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DvP Study in Ukraine

SWIFT Business & Standards Advisory

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Part I

Overview of current DvP transactions in Ukraine (“As-Is”)

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1. Introduction and background

In 2017, the National Bank of Ukraine (NBU) and the National Securities and Stock Market Commission (NSSMC) signed a Memorandum of Understanding (MoU) to work together to reform the capital markets infrastructure in order to gradually align it with the European regulatory framework (CSDR, EMIR, MiFID), international standards and best practices. This MoU envisions a target operating model that consists of two main elements: clearing on the one hand, and settlement and depository on the other hand. The clearing component describes the implementation of a "light" CCP and/or the use of a "regional" CCP, as well as the engagement of a CCP for settlement of trades executed on the stock exchange (compulsory) and for OTC trades (optional), etc. **There are three important aspects, derived partially from the settlement and depository services component and partially from other related agreements: 1) NDU will take over the responsibilities and tasks of the NBU depository 2) the move towards cash settlement in Central Bank money for securities settlement, and 3) the Settlement Centre will give up its banking licence.**

To be in line with best practices when implementing the settlement and depository component of this target operating model, a Delivery-versus-Payment (DvP) study has been requested to present several options for the interconnection between the CSD and SEP. For defining these options, several markets with similar characteristics as the target operating model of Ukraine (e.g. one CSD, settlement in Central Bank money) will be analysed. This interconnection between the CSD and SEP is stipulated in the law 738-IX recently adopted by the Parliament.

It is important to note that the NBU, in coordination with the NSSMC, will be overseeing the operation of the capital markets infrastructure according to EU standards and IOSCO principles. The DvP study aims at providing an inventory of the current DvP processes by asset class (As-Is) before providing the detailed assessment of options for the future communication between the CSD and SEP (To-Be).

This document (As-Is) contains several visualizations and descriptions of the current DvP processes and players involved in securities and cash settlement for the Ukrainian market, and this for both government debt as well as equities and corporate debt. The role of the different financial actors and the current account set-up will also be covered.

The scope of this paper is domestic DvP securities transactions as cross-border securities transactions are only settled Free-of-Payment (FOP) through Clearstream.

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2. Overview of financial actors involved in DvP process

The following financial actors are involved in the Ukrainian DvP process:

- **National Bank of Ukraine (NBU) – State Securities Depository (SSD)**: central securities depository for government and municipal securities denominated in UAH.
- **National Depository of Ukraine (NDU)**: central securities depository for equities and corporate debt denominated in UAH.
- **National Bank of Ukraine – System of Electronic Payment (SEP)**: state bank payment system (or RTGS) which is created for the purpose of carrying out interbank money transfers in Ukraine in national currency through accounts of resident banks and accounts of other SEP participating organizations opened in the NBU.
- **Settlement Centre (SC)**: For all *exchange-traded* securities (denominated in UAH), SC clears and nets the transactions. Subsequently, the SC sends the instructions to SSD or NDU to conduct securities settlement and to its own banking system to conduct cash settlement. For *over-the-counter (OTC)* securities transactions, SC can act as a settlement entity if both parties agree to use its services.
- **Stock Exchange (SE)**: a facility where brokers and traders can buy and sell securities. Some examples in Ukraine are the Ukrainian Exchange the PFTS Stock Exchange and "Perspektyva" Stock Exchange.
- **Custodian bank**: an entity that safekeeps and administers securities for its customers.
- **(Cash settlement) bank**: a financial institution that is involved to settle the payment obligations arising from securities transfers.
- **Brokers**: independent person or company that organises and executes financial transactions on behalf of another party.

3. Current account set-up and interconnection between the CSDs and SEP

DvP in Ukraine occurs currently via an interfaced model, which means that securities accounts and cash accounts are located on two separate platforms. For government securities, the securities accounts are maintained at the NBU depository while the securities accounts for corporate securities are maintained at NDU. The cash accounts for the national DvP settlement model (for stock-exchange and OTC trades) are located within SC. If institutions opt for the RvP model (i.e. the transfer of securities occurs before the blocking of these securities), then cash settlement will happen at SEP.

With regards to the settlement model that interacts with SEP, there is currently no accounting relationship between the central depositories and SEP. The reason that the central depositories do not have a SEP account is that direct access to SEP (i.e. opening a technical account for processing payments in SEP) can be granted only to the entities that hold a commercial banking licence. This results in the fact that there is no possibility for the SEP participants to settle the cash-leg directly with the central depositories. As a consequence, SEP informs the central depositories of cash settlement of securities-related payments.

Furthermore, there is no power of attorney where the central depositories have the authority to debit and/or credit SEP cash accounts on behalf of the SEP participants.

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4. DvP models for securities in Ukraine

A visual overview of the four different DvP & RvP scenarios is shown below.

Secondary market	Type of trade		Type of securities		Place of cash settlement	
	On-exchange	OTC	Government securities	Equities & corporate debt	SC	SEP
Scenario 1 (DvP)	x		x	x	x	
Scenario 2 (DvP)		x	x	x	x	
Scenario 3 (RvP)		x	x			x

i.e. place of securities settlement = NBU depository

i.e. place of securities settlement = NDU

Primary market	Type of trade	Type of securities		Place of cash settlement	
	Auction	Government securities	Equities & corporate debt	SC	SEP
Scenario 4 (RvP)	x	x			x

The first three scenarios focus on the secondary market and the fourth scenario describes the primary market. The first scenario shows the DvP settlement process for a government or corporate security that was traded on a stock exchange and subsequently, cash settlement took place at the SC. The second scenario shows the DvP settlement process for a government or corporate security that was the result of an OTC trade and whereby cash settlement occurs at the SC. The third scenario explains an RvP settlement process for a government security, resulting from an OTC trade, for which the cash leg will be settled at SEP. The last scenario describes the primary government auctions for which the cash leg will mandatorily be settled at SEP.

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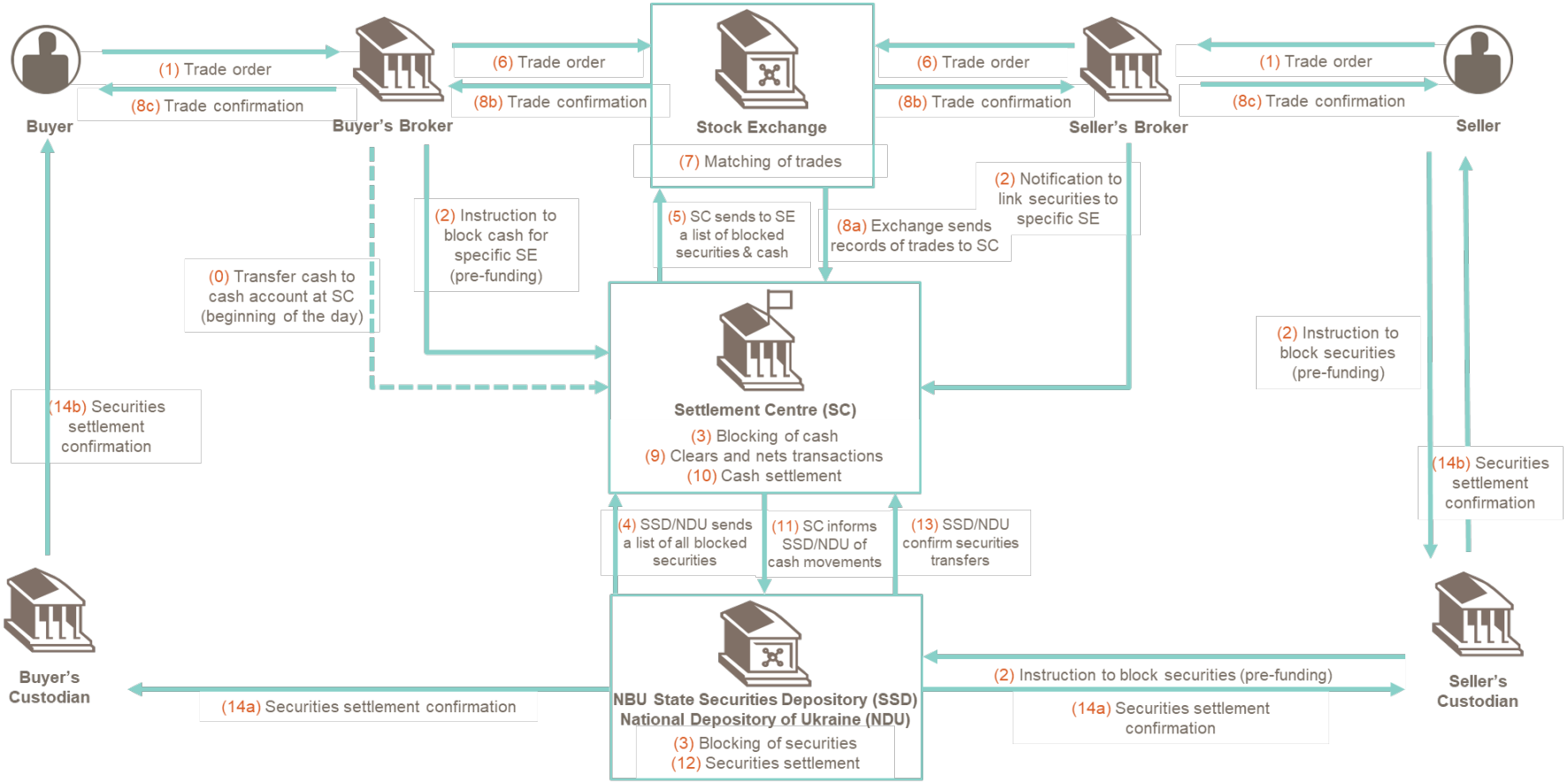
4.1. Secondary market

4.1.1. On-exchange transactions

Scenario 1: The below business flow shows a DvP on-exchange transaction. This flow is relevant for both **government securities** (securities settlement at SSD) as well as **equities & corporate debt** (securities settlement at NDU). Cash settlement happens at the SC.



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Business flow description of a DvP on-exchange transaction (all securities)

Step	Description
0	At start of day, the buyer transfers cash to its cash account with the SC.
1	The buyer and seller send an order to their respective brokers to execute a trade.
2	The buyer sends an instruction to the SC to block cash (pre-funding) for a specific stock exchange and transfer cash from its cash account to its clearing account (with the SC). The seller sends an instruction to its custodian to block securities (pre-funding) and informs the SC to link specific securities to a specific stock exchange. The seller's custodian forwards the instruction to block securities to the SSD/NDU.
3	Cash is blocked at the SC and securities are blocked at the SSD/NDU.
4/5	The SSD/NDU sends a list of blocked securities to the SC and the SC sends a list of blocked cash & securities to the stock exchange.
6	Both buyer and seller submit their trades to the stock exchange.
7/8a	The stock exchange matches the trades and sends records of the matched trades to the SC.
8b/c	The stock exchange sends trade confirmations to the buyer's and seller's brokers and the brokers inform their respective customers.
9	The SC clears and nets the transactions.
10/11	The SC executes the cash movements and informs the SSD/NDU.
12	Securities are transferred at the SSD/NDU.
13	The SSD/NDU confirms the securities transfer to SC.
14a/b	The SSD/NDU confirms securities settlement to the buyer's and seller's custodians and the custodians confirm settlement to their respective customers.

Notes

- (2) In those cases where the seller's broker would have a Power of Attorney and be the operator of the seller's account with the custodian, the broker would send the instruction to block securities to the custodian (and not the seller).
- (9) Before the actual cash settlement, the SC will perform some pre-checks with SSD/NDU to confirm that securities are still blocked and available for a specific trade.

Observations

- Cash settlement at SC happens in commercial bank money.
- For all on-exchange transactions, the SC clears and nets the transactions.
- Pre-funding for both cash and securities is mandatory for all assets traded on exchange.

