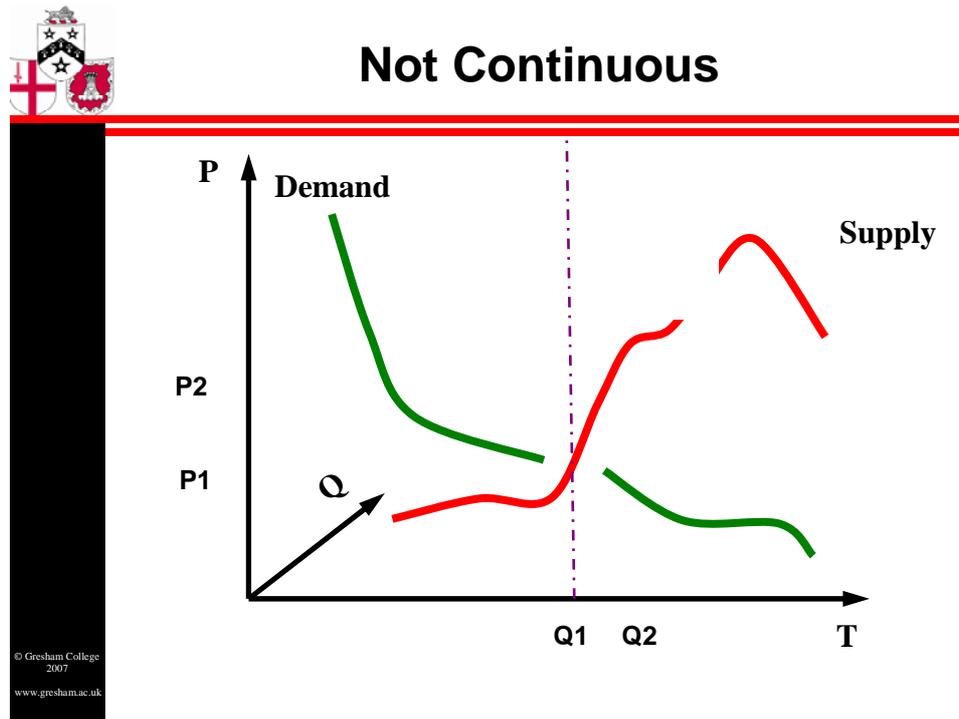


Not Smooth Curvature



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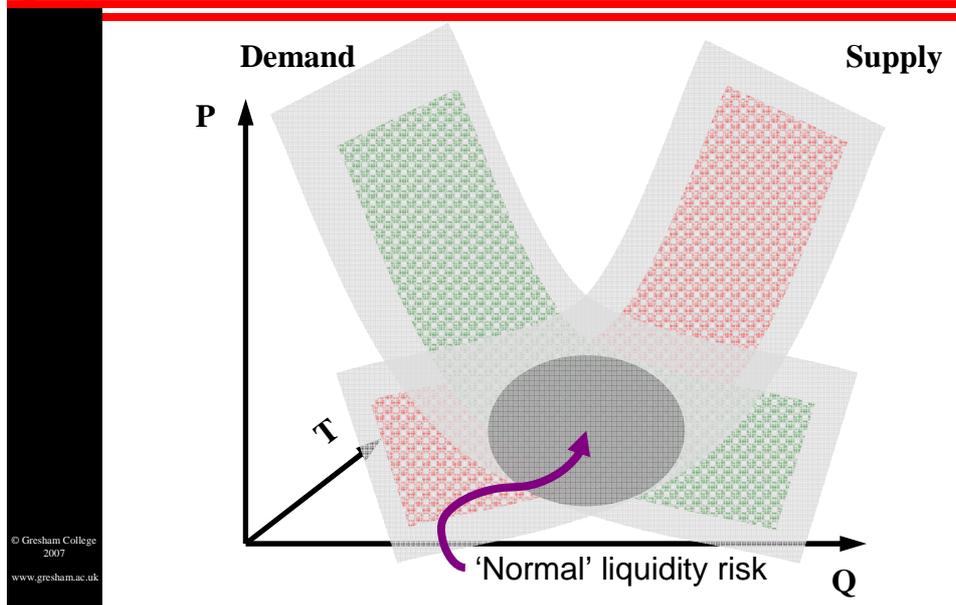
Notice now that a small change in quantity available can result in a much larger price movement than might be expected. Patrick Young tells of the fact that in trading Treasury bonds at certain times people would exclaim that there were “elephants in the swimming pool”, i.e. the biggest players had arrived. When the big players come, the little players leave the pool because they will be unable to match the buys or sells, or see which direction the big players expect prices to move. Small players lose because they can't see the kinks and holes in the supply and demand curves.



This example shows someone trying to sell a quantity that, at this time, just isn't needed. The entire process is one of matching buyers and sellers. In an earlier Gresham lecture, “Perceptions Rather Than Rules: The (Mis)Behaviour of Markets”, November 2005, we explored how there is no value, except that of a willing buyer and a willing seller. So these supply and demand curves aren't curves at all, just scatterings of potential buys and sells. There is no correct price. All values are set by people interacting around supply and demand. We have a model more reminiscent of the discreteness of quantum physics than continuous Newtonian physics.



