

Why Do Markets Freeze?*

BY YARON LEITNER

In normal times, investors buy and sell financial assets because there are gains from trade. However, markets do not always function properly — they sometimes “freeze.”

An example is the collapse of trading in mortgage-backed securities during the recent financial crisis. Why does trade break down despite the potential gains from trade? Can the government intervene to restore the normal functioning of markets? In this article, Yaron Leitner explains what a market freeze is and some of the theories as to why these freezes occur.

A puzzling feature of the recent financial crisis is the collapse of trading volume and the lack of transactions in many financial markets that were historically quite liquid. This is strange because we expect demand and supply forces to generate a price at which trade will occur. However, like everything else in life, markets are not perfect, and they may not always function properly. Why do markets seize up, even when there are potential gains from trade? Can the government intervene to restore the normal functioning of markets? We begin by explaining what we mean by a market freeze.



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WHAT IS A MARKET FREEZE?

In normal times, investors buy and sell financial assets for various reasons. First, they may have different opinions as to what assets are worth. Those who think an asset is worth more than its current price will buy, and those who think the asset is worth less will sell. Second, investors may have different needs. For example, one investor is about to retire and would like to hold relatively safe assets; another investor is young and may prefer to hold risky assets, taking the chance of getting a higher return. The first investor can reduce the risk in his portfolio by selling shares of stocks he owns to the second investor. Another example is the sale of mortgage-backed securities: A bank originates a mortgage and then sells it to other investors. In this way,

*The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

the bank replenishes its funds and can use the sale's proceeds to originate another loan.

One way to think of the examples above is to say that each investor attaches a different “value” to the asset, where this value incorporates his own assessment about the asset's cash flows (for example, stock dividends) as well as his own preferences (for example, attitude toward risk). If one investor attaches a high value and another investor attaches a low value, there are potential gains from trade. As long as trade takes place at a price that is between the two values, both investors are better off. If there are many buyers and sellers, trade will take place until the market “clears.” The market-clearing price is the price at which demand equals supply. That is, no one wants to sell below the price, and no one wants to buy above the price. In normal times, market-clearing prices represent “fair values,” which reflect expected cash flows and individuals' attitudes toward risk. You can think of fair values as the price that would be agreed on between a willing buyer and a willing seller, with neither being required to act, and both having reasonable knowledge of the relevant facts.¹

A *market freeze* refers to a situation in which trade does not occur despite

¹This is the IRS definition (Publication 561). The Financial Accounting Standards Board (FASB) defines fair value as the “price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.” FASB then explains each term in the definition above in more detail. (See Statement of Financial Accounting Standards No. 157, September 2006.)

the potential gains from trade. An example is the collapse of trading in mortgage-backed securities during the recent financial crisis. (See the figure.)

One of the challenges during a market freeze is the lack of market prices from which we can infer fair values. While in practice some transactions may occur, these transaction prices may not represent fair values because only a limited number of transactions take place and/or some investors trade only because they must. For example, to avoid bankruptcy, a firm might be forced to sell its assets at a very low price, one that does not represent the fair value. While a lack of market prices is a symptom of one problem, it can also cause additional problems, since potential buyers may not know how much to bid for the assets. For example, when you buy a house, you look at the prices at which similar houses in the area were sold. However, if no houses were sold recently, it may be hard to come up with a price.² The lack of market prices also led BNP Paribas, France's largest bank, to halt withdrawals from three of its investment funds in 2007. In a statement, BNP Paribas said that "the complete evaporation of liquidity in certain market segments of the U.S. securitization market has made it impossible to value certain assets fairly regardless of their quality of credit rating." Alain Papiasse, head of BNP Paribas's asset management and services division, said in an interview, "For some of the securities there are just no prices...As there are no prices, we can't calculate the value of the funds."³

²William Lang and Leonard Nakamura provide a formal model for this. They show that a lack (or a low amount) of recent home sales reduces the precision of appraisals. This, in turn, forces lenders to require larger down payments, thereby affecting current sales.