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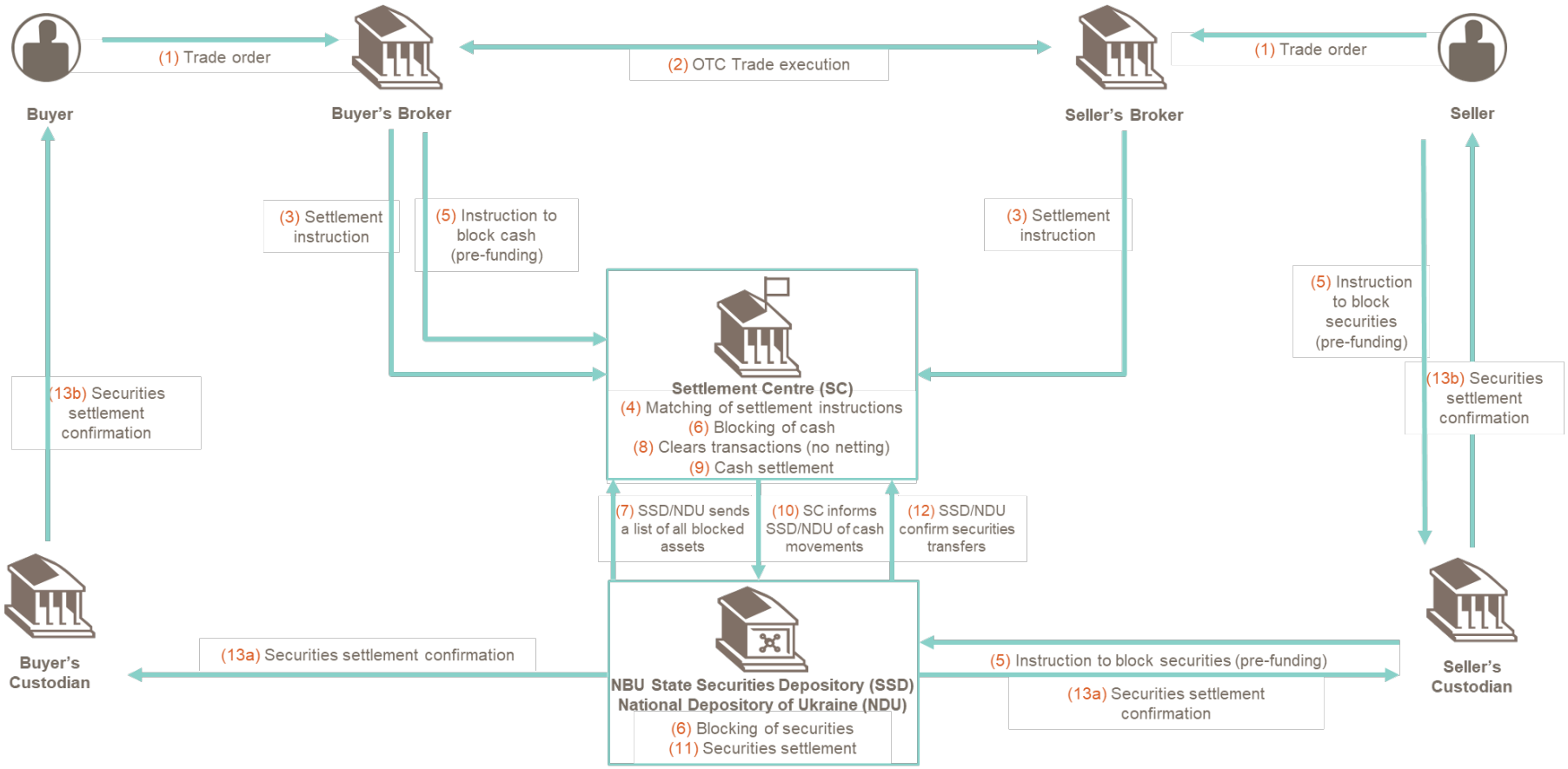
4.1.2. OTC transactions with cash settlement at SC

Scenario 2: The below business flow shows a DvP OTC transaction. This flow is relevant for both **government securities** (securities settlement at SSD) as well as **equities & corporate debt** (securities settlement at NDU). Cash settlement happens at the SC.



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Business flow description of a DvP OTC transaction (all securities)

Step	Description
1	Buyer and seller send an order to their respective broker to execute a trade.
2	Buyer's and seller's broker execute the OTC trade.
3	Optional: both buyer's and seller's broker send a settlement instruction to the SC.
4	The SC matches the settlement instructions (if sent).
5	Buyer's broker sends an instruction to the SC to block the cash (pre-funding) whereas the seller send an instruction to block securities (pre-funding) to its custodian who forwards the instruction to the SSD/NDU.
6	Cash is blocked at the SC and securities are blocked at the SSD/NDU.
7	The SSD/NDU sends a list of blocked securities to SC.
8	The SC clears the transactions.
9/10	The SC executes the cash movements and informs the SSD/NDU.
11/12	The securities are transferred at the SSD/NDU and the SC is informed.
13a/b	The SSD/NDU confirms settlement to the buyer's and seller's custodian who inform their respective customers (buyer/seller).

Observations

- Cash settlement at SC happens in commercial bank money.
- This business flow shows an OTC transaction. It is up to the parties to decide the way a transaction is concluded and settled. If a party does not wish to use SC's services, then it will have to outline in the bilateral agreement their intent to forgo DvP settlement process. If both parties want to use DvP settlement regime they will have to use SC's services by law.
- Pre-funding for both cash and securities is mandatory for all OTC trades through SC

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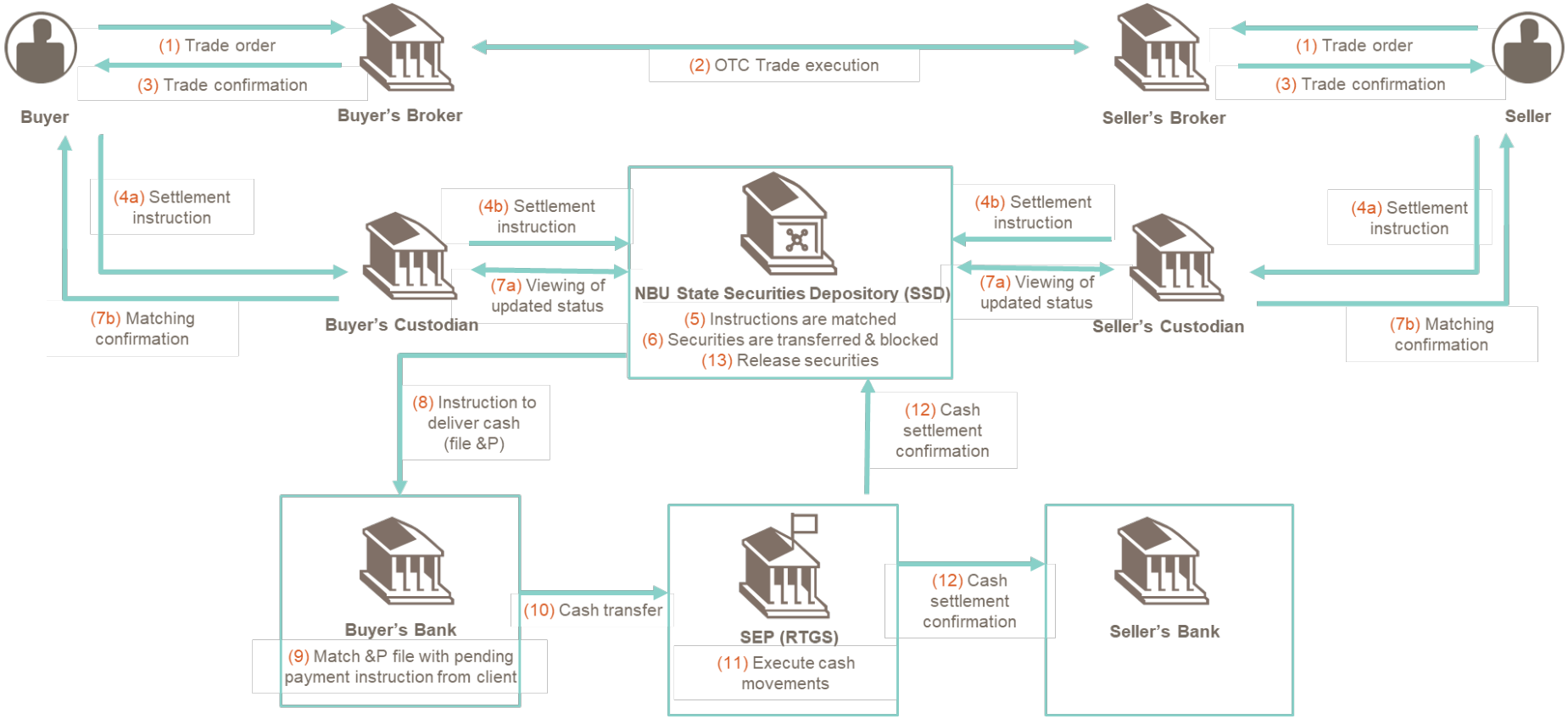
4.1.3. OTC transactions with cash settlement at SEP

Scenario 3: The below business flow shows an **RvP** OTC transaction. This flow is only relevant for **government securities** (securities settlement at SSD). Cash settlement happens at SEP.



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Business flow description of RvP OTC transaction (government securities)

Step	Description
1	Buyer and seller send an order to their respective broker to execute a trade.
2	Buyer's and seller's broker execute the OTC trade.
3	Buyer's and seller's broker confirm the trade execution to their respective customers.
4a/b	Optional: buyer and seller send to their respective brokers an instruction to settle the trade and the custodians forward the instructions to the SSD.
5/6/7	The SSD matches the settlement instructions, transfers and blocks the securities in the buyer's account and updates the status in the system. The custodians can access a web application to see the status of their instructions.
8	The SSD generates a file (&P file) that the buyer's bank has to extract. This file contains a request to transfer cash from buyer's account to seller's account.
9	The buyer's bank transfers cash to the SEP.
11	The SEP executes cash movements.
12	The SEP informs the SSD and the seller's bank of cash settlement
13	The SSD releases the securities in the buyer's account.

Observations

- Cash settlement at SEP happens in central bank money.
- Pre-funding for only securities is mandatory in this scenario.

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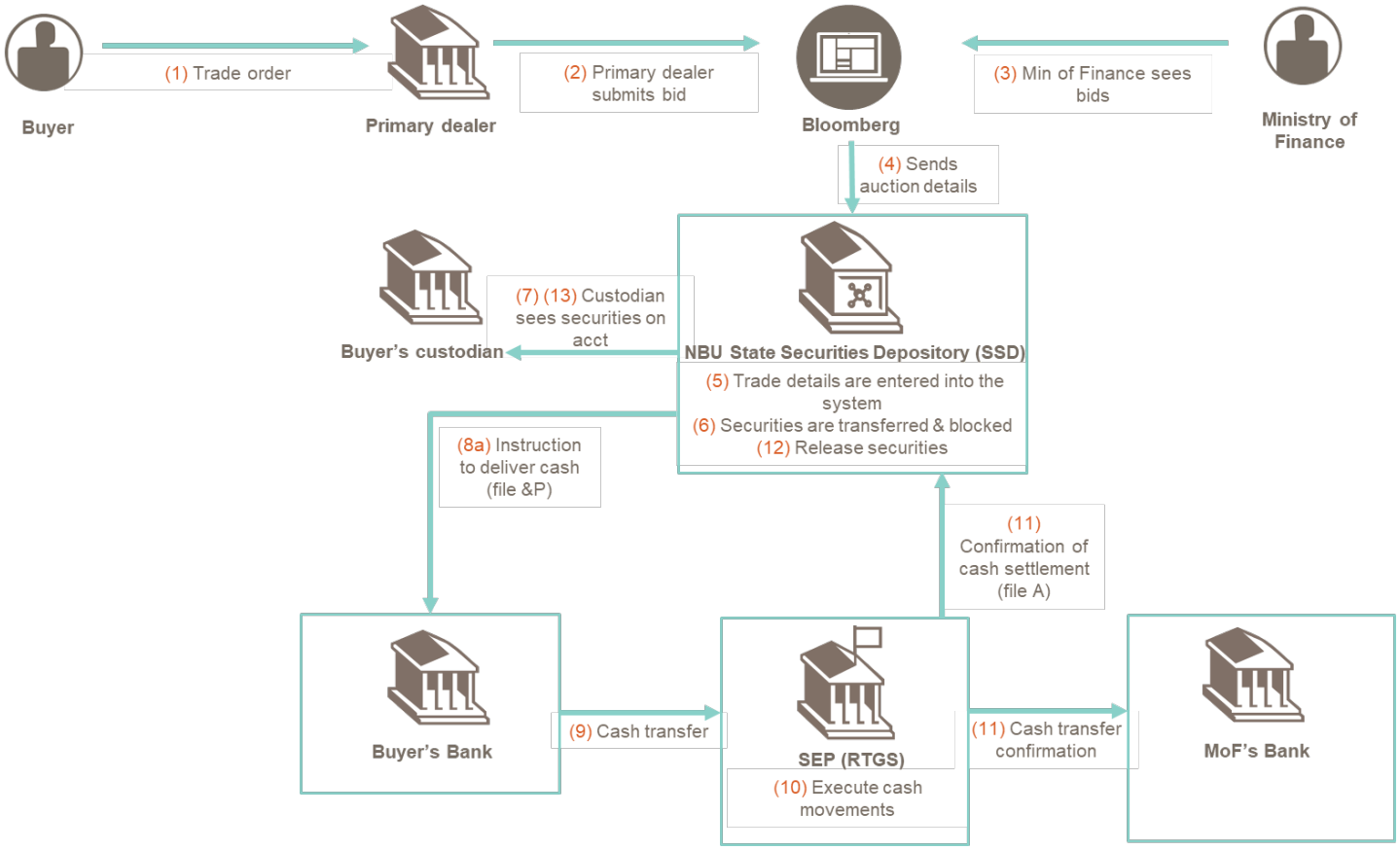
4.2. Primary market

Scenario 4: The below business flow shows an **RvP** transaction covering the auctioning process in the primary market. This flow is only relevant for **government securities** (securities settlement at SSD). Cash settlement happens at SEP.