Liquidity Clouds



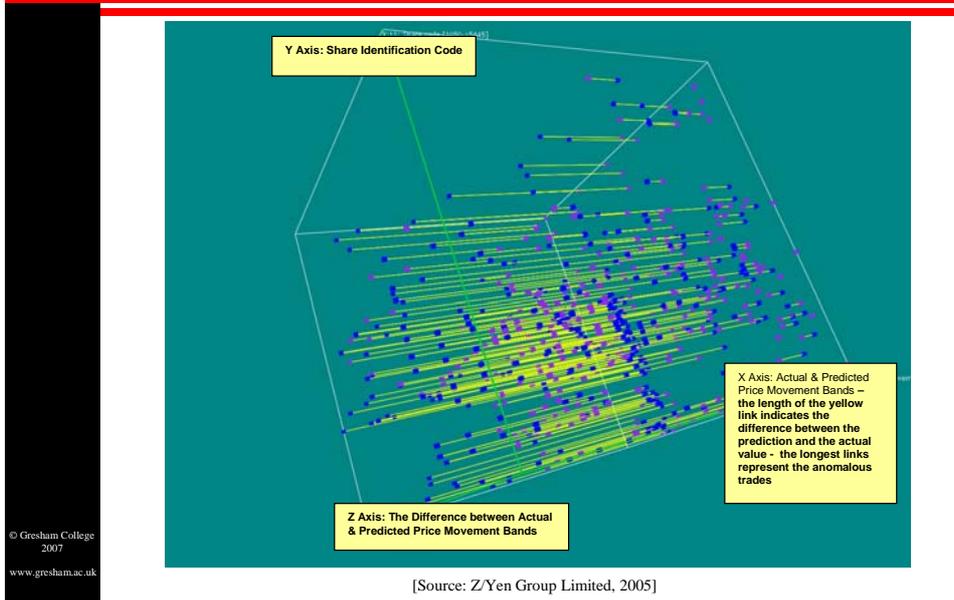
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A market helps to increase the odds that buyers and sellers meet with appropriate quantities at appropriate times. This increases liquidity. Markets typically increase liquidity by publishing prices to attract people, by providing volume & other trading information, and by standardising contracts, contract sizes, terms & conditions, all in aid of increasing the odds that a deal can be struck. Markets try to encourage gaps to be filled in the supply and demand curves, to give confidence that the curves are continuous and known, and won't move too rapidly. Yet more information leads to more spurious movements and people trade on the movements. It is difficult to separate the noise from the information.

It is difficult to distinguish clearly a normal price movement from an abnormal price movement, or a normal transaction time from an abnormal transaction time. Though we try to pin the tail of the supply or demand curve, we are partially clouded. Liquidity risk is the likelihood that we are significantly off in our estimation of time or cost, that we will be surprised.



Predicting Price Movements

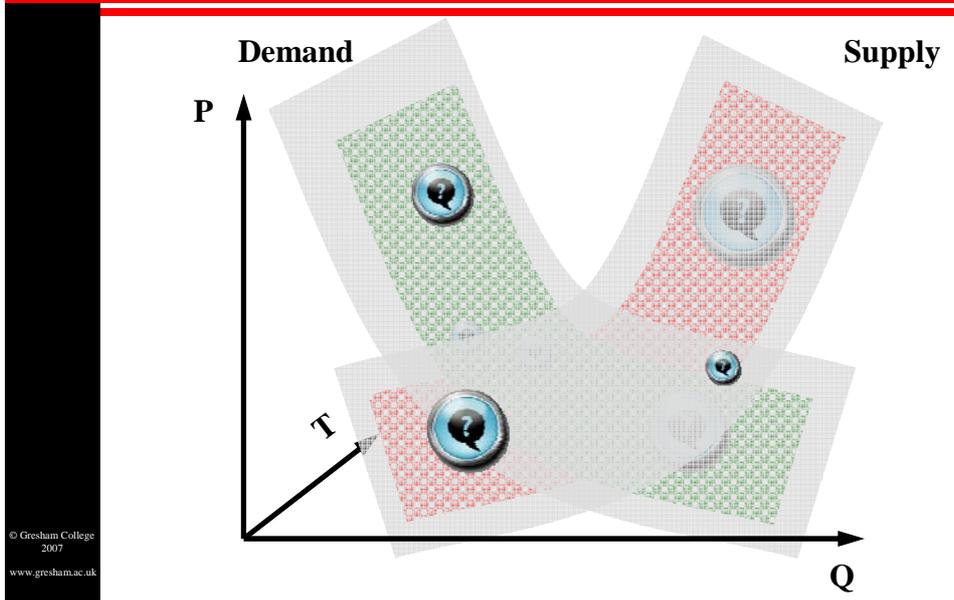


In order to reduce liquidity risk, one tries to reduce the potential of being surprised that the supply and demand curves are not what you thought. Liquidity predictors are gaining in power and precision. This is a picture produced by a computer program trying to predict the price movement that will result from buying or selling various quantities at various times along the supply and demand curves. The predicted price movement bands in blue are plotted against the actual price movement bands in purple. The length of the yellow link shows the difference between the actual and predicted values. Where the yellow 'dumbbell' link is long, this is an area of greater uncertainty about price movements. Similar diagrams apply to timing. Traders will spend a lot of time and money trying to ensure that they don't inadvertently fall into a liquidity hole, an area where prices and timing surprise more than normal, or typical rules don't seem to apply.

