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# Financial Market Utilities and the Challenge of Just-In-Time Liquidity

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# Financial market utilities and the challenge of just-in-time liquidity

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Financial market utilities ensure that clearing, settlement, and payments operations go smoothly. This article explores how these systems mitigate settlement risk, using precisely targeted "just-in-time" liquidity, and discusses the risks for financial stability implied by the increasing role of just-in-time liquidity in our financial markets.

**Every** day, trillions of dollars, euros, yen, and many other currencies flow among participants in markets for foreign currency, securities, and derivatives contracts.[1] This vast flow of payments happens largely below the radar screen of most people, thanks to a collection of institutions known as financial market utilities (FMUs). The basic function FMUs perform is simple. After a financial trade has been agreed upon, a mechanism must exist to convey the financial asset from seller to buyer and reciprocally to convey compensation from buyer to seller. FMUs provide this mechanism. In particular, FMUs mitigate settlement risk (the risk that trades will not be settled or completed as expected) and the particular form of settlement risk known as counterparty credit risk (the risk that a party involved in a transaction might fail to deliver funds or securities as promised).

A key insight about FMU operations, which we discuss in detail, is that all of the key FMUs mitigate settlement risk through essentially the same mechanism: precisely targeted liquidity that requires the FMUs and their participants to make payments according to a tight within-day timetable. We refer to this as *just-in-time* liquidity: liquidity that must be available *at a particular location, in a particular currency,* and *in a precise time frame* measured not in days, but in hours or even minutes.

The need for just-in-time liquidity poses challenges for both FMUs and their participants. Financial market participants must be able to manage their liquidity requirements on an ongoing basis as their payment and settlement obligations fall due. FMUs, in turn, must be able to manage their liquidity requirements in the event a participant defaults. This liquidity-dependent structure for FMUs raises an important question for the stability of financial markets: Does this dependence on precisely timed liquidity actually make financial markets *more* vulnerable to episodes when liquidity becomes less available? Put another way, do these FMUs succeed in reducing settlement risk only by increasing liquidity risk?

In this *Chicago Fed Letter*, we describe the evolution of FMUs. Then we focus on certain key FMUs, describing the particular credit risk they are designed to mitigate and how they depend on just-in-time liquidity. Finally, we consider the risks for financial stability implied by the increasing role of just-in-time liquidity in our financial markets.

## Historical background

In the 1970s, markets relied on payment and settlement systems with significant settlement lags, meaning that payment of funds and delivery of securities for a given transaction would not be completed the day the transaction was initiated. The primary FMU through which banks exchanged large-value U.S. dollar payments for foreign currency transactions was the Clearing House Interbank Payments System (CHIPS). At that time, CHIPS operated as a *deferred net settlement* system, in which payments were not final until the next day.

The risks associated with deferred settlement were brought to the world's attention in dramatic fashion by the 1974 failure of Bankhaus ID Herstatt KGaA, a commercial bank based in Köln (Cologne), Germany, which had been an active trader in foreign currency markets. At about 3:30 p.m. Central European Time (CET) on Wednesday, June 26, 1974, Bankhaus Herstatt had its banking license withdrawn by the German banking authority. That action took place after the close of the system for making interbank payments in Germany. Herstatt's counterparties in various foreign currency transactions had irrevocably paid deutsche marks to Herstatt on that day through the German payments system against anticipated receipts from Herstatt of U.S. dollars later the same day in New York. Herstatt's U.S. correspondent bank, Chase Manhattan, received news of Herstatt's failure shortly after 10:30 a.m. Eastern Time. Chase responded to the news by withholding some $620 million

of U.S. dollar payments that were to be made to Herstatt's foreign currency counterparties. This action left Herstatt's counterparties exposed for the full value of the deutsche mark deliveries made and resulted in a temporary, but systemically disturbing, halt in the flow of payments through CHIPS. The potential for gridlock in the U.S. payments system was real.

Herstatt's counterparties faced huge losses on payments to Herstatt they had made without receiving counterpayment. The failure of Herstatt resulted in litigation over many years—both in Germany, where Herstatt was subject to liquidation proceedings, and in the U.S. Quite apart from the immediate impact on Herstatt's counterparties, however, the failure of Bankhaus Herstatt made financial market participants and policymakers aware of the risks inherent in foreign currency markets, which depend upon the completion of payments in different currencies through payments systems operating across national borders and different time zones.

The immediate lesson that central bankers took from Herstatt was that existing deferred net settlement payments systems were insufficiently robust to stand up to the default of a market participant. The public policy response focused on two complementary developments. First, new systems needed to be created that would guarantee intraday finality of settlement. And second, there was a clear need to more closely coordinate all settlements associated with a given transaction (e.g., the payout in one currency and the receipt of another currency). As we shall see, each of these developments increased the financial markets' reliance on just-in-time liquidity.