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Business flow description of RvP primary government auction (government securities)

Step	Description
1	Buyer sends an order to the primary dealer to purchase new securities.
2	Primary dealer submits a bid via the Bloomberg terminal.
3	Ministry of Finance sees all bids via the Bloomberg terminal and will select a “winning” bid.
4/5	Bloomberg sends a file with all auction details to SSD and SSD will put the trades in its system.
6	SSD transfers the securities to the custodian’s account and blocks these.
7	Custodian will see the securities on its account but with status “blocked”.
8	Next day, the SSD generates a file (&P file) that the buyer’s bank has to extract. This file contains a request to transfer cash from buyer’s account to MoF’s account.
9/10	Buyer’s bank transfers the cash and SEP executes the cash movements.
11	SEP confirms cash settlement to SSD and MoF’s bank.
12	SSD releases the securities on the custodian’s account.
13	Custodian will see the status of the securities changing from “blocked” to “available”.

Observations

- Cash settlement at SEP happens in central bank money.

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Part II

Models for cash-leg of securities settlement transactions (“To- Be”)

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1. Executive summary

With these upcoming legislative changes that will impact the settlement process, a policy framework is required for the access rights of NDU to SEP. To be in line with best practices when implementing the settlement and depository component of this target operating model, a Delivery-versus-Payment (DvP) study has been requested to present several options for the interconnection between the CSD and SEP. For defining these options, several markets with similar characteristics as the target operating model of Ukraine (e.g. a single CSD, settlement in Central Bank money) have been analysed. The need for this interconnection between the CSD and SEP is stipulated in the draft law #2284 that is already approved by the Parliament (and will become effective as of July 2021).

The DvP study aims at listing the current DvP processes (As-Is) before providing the detailed analysis of future potential models for the cash-leg of securities settlement transactions, which may differ from the existing model applicable in Ukraine, to assess their potential benefits and challenges (To-Be).

However, four key considerations that may impact the models, have been first assessed in more detail to highlight the differentiating factors between these models.

These four key considerations are:

1. Who generates the securities settlement-related payment instructions?
2. Should the CSD have an operational cash account with SEP?
3. Should the settlement banks use an SEP sub-account for settlement of securities-related payments?
4. Interfaced versus integrated model

The current model for the cash-leg of securities settlement transactions in Ukraine that requires communication between the CSD and SEP is only applicable for the RvP model and thus limited to government OTC transactions and bond auctions. For this model, Ukraine applies an interfaced model, whereby the settlement banks generate the payment instructions, the CSD has no operational cash account with SEP, and the settlement banks have no specific SEP account dedicated to securities settlement-related payments.

After analysing the different models that may vary based on the four key considerations mentioned above and studying how these models are applied in different markets, a model has been chosen that brings a significant number of benefits, but is still reasonable in terms of investment.

A first recommendation is to authorise the CSD[1] to initiate the securities settlement-related payments. The main benefits are: 1) a more simultaneous and true DvP as there is a minimal delay between the movement of the security and the movement of cash, 2) a decrease in systemic risk as the entire market is not dependent on each settlement bank sending timely payments for the full amount, and 3) the simplification of operational processes for the settlement banks since no further action needs to be undertaken by them if sufficient funds are available on their SEP account.

A second recommendation is to create an operational cash account for the CSD with SEP and to allow the CSD to become a direct participant of SEP. The main advantages are 1) that the impacts of the default of a settlement bank

[1] With regards to the authorisation of the CSD to initiate the securities-related payments in SEP, there is no need for a legislative change as the SEP participants could grant a power of attorney to the CSD. Such power of attorney may apply to all accounts of the SEP participant or may be restricted to a specific account of the SEP participant.
As soon as such power of attorney, duly completed and signed, has been transmitted to SEP and set up appropriately, SEP accepts instructions sent by the CSD on behalf of the concerned participant, subject to the conditions stipulated in the power of attorney.

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can be limited due to the central role of the CSD in the processing chain since the settlement finality will be always declared by the CSD and the CSD orchestrates the securities and cash movements, 2) an easier reconciliation process for settlement banks when cash settlement occurs on a net basis (only applicable under BIS DvP models 2 and 3[2]), and 3) the potential for the CSD to offer a more risk-free method of services related to asset servicing. The main challenge of this recommendation is that according to the Ukrainian central bank criteria for SEP membership, direct access to SEP (i.e. opening an operational account for processing payments in SEP) can only be granted to entities that hold a commercial bank licence.

A third recommendation (and change to the current model) is to create an SEP sub-account for the cash settlement of securities settlement transactions. The main factors for this recommendation are that 1) this SEP sub-account will assist settlement banks with an easier reconciliation process for debit/credit movements resulting from securities settlement transactions 2) cash settlement of securities settlement transactions cannot be disturbed by an unexpected high value or volumes of non securities-related debit movements on the SEP main account. The creation of a sub-account can be easily complemented with features such automatic end-of-day cash sweep from the sub-account to the main account to ease the settlement banks' liquidity management.

These recommendations are in line with best practices from other (similar) markets, but still need to be reviewed if they are all satisfactory for the particularities of the Ukrainian capital market infrastructure.

[2] BIS DvP model 2: Gross settlement of securities transfers followed by net settlement of funds transfers
BIS DvP model 3: Simultaneous net settlement of securities and funds transfers

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2. Key considerations when choosing a model for cash-leg of securities settlement transactions

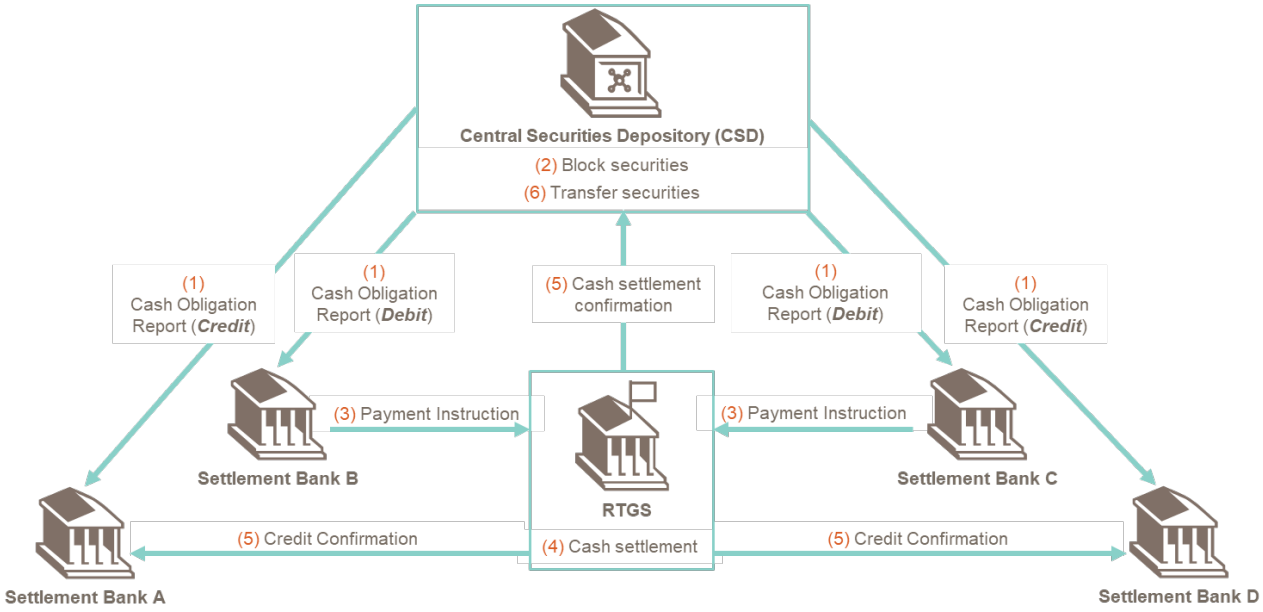
In this section, four key considerations will be described that have an impact on the different potential models for the cash-leg of securities settlement transactions. The first three considerations are explained in the context of an interfaced model. The fourth consideration illustrates in more detail the integrated model. Based on the four considerations, six different potential models will be created.

2.1. Key consideration 1 – Who generates payment instructions?

There are generally two types of participants who initiate the payment instruction to settle the cash-leg of securities settlement transactions: either the settlement banks themselves or the CSD.

2.1.1. Option 1: Settlement banks generate the payment instructions

The first option is visualised below where settlement banks generate the payment instructions as the CSD has no authorisation to initiate RTGS payment instructions on behalf of settlement banks for securities settlement-related payments. This model shows the DvP process where the settlement of cash happens on a net basis (i.e. off-setting of debits against credits between multiple counterparties resulting in net instructions per party), which means that BIS DvP model 2 or 3 is applied.



Every settlement bank that has a debit on the cash side after multilateral netting, has to instruct a payment to the RTGS to settle the cash-leg of securities transactions. After cash settlement at RTGS, the RTGS will confirm the cash settlement to the CSD and the settlement banks that are supposed to receive cash (after multilateral netting).

2.1.2. Option 2: CSD generates the payment instructions

The second option is shown below where the CSD generates the securities-related payment instructions on behalf of the settlement banks (which are RTGS participants).

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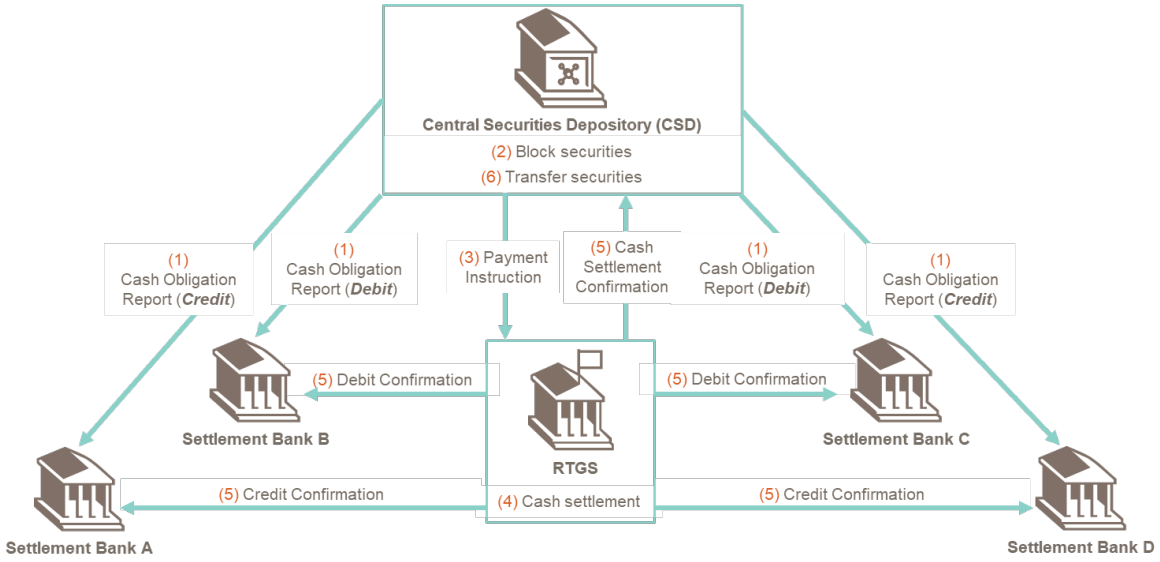

The payment instruction that is sent from the CSD to the RTGS is a mandated payment (i.e. a payment made on behalf of a settlement bank upon instruction issued by the CSD) in order to debit and credit the respective settlement banks. When cash settlement happens at the RTGS, usually the debits will be settled before settling the credits. After cash settlement, each settlement bank will either receive a debit or credit confirmation.

2.1.3. Analysis

When settlement banks generate the payment instruction themselves, the entire market is dependent on each settlement bank for:

- Processing timely payments (before the cash settlement deadline)
- Transferring sufficient funds
- Making no operational or technical errors

This results in an increased systemic risk (i.e. 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). On top of that, if the CSD has to wait for all the settlement banks to initiate the payment, the CSD cannot settle the securities before receiving the credit confirmation from the RTGS that informs the CSD that the cash settlements between all settlement banks have taken place. This leads to a bigger time gap between the settlement of cash and the settlement of securities, which moves away from true DvP (i.e. no delay between the movement of security and the movement of cash) and increases the settlement risk.

When the CSD is authorised to generate payment instructions on behalf of all settlement banks, the CSD can initiate the payments between the settlement banks instead of relying on each settlement bank to send their securities-related payment to the RTGS. The settlement banks will still need to ensure that sufficient funds are available on the relevant RTGS cash account, but they do not need to wait for the other settlement banks. The main advantage of this approach is that the CSD practices nearly true or simultaneous DvP as the securities will be transferred only a few minutes after the movement of cash, which reduces the settlement risk. The settlement process is more optimised if the CSD is in charge of both the securities side as well as the cash side. Another benefit (of the CSD initiating the payment) for the RTGS participants is that no further action has to be undertaken by them if sufficient funds are available on their RTGS cash account for the cash settlement of the securities settlement transactions.

Globally, the most common cash settlement instructions take the form of a 'mandated payment'. Some examples of markets where the CSD initiates the RTGS payment instructions on behalf of the settlement banks: Poland (KDPW), USA (DTCC), Australia (CHESS), Iceland (Nasdaq CSD), Norway (VPS), South Africa (Strate), Sweden (Euroclear).

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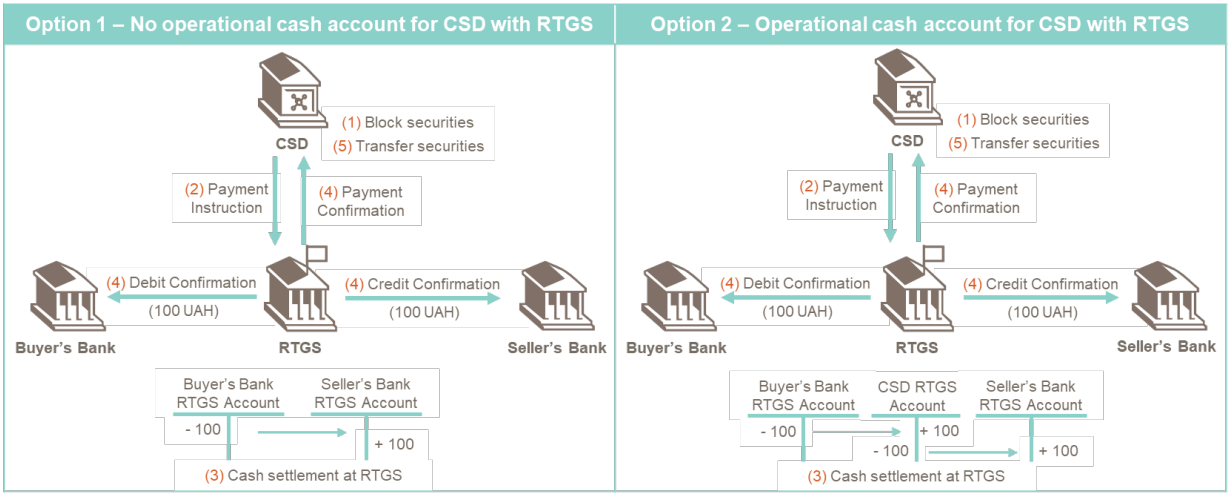
2.2. Key consideration 2 – Operational cash account for the CSD with the RTGS

This section focuses on the question whether a CSD should have an operational cash account with the RTGS. This will be analysed for the two types of cash settlement: on a real time gross basis and on a net basis.

It is important to note that a condition of opening an operational cash account for the CSD (or any institution providing clearing or settlement services) with the RTGS is that the CSD will have to be a direct participant of the RTGS. As a direct participant, the CSD can manage the settlement of the securities-related payments directly in the RTGS. Examples of CSDs that are direct participants of the RTGS are CREST (UK), NDC (Azerbaijan), KDPW (Poland). The creation of a cash account for the CSD does not automatically result in the provision of deposit facilities[3] and it can be agreed that this cash account can only be used for settling securities-related payments (e.g. cash-leg of securities settlement, payments for corporate actions). It is possible that legislative changes are required to allow the CSD to have an operational cash account at SEP.

2.2.1. Cash settlement on a real time gross basis

The below model shows the impact of an operational cash account for the CSD with the RTGS when cash is settled on a gross basis (i.e. the transaction is settled on a one-to-one basis, without netting any other transaction), which means that BIS DvP model 1[4] is applied. The assumption for this model is that the CSD has the authorisation to initiate payments on behalf of the settlement banks. The model could have been represented as well with the settlement banks initiating the payment.



For BIS DvP model 1, there is limited difference between the two options from a bank's perspective as in both cases they will be debited/credited once and receive the corresponding debit/credit confirmation.

[3] The CSD can use his SEP account exclusively for settlement of securities-related payments and cannot use this account for depositing funds in order to perform any other non-securities-related payment transactions.
[4] BIS DvP model 1: Gross, simultaneous settlements of securities and funds transfers

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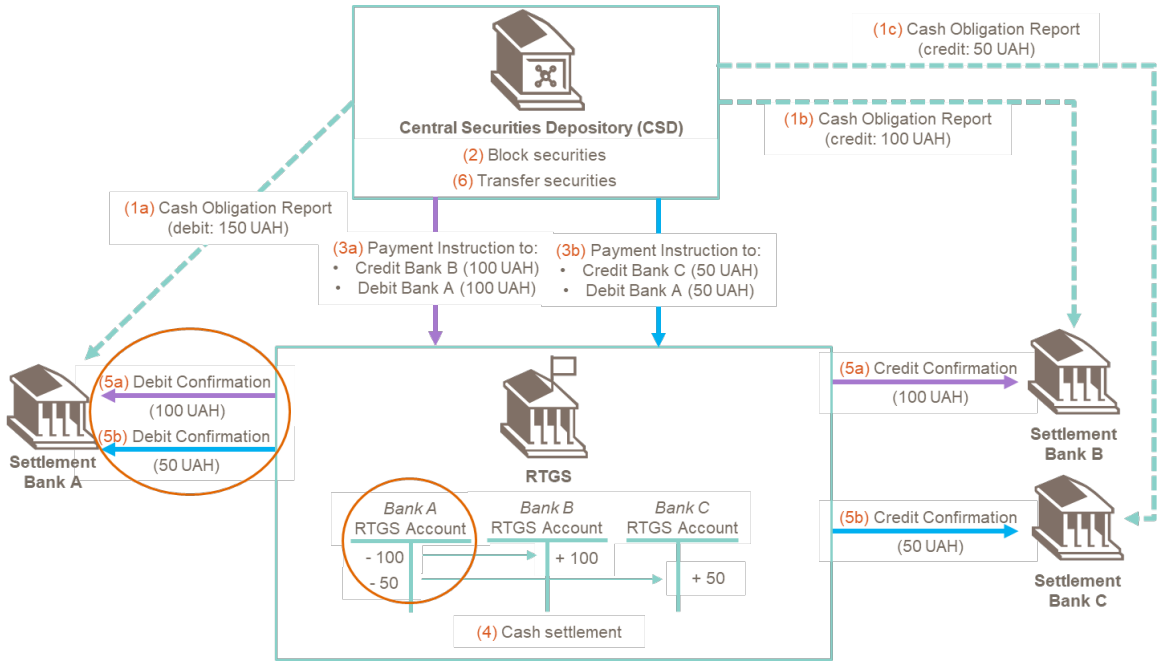
2.2.2. Cash settlement on a net basis

The following two models show the impact of an operational account for the CSD with the RTGS when cash is settled on a net basis (i.e. off-setting of debits against credits between multiple counterparties resulting in net instructions per party). The assumption is that the CSD has the authorisation to initiate payments on behalf of the settlement banks.

The first model below shows the scenario whereby the CSD has no operational cash account with the RTGS. This scenario also shows the results at the end of one settlement cycle (a CSD can implement multiple settlement batches/cycles throughout the settlement day).



Once the CSD performed multilateral cash netting, it will report to each settlement bank (via a Cash Obligation Report) the projected or actual cash settlement obligations that will be submitted for settlement, which allows banks that are expecting a cash debit to still fund their relevant RTGS account before cash settlement takes place. This Cash Obligation Report contains one total net cash amount for all its securities transactions linked to a settlement cycle towards all other settlement banks. After multilateral cash netting, it will be very unlikely that, at the end of a settlement cycle, a settlement bank with a certain amount in credit will find another settlement bank with the same amount in debit. Therefore, without an RTGS account for the CSD, the CSD will have to initiate payments that can result in multiple debit or credit movements on the account of the settlement bank in order to ensure that every settlement bank has the correct cash position at the end of the corresponding settlement cycle.

An important conclusion is that at the end of the day, the cash position will be correct for the settlement bank, but it will be more complex for the settlement bank (in this scenario, settlement bank A) to reconcile the cash-leg of the securities transactions of a certain settlement cycle as this model can result in multiple debit/credit movements. Although the settlement bank will receive from the CSD, via the Cash Obligation Report, one total net debit/credit amount, the settlement bank might have to connect this to several debit/credit movements on its cash account and to different clients in its books.

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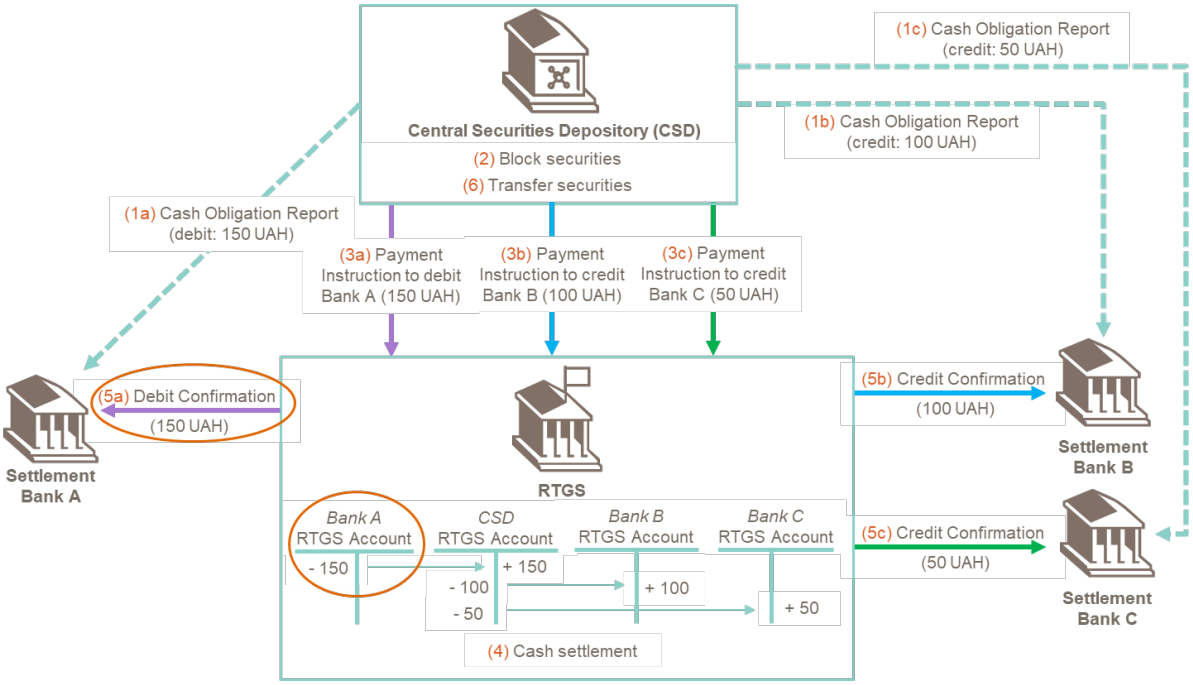
The second model below shows the scenario whereby the CSD has an operational cash account with the RTGS.



Since the CSD has an operational cash account with the RTGS, the CSD can send one separate payment instruction per settlement bank that the CSD can offset against its own account. That way, the reconciliation process of every settlement bank will be simplified as the single debit/credit movement on the cash account is now aligned with the single amount received from the Cash Obligation Report of the CSD. At the end of the settlement cycle, the balance of the CSD's RTGS account will be 0.

2.2.3. Analysis

The BIS DvP model is an important factor to be taken into consideration for the creation of an operational cash account for the CSD with the RTGS. In the context of settlement of cash on a real-time and gross basis (BIS DvP model 1), there is limited added value, from a pure reconciliation perspective, in creating an operational cash account for the CSD with the RTGS as the debit/credit movements in both scenarios are similar for the buyer's bank and seller's bank. However, additional risk management considerations could argue in favour of having an operational cash account for the CSD operating under the BIS DvP Model 1. In the context of settlement of cash on a net basis (BIS DvP model 2 or 3), there is added value in creating an operational cash account for the CSD with the RTGS as it allows every settlement bank to have a single (instead of multiple) debit/credit for all securities transactions of that settlement cycle. As a result, the benefit (of an operational cash account for the CSD with the RTGS when BIS DvP model 2 or 3 applies) is that it will be easier for settlement banks to reconcile the debit/credit movements of securities settlement-related payments. The debit/credit entry will be the same as the net amount received in the Cash Obligation Report sent by the CSD.

Another key benefit of the CSD having an operational cash account with the RTGS is that the impacts of the default of a settlement bank can be limited due to the central role of the CSD in the processing chain. Be reminded that the settlement finality will be always declared by the CSD and that the CSD orchestrates the securities and cash movements. This will be to the benefits of the integrity of the capital markets and will support better control mechanisms over potential systemic risk.

An operational cash account with the RTGS for the CSD can create as well potential benefits for the CSD itself. Firstly, if the CSD would offer services related to asset servicing, its operational cash account with the RTGS can also be used for processing corporate actions related payments (e.g. CSD receives the dividend or interest payment

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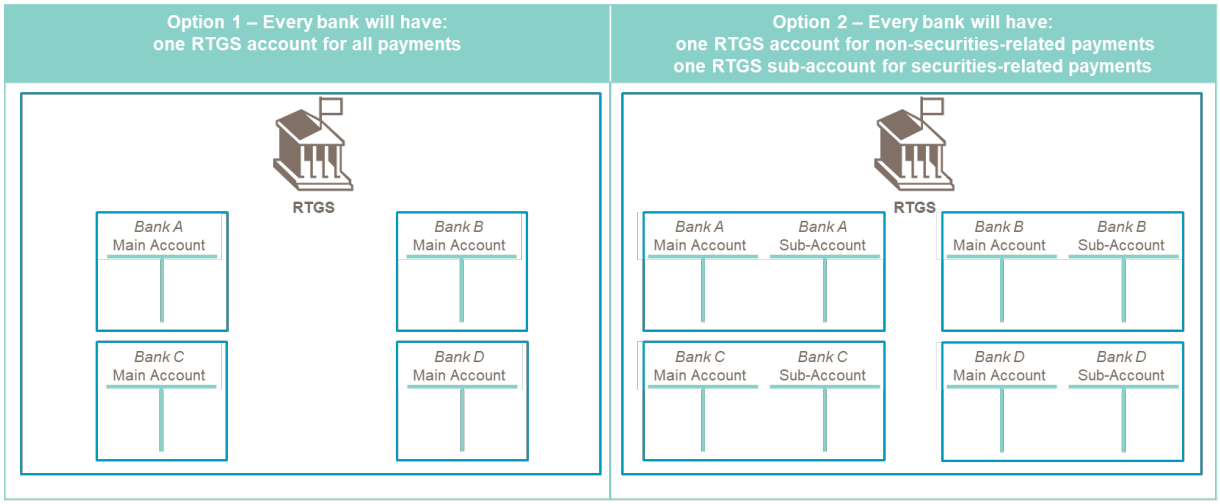
on its operational cash account with the RTGS from the issuers or the issuers' agents and distributes the funds to the participants based on their securities positions), which would reduce the risk as the CSD does not have to use a settlement bank. Secondly, the CSD can also use this operational cash account for the collection of the CSD service fees.

Some markets that settle cash on a net basis are markets where the CSD has an operational cash account with the RTGS: Poland (KDPW), USA (DTCC), Australia (CHESS), Canada (CDS), etc.

The main challenge for creating an operational cash account for the CSD with SEP in Ukraine is that according to central bank criteria for SEP membership, direct access to the SEP (i.e. opening an operational account for processing payments in SEP) can be granted only to entities that hold a commercial bank licence. This means that creating an operational cash account for the CSD with SEP might require a change in SEP membership criteria. Based on the benefits mentioned above, other markets have made an exception by considering the CSD as an RTGS participant without having a commercial bank licence. It would need to be investigated if a change in legislation is required for such a change to be possible in Ukraine.

2.3. Key consideration 3 – RTGS sub-account for securities-related payments

This section addresses the question whether the settlement bank should use an RTGS sub-account for securities-related payments. There are two main options. The first option is that every settlement bank would have a single RTGS account for all payments. The second option is that every settlement bank would have one RTGS account for all non-securities-related payments and another RTGS sub-account for securities-related payments.



One of the benefits of this sub-account for securities-related payments is that the reconciliation process will be simplified as a result of more specific cash reporting for securities-related debits and credits. This argument is more relevant when cash settlement happens on a real-time gross basis (BIS DvP model 1) and many DvP transactions can be settled throughout the day. Another benefit is that cash settlement of securities settlement transactions cannot be disturbed by an unexpected high value or volumes of non securities-related debit movements on the RTGS main account.

On the other hand, if settlement banks would have multiple RTGS accounts, 1) their liquidity management would become more complex since they would be required to monitor all the accounts actively, and 2) the settlement risk would be higher since they have to ensure that sufficient funds is available on the account where it is needed.

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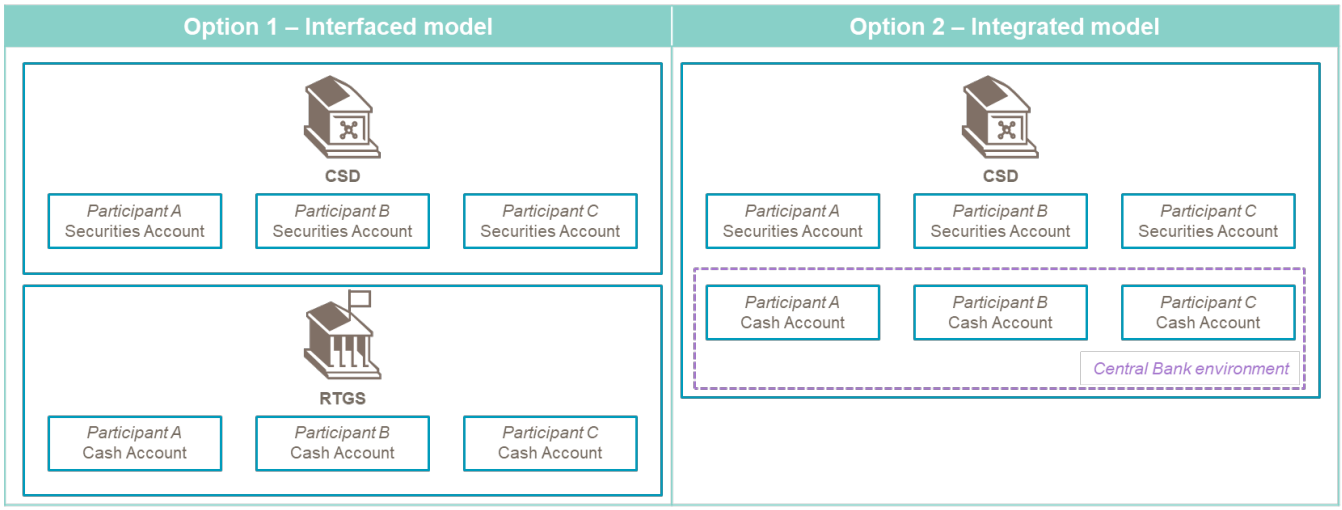
If an RTGS sub-account for securities-related payments would be introduced, it is important to consider tools for cash management. An example is an automated end-of-day cash sweep that transfers all cash from the RTGS sub-account to RTGS main account in order to avoid long overnight cash positions at sub-account level.

In Europe (T2S), there is a specific cash account for securities opened in the books of the respective central banks but hosted on the T2S settlement platform. In other markets, depending on the size of the securities market, certain RTGS systems offer also a specific account for securities-related payments.

2.4. Key consideration 4 – Interfaced vs integrated model

An approach to categorising the different modes of interaction between the RTGS and the CSD 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 two main models of interaction categorised following this approach, namely 'Interfaced', and 'Integrated' models.



For both models, the cash accounts remain legally in the central bank environment, but the difference lies in whether or not the cash accounts are on the same platform as the securities accounts. For the integrated model, both cash accounts and securities accounts are on the same platform, while for the interfaced model, the cash accounts and securities accounts are on two different platforms.

The lack of interface (or messaging) between the CSD and the RTGS cuts down on operational risk within the DvP process itself (e.g. disruption of link mid-way through settlement). As a result, the integrated model facilitates fast/real-time, highly efficient and low-risk settlement. Nevertheless, an interface is still required between the CSD and the RTGS for funding purposes.

The interfaced model is less satisfactory, as it may involve delays in processing transactions and an increased risk of error, as well as making auto-collateralisation[5] less efficient.

The main challenge for shifting from an interfaced model to an integrated model is that this would require a more substantial investment than the previous three considerations. Nevertheless, it can still be included for a more long-term consideration. Another challenge for an integrated model is that a banking licence could potentially be required

[5] Auto-collateralisation consists in posting automatically as collateral with the central bank either the securities that underlie the transaction (on-flow collateral), or other securities available in the buyer's securities account (on-stock collateral), thus triggering the receipt of intraday credit by the participant exposed to a temporary liquidity shortfall.

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for the CSD to open an RTGS account. Usually, this will be a restricted banking licence as the CSD will not offer any commercial bank services.

Markets that use an integrated model are Europe (T2S) and Russia (NSD). Currently, the interfaced model is from a global perspective still more prevalent.

3. Different models for cash-leg of securities settlement transactions

3.1. High-level overview

Based on the four key considerations, different models can be created for the cash leg of securities transactions. Six models have been selected, but more variants of these models are possible.

	Integrated or interfaced	Does the CSD have an operational cash account at the SEP?	SEP account of settlement bank used for settlement	Who generates the payment instructions?
Model 1	Interfaced	No	Main account	CSD*
Model 2	Interfaced	Yes	Main account	CSD*
Model 3	Interfaced	Yes	Main account	Settlement Bank
Model 4	Interfaced	Yes	Sub-account	CSD*
Model 5	Integrated			
Model 6	Integrated by joining T2S			

For clarification purposes, these six models are different from the three BIS DvP models.

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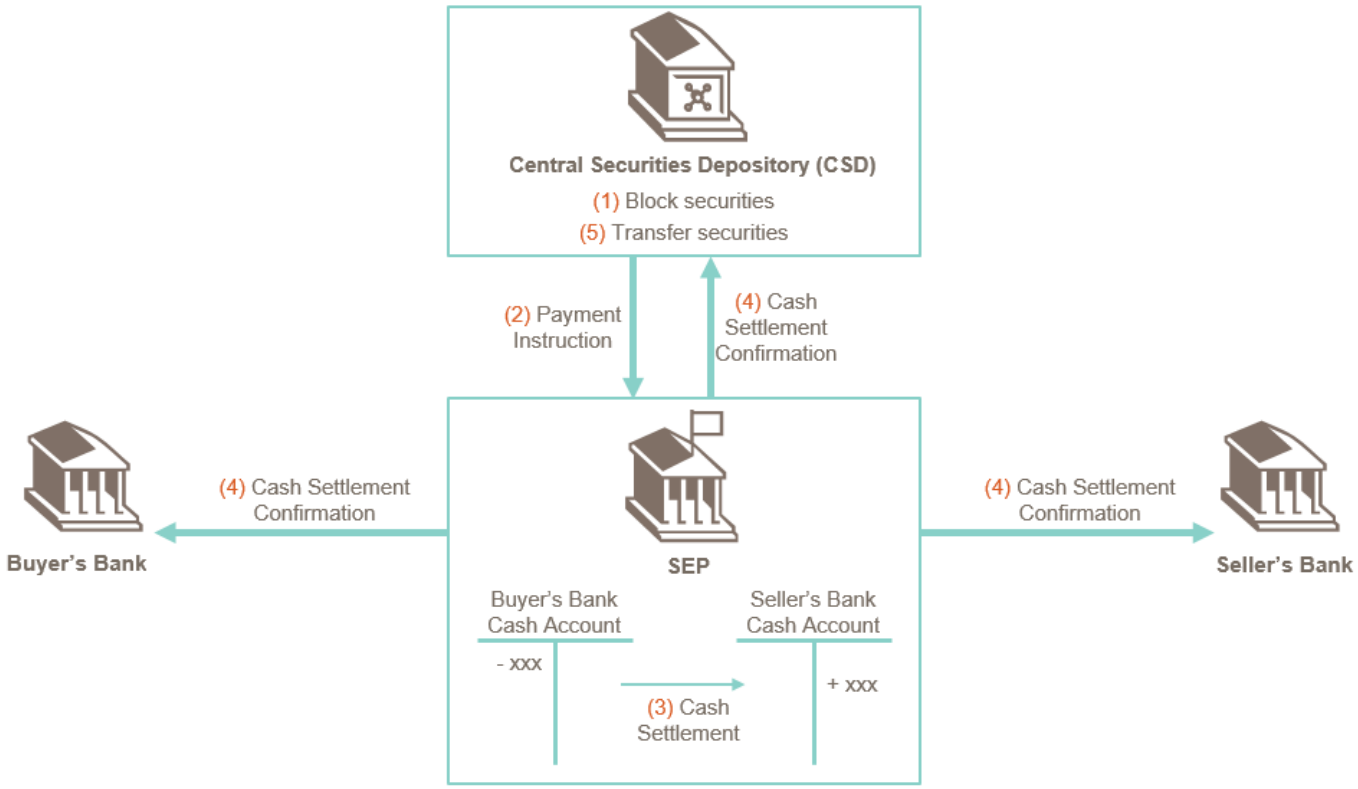
3.2. Model 1