Small Holes



Liquidity Holes

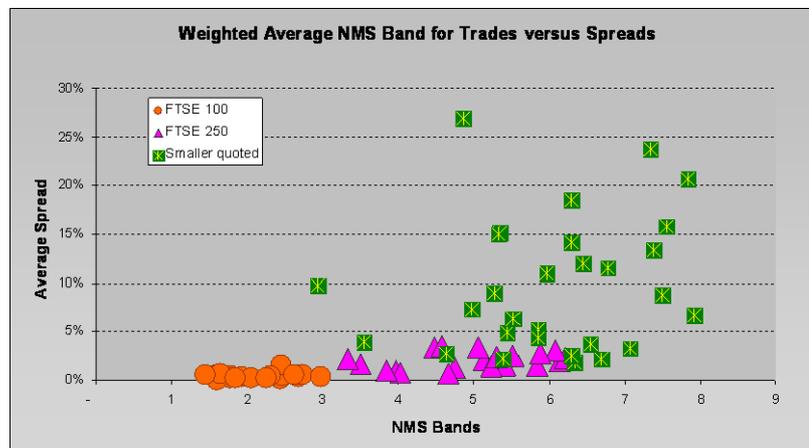


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Where are some of these holes? Well, one well-discussed hole is small cap stocks. These are equities, typically in small companies, which are thinly traded. It takes a very large trade to be even a small percentage of large cap stock such as Vodafone or BP. It may take only a few hundred thousand pounds to be a very large trade in a small cap stock. Spreads, i.e. the difference between buying and selling prices, may be used as a simple measure of liquidity costs, i.e. less liquid stock should have higher spreads reflecting their increased risk. Spreads should be a function of the cost of trading, asymmetric information costs, i.e. uninformed traders can protect themselves from informed traders by increasing the spreads, and inventory carrying costs, i.e. the cost of capital on traders' positions.



Small versus Large



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[Source: Z/Yen Group Limited, 2002]

Here you can see that, measured by the bid-offer spread, the liquidity of small cap shares, high and on the right in green, is much smaller than FTSE 250, in purple, or FTSE 100 shares, in orange low and on the left. The slide shows that, on average, small cap stocks have more trades that are higher as a proportion of normal market size. In short, you can't expect to sell shares in small caps, in any volume, cheaply or quickly and a small amount of buying or selling can change prices markedly.

It is increasingly difficult for large fund managers who are not small cap specialists to invest without owning a high proportion of the company. Simple arithmetic means that very large institutions cannot deal in companies below a certain size, regardless of performance. The minimum liquidity requirement, bought in after the Maxwell pensions scandal, requires that a pension scheme is capable of being liquidated quickly to cover its liabilities. Accounting rules (e.g. FRS 17) require that things be marked-to-market, any shortfall be immediately reflected in the financials, thus pushing pension investors away from risky and illiquid assets. Yet, this "penny share" area of the market can be a lot of fun, or a lot of frustration, because it is so easily driven by sentiment.



Bull or Bear?

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"They chose those two animals to represent the stock market because your broker will feed you all the bull you can bear."

Some small cap stocks suffer from rolling waves of sales pitches followed by price rises, followed by increased demand, until the fundamentals don't stack up and it comes crashing down. An expert in small caps, Richard Poulton, points out, "Nobody buys small cap stocks; they are sold them." This 'rolling retail' model is well-known, where brokers entice clients to enter and leave specific stocks hoping to generate an ever-upward spiral in value. Clients enter Super-Tiny plc early, then leave, then come back in to Super-Tiny plc later only to leave again, each time gaining in value. Meanwhile the broker is circulating these clients with others who have been in and out of Fantast-ino plc. Sooner or later both Super-Tiny plc and Fantast-ino plc turn out to be worth many times what a rational price-to-earnings ratio might imply and come crashing down. Overall, the clients may be better off if they're among the few who are liquid before the crash. More likely they're a bit worse



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off, but their broker is clearly a star as he or she has put them in early at good points in these two growth stocks; they just didn't get out in time. It's a bit like musical chairs with an advisor taking credit for randomly picking a successful chair for you. Why can't these people see that the underlying fundamentals of the shares are so often unchanging? But "if the facts spoke for themselves, you wouldn't need marketing."