³See the article, "BNP Paribas Freezes Funds as Loan Losses Roil Markets," Bloomberg, August 9, 2007.

In practice, it is hard to tell precisely whether gains from trade exist because we do not observe investors' needs and we do not know the valuations they have in mind. Thus, a simple explanation for the lack of trade might be that investors do not trade because they do not need to; for example, they have exhausted all the gains from trade and have reached the desired outcome. While possible in theory, it is difficult to imagine that changes in preferences or portfolio objectives could explain the dramatic collapse in trading we observe in the figure.

Another simple explanation for a market freeze is that assets have become more risky, so investors are reluctant to hold them. However, there is no simple relationship between changes in asset risk and the volume of trading. Increased risk may actually result in more trade, since those who already hold the assets may rush to sell them. And if the price is low enough,

other investors may be willing to buy, as in our example in which the investor who wants a safe portfolio sells shares of stock to the investor who wants to take more risk. Thus, when assets become more risky, we may see a market crash in which prices drop significantly but not necessarily a market freeze.

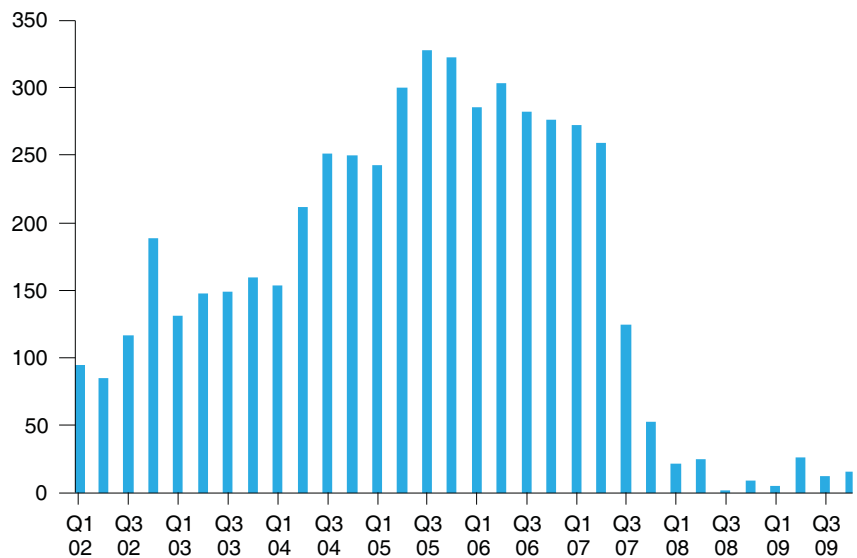
Other explanations involve a more puzzling situation in which investors do not trade even though it may seem that trade can make them better off. In particular, we explain why Investor A, who owns an asset, may not sell it to Investor B, even though both investors know that Investor B attaches a higher value to the asset.⁴

⁴In a related *Business Review* article, Ronel Elul discusses some other features of a liquidity crisis, such as a large decline in prices, a flight to quality, and a liquidity spiral, wherein an initial drop in prices propagates to a large decline.

FIGURE

Nonagency MBS Issuance

Billions of \$USD



Source: Inside Mortgage Finance MBS Database (2002-2007), Inside MBS & ABS (2008-2009)

INVESTORS MAY NOT KNOW HOW TO QUANTIFY RISK

Introductory finance classes usually teach students how to calculate present values, that is, how to answer the question, “How much is an asset worth?” An important ingredient in this process is an estimate of the asset’s expected cash flows. Another important ingredient is the asset’s risk or, in other words, how likely you are to obtain each potential outcome. Financial companies use various models to quantify assets’ risk. In normal times, these models seemed to have worked pretty well. However, when house prices started falling, and homeowners defaulted on their mortgages, investors realized that the models did not work; that is, the assumptions behind the models were incorrect. Investors knew that there was risk, but they did not know how to quantify it.

What should investors do in this case? One response might be to avoid buying the asset and try to sell it if you already own it. As mentioned earlier, in this case, the outcome could be a huge volume of sell orders and a price collapse, but not a market freeze.