The decisions of the four key considerations for model 1 are:

- Interfaced model
- No operational cash account for CSD with the SEP
- Settlement bank's SEP main account is used for settlement
- CSD generates the payment instructions on behalf of the settlement banks



Market	No country that was part of analysis
Benefits	• A key benefit of granting authorisation to the CSD to initiate payments on behalf of settlement banks is the reduced systemic risk as the entire market is not dependent on each settlement bank to instruct timely payments for the full amount without any errors. • A second key benefit (of the CSD initiating the payment) is that this model is very close to a simultaneous DvP model, even when two different systems are used, which reduces the settlement risk. • The benefit (of the CSD initiating the payment) for SEP participants is that no further action has to be undertaken by them if sufficient funds are available on their SEP account for the cash settlement of the securities transactions. • If settlement banks would have a single SEP account, 1) their liquidity management process would be simplified since they only need to monitor one account actively, and 2) they only have to ensure that sufficient funds is available on the single account.
Challenges	• A main challenge (of no operational cash account for the CSD with the SEP) is that it will be more difficult for settlement banks to reconcile the debit/credit entry of securities-related

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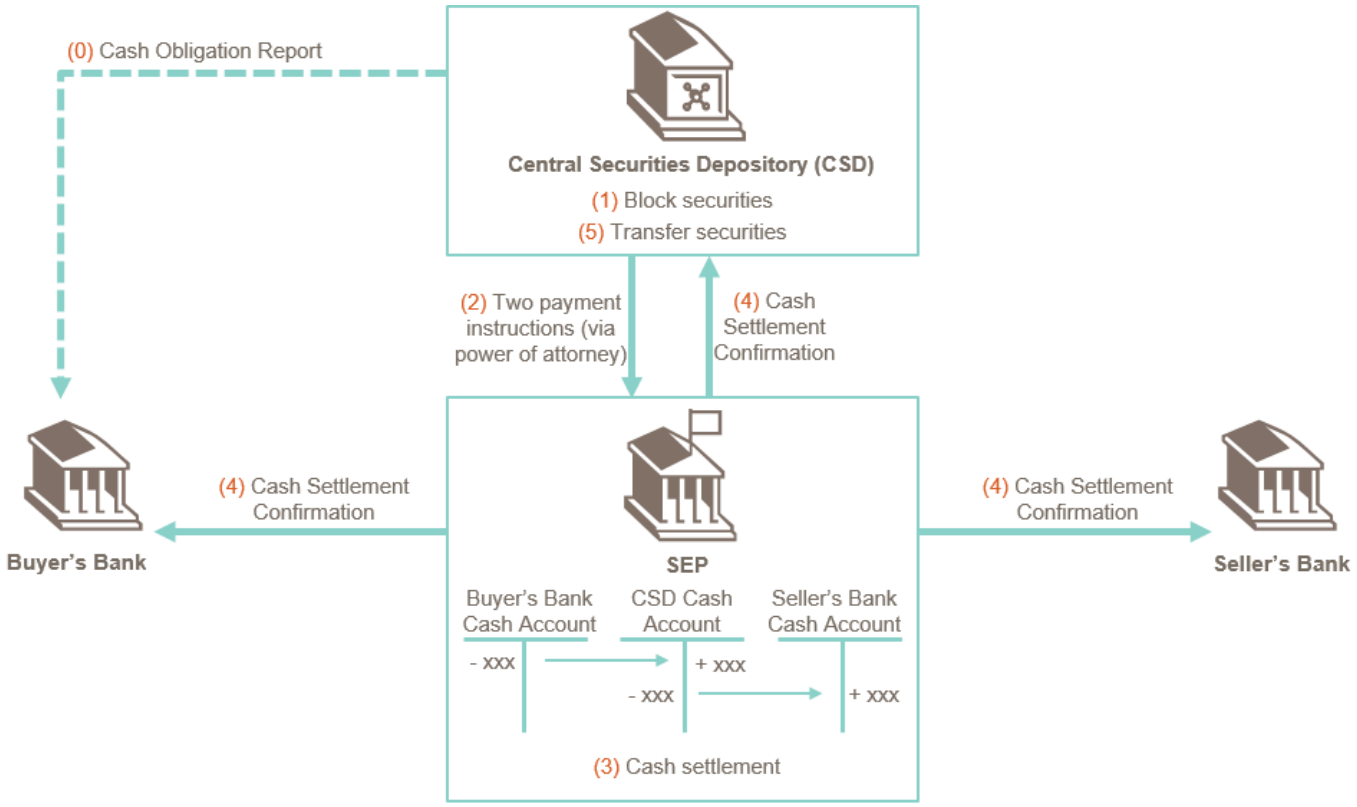
	payments (applicable under BIS DvP model 2 and 3). • Having only one SEP account 1) can make the reconciliation process more complex since all cash movements of non securities-related payments and securities-related payments are happening on the same account, and 2) needs more close liquidity monitoring of settlement banks to ensure that cash settlement of securities settlement transactions cannot be disturbed by an unexpected high value or volumes of non securities-related debit movements on the SEP main account.

3.3. Model 2

The decisions of the four key considerations for model 2 are:

- Interfaced model
- Operational cash account for CSD with the SEP
- Settlement bank's SEP main account is used for settlement
- CSD generates the payment instructions on behalf of the settlement banks



Market	USA (DTCC), Poland (KDPW)[6], Australia (CHESS), Japan (JASDEC)
Benefits	• A key benefit of granting authorisation to the CSD to initiate payments on behalf of settlement banks is the reduced systemic risk as the entire market is not dependent on each settlement bank to instruct timely payments for the full amount without any errors. • A second key benefit (of the CSD initiating the payment) is that this model is very close to a

[6] The scope of this model for Poland is domestic settlement.

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	simultaneous DvP model, even when two different systems are used, which reduces the settlement risk. • The benefit (of the CSD initiating the payment) for SEP participants is that no further action has to be undertaken by them if sufficient funds are available on their SEP account for the cash settlement of the securities transactions. • A key benefit (of an operational cash account for the CSD with the SEP) is that it will be easier for settlement banks to reconcile the debit/credit entry of securities-related payments (applicable under BIS DvP model 2 and 3). • Another key benefit of the CSD having an SEP account is that the impacts of the default of a settlement bank can be limited due to the central role of the CSD in the processing chain. • If the CSD would offer services related to asset servicing, its SEP account can also be used for processing corporate actions related payments, which would reduce the risk as the CSD does not have to use a settlement bank. • If settlement banks would have a single SEP account, 1) their liquidity management process would be simplified since they only need to monitor one account actively, and 2) they only have to ensure that sufficient funds is available on the single account.
Challenges	• A challenge is that according to central bank criteria for SEP membership, direct access to the SEP (i.e. opening an operational account for processing payments in the SEP) can be granted only to entities that hold a commercial bank licence. • Having only one SEP account 1) can make the reconciliation process more complex since all cash movements of non securities-related payments and securities-related payments are happening on the same account, and 2) needs more close liquidity monitoring of settlement banks to ensure that cash settlement of securities settlement transactions cannot be disturbed by an unexpected high value or volumes of non securities-related debit movements on the SEP main account.

3.4. Model 3

The decisions of the four key considerations for model 3 are:

- Interfaced model
- Operational cash account for CSD with the SEP
- Settlement bank's SEP main account is used for settlement
- Settlement banks generates the payment instructions

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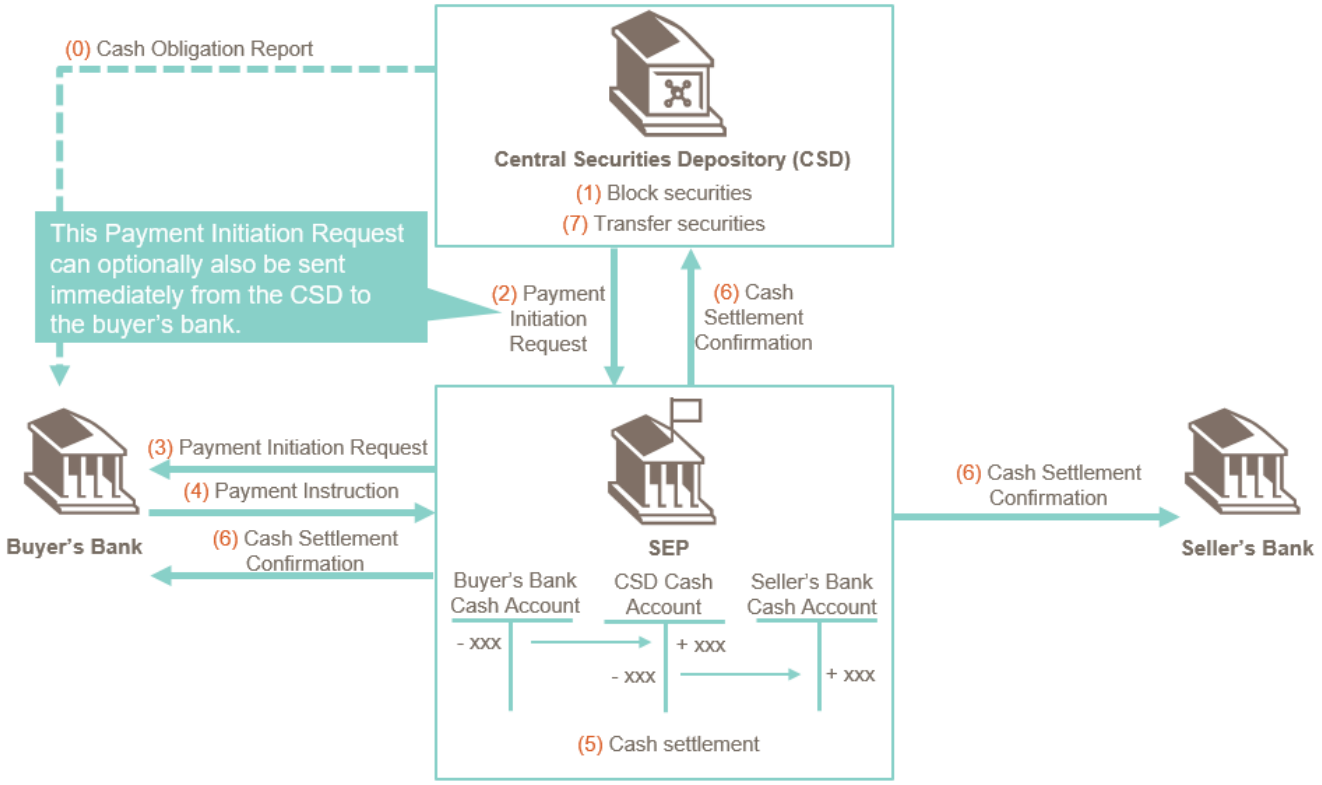

Market	Canada (CDS)
Benefits	• A key benefit (of an operational cash account for the CSD with the SEP) is that it will be easier for settlement banks to reconcile the debit/credit entry of securities-related payments (applicable under BIS DvP model 2 and 3). • Another key benefit of the CSD having an SEP account is that the impacts of the default of a settlement bank can be limited due to the central role of the CSD in the processing chain. • If the CSD would offer services related to asset servicing, its SEP account can also be used for processing corporate actions related payments, which would reduce the risk as the CSD does not have to use a settlement bank. • If settlement banks would have a single SEP account, 1) their liquidity management process would be simplified since they only need to monitor one account actively, and 2) they only have to ensure that sufficient funds is available on the single account.
Challenges	• This model increases the systemic risk as the entire market is dependent on each settlement bank to instruct timely payments for the full amount (without operational or technical errors). • A key disadvantage (of the settlement banks initiating the payment) is that this model goes away from a simultaneous DvP model, which increases the settlement risk. • A challenge is that according to central bank criteria for SEP membership, direct access to the SEP (i.e. opening an operational account for processing payments in the SEP) can be granted only to entities that hold a commercial bank licence. • Having only one SEP account 1) can make the reconciliation process more complex since all cash movements of non securities-related payments and securities-related payments are happening on the same account, and 2) needs more close liquidity monitoring of settlement banks to ensure that cash settlement of securities settlement transactions cannot be disturbed