Liquidity and Lucidity Among The Dark Pools



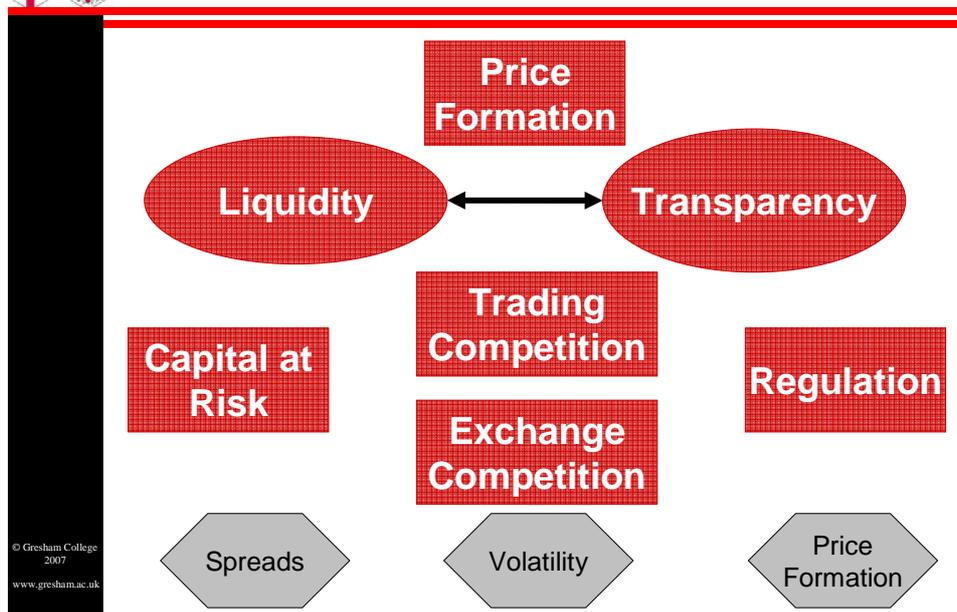
Dark Liquidity Pools



Another set of holes arises from what are called "dark liquidity pools". Dark liquidity pools are backwaters, often overlooked pools of capital separate from the main trading markets. These pools can exist within a large financial institution or among a group of financial institutions trading outside public exchanges. To understand these dark pools, imagine you bump into a friend who wants to buy your house. How do the two of you agree a price? Well, you probably look at estate agents' notice boards to see what other people are paying. If you agree a deal, then you should have no fees and know the price. You may well conclude such a sale and gleefully avoid estate agents' fees. You are both happy, but you have also reduced information for others. Two other friends trying to conclude a similar deal are not aware of the price of your sale. You have removed liquidity from the estate agents' and information from the market. A well-functioning market is one that provides efficient price signals through a "price discovery" process, smoothes the exchange of ownership, and reduces the risks involved in transferring assets or rewards. In this example, you and your friend have traded 'off market' using the price discovery of the estate agents without the transaction costs. You are 'parasitic' on the estate agents' price discovery. If estate agents didn't publish prices and sales, you wouldn't have known a fair price for your transaction.



Liquidity or Lucidity?



Without liquidity, there is little point for people to use an exchange - they would soon be frustrated at not being able to trade in volume at the published prices. On the other hand, people want choice; they don't want to be forced to use an exchange. Ensuring transparency about exchanges is an important objective for exchange regulators. Government interest in the state of financial exchanges is understandable. Confidence in exchange prices feeds through to confidence in decisions throughout the economy. Consumer confidence in well-regulated exchanges leads to appropriate investment. Without transparency, it is difficult to ensure that some market participants are not getting favoured treatment. At times, transparency and liquidity seem to conflict. Market participants tend to react strongly against suggestions for more regulator-imposed transparency with dire warnings of reduced liquidity. Regulators are sympathetic, for instance regulators permit less transparency (reductions in reporting requirements) for "less liquid" trades. Some types of exchange seem to be particularly entrancing to regulators, for instance equity exchanges, while governments almost ignore others, such as foreign exchange trading.

But exchanges are not neophytes about disclosure. Large trades contain potentially valuable information about the likely price movements of the instrument being traded. Complete transparency is believed to harm liquidity, i.e. market makers will be loathe to provide risk capital to support trading if all of their moves must be published in advance. Typical market participant responses to inconvenient or costly regulatory disclosure requirements are to move 'off exchange', move 'off shore', 'cross' trades, create segregated 'professional' exchanges or plead for exemptions.

There is a balancing act for an exchange in ensuring that it is seen to provide the best price, yet at the same time ensuring that the incentives to trade 'off exchange' are minimised by sufficiently rewarding principal risk takers to encourage them to take risks in future. Exchanges teeter on issues of legitimate asymmetric information and the rights and responsibilities of market participants to share information. International competition



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among exchanges is fierce; international standards and standards bodies affect domestic markets; domestic regulators increasingly find that funds flow globally and regulation seems to need to follow; previously “mutual” exchanges are increasingly “for profit”; technology has blurred the definition of an exchange; matching, clearing and settlement are increasingly mixed functions; electronic communication networks (ECNs), alternative trading systems (ATSs) and multi-lateral trading facilities (MTFs) proliferate, let alone the fact that many firms are systematic internalisers, acting as exchanges for their direct clients.

Regulators have no monopoly on fundamentalist fervour about the importance of trade publication. Different market participants favour different disclosures. Academic studies indicate that certain types of disclosure may improve market efficiency. There are sensible debates about the amount of post-trade disclosure (how much, how long delayed, how detailed, how anonymous) and the amount of pre-trade disclosure (bid/offer, quantities). Regulators and many academics like to promote centralised exchanges that prevent parasitical use of exchange prices by restricting ‘off exchange’ trades or protecting exchanges competitively through barriers to entry or permitting certain monopolistic advantages to exchanges. Naturally, ATSs argue that forcing all trades ‘on exchange’ would raise the cost of trades unnecessarily, and that a large proportion of trades can occur on ATSs without degrading price formation.



With Apologies To Jonathan Swift

**So, financiers observe, small pools
suck larger pools’ liquidity;
yet tinier pools drain other drops,
and so on to aridity.**

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Here, I’m afraid I can’t resist a little ditty of my own, based on Jonathan Swift’s construction around a flea:

So, financiers observe, small pools
suck larger pools’ liquidity;
yet tinier pools drain other drops,
and so on to aridity.

Liquidity Crises



Baltic Liquidity Crisis 2007?

“Water, water, everywhere, nor any beer to sink.”



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Though last week I faced a liquidity crisis of a different nature, given recent events in the credit, equity and other markets, liquidity crises are topical. Over the centuries there has been a constant tickertape of financial crises where, to continue the liquid metaphor, liquidity either evaporates or freezes.