Another response, discussed in a paper by David Easley and Maureen O’Hara, is to stay with the status quo, that is, do nothing. This response leads to a market freeze. Investors avoid buying because they do not want to pay too much, and those who already own the asset avoid selling because they do not want to sell at too low a price. For example, suppose you own an asset and someone offers to buy it for \$50. You may think this price is too low because the asset might be worth \$70. Now suppose someone offers to sell you additional units of the asset at \$50 per unit. (So then you would have the units you already own plus additional ones.) If you are sure that the assets are worth \$70,

buying additional units at \$50 would be a good thing. However, if you are afraid that the price might fall to \$30, you will not buy additional units at \$50. Thus, you may simply sit on the fence and do nothing. If everyone else behaves like you, the market freezes.

The underlying assumption is that if an investor thinks there is more than one plausible way to value the asset, he trades only if he is better off given every plausible scenario.⁵ In the example above, you (the investor) thought it was plausible that the asset might be worth \$70, but it was also plausible that it could be worth only \$30. If you had bought the asset at \$50, you would be better off if the asset is actually worth \$70, but worse off if the asset is worth only \$30. If, instead, you sold the asset at \$50, you would be better off if it is worth only \$30, but worse off if the asset is worth \$70. Therefore, you did nothing.⁶

Quoted Prices May Be Biased Relative to Fair Values. Easley and O’Hara’s model has some interesting implications for the debate on how to establish fair values when markets are frozen. For example, FASB suggests using quoted prices.⁷ In normal times, quoted prices reflect fair values, since transactions occur at or close to these

⁵ Different investors may have different scenarios in mind, depending on whether they are optimistic or pessimistic.

⁶ Economists have used the words “uncertainty aversion” and “inertia” to describe the behavior of the investor above. Uncertainty aversion means that investors behave as if the worst-case scenario will happen. This type of behavior and its implications for a liquidity crisis are discussed in Ronel Elul’s *Business Review* article. Inertia means that investors act (buy or sell) only if they expect to be happy with their decision, given any plausible model for valuing the assets. If they can come up with even one plausible model under which they expect to lose money, they do nothing.

⁷ See Statement of Financial Accounting Standards No. 157.

prices, and it doesn’t really matter if we use bid or ask prices, since for highly liquid assets the two prices are roughly the same.⁸

Suppose now that the markets are frozen. Easley and O’Hara show that while investors may continue to quote bid and ask prices, these prices may be biased relative to fair values, since no trades occur at these prices. Consider, for example, the bid price. You might guess that the fair value is above the bid price because investors who do not know how to quantify the risk may play it safe by offering to buy at a low price. While this may be true in some cases, Easley and O’Hara obtain the surprising result that, in other cases, the fair value may actually be below the bid price. The intuition is that the bid price reflects the beliefs of only one investor — the one who is the most optimistic; however, fair values should reflect the beliefs of all investors, including those who are very pessimistic and bid very low prices. Similarly, Easley and O’Hara show that the ask price may overestimate the fair value, but it may also underestimate it. Easley and O’Hara suggest that using the average of the bid and ask spread might be better than using just one of these two quotes. However, they also point out that this measure may be biased relative to the fair value; it may overestimate the fair value, but it may underestimate it.⁹

ASYMMETRIC INFORMATION

Another explanation suggested by economists for the recent market freeze is an increase in *asymmetric information*, that is, a situation in which some investors have better

⁸ The bid price is the highest price someone is willing to pay for an asset. The ask price is the lowest price a seller will accept when selling the asset.

information than other investors. For example, the seller of a used car may know whether the car is a lemon, but the buyer would have no knowledge of that. This is different from the situation in the previous section in which two investors had different opinions as to what the true value was, but none of them had better information than the other.^{10,11}

In a well-known article, George Akerlof, who won a Nobel Prize in

economics in 2001, has shown that an information asymmetry, such as that in the example above, can lead to a market breakdown. The idea is this: If you think someone has more information than you do, you will be afraid to trade with him for fear of being exploited.