**Real-time gross settlement systems**

To achieve intraday finality of payments, central banks began to replace then-predominant deferred net settlement systems with real-time gross settlement (RTGS) systems. Final settlement in an RTGS system is both immediate and continuous, subject to the proviso that a payment instruction will be processed if, and only if, the sending bank has sufficient covering balances or credit. This ensures finality to any payment initiated in the RTGS system, but unlike in a deferred net settlement system, an RTGS system requires the paying party to have sufficient liquidity resources at precisely the time the payment is made. For this reason, an RTGS payments system depends on just-in-time liquidity.

In 1974, the United States was the only country to have an RTGS system—the Fedwire Funds Transfer System. According to a recent survey by the World Bank, there are at least 98 RTGS systems in operation around the world today, serving 112 national payments systems.[2]

**Coordinating settlements**

The Herstatt incident illustrated not only the vulnerability of deferred net settlement systems, but also the risks associated with any transaction involving settlements that occur at different times. To take an example from the securities market, if the delivery of the security to the buyer occurs after payment is made to the seller, the risk exists that the seller might take the payment but fail to deliver the security. In a similar example involving a foreign currency transaction, if a payout in U.S. dollars occurs before the pay-in of another currency, the risk exists that the payout could be finalized but the pay-in might never be received.

To eliminate these sorts of risks, new systems for settling securities and currency transactions were developed that built on the adoption of RTGS systems worldwide in the late 1980s and 1990s. They use a similar strategy to synchronize all settlements associated with a financial transaction. In securities markets this strategy is known as delivery versus payment (DvP). In foreign currency markets the same strategy is referred to as payment versus payment (PvP). With DvP, the timing of the delivery of a security to the buyer is coordinated with the transfer of funds to the seller. With PvP, the timing of the payment in one currency is coordinated with the return payment in the second currency.

**Key financial market utilities**

In the U.S., the key FMUs that implement DvP settlement of securities are the Depository Trust and Clearing Corporation (DTCC) and its two main subsidiaries, the National Securities Clearing Corporation (NSCC)—for equities—and the Fixed Income Clearing Corporation (FICC)—for fixed income securities. Both NSCC and FICC are particular types of FMUs known as central counterparties (CCPs). A CCP legally interposes itself between the two parties of a trade, guaranteeing that the trade will settle. Both of these CCPs use another DTCC subsidiary, the Depository Trust Company (DTC), as their central securities depository and settlement agent.

While the details of this process are somewhat intricate, the key point is that delivery of securities to the purchaser and payment of funds to the seller occur if, and only if, the CCP is satisfied that each party has met its obligations. DvP securities settlements depend on just-in-time liquidity because participants must satisfy strict time deadlines for the settlement of open commitments. In addition, the CCP must have access to just-in-time liquidity to meet its guarantees in the event that one of its participants defaults.

PvP represents an analogous system to settle both legs of a foreign currency transaction. Currently, the key FMU that implements PvP is the CLS Bank,[3] which operates the Continuous Linked Settlement (CLS) system. CLS began operations in September 2002 and currently settles 17 actively traded currencies and 55% of all foreign currency transactions, making it the dominant settlement method for foreign currency trades.[4]

The way CLS works is an instructive example of how just-in-time liquidity is used to mitigate settlement risk. Eligible foreign currency transactions of CLS settlement participants must be submitted to CLS by a specific time and are settled in accordance with a sophisticated risk-management process. As a result of the settlement process, virtually all CLS participants will have obligations to CLS Bank in some currencies and receivables from CLS Bank in other currencies. Obligations to CLS Bank must be funded within the five-hour period from 7:00 a.m. to noon CET.[5] This is where just-in-time liquidity becomes crucial for the participants. CLS Bank will not pay out currencies owed to settlement participants if it would trigger a deficit across all currencies. To avoid such a situation, settlement participants must have access to sufficient just-in-time liquidity to meet promptly their pay-in obligations in currencies owed to CLS Bank. Failure to pay in according to this strict timetable constitutes default and would result in severe penalties for the defaulting bank. In addition, a default would require CLS itself to invoke its settlement failure procedures, which would require access to just-in-time liquidity, perhaps on very short notice.

**Increasing reliance on just-in-time liquidity**

For both securities and derivatives contracts, the CCP is the legal buyer to every seller and the legal seller to every buyer. Thus, CCPs take on significant credit risk, often for a considerable period.[6] To protect itself from this potentially long-term credit risk, CCPs typically require payment of an initial margin amount (also known as a performance bond). As market prices change following the initial trade, the CCP typically demands additional payments to ensure the ability of the CCP to fulfill its guarantee that the trade will settle.[7] To address counterparty risk and settlement risk, the CCP requires that all such payments be made according to strict time deadlines, introducing once again the need for just-in-time liquidity.