An Historical Perspective

- Holy Roman Empire currency 1622
- Tulips 1636
- South Sea Scheme 1720
- Northern Europe 1763
- East India Company 1772
- Emerging markets 1809-1838
- Railways 1847-1873
- Commodities 1890-1920
- Great Crash of 1929
- Bretton Woods collapse 1973
- Savings & Loans 1980



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It's never happened before... Last month, James Breiding of Naissance Capital remarked:



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“Who would have thought, for example, that IKB, a remote German bank, would now be writing off mortgages because unemployed, lower class workers in Los Angeles are now defaulting on loans made in 2006. Never mind that the loans required no commitment of equity, repayment of principal, and were authorised using misleading and often dishonest disclosure regarding the borrower’s ability to repay. Some market observers are now beginning to ponder whether the ostensible benefits of dispersion of risk in an opaque and anonymous manner contributes to, rather than mitigates instability.”

Bob Moon on American Public Radio on 10 August 2007 said:

“We’ve been talking for months, even a year or two now, about the flood of investment cash until recently. All you had to do was turn on the spigot, really, and the money flowed. There was so much money flowing, in fact, that the terms to borrow that cash were extremely favorable. Now that many of the banks are going to have to cover their losses from all these subprime defaults, that great reservoir of money has started drying up.

So you turn on the faucet now and the money is down to a trickle. That means a lot of banks that pump that money out to pay for everything — from the mega takeover deals that we’ve been hearing about to just writing a mortgage — are rationing the supply. And just as if it were water or gasoline, when there’s less supply, the cost goes up. And the cost of borrowing money, in this case, is going up.”



A Modern Perspective

- Third World Debt 1982
- Black Monday 1987
- Junk Bonds 1988
- Japanese Bubble 1990s
- US Bond Crash 1994
- Mexican Crisis 1995
- Asian Crisis 1997
- Russian Crisis 1998
- Long Term Capital Management 1998
- Dotcom Crash 2000
- September 11 Disruption 2001
- Argentine Crisis 2002
- Credit Crunch 2007



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We must look at bubble and bust in greater detail. Hyman Minsky was a 20th century American economist who contributed a model of asset bubbles driven by credit cycles, followed by busts. He theorized that financial fragility is a typical feature of any capitalist economy. In Minsky’s view periods of economic and financial stability lead to a lowering of investors’ risk aversion and a process of releveraging that ultimately leads to crisis.

Minsky sets out three types of finance - hedge finance, speculative finance and Ponzi finance. Starting just after a recession, firms have lost much financing and choose only safe 'hedge' financing, every piece of credit they seek is covered. Hedge borrowers are sound borrowers who can meet both interest and principal payments out of their own cash flows.



Bubble, Bubble, Toil and Trouble

Hyman Minsky's Waterfall

Hedge
Speculative
Ponzi



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As the economy grows, and expected profits rise, firms tend to believe that they can take on speculative financing. Companies know that profits will not cover all the interest all the time, but believe that profits will rise and the loans will eventually be repaid without much trouble. Speculative borrowers can only service interest payments out of their cash flows. More loans lead to more investment and the economy grows further. Lenders also start believing that they will get back all the money they lend. Therefore they are ready to lend to firms without full guarantees of success. Lenders know that some firms will have problems repaying but expect that the firms will refinance from elsewhere as their expected profits rise and credit is getting looser. Supervisors, regulators, central bankers and credit raters can't ignore the facts – default rates are low and credit risk is low, so they start loosening their evaluations.



Ponzi Borrowers

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Now Ponzi borrowers enter. These are borrowers who can service neither interest nor principal payments. Ponzi borrowers use their assets to get more loans. As in a Ponzi-pyramid-scheme, Ponzi borrowers need constantly increasing asset values to refinance their debts. Ponzi borrowers appreciate liquid capital markets that allow them to roll over the debts with ease. Typically, an increase in the money supply accompanies looser credit and this finances the growth in asset value. Now the economy has a lot of money, a lot of risk and a lot of credit. As Dr Doom, Henry Kaufman the legendary former chief economist for Salomon Brothers, notes: “firms and households alike often blur the distinction between liquidity and credit availability. Money matters but credit counts.” [Authers, John, “The Short View”, Financial Times, 15 March 2007, page 13] Soon, some noticeable firm defaults, lenders re-evaluate risk and rein in credit. Refinancing becomes impossible for many. More firms default. An economic crisis ensues. To quote Matt King of Citigroup – “In such an environment, it is very difficult to know where things stop. The main fear becomes fear itself.” During the consequent recession, the safe, surviving firms start to hedge again and the cycle restarts.

Black Holes, White Bubbles



Black Holes and White Bubbles



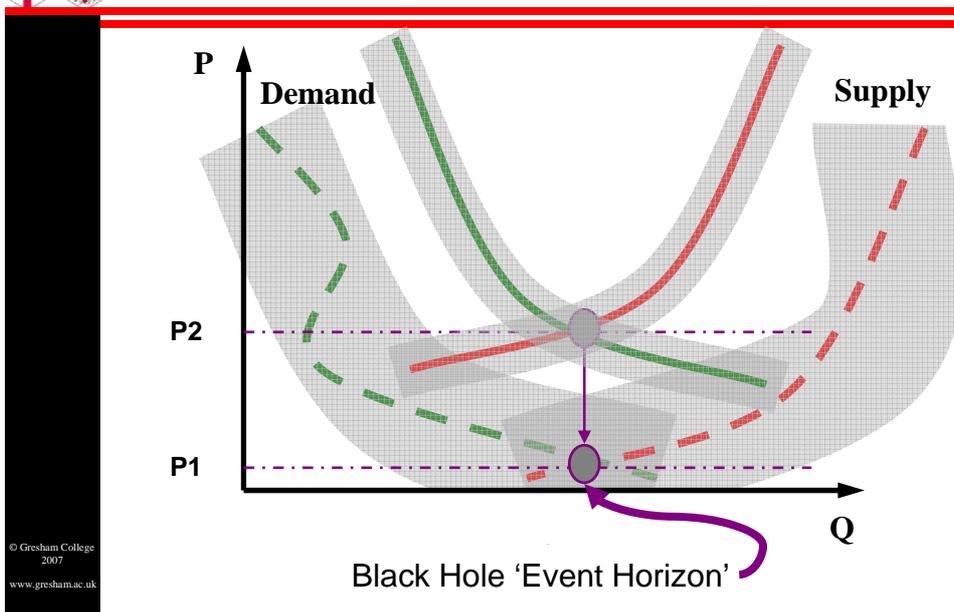
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My predecessor in this Chair, Professor Avi Persaud, has very insightful and influential thoughts on liquidity, particularly his articulation of ‘liquidity black holes’. A physical black hole is a region of space formed from the collapse of a star, where gravity is so strong that nothing, not even light, can escape after falling passed the event horizon (the “edge” of the black hole). A liquidity black hole is a region in finance, where liquidity is falling so rapidly that nothing, not even a large financial institution, can escape after prices start to fall. Everything dries up. Avi says “a liquidity black hole is where price falls do not bring out buyers, but generate even more sellers.” Avi points out that this definition is easily falsified. Normal price falls do not increase sellers, they increase buyers, while in a liquidity black hole price falls cause an increase in sales flow. People pay close attention to the total volume traded as an indicator of confidence in a market. This is rather strange as one can easily imagine that confidence in a market should lead to less trading. Perhaps the opposite of Avi’s liquidity black hole is the financial analogue of a supernova, a “liquidity white bubble”, where price rises do not bring out sellers, but generate even more buyers.

Liquidity black holes bear a strong resemblance to bank runs, where depositors seeking to take their money out of a solvent bank, which they perceive might fail, precipitate a crisis that attracts other depositors to withdraw their funds which leads to certain failure. “And when average opinion comes to believe that average opinion will decide to turn assets into cash, then liquidity may be confidently expected to go to zero.” [Janeway 2005] People head for the door, in German, *Torschlusspanik*. According to the FT, “When John Maynard Keynes described a “mania for liquidity” in 1931 – the US was running out of safe-deposit boxes – he meant it in this sense.” [Financial Times, “Defining Liquidity”, 10 August 2007] Naturally, the ones who precipitate the crisis have their cash, while the laggards are left penniless. As Brandon Davies points out, in a black hole “He who panics first, panics best”, while in a white bubble I say, “He who smugs first, smugs best.” We see a tremendous fall in both the supply and the demand curve prices, as illustrated here.



Modelling Financial Black Holes



So, we sum up in this diagram the characteristics of liquidity risk in the supply and demand curves as being:

- ◆ not necessarily smooth;
- ◆ not necessarily continuous;
- ◆ uncertain around value and time.

Unable to escape a liquidity black hole, both the supply and demand curves get kinkier, with more holes; the bands of uncertainty for value and price widen markedly; and all these changes accompany a precipitate drop in price. Just like their physical cousins, black holes and white bubbles are intriguing because the system, in this case the financial system, past a certain point, feeds on itself, drawing on its own energy to keep going to the limit. As asset prices fall some dealers will suffer losses at close to their loss limits, and must sell assets to avoid exceeding their limits. As asset prices fall further so other dealers get close to their limits and are induced to sell, creating a downward spiral in asset prices till “offer no bid”. Even worse, as share price deflation re-prices existing portfolios, so volume selling to realise the price is often based on the price of the extreme one or two latest trades, which in turn become the basis for re-pricing the portfolio again.

But don't these black holes bottom out eventually, a bit more like hurricanes petering out than black holes gobbling up the universe? Yes, balanced buyers and sellers can return to dramatically lower prices. Mercilessly, many black hole implosions then initiate white bubbles. In a liquidity white bubble, the remaining, successful traders have stock that now rises, attracting other traders, leading to more assets that can be leveraged, leading to more purchases, leading to more value, and so on.

The 1988 Brady Commission's report into the October 1987 collapse of the US stock market attributed the magnitude and swiftness of the price declines to portfolio insurance based on dynamic hedging. Funds pursuing such strategies controlled \$100bn, only about 3% of the market value (pre-crash), but their inability to replicate portfolio rebalancing in



Liquidity: Finance In Motion Or Evaporation?

times of market distress led to a “buy dear, sell cheap” strategy within the overall system dragging others with them. You can make money in a liquidity crisis, particularly if you have a longer-term view, i.e. being able to buy cheaply and wait. There is almost always a flight to simpler products and a flight to quality, that lets risk-takers buy complex products and hold them or disaggregate them and try to match section of the supply and demand curves.

We can distinguish exogenous (outside the system) events from endogenous (inside the system events). The system’s own reaction affects its environment, feed-forward or positive feedback in a cybernetic sense. Liquidity black holes or liquidity white bubbles are not just large price falls or rises from the release of new, or even shocking, economic data or firm results, they are unstoppable forces emanating from within the price setting system itself. The misbehaviour of people’s perceptions gets locked into a price setting system that creates, for a time, an unbreakable spiral in one direction. One of the great investors, Jeremy Grantham, believes that all busts last as long as the preceding boom. Some folks question, why is it that markets can’t just find the optimum price? Because of the way markets function, they must exceed (or undershoot) a price before they can go back. Markets must always oscillate around a price, changing with any new information or preferences. There is no optimum.