The following example illustrates this. Bank A (the seller) originates a loan, which it wants to sell to Bank B (the buyer). The value of the loan

example, if Bank A agrees to sell at \$60, Bank B can conclude that the value of the loan to Bank A is between \$0 and \$60. Since Bank B values the loan at \$20 more than Bank A, this means that the value of the loan to Bank B is between \$20 and \$80, or \$50, on average. Thus, if Bank B buys the loan at \$60, it expects to lose money, on average. If Bank B offered a higher price, it would expect to lose even more. However, since Bank A

⁹The discussion above explains why we may observe large bid and ask spreads during a financial crisis. A small bid and ask spread exists during normal times, even if markets are competitive. The small spread reflects the risk of trading with investors who have better information or the risk that the value of dealers' inventories (that is, the units of assets they may need to hold temporarily when buying and selling) will fall. I discussed these two components of the spread in more detail in an earlier *Business Review* article. During a financial crisis, a spread exists not only for the two reasons above but also because investors do not know how to value the assets.

¹⁰Many market observers emphasized the problems of asymmetric information in the markets for mortgage-backed securities during the financial crisis. For example, the original TARP proposed that the Treasury Department purchase mortgage-backed securities from banks in an auction. Commenting on this plan, finance professors Glenn Hubbard, Hal Scott, and Luigi Zingales note that "such an approach raises significant problems – most significant is the risk posed by asymmetric information regarding the value of these securities. Because the holders of complex and incomparable mortgage-related securities have more information regarding their worth than does Treasury, Treasury is at a huge disadvantage and will likely overpay." See the article, "From Awful to Merely Bad: Reviewing the Bank Rescue Options," *Wall Street Journal*, February 7, 2009.

¹¹Why would asymmetric information increase suddenly? Gary Gorton has suggested that initially investors thought that mortgage-backed securities were "safe," so the fact that the seller might have had more information was not an issue. However, when indexes of subprime risk began to fall, investors realized that mortgage-backed securities were not safe; that is, investors realized that some market participants were willing to pay a premium to protect themselves against subprime loan default. At this point, the fact that the seller may know more about the likelihood of default became an issue.

The effects of asymmetric information are magnified when the seller has large inventories of assets but can sell only a fraction of them.

depends on the borrower's likelihood of default; the value is \$60 to Bank A and \$80 to Bank B. Both banks know that Bank B has a higher valuation because it can do a better job of monitoring the borrower and collecting the loan. Everyone is better off if Bank A sells the loan to Bank B. Any price between \$60 and \$80 could work.

The sale above may not go through, however. The problem is that since Bank A originated the loan, it has a better idea of whether the borrower is likely to default. That is, Bank A has more information than Bank B. For example, suppose Bank A knows that the loan is worth \$60 to itself and \$80 to Bank B. In contrast, Bank B knows only that it values the loan at \$20 more than Bank A, and that the value of the loan to Bank A is somewhere between \$0 and \$100, with each value equally likely. Then Bank A will not sell the loan to Bank B, despite the fact that both banks know that the loan is more valuable to Bank B than to Bank A.

Why won't the sale go through? Whenever Bank A agrees to sell, Bank B can conclude that Bank A values the loan at the sale price or less. For

knows that its own valuation of the loan is \$60, it will agree to sell only if the price is at least \$60.

CAPITAL CONSTRAINTS

The effects of asymmetric information are magnified when the seller has large inventories of assets but can sell only a fraction of them. In particular, regulators may use the new sale price to reassess the value of the seller's remaining assets. If the value drops, regulators may require more capital, or even worse, if the seller is a bank, the regulator may shut it down. Potential lenders may also use market prices to decide how much to lend and whether to roll over loans, even if regulators don't require banks to use mark-to-market accounting.¹² Whether the constraints are imposed by a regulator or by market participants, we can simply say that the seller is subject to

¹²Under mark-to-market accounting, assets are valued based on the recent market price of identical or similar assets. For example, if you bought a share of stock for \$50 and the stock now trades for \$20, the "mark-to-market" value of your stock is only \$20, even though the "book value" is \$50.

capital constraints, meaning that the seller must ensure that the market value of his inventories is high enough relative to the value of his liabilities. The cost of violating the constraint is assumed to be very high.