The time frame for these payments is very tight. In the U.S., the CME Group Clearing House Division (CME), based in Chicago, is the CCP that clears almost all U.S. exchange-traded futures. Its daily settlement operations involve two payments events: the morning settlement, based on prices from the "close" of trading the day prior, and a midday settlement, based on midday market prices. Both the morning and midday settlements must be made promptly when due. The morning settlements are due at or before 8:30 a.m. Central Time (CT); afternoon settlements are due within one hour of the time CME requests payment from its clearing members. These tight deadlines contribute to a reliance on just-in-time liquidity, since failure to meet either deadline would constitute a default by the clearing participant. Such a default would trigger the CME's failure resolution procedures, which also depend on just-in-time liquidity, since the CME would be obligated to replace within a narrow time frame the liquidity missing from the defaulting participant.

The Options Clearing Corporation (OCC), also based in Chicago, is a CCP that clears all options on stocks traded on U.S. exchanges. The OCC is also dependent on just-in-time liquidity to manage credit risk. In particular, each morning the OCC settles payment obligations incurred the previous business day. These payments include options premiums (passed through the OCC from buyer to seller), margin, and collateral securities. The OCC requires that all payments due to it be received by 9:00 a.m. CT. The OCC, in turn, is obligated to make all payments required of it to its clearing participants by 10:00 a.m. CT. If any clearing participant were to default on a payment, the OCC would be obligated to obtain the liquidity needed to replace the defaulted payment by 10:00 a.m. in order to meet its payout obligations. This one-hour time frame enables the OCC to tightly manage the settlement process, but exacerbates its dependence on timely liquidity.

## Conclusion

In this article, we have documented how strategies implemented to mitigate credit risk in the settlement process have increased FMUs' dependence on just-in-time liquidity. Timely liquidity is essential during the routine settlement process. But, it is just as important in a default scenario, when the ability of an FMU to complete settlement depends on access to sufficient backup liquidity to permit the FMU to fill the funding gap left by the defaulting participant. In addition, central securities depositories and CCPs must have sufficient liquidity to close out the defaulting participant's positions.

The liquidity needs we have outlined here raise important questions for risk management and public policy. How might the inability of a key institution to deliver on its just-in-time liquidity obligations impact other market participants? More specifically, in light of the liquidity crises that affected markets in March 2008 and, more severely, in September and October 2008, can we take it for granted that just-in-time liquidity will be available to FMUs at a time when multiple market participants are in danger of defaulting? The key objective of an FMU in such a case would be to turn whatever collateral or other noncash instruments are available to it—including lines of credit, guarantee funds, and insurance—into cash in the shortest possible amount of time. This reliance on private sources of liquidity presumes that banks and other lenders would be available and would have the capacity to take on such transactions at reasonable rates and on very short notice. During a period of extreme market disruption, these presumptions may not hold.

The recent global financial crises have shown that stable and liquid funding may not always be available and that liquidity risk must be taken seriously. For example, Bear Stearns was nearly brought to bankruptcy in March 2008 by its inability to obtain short-term secured funding, a source of liquidity that it had previously counted on. With the increasing dependence of FMUs on just-in-time liquidity, the impact of such liquidity risk on financial markets should be a particular focus of vigilance by market participants and regulators; and it is an important issue to keep in mind as we consider potential changes to the regulatory process.

[1] A derivatives contract is a financial contract that derives its value from some underlying commodity or asset. Examples include futures, options, and swaps.

[2] Peter Allsopp, Bruce Summers, and John Veale, 2008, "The evolution of real-time gross settlement: Access, liquidity and credit, and pricing," Financial Infrastructure Series, Payment Systems Policy and Research, World Bank, report, February, available at http://siteresources.worldbank.org/EXTPAYMENTREMMITTANCE/Resources/TheEvolutionofRTGS.pdf.

[3] CLS Bank International is chartered by the Board of Governors of the Federal Reserve System and headquartered in New York.

[4] See Bank for International Settlements, Committee on Payment and Settlement Systems, 2003, "Payment and settlement systems in selected countries," report, Basel, Switzerland, April, p. 462, available at www.bis.org/publ/cpss53.pdf. Also, Bank for International Settlements, Committee on Payment and Settlement Systems, 2008, "Progress in reducing foreign exchange settlement risk," report, Basel, Switzerland, May, available at www.bis.org/publ/cpss83.pdf.

[5] Asia-Pacific currency obligations must be funded between 7:00 a.m. and 10:00 a.m. CET.

[6] For example, credit default swaps, which have recently started to be centrally cleared, can have maturities as long as five years.

[7] In derivatives markets, this additional payment is known as variation margin.