

Answers to Exercises of Chapter 4

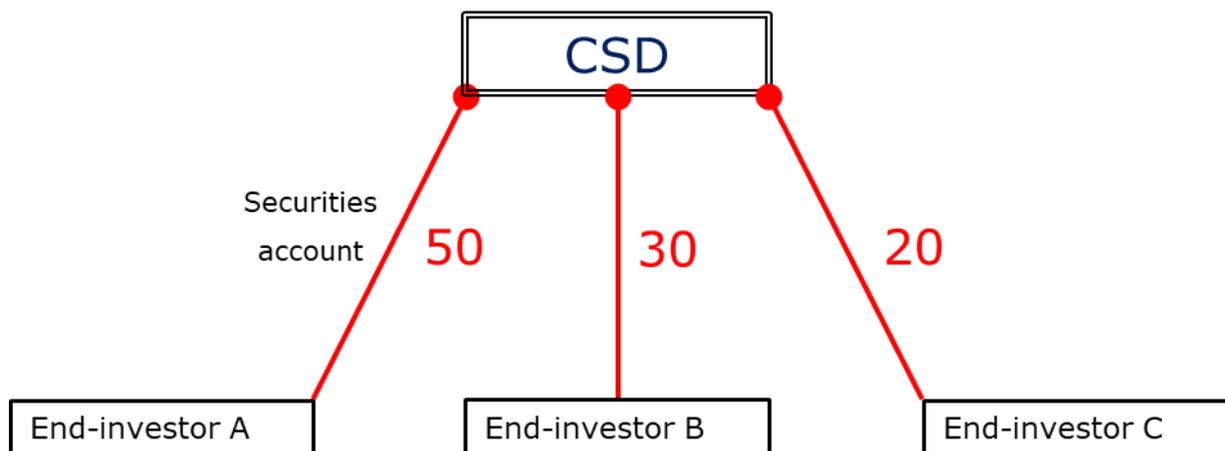
1. Below the five FMI types are given:

<i>FMI</i>	<i>Acronym</i>	<i>Main purpose</i>
<b>P</b> ayment <b>S</b> ystem	PS	settlement one-sided large-value payments
<b>C</b> entral <b>S</b> ecurities <b>D</b> epository	CSD	issuance and custody of securities
<b>S</b> ecurities <b>S</b> ettlement <b>S</b> ystem	SSS	settlement of two-sided securities transactions
<b>C</b> entral <b>C</b> ounter <b>P</b> arty	CCP	clearing of OTC and on-exchange transactions
<b>T</b> rade <b>R</b> epository	TR	Reporting of OTC transactions

Only a (systemically important) Payment System is located on the middle floor; the other types are on the upper floor.

2. An RTGS and SSS eliminate settlement risk exposures (in case of successful settlement of course) but a TR does not alter settlement risk exposures in any way.
3. Multilateral trading facilities (MTFs) only serve the secondary market while exchanges also serve the primary market; they can therefore often operate at lower costs and faster speeds than exchanges. Dark pools are MTFs in which large blocks of securities can be traded without the large impact on price that would follow if the same large orders were traded on a "lit" MTF or exchange.
4. A CSD performs the custody function by safekeeping securities; in the old days those securities were kept in a physical vault, nowadays those securities are in digital form in a kind of warehouse. But a CSD also performs other functions such as taking care of corporate actions, the initial issuance of new securities and operating the SSS.
5. The purpose is to eliminate settlement risk in the sense of principal risk in two-sided securities transactions. This is achieved by ensuring that the principal amounts of both legs are legally never in possession of the same counterparty i.e. final transfer of the securities from the seller to the buyer happens if and only if the final transfer of money from the buyer to the seller takes place. The principal risk is eliminated quickest if both legs are settled in real-time which presumes DvP model 1 (i.e. gross amounts). DvP model 2 and 3 delay settlement in order to aggregate and net the payment side (DvP model 2) or both the payment and delivery side (DvP model 3). This prolongs principal risk in comparison to the real-time settlement case. In addition, if there are fails (not enough liquidity provided or securities delivered) many transactions are affected.
6. DvP model 4 would be to net the securities side but keep the payment side gross. This would be much less efficient in terms of liquidity use without getting any benefits, compared to DvP model 3. That's why model 4 is not even defined in the literature.

7. The Securities Custody “Chain” in case of the direct holding model is pictured below (compare with Figure 4.3 on page 63 for the indirect holding model).



Asset protection is more straightforward in a direct holding model as there are no intermediaries between the end-investors and the CSD, hence there are no (blue) information links. However, as there are millions of accounts, some with many transactions and many with very little transactions, the number of transactions settled is much larger at the CSD level (compared to the tiered structure of Figure 4.3).

8. The main risk is counterparty credit risk: the risk that a counterparty to a trade goes into bankruptcy leaving the creditor with a loss. This is also known as pre-settlement risk. The CCP manages this risk also in extreme but plausible market circumstances.
9. In case the green and light blue securities in Figure 4.5 can be considered as fully fungible, you need to net per clearing member the two positions with the CCP. You should end up with the same configuration as Figure 3.5 where the ACH has been replaced by the CCP. The gross market exposure is equal to  $90+60+30+0 = 180$ . From this you can conclude that novation by the CCP of a single asset type is the same as multilateral netting.
10. The completed Table 4.3 can be found below. Survivors are hit once the margin and default fund contributions of the defaulters are exhausted i.e. a loss exceeding EUR 528 million ( $200+40+240+48$ ). This is the case in scenarios 2 and 3. If the loss exceeds EUR 620 million in scenario 3 the prefunded waterfall is not sufficient to cover the loss (note that the margins posted by survivors *b* and *c* remain untouched), so at 621 million loss the CCP goes into recovery mode (see Figure 4.6 on page 70).

Example Cover 2 CCP

EUR millions	CM <i>a</i>	CM <i>b</i>	CM <i>c</i>	CM <i>d</i>	CCP (total)
<i>Ex ante Waterfall</i>					
Margin	200	160	240	100	700
Default fund	40	32	48	20	140
CCP capital					40
<i>Scenario 1 loss of 320 given default of CM a (140) and CM c (180)</i>					
Margin	60	160	60	100	380
Default fund	40	32	48	20	140
CCP capital					40
<i>Scenario 2 loss of 560 given default of CM a (260) and CM c (300)</i>					
Margin	0	160	0	100	260
Default fund	0	12	0	8	20
CCP capital					40
<i>Scenario 3 loss of 620 given default of CM a (300) and CM c (320)</i>					
Margin	0	160	0	100	260
Default fund	0	0	0	0	0
CCP capital					0

11. The CCP reserves 80% of its capital (i.e. 32 million) as skin-in-the-game which sits in between the default fund defaulters' part and survivors' part (but this is of course quantitatively known when there is a default). At the time of the simultaneous default in scenario 2 the prefunded waterfall is shown in the table below. The skin-in-the-game in this particular case prevents survivors pay so its function is to provide incentives to the management of the CCP to protect the survivors' default fