CMI in Focus: Delivery Versus Payment in Securities Settlement Systems

The concept of Delivery (of securities) Versus Payment (DVP) is employed in exchange-of-value settlement systems to eliminate principal risk, that is, the risk that the seller of a security would deliver the security but not receive payment or that the buyer of a security would make payment but not receive delivery of the security. Thus principal risk is, in other terms, the risk of losing the full value involved in a transaction typically as a result of a counterparty default/insolvency. Furthermore, principal risk is generally recognised to be one of the largest potential sources of systemic risk, that is, the risk that the inability of one institution to meet its obligations when due will cause other institutions to fail to meet their obligations when due, ultimately threatening the stability of the payment/settlement systems and the stability of the financial markets.

General description

DVP links the delivery and payment obligations in such a way as to ensure that the final (i.e. irrevocable and unconditional) settlement of securities occurs if and only if the final settlement of the corresponding payment occurs. Often DVP takes the general form of a basic three-step process: first the Securities Settlement System (SSS) blocks the underlying securities in the account of the seller, then requests a transfer of funds from the buyer’s bank to the seller’s bank in the Payment System (PS), and finally delivers the securities to the buyer if, and only if, a confirmation of settlement of the cash leg from the settlement bank is received. Thus, strictly speaking, DVP does not require a simultaneous settlement of obligations since the settlement of one obligation can follow the settlement of the other (i.e. sequential settlement of securities and funds), but what is of importance from a legal perspective is that the final settlement of one obligation is contingent upon the final settlement of the other.

The examples of Qatar Exchange (QE), Dubai Financial Market (DFM) and Abu Dhabi Securities Exchange (ADX) illustrate this three-step process. The trading system is tightly coupled with the SSS in these three markets. A sale order is checked against the seller’s securities account balance before it is routed to the trading book. Upon trade execution, securities are earmarked with “pending out settlement” status in the seller’s account, and the earmarking remains until settlement date (SD). The earmarked securities are effectively blocked in the seller’s account so they cannot be sold again in the market. The blocking of securities thus provides the assurance to the market that securities will be delivered to the buyer at the designated times on SD. The SSS sends the clearing reports to the settlement agent banks for funds transfer on SD, and as soon as the cash settlement confirmation is received from the settlement bank, the SSS initiates the securities settlement process. The time gap between the cash leg and the securities leg settlement is fifteen minutes. In the case of Qatar, the settlement bank is Qatar Central Bank (QCB) and as soon as the cash settlement confirmation is received from QCB on SD via SWIFT, an alert email is generated to all related QE officers. The officer in charge of the triggering the securities settlement process initiates the gross settlement of securities.
An example of real-time settlement during SD (as opposed to designated settlement times on SD) is that of the Swiss CSD, SIX-SIS which operates a strict simultaneous, irrevocable and final DVP settlement process (i.e. no noticeable time gap between the cash leg settlement and the securities leg settlement). Nonetheless, the entire DVP process may still technically be fragmented in sequential events. On SD the seller’s securities position is verified, and securities reserved for settlement. Payment instructions are immediately forwarded by the settlement system (SECOM) over an electronic link to the money transfer system (Swiss Interbank Clearing, SIC), which checks for the availability of funds. Once payment is made, SIC returns a settlement advice to SECOM and securities are debited from the seller’s account and credited to the buyer’s account. The whole process from receiving a matched transaction in the system to transfer finality can be as quick as 4.12 secs.

From the examples above, one can deduce that the DVP process is controlled by the SSS to ensure that the settlement of securities and the settlement of funds are linked. The control mechanism generally relies on a set of predetermined procedures, and as shown in the examples above these procedures may be executed automatically through electronic communication standards between the SSS and PS or manually (though the latter will introduce some additional operational risk exposure).

The mechanic of the three-step process is straightforward, but what is less is the concept of settlement finality. Finality of legal transfer of title is logically bound to the legal form of ownership of the asset, primarily is it a bearer or registered asset. For bearer instruments, most obviously cash, finality is simple to define, since transfer of possession of the asset is equal to transfer of legal ownership. For registered securities, only re-registration of the title legally transfers ownership. Since there is in most cases a time-gap between settlement and registration, it is necessary for the law to vest finality in the SSS such that its records supersede those of the registrar, and transfers it makes in its books is equal to finality. The legal frameworks in most developed markets has embedded this concept in the Securities Law (or equivalent), and in the EU is harmonised according to the Settlement Finality Directive, but in many emerging markets it is not so well legally established, weakening the quality of the DVP process and leaving title transfer open to legal challenge.

**BIS Models**

In the report prepared by the Committee on Payment and Settlement Systems (CPSS) of the central banks of the G-10 countries on the topic of “Delivery Versus Payment in Securities Settlement Systems” and published by the Bank of International Settlements (BIS) in 1992, the Study Group had identified broadly three DVP models.

- The first, DVP model 1, refers to systems that settle transfers of both securities and funds on a gross (or obligation-by-obligation) basis, with final (irrevocable and unconditional) transfer of securities from the seller to the buyer occurring at the same time as final transfer of funds from the buyer to the seller.

- The second, DVP model 2, refers to systems that settle securities transfer obligations on a gross basis, with final transfer of securities from the seller to the buyer occurring throughout the processing cycle, but settles funds transfer obligations on a net basis, with final transfer of funds from the buyer to the seller occurring at the end of the processing cycle.
Lastly, the third, DVP model 3, refers to systems that settle transfer obligations for both securities and funds on a net basis, with final transfers of both securities and funds occurring at the end of the processing cycle.

The chart below shows the adoption of the different DVP models by the markets across the globe.

![Figure 1. Regional breakdown of DVP models]

DVP model 2 is predominant globally as it requires significantly less liquidity for settlement by netting the funds settlement obligations among participants. Since it is probably the easiest model in which to realise liquidity efficiencies, it is particularly popular in the emerging markets of Latam, Africa and the Middle East. In contrast, DVP model 1 requires participants to cover the principal/full value of the funds leg of each settlement obligation, thus requiring a potentially larger amount of liquidity from participants. However, an advantage to DVP model 1 is that transfers become final on an obligation-by-obligation basis during the course of the settlement day, thus reducing intraday credit and liquidity exposures among participants. Conversely, a disadvantage to DVP model 2 is the amount of intraday risk that can be created by the delay in settlement finality until designated times during the day. DVP model 3 has the advantage of reducing both the funds and securities liquidity requirements within the settlement systems, but can potentially create large liquidity exposures if a participant fails to settle its net funds debit position, in which case some or all of the defaulting participant’s transfers may have to be unwound.

DVP model 1 is predominantly used in Europe (but equally DVP model 3) and in Eurasia. As mentioned above, DVP model 1 requires large amounts of liquidity, but some systems have put in place mechanisms to provide liquidity such as automatic borrowing, automatic repurchase agreements, mini-netting and/or liquidity optimisation algorithms in the RTGS systems.
Modes of interaction between SSS and PS

In May 2004, the European Central Bank (ECB) issued a paper summarising the various ways of organising the interaction between the SSS and PS in relation to the use of central bank money for settling securities transactions. The first approach to categorising the different modes of interaction is to look at the technical location of the cash accounts used for the cash leg settlement, and the entity that operates the accounts or makes the entries in the accounts of the central bank. There are three main models of interaction categorised following this approach, namely ‘Interfaced’, ‘Integrated’ and ‘Memorandum, Pre-funded Account’ models.

- The first model, ‘Interfaced’ model, is far more prevalent globally. In this model, the cash settlement accounts of participants are (normally) their settlement banks’ Real-Time Gross Settlement System (RTGS) accounts in the PS, separate from the SSS. This model requires the DVP mechanism to be controlled between the separate systems via an interface communication protocol that should link the automated settlement processes seamlessly. This ‘Interfaced’ model operates in US, Spain, Singapore, Italy and many other countries.