Depending on Leverage, We May Observe Increased Trade or a Market Freeze. Concerns about the market value of his remaining assets may induce the seller to reject offers that he would accept if he were not subject to a capital constraint. Thus, we may observe less trade compared with the situation in which the only problem was asymmetric information. However, in some cases, we may actually see more trade. The reason is that the buyer may understand that a profitable trade would be scuttled by the seller's capital constraint and may offer to buy the asset at a higher price. Since a higher price increases the chances that the seller will accept the offer, trade is more likely to happen.

In a recent working paper, Philip Bond and I show that whether we see more trade or less trade depends on the seller's "leverage," meaning that it depends on the size of his liabilities relative to the market value of his assets or, alternatively, on how tight his capital constraint is. When leverage is low, inventories have no effect on trade. When leverage is moderate, inventories increase the likelihood of trade. Finally, when leverage is high, the market freezes. We also show that a market freeze may be preceded by increased trade and an increase in leverage. This pattern is consistent with what we have seen in the recent crisis.

The reason is as follows: If the seller has only moderate leverage, the buyer can ensure that the seller's capital constraint is satisfied by increasing the bid. This reduces the buyer's expected profits from the transaction but still allows him to profit, on average. However, if the seller's leverage is too

high, such that the value of his assets is just a little bit above the value of his liabilities, the buyer must increase the bid by a lot to ensure that the seller's capital constraint remains satisfied after the transaction. However, with such a high price, the buyer expects to lose money and may prefer not to bid at all.

The reasoning above also explains why we may see increased trade before the market freezes. Like the seller, the buyer may also have inventoried assets, and the buyer may be concerned about their market value. Under some circumstances, when the buyer purchases new assets, the market value of his existing assets falls.¹³ In turn, he becomes more leveraged and his capital constraint tightens. This forces him to bid a higher price in the next trade, which increases the chances that the next seller will accept the offer — so we may see more trade. However, at some point, when the buyer continues to accumulate assets, he becomes over-leveraged and he can no longer bid for the asset because whatever he does, he will either expect to lose money or he will violate his capital constraint. This is when the market freezes.¹⁴

Policy Implications. Our model suggests a caveat to proposals that would require sellers of asset-backed securities to retain a stake on their own books. In particular, regulatory

¹³This might happen, for example, if the buyer already has some assets similar to the one he purchases, and if the fact that the seller was willing to sell indicates that the value of these assets is lower than initially thought.

¹⁴For our results, we do not need to assume mark-to-market accounting, where inventoried assets are being evaluated "technically" based on the price of the last transaction. We could assume instead that regulators or potential lenders make inferences from the sale price, just as the buyer did in the previous section, and that they use these inferences to assess the value of inventoried assets.

interventions to buy up assets may need to be large enough to buy *all or most* of a seller's assets. Selling assets helps the seller raise cash — which strengthens his balance sheet. However, selling assets also reduces the value of the assets that remain on the balance sheet — which weakens the balance sheet. Buying all of the seller's assets eliminates this second effect. Thus, requiring sellers to retain some stake in the assets they sell may lead to a market freeze.¹⁵

Another implication is that piecemeal government interventions to facilitate asset sales may not be feasible. When potential buyers are highly leveraged, they are reluctant to buy assets for fear of creating a new price that will reduce the value of their inventoried assets. The government could then unfreeze the market by buying the assets, rather than having the highly leveraged buyers buy the assets. Since the government may have less information than the seller, it must offer a low enough price so that it can break even, on average.¹⁶ However, by creating this lower price, the government may harm other potential buyers who previously chose not to trade, since the new price can be used to reevaluate their inventoried assets. Alternatively, if the government does not want to hurt potential buyers, it could offer them a subsidy or could increase the price it pays to the seller. However, these options impose a cost on taxpayers.

¹⁵This possibility must be weighed against the possible benefits of requiring the seller to retain a stake in his own assets. Such a requirement may discourage loan originators from making bad loans in the first place. See, for example, Senate bill S. 3217 - Restoring American Financial Stability Act of 2010 (April 15, 2010).

¹⁶This assumes that the government has a higher valuation for the asset. Otherwise, the government can never break even, on average.

FEAR OF FIRE SALES CAN LEAD TO A MARKET FREEZE

During the recent financial crisis, we observed not only a market freeze but also a contemporaneous credit crunch, during which banks were reluctant to make loans. Douglas Diamond and Raghuram Rajan suggest that both problems may have a common root: the fear of a fire sale, that is, the fear that banks will be forced to sell their assets at prices that are well below fair values.

Why Do Fire Sales Occur?

Suppose a firm runs into liquidity problems and needs to raise cash. Ideally, the firm would sell its assets to the buyer who values them the most, such as another firm in the same industry. However, this buyer may be experiencing financial difficulties at the same time as the firm and may be unable to raise the money to buy the assets at a fair value. The firm may then attempt to sell its assets to a firm outside its industry, but this other firm might place a lower value on the assets. For example, if all airlines are losing money, an airline that runs into bankruptcy might need to sell its assets to a financial firm with an airplane leasing subsidiary. This financial firm may not value the assets as much because it may take time for it to find a lessee and put the aircraft in service, especially during a recession. In this case, the sale price might be well below the price that firms in the airline industry would pay if they had the money.¹⁷

¹⁷ The discussion above is based on the paper by Andrei Shleifer and Robert Vishny. Todd Pulvino provides empirical evidence consistent with Shleifer and Vishny's model. Using aircraft sale transactions that occurred from 1978 to 1991, he shows that during a recession, an airline that is more financially constrained is more likely to sell to a financial institution (rather than to another airline) and that financial institutions pay, on average, 30 percent less than the market price.

Similarly, when a bank runs into financial problems, it may need to sell its assets at fire sale prices simply because other banks that value its assets don't have enough cash to pay fair prices. (Or, alternatively, if there is only one bank with cash, that bank may use its monopoly power to lower

During the recent financial crisis, we observed not only a market freeze but also a contemporaneous credit crunch, during which banks were reluctant to make loans.

its bid.) In our context, different valuations may arise because of different expertise. For example, some financial firms specialize in mortgage-backed securities (they know how to value and how to market these securities), while other firms don't. These less knowledgeable firms may be willing to buy the assets only if they get a large enough discount, which may also reflect the fact that they have less information about the assets. Note, however, that once conditions in the financial sector improve and the banks that value the assets the most are no longer cash constrained, the price of the asset is expected to return to its fair value.

Viral Acharya, Douglas Gale, and Tanju Yorulmazer expand the intuition above to explain why a bank may not be able to roll over short-term loans, even though the bank posts collateral whose value is expected to be high in the long term. In their paper, the problem is that if the bank defaults,

the lender must sell the collateral in a fire sale to another bank, which also borrows short term and which can also default on its loan. If this second bank defaults, its lender must also sell the collateral in a fire sale to a third bank, which can borrow short term and default, and so on. Anticipating this, the initial lender may not be willing to lend against the full value of the collateral. (In the language of the finance profession, the initial lender may require a large "haircut."¹⁸)

The Prospect of a Fire Sale May Cause a Market Freeze. The prospect of a fire sale will be reflected in the price today because, instead of buying today, a potential buyer can wait and buy later. For example, if investors think that there is a 50 percent chance that the price next month will be \$100 and a 50 percent chance that the price will be only \$20 (because of a fire sale), the most they will be willing to pay today is the average price of \$60.¹⁹

Douglas Diamond and Raghuram Rajan show that the possibility of a fire sale can lead to what financial economists call "debt overhang" and, in turn, a market freeze. In their model, a bank is reluctant to sell its assets today, even though this could save it from potential bankruptcy in the future, because the gains from selling at today's low price are captured by the firm's creditors rather than its shareholders. To see that, let's continue with the example above. Suppose the bank owes \$60 to its creditors, to be paid next month. If the bank does not have any financial problems,

¹⁸ For example, if the face value of a bond used as collateral is \$100, but the lender is willing to lend only \$80 against it, we say that the haircut is 20 percent.