Trading on Ice

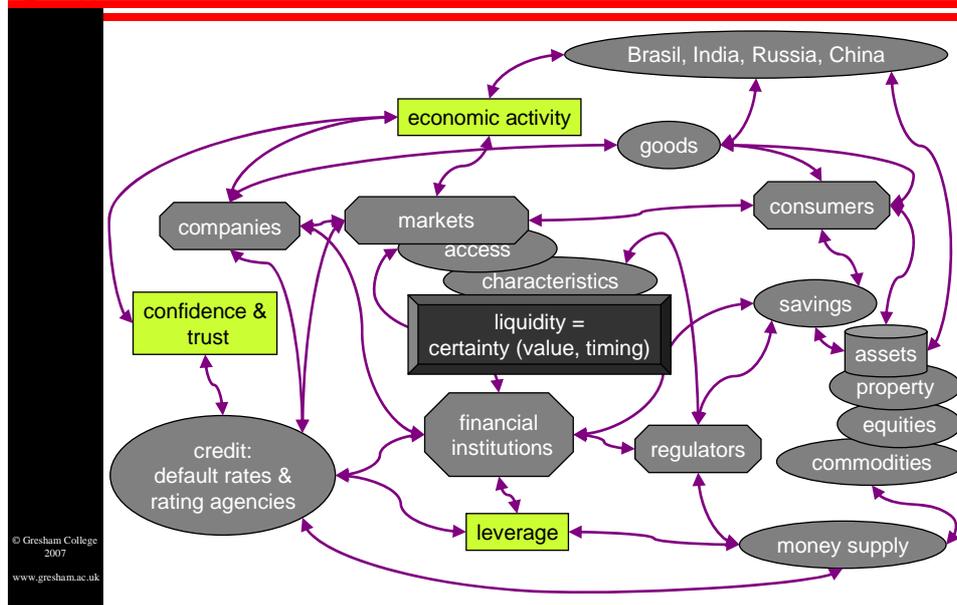
So, only liquid is solvent? There is an old phrase that “liquidity begets liquidity” meaning, simply, that once some people start trading, more people will join them. This phrase is often used to explain away monopolistic problems with exchanges. The assumption is that a successful, and beneficial, exchange will inexorably draw all relevant trading to its increasingly liquid market. Michael Milken said, “Liquidity is an illusion. It’s always there when you don’t need it, and rarely there when you do.” Most traders claim that more liquid markets are better than less liquid markets for everybody. Not surprisingly, while they last, liquid markets are better for traders. In liquid markets traders can conclude many deals with concomitant commission. In illiquid markets traders have fewer trades and more risk. However, a number of economists question the notion that liquidity is inherently good or bad. O’Hara summarises Keynes’, Tobin’s and Summers’ criticisms as “liquidity begets instability.” The ability to buy and sell easily might drive short-term markets and exacerbate market changes, i.e. inducing liquidity crises. At a recent City fund manager luncheon I heard that “old, overheating liquidity story”, which one assumes ends with all of finance boiling away. Liquidity is like most things, good in moderation, but bad in excess or deficit.

Persaud and others point out that there are a number of problems with the structure of today’s markets that do increase our susceptibility to liquidity disruptions:

- ◆ interlinked global markets - liquidity problems now reverberate across markets and borders and there is greater correlation among asset classes;
- ◆ more rigorous and regular benchmarking – constant appraisal induces people to track benchmark indices in similar ways and need to buy or sell at identical times;
- ◆ regulatory rationalisation - common strategies, credit policies and margin requirements lead to similar sales frenzies to maintain capital adequacy;
- ◆ information systems commoditisation – using similar analytics and computer systems increases the likelihood of similar trading strategies and investment approaches.