The ‘Interfaced’ model can also describe cases where the cash settlement accounts of participants are held with a commercial bank rather than with the RTGS system of the central bank. In this case, the credit and debit of participants’ settlement accounts are processed directly on the commercial bank books upon receipt of settlement instructions from the SSS. Nonetheless, the funding of participants’ settlement accounts with the commercial bank may be through the national inter-bank payment systems or RTGS systems. To reduce concentration risk and settlement bank credit risk exposures, some markets (e.g. Sri-Lanka, UAE DFM or Kenya) operate a multi-settlement bank model. Once again, in most markets that use a commercial bank for funds settlement, the interface between the securities transfer and funds transfer usually requires manual intervention, thus entailing operational risk.

The chart below shows the use of commercial bank money versus central bank money across the globe.

![Figure 2. Regional breakdown of use of commercial bank money vs. central bank money](image)
Thus the use of central bank money for settling securities transactions is predominantly consistent across all regions. In general, central bank money bears less credit risk than commercial bank money.

- The second model is the 'Integrated' model in which the SSS can operate the entries directly in participants’ dedicated RTGS accounts at the central bank, requiring no messaging between systems. In other words, although the cash settlement accounts are legally on the RTGS system of the central bank, their management is fully outsourced to the SSS which makes entries in participants' RTGS accounts as if it were the central bank. This model was adopted by Euroclear as the model for its ESES markets (France, Belgium and Netherlands), is the defacto model for many Central Bank settlement systems, and is the model for the TARGET2-Securities solution in Europe. The lack of interface between SSS and PS cuts down on the operational risk within the DVP process itself (e.g. disruption of link mid-way through settlement), though, certainly for the non-Central Bank models, an interface is still required between the PS and SSS for funding purposes. Settlement may also be conducted in a wider variety of different ways as it is not so dependent on the consecutive stages required under the 'Interfaced' model, which can open up more efficient forms of processing.

- The third model, the 'Memorandum, Pre-funding Account', in which participants use their own cash settlement accounts at the SSS. This model is an evolution of what many SSS’s do as part of the settlement models, and can be considered a variant of both the 'Interfaced’ and 'Integrated’ models, depending on whether finality is achieved in the central bank or in the SSS environment. One of the pre-requisites of this model is the ‘legal arrangement' which links the settlement in the accounts of the SSS with the balances in central bank money at the central bank, ensuring that finality is achieved at the time of transfers in the SSS settlement accounts, just as if they were central bank money.

This is the model run in Euroclear UK&Ireland’s CREST system. Cash settlement is external to the CREST system but CREST is able to offer finality, once entries are passed across its Cash Memorandum Account ('CMA account'), because the settlement banks’ obligations are pre-funded at the Bank of England. On advice from the Bank of England, prior to the start of each settlement cycle, the CREST system credits the settlement bank’s Liquidity Management Account ('LMA account') with the liquidity available for settlement. The CREST system then employs an algorithm to utilise all the liquidity on the settlement bank’s LMA account when settling transactions across the bank’s CMA accounts. Following settlement across the CMA account, Euroclear UK & Ireland advises the Bank of England of the net settlement amount and the Bank of England then moves cash between the settlement bank’s accounts at the central bank. The LMA account is then re-set to zero by the CREST system prior to the next settlement cycle. Settlement banks then pre-fund their liquidity at the Bank of England for the next settlement cycle, which starts over again. The close linkage between the CREST system and the Bank of England’s RTGS system allows real-time finality for numerous settlement cycles throughout the day, between 6.00am and 2.00pm (for equities) and 2.55pm (for Gilts).
The chart below summarises the different models, Interfaced, Integrated and Memo, Pre-Funded Accounts, across the regions.

![Chart showing regional breakdown of different models](image)

**Figure 3. Regional breakdown of "Interfaced", 'Integrated' and 'Memorandum, Pre-funded Account' models**

Clearly the predominant model is the ‘Interfaced’ model. The ‘Integrated’ model is mostly operated by the national central banks which run both the payment systems and the securities settlement systems.