¹⁹ If the investor does not care about risk (that is, he is risk neutral) and if the interest rate is very low, say 0 percent, the price today will be \$60. Otherwise, the price will be lower.

it can sell its asset next month for \$100, pay its creditors, and distribute the rest (\$40) to its shareholders. However, if the bank runs into a financial problem and is forced to sell its assets at a price of only \$20, it cannot fully pay its creditors and its shareholders get nothing. On average, the bank's shareholders expect to obtain \$20 ($0.5 \cdot 40 + 0.5 \cdot 0$) and the bank's creditors expect to obtain \$40 ($0.5 \cdot 60 + 0.5 \cdot 20$). Now suppose instead that the bank can sell its assets today at \$60. Then the bank can pay back its creditors, but nothing is left for its shareholders. Hence, the bank's shareholders will prefer not to sell, despite the financial risk. And if the bank's manager acts on behalf of its shareholders, he will not sell, and the market will freeze.²⁰

The Prospect of a Fire Sale Can Also Make Banks Reluctant to Lend. Diamond and Rajan's model explains not only a freeze in asset markets but also a contemporaneous credit freeze, which is consistent with what we saw in the recent recession. Banks may be induced to hoard cash rather than to lend because if there is

²⁰Note that if the bank's creditors were in control, they would decide to sell the asset today. The conflict of interest between shareholders and creditors (debt holders) described above is a common problem in corporate finance. See, for example, the well-known paper by Michael Jensen and William Meckling and the well-known paper by Stewart Myers.

a fire sale, cash on hand could make them a fortune, since they would pay less for assets than what they are truly worth.²¹

Diamond and Rajan discuss various interventions through which the government can reduce the prospects of fire sales and unfreeze the market. For example, the government can induce banks to sell their assets by offering to pay more than other potential buyers offer. However, as in the previous section, this does not necessarily imply that the government is expected to lose money. In particular, if the government can hold the assets until the price comes back to fair value, the government could potentially make money. However, this argument ignores the potential costs involved in managing those assets.


CONCLUSION

Economists have suggested a few explanations for the recent freeze in asset markets, such as: (1) investors did not know how to quantify risk; (2) asymmetric information has increased;

²¹In a recent working paper, Lucian Bebchuk and Itay Goldstein suggest a different explanation for the recent credit freeze. In their paper, a bank is reluctant to lend to a firm with a good investment opportunity because the bank is afraid that other banks won't lend and the firm will fail. In another paper, Ricardo Caballero and Arvind Krishnamurthy show that banks that are worried about worst-case scenarios may hoard liquidity instead of lending to one another.

(3) banks were concerned about the effect of transactions on the value of their inventories; or (4) banks did not want to sell their assets at low prices that reflected the possibility of a future fire sale.

While it is unlikely that a single model will explain everything — after all a model is not reality — each model sheds light on some aspect of the crisis. For example, one model explains the large bid-and-ask spreads and the relationship to fair values, another explains the increased trade before the market froze, and yet another explains the contemporaneous freeze in credit markets.

The models also help us think about the effects of government interventions. For example, if banks are worried about the effects of transactions on their inventoried assets, the government may need to buy all or most of the assets on the seller's balance sheet in order to unfreeze the market; however, creating a lower market price may impose a cost on other market participants. If banks are worried about future fire sales, the government may help by reducing the chance of fire sales, for example, by closing weak banks, infusing capital into banks that face liquidity problems, buying assets, or injecting capital into potential buyers.²² 

²²These government interventions are discussed in Diamond and Rajan's paper.

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