Simple Really

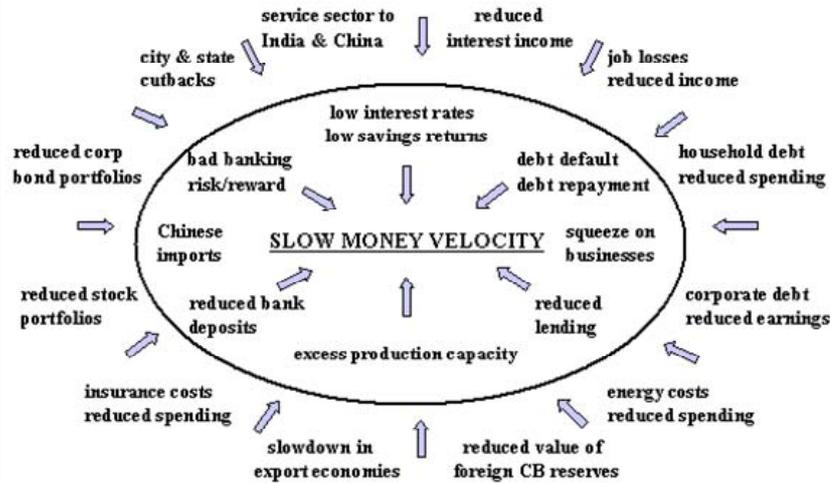


Well, it would be nice to wrap all this up on one slide. As you can see, it's all rather simple. (1) Consumers want goods and (2) companies want to provide them for profit, which (3) creates economic activity. To expand, (4) companies go to financial institutions which must (5) evaluate their credit. Meanwhile, (6) consumers are starting to save and (7) build up assets. These savings (8) go to financial institutions, thus completing the core funding circle. But this funding circle can be enhanced if (9) financial institutions tap into markets. (10) Companies too, with appropriate credit assurances, (11) tap into markets. The core money supply has always been regulated, but now, for the sake of the consumers, regulators watch (12) savings and (13) financial institutions with a new awareness that (14), the money supply is not just cash and (15) is increasing with ease of credit, so (16) financial institutions and their leverage are core to the system. Leverage in turn affects (17) credit and (18) the money supply. Of course, with this much money sloshing around, people can afford to (19) bid up asset prices and, given the increased value of their assets, (20) not save so much and perhaps even (21) play the markets themselves. This makes them (22) more aware of economic activity and (23) brings out the regulators to watch over them. Now thoroughly flush, (24) consumers are more desirous of goods, (25) importing them and (26) increasing economic activity, while (27) exporting countries build up assets and the money supply. All of this economic activity (28) depends on confidence & trust, which in turn builds up (29) credit that finds its way to (30) inflating markets. Naturally all of this trust & confidence are pinned on (31) liquidity. Until it collapses.

I leave other trifling details in this model to the aspiring students among you, such as incorporating volatility, rating triggers, central bank intervention, trade balances, foreign exchange rates, inflation, fear of deflation, government expenditure & taxation or even the fact that consumers' confidence is materially affected by their employment in companies. Our global system for the dispersion of risk, from credit agencies and pension funds to prime brokers and hedge funds, may contribute to creating too much liquidity which in turn leads to risk.



Avoiding Liquidity Traps



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[Source: www.moneyfiles.org]

What might we recommend? Perhaps, not a lot. It's a bit like one of Canute's courtiers writing a policy document recommending the extermination of astral black holes, "first stop supernovas from forming..." Perhaps liquidity black holes are another immutable feature of the universe. As long as there are markets it is likely that there will be liquidity crises. Yet, not all is defeatism. I subscribe to the idea put forward by Persaud and others that increased diversity in financial markets would lower the risk of liquidity black holes. Investors would exhibit a range of behaviours, so sellers are more likely to meet buyers in part, and be more patient. In addition to stressing more work on control and measurement of the money supply, I would summarise some potential recommendations as:

- ◆ heterogeneity – encouraging the broadest possible range of investors, from individuals, to corporates, investment managers, insurers, share clubs, gamblers or hedge funds, into multiple markets;
- ◆ measurement – a number of fractal measures or biodiversity indices could be researched to help investors distinguish a deep and diverse liquidity pool from a deep and homogenous one. I wonder if we can find better analogies for liquidity in measures such as digital television signal quality or quantum physics, from which we can measure choppiness, gaps and uncertainty, than some of the more common continuous physical functions;
- ◆ market structures – some adjustments to market structures might reduce the risk of black holes, such as advanced encryption systems for anonymous and confidential trading, including the exchange of inventories and buy/sell intentions. I also wonder about encouraging markets where trading is done in a fixed size, e.g. one share at a time without large block/bulk trades and their price impact problems. Or even markets where trade orders are randomised in time and position before being matched.



Discussion

1. Are all liquidity crises unique, or irrelevant, or useful - or are things different today?
2. When new markets emerge, from where does the liquidity come?



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So what have we learned? We can distinguish timing liquidity, value liquidity, market liquidity and monetary liquidity. We see that the characteristics of liquid markets are resilience, depth and tightness. We can visualize the idea of “discovering the supply and demand curves” – they may not be smooth, nor continuous; they may have a wide band of uncertainty. In normal circumstances, liquidity risk = the odds of being surprised that the supply or demand curve isn’t where you thought. We also know that black holes and white bubbles fundamentally change the nature of liquid markets – where sellers draw in more sellers, or buyers draw in more buyers, the price drops, or rises, precipitously. Finally, we believe that liquidity risk might be reduced in markets that encourage diversity of participants.

More often than it should be, ‘liquidity’ is discussed in a way that is simply synonymous with monetary policy, private equity lending, credit derivatives or the yen carry trade. These Alice in Wonderland conversations with slippery meanings remind me of the liquid joke where a policeman stops a minister for speeding. The policeman smells alcohol on the minister’s breath and sees an empty wine bottle on the floor. The policeman asks, “Sir, what have you been drinking?” And the minister says, “Just water.” The policeman asks, “Then why do I smell wine?” The minister looks down at the bottle and says, “Good Lord, He’s done it again!” Perhaps the joke should be about a central banker chatting about the money supply.

Tonight I’ll close with a small paradox touching on the next lecture here – will we really care about liquidity if all the glaciers melt?

Thank you.



Liquidity: Finance In Motion Or Evaporation?

Thank you!



*“Get a big picture grip on the details.”
Chao Kli Ning*

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Further Discussion

1. Are all liquidity crises unique, or irrelevant, or useful - or are things different today?
2. When new markets emerge, from where does the liquidity come?

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Thanks

I would like to thank all of those people who were kind enough to discuss liquidity with me, among others, Avi Persaud, Brandon Davies, Christopher Hall, Christopher Prior-Willeard, Con Keating, David Birch, Gabriel Didham, Ian Harris, Jan-Peter Onstwedder, Kelly Mainelli, Mark Yeandle, Matthew Leitch, Michael Feeney, Nigel Wilson, Patrick Young, Richard Poulden, Robert Barnes, Robert Pay, Stephen Wells and Tomas Carruthers. I would especially like to remember Charles Goldfinger who passed away this summer. Charles helped with this lecture and inspired many other thoughts. He is, and will be, missed.