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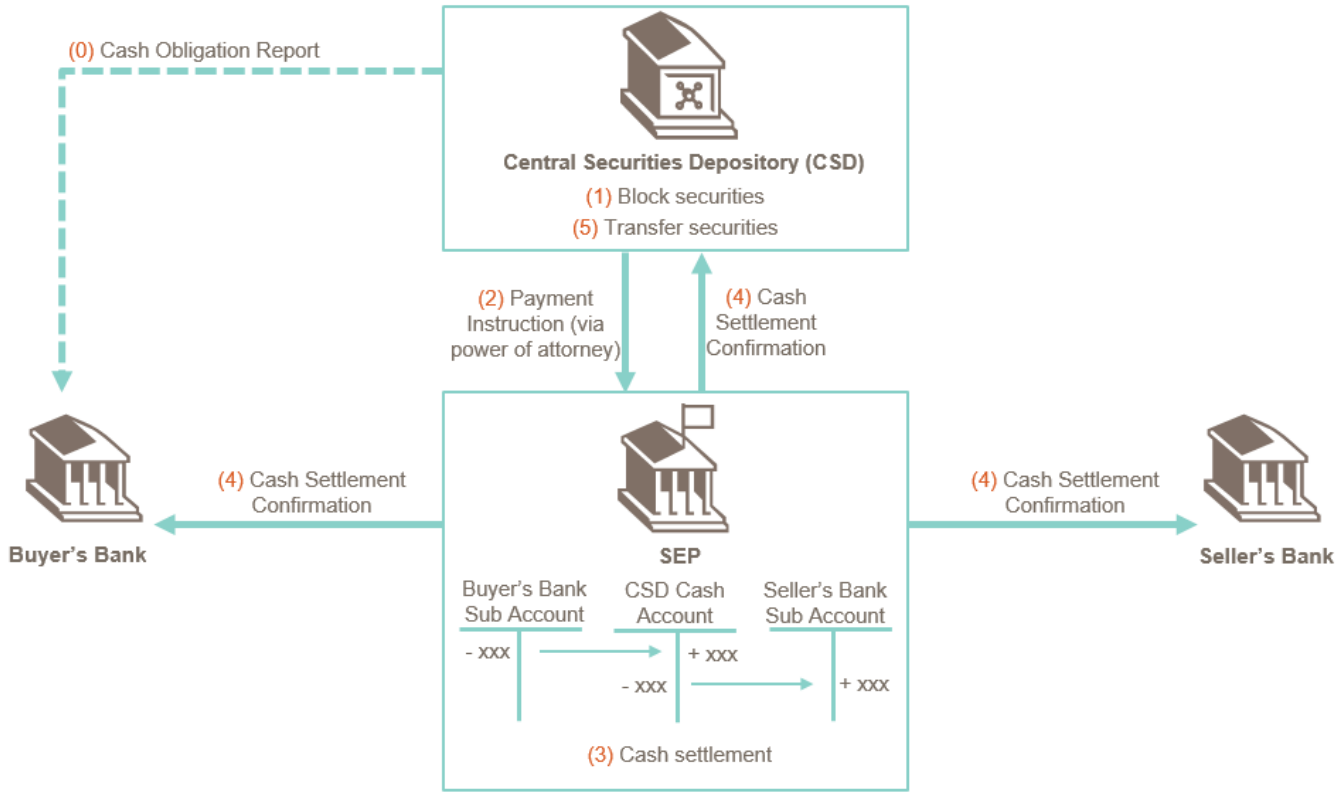
	by an unexpected high value or volumes of non securities-related debit movements on the SEP main account.

3.5. Model 4

The decisions of the four key considerations for model 4 are:

- Interfaced model
- Operational cash account for CSD with the SEP
- Settlement bank's SEP sub-account is used for settlement
- CSD generates the payment instructions on behalf of the settlement banks



Market	The same countries could apply as the ones from model 2 as it is not always clearly whether the settlement bank is debited from the main SEP account or from an SEP sub-account.
Benefits	• A key benefit of granting authorisation to the CSD to initiate payments on behalf of settlement banks is the reduced systemic risk as the entire market is not dependent on each settlement bank to instruct timely payments for the full amount without any errors. • A second key benefit (of the CSD initiating the payment) is that this model is very close to a simultaneous DvP model, even when two different systems are used, which reduces the settlement risk. • The benefit (of the CSD initiating the payment) for SEP participants is that no further action has to be undertaken by them if sufficient funds are available on their SEP account for the cash settlement of the securities transactions.

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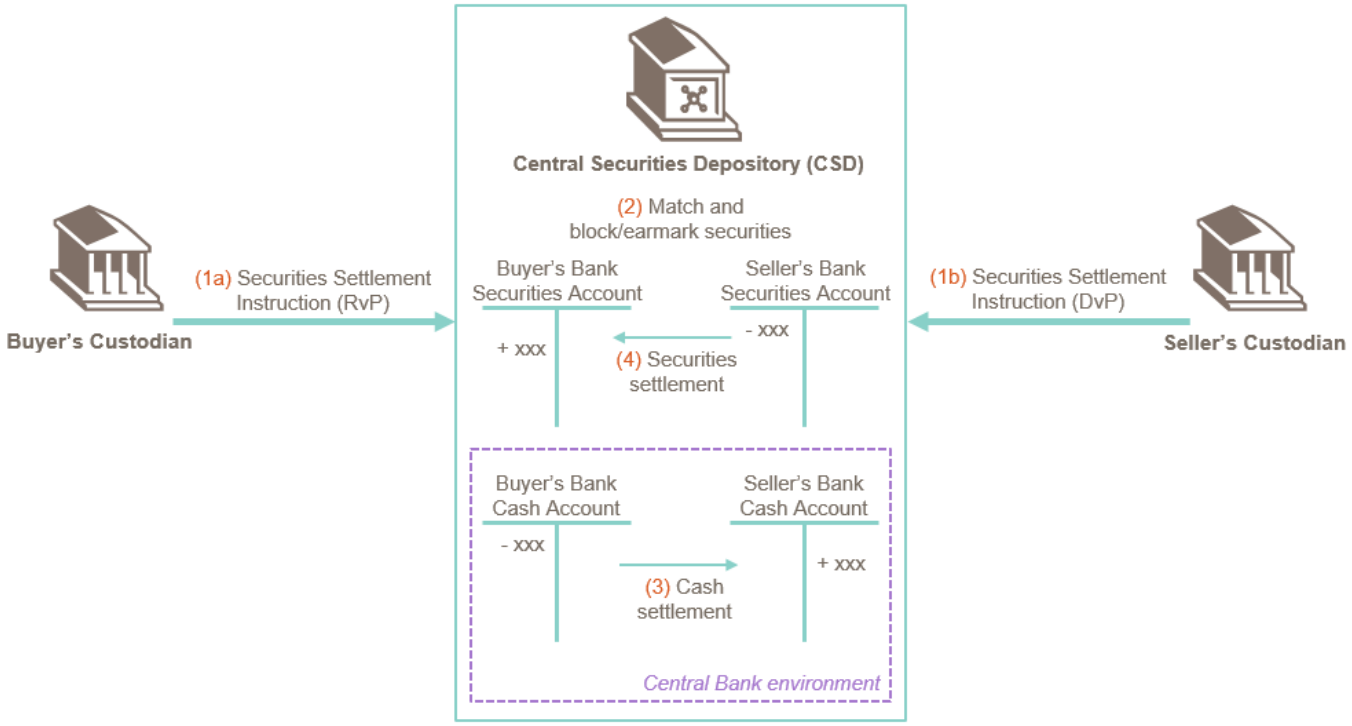
	• A key benefit (of an operational cash account for the CSD with the SEP) is that it will be easier for settlement banks to reconcile the debit/credit entry of securities-related payments (applicable under BIS DvP model 2 and 3). • Another key benefit of the CSD having an SEP account is that the impacts of the default of a settlement bank can be limited due to the central role of the CSD in the processing chain. • If the CSD would offer services related to asset servicing, its SEP account can also be used for processing corporate actions related payments, which would reduce the risk as the CSD does not have to use a settlement bank. • The benefits of having an SEP sub-account for cash-leg of securities settlement transactions is that 1) this SEP sub-account will assist settlement banks with an easier reconciliation process for debit/credit movements resulting from securities settlement transactions 2) cash settlement of securities settlement transactions cannot be disturbed by an unexpected high value or volumes of non securities-related debit movements on the SEP main account
Challenges	• A challenge is that according to central bank criteria for SEP membership, direct access to the SEP (i.e. opening an operational account for processing payments in the SEP) can be granted only to entities that hold a commercial bank licence. • If settlement banks would have multiple SEP accounts, 1) their liquidity management would become more complex since they would be required to monitor all the accounts actively, and 2) the settlement risk would be higher since they have to ensure that sufficient funds is available on the account where it is needed.

3.6. Model 5

Model 5 is an integrated model.



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Market	Europe[7] (T2S), Russia (NSD)

The benefits and challenges were discussed in '2.4. Key consideration 4 – Interfaced versus integrated model'.

3.7. Model 6

Model 6 suggests to join T2S for domestic securities settlement.

Market	Denmark
Benefits	• Create easier gateway for investors from other European markets into local market and from the local market to other European markets • Make cross-border settlement as easy as domestic settlement • Make use of T2S features (e.g. lower need of liquidity due to auto-collateralisation functionality) • Potential to dismantle some EPTF[8] barriers and contribute to an efficient settlement of securities, from a cross-border perspective, in Europe • Explore business opportunities, such as the possibility of simplifying the infrastructure by letting the CSD move up the value chain through the creation of links to other T2S markets
Challenges	• Extend CSD membership criteria to include foreign participants.

[7] Domestic and cross-border settlement for Eurozone countries and Denmark; cross-border settlement for European non-Eurozone countries (Poland, Switzerland, Romania, Hungary)

[8] EPTF (European Post Trade Forum): Informal expert group on post-trading, set up by the European Commission in early 2016 to identify the new barriers and bottlenecks to efficient and resilient cross-border post-trading in the EU, considering the global nature of capital markets.

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4. Recommended model

After analysing the different models that vary based on the four key considerations and studying how these models are applied to different markets, the recommended model for the cash-leg of securities settlement transactions in Ukraine would be model 4 as this brings a significant number of benefits, but is still reasonable in terms of investment.

A first recommendation (and change to the current model) is to authorise the CSD to initiate the securities settlement-related payments. The main benefits are: 1) a more simultaneous and true DvP as there is a minimal delay between the movement of the security and the movement of cash, 2) a decrease in systemic risk as the entire market is not dependent on each settlement bank sending timely payments for the full amount, and 3) the simplification of operational processes for the settlement banks since no further action needs to be undertaken by them if sufficient funds are available on their SEP account.

A second recommendation (and change to the current model) is to create an operational cash account for the CSD with SEP. The main advantages are 1) the impacts of the default of a settlement bank can be limited due to the central role of the CSD in the processing chain since the settlement finality will be always declared by the CSD and the CSD orchestrates the securities and cash movements, 2) an easier reconciliation process for settlement banks when cash settlement occurs on a net basis (only applicable under BIS DvP models 2 and 3), and 3) the potential for the CSD to offer a more risk-free method of services related to asset servicing. The main challenge of this recommendation is that according to the Ukrainian central bank criteria for SEP membership, direct access to SEP (i.e. opening an operational account for processing payments in SEP) can only be granted to entities that hold a commercial bank licence.

A third recommendation (and change to the current model) is to create a SEP sub-account for the cash settlement of securities settlement transactions. The main factors for this recommendation are that 1) this SEP sub-account will assist settlement banks with an easier reconciliation process for debit/credit movements resulting from securities settlement transactions 2) cash settlement of securities settlement transactions cannot be disturbed by an unexpected high value or volumes of non securities-related debit movements on the SEP main account. The creation of a sub-account can be easily complemented with features such automatic end-of-day cash sweep from the sub-account to the main account to ease the settlement banks' liquidity management.