The second approach to describing the interaction between the SSS and PS is to look at who generates the payment instructions and operates account entries (i.e. who controls the DVP process). The SSS would normally calculate the participants’ cash obligations within the settlement process, therefore, the SSS would typically initiate the interactions with the payment systems. In practice, at the beginning and/or then end of the settlement cycle, the SSS sends the cash settlement instructions to the payment system to process funds transfers. The most common cash settlement instructions take the form of ‘mandated payment’ (i.e. a payment made on behalf of a participant upon instruction issued by the SSS).

One of the many examples illustrating the ‘mandated payment’ is that of TASECH (Tel-Aviv Stock Exchange Clearing House). TASECH is responsible for calculating the settlement obligations of participants, and 15 minutes before the opening of the clearing window on SD, TASECH sends the settlement instructions to the RTGS system of the Bank of Israel via SWIFT to debit and credit participants’ accounts. Upon receipt of cash settlement from the RTGS system via SWIFT, TASECH credits and debits participants’ securities accounts.

In some markets, the payment instructions and securities settlement instructions are generated by a third party, generally a Clearing House or Central Counterparty (CCP), which operates as a distinct entity from the settlement bank or the central securities depository (which usually runs the SSS). An example of the control process not done by the SSS is that of DECEVAL, the Colombian depository. For equity trades, settlements are coordinated by the stock exchange (BVC) as clearing house. A BIS model 2 applies, where cash netting is executed by the stock exchange and securities are transferred gross in DECEVAL, based on the exchange’s instructions. Only
equity repos and other non-spot market transactions are done on a DVP basis at the depository, using the automatic debit facility (i.e. whereby no authorisation is required from the buyer). In the morning of SD, DECEVAL receives a file from the exchange with the trades executed on TD and the instruction to block securities in the seller's account as soon as they are available. DECEVAL runs cycles every five minutes to look for securities. If there are enough securities, the BVC orders DECEVAL to block the securities on the sellers account, and then if the value of cash is paid by the buyer to the BVC, using CUD, the electronic payment system of the Central Bank, the securities transfer will be executed by DECEVAL.

Conclusion

DVP is an extremely important infrastructure solution to eliminate principal risk. Surprisingly enough, a few markets (including Nigeria) have still not yet adopted the DVP mechanism for settling any securities transactions, while many more settle only on-market (i.e. broker-broker) transactions DVP, leaving client-side (i.e. broker-custodian, custodian-custodian) transactions as non-DVP. Furthermore, some markets (e.g. Malawi or Swaziland) still operate in a physical environment, and DVP is performed through the exchange of physical certificates against cheques. Principal risk is significant as cheques can be lost or damaged and parties may become insolvent before the cheque clears.

The opposite of DVP is obviously Delivery Free of Payment (DFP) from the SSS perspective since the SSS does not link the settlement of securities with the settlement of funds, but DFP does not necessarily mean pure DFP from the market perspective as delivery of securities may be against (not versus) payment with change of beneficial ownership. However, when a delivery is against payment, many SSSs across the globe provide DVP, where final delivery of the security occurs if and only if final payment occurs.

Some of the participants are excluded from the DVP environment when dealing with tiered settlement arrangements. For example, B may appoint C as its cash clearing agent (i.e., in B has no cash account at the settlement bank), in which case A delivers securities to B but C pays A. Cash settlement between B and C then resides outside the DVP arrangements, thus C is exposed to B’s credit risk. Some systems may restrict participation to creditworthy members only in order to preserve the stability of the systems. On the other hand, this restriction may cause settlements to take place outside the DVP environment, therefore increasing principal risk, which may in turn cause disruptions to the financial system as a whole. However, it is understood that there should be a balance struck between restricting participation and maximising settlements in the DVP environment.

For further information contact:

Sinang Chrea | Jim Micklethwaite
---|---
Senior Analyst | Director, Capital Markets
Thomas Murray | Thomas Murray
+44 (0) 208-600-2300 | +44(0) 208-600-2309
schrea@thomasmurray.com | jmicklethwaite@thomasmurray.com