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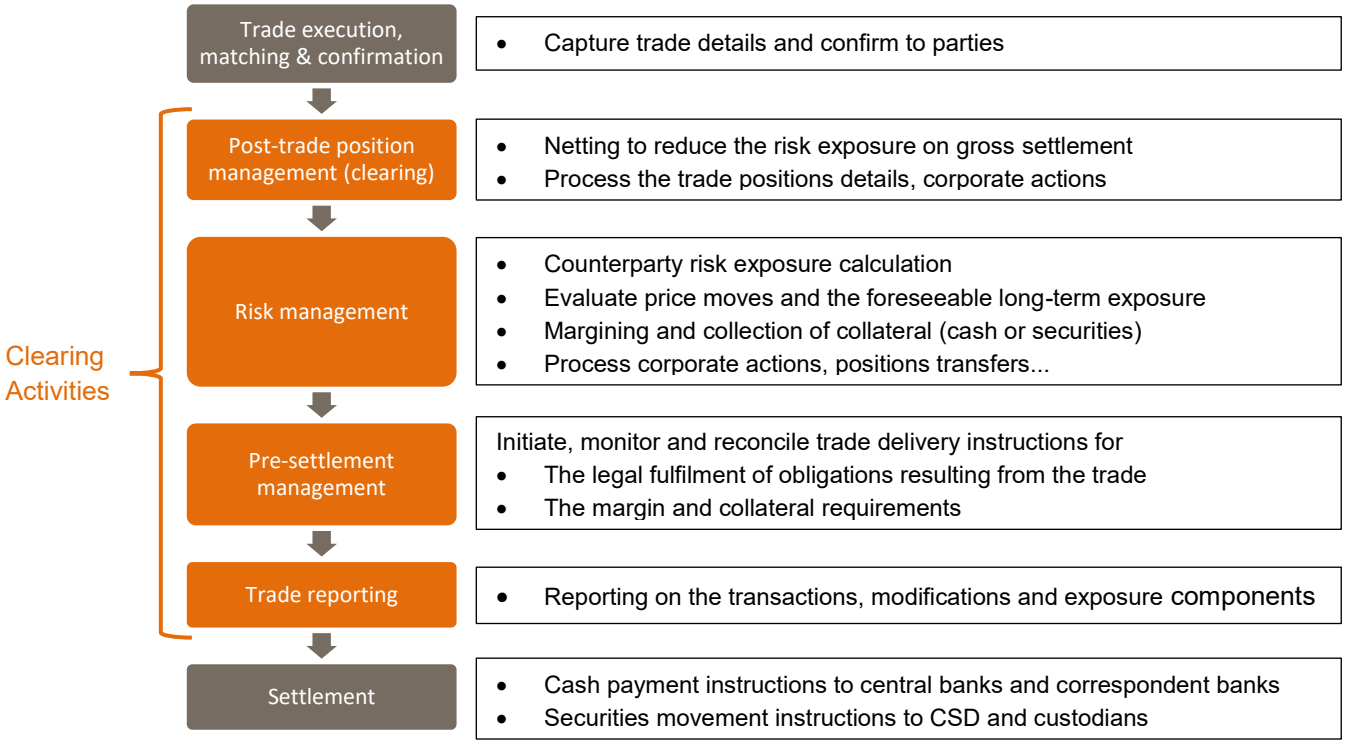
5. Other considerations for cash-leg of securities transactions

5.1. Clearing and the role of a Central Counterparty (CCP)

Clearing is a post-trade and pre-settlement activity and focuses on the management of a trade transaction after the execution and prior to the legal fulfilment of the respective obligation (settlement). Technically, clearing is the process of establishing positions, including the calculation of net obligations, and ensuring that financial instruments and/or cash are available to secure the exposures arising from those positions. Clearing is performed by Central Counterparties (CCPs), which are financial market infrastructures that interpose themselves between two trading parties and thus becoming the buyer to every seller and the seller to every buyer. Clearing via a CCP allows counterparties to trade with each other anonymously without worrying about whether their counterparty will respect the trade. In addition, in the event that a counterparty goes bankrupt, clearing allows the market to continue trading without the bankruptcy impacting or spreading to the rest of the market.

The below shows the securities trade lifecycle (from execution to settlement), with the clearing activities highlighted in orange.



Although CCPs and CSDs are both seen as “post-trade infrastructures”, their roles in the financial ecosystem are different as these clearing activities will be performed by the CCP and the actual settlement will be performed by the CSD (for the securities-leg) and the RTGS (for the cash-leg).

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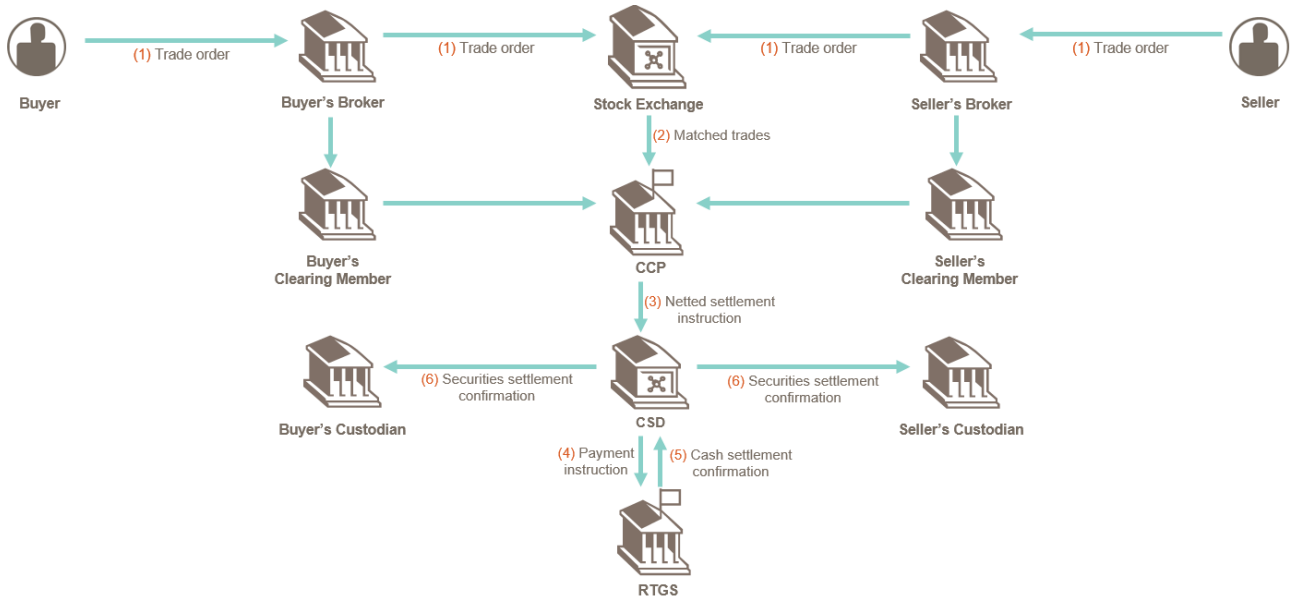
The below shows the typical flow for the cash-leg of a securities settlement transaction that involves a CCP in markets where the CSD has the authorisation to debit and credit the relevant RTGS participants for securities settlement-related payments.



A trend in Europe is that CCPs also become a direct participant of the RTGS (e.g. EuroCCP is a direct participant of T2 (Europe), LCH is a direct participant of CHAPS (UK)). This means that the CCP receives a cash settlement account because the CCP provides a function that is systemically important and the Central Bank considers that the financial stability would be enhanced if the CCP settled in central bank money by becoming a direct participant of the RTGS.

A CCP should be treated like other settling counterparties, because the preferred model is, that the CCP legally steps into a trade relationship and hence should manage both the cash and the securities side like a bank would do i.e. directly with the RTGS for cash settlement and directly with the CSD for securities settlement.

Another advantage of the CCP being a direct participant of the RTGS is that the CCP might also clear other instruments (e.g. derivatives), where a CSD is not involved. For those cases, the CCP shall also communicate directly with the RTGS, if the clearing shall be done in central bank money, which is the preferred model.

EU regulation mandates that a CCP should able to settle at multiple CSDs and CSDs should support settling trades coming from multiple CCPs (i.e. allowing competition). If a CCP is a direct participant of the RTGS, there is no "bias" from the CSD that could distort competition.

What is the financial exposure of a participant when using a CCP?

When deciding to use a CCP, it is important to examine whether the CCP has sufficient capital. A CCP collects a pre-set amount of collateral (also called "initial margin") and default fund contributions from its members, in the form of cash or other liquid assets. This allows the CCP to cover for any members that would fail to meet their clearing obligations.

In addition, institutions in Europe that want to offer CCP services need to comply with a range of standards including capital requirements under EMIR and need to get approval from either the national securities regulator (for entities based in the EU) or ESMA (for entities based outside the EU but wanting to offer CCP services within the EU).

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5.2. Liquidity Management

If the current pre-funded model remains, then settlement banks know when and what amount of funds they have to deposit into their respective accounts. If the model would be converted into a model of deferred settlements (T+2) with automatic transfer of cash from the SEP account of the settlement bank to the SEP account of the CSD, then there is a risk that insufficient funds would be available to meet the minimum reserve requirements of the central bank. To mitigate this risk, a cash obligation report can be sent in advance (of cash settlement) by the CSD to the settlement banks. This cash obligation report informs the settlement banks when and how much the settlement banks will be debited or credited. This allows the settlement banks to gather sufficient capital to settle the DvP transactions and meet the minimum reserve requirements.

When model 5 (i.e. integrated model) would be applied, there is a need for the settlement banks to set up an additional cash account with the CSD. This means that there needs to be a minimum amount of funds (i.e. minimum reserves) also on this cash account. As a result, liquidity needs to be managed between the cash account with the CSD and the cash account at SEP, meaning that settlement banks need to have sufficient funds on both accounts. The funds that is available on the cash account with the CSD cannot be used by settlement banks for other purposes. If model 5 would be selected, it also needs to be discussed whether the funds on the cash account at the CSD counts towards the minimum reserve requirements.

5.3. 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.

DVP model 2 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 Latin America, 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 or having dedicated collateralisation mechanisms in place. 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.

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5.4. Guarantee settlement

In many systems the completion of settlement is guaranteed, either by the system operator (e.g. a central bank) or by one or more third parties (often commercial banks). In systems that provide such a guarantee, a variety of risk controls are imposed by the guarantor to protect it from losses and liquidity pressures and, in cases where the guarantor's solvency might be questioned, to make the guarantee credible to participants. At a minimum, such systems establish membership requirements. Additional credit risk safeguards that may be employed are requirements that credit extensions be collateralised and, less frequently, the creation of collateral pools to cover any residual losses (analogous to replacement costs). Safeguards that directly limit liquidity risk, such as caps on credit extensions and third-party liquidity facilities, are utilised much less often. In several cases, a collateral requirement is the only factor limiting the size of potential credit extensions to participants. The effectiveness of such risk controls is critical; should the controls prove to be inadequate and the guarantor's financial condition become impaired, serious systemic problems would be likely to result.

Some model 3 systems, by contrast, do not guarantee settlement; rather, they would respond to a failed payment by a participant by unwinding (deleting) some or all of the transfers involving that participant and then recalculating the settlement obligations of the other participants. Reliance on this procedure has the potential to create significant systemic risk. The key issue raised is whether the participants can be expected to cope with the potential liquidity pressures that might arise from an unwind. This would depend on the magnitude of the pressures and the liquidity resources available to the other participants. The magnitude of the pressures would depend on the size of the net positions of the participant that fails to settle and on how widely the underlying transfer activity is divided among the other participants. The liquidity resources available to other participants would depend, among other things, on the liquidity of the relevant money and securities lending markets at the time a settlement failure became apparent and on the size and availability of their credit facilities (either from the central bank or from commercial banks).[9]

5.5. Multilateral netting

The CSD debits and credits for each CSD participant arise primarily from securities transfers versus payment, but could also be incurred from corporate action related payments (e.g. dividend payment, interest payment, etc.) for securities credited to the participant's securities account. Upon the completion of the settlement cycle, a final net debit or credit is determined for each CSD participant. Debits reflect a participant's obligation to pay the CSD while credits reflect an obligation for the CSD to pay the participant. Each CSD participant will have to choose a settlement bank with access to the RTGS system to act on its behalf when settling with the CSD.

The CSD can further reduce money transfers by netting participant balances at the settlement bank level, which allows a settling bank to settle for multiple participants via a single RTGS instruction rather than settling each individual participant balance.

5.6. Operating times

The relationship between a CSD and an RTGS to achieve DvP settlement can create system-based interdependencies. This means that the operating hours and days of a CSD should align with the operating hours and days of the relevant payment system or it should have been agreed very clearly what the allowed timeframes for communication between the RTGS and the CSD.

[9] Source: Delivery versus Payment in Securities Settlement Systems (BIS study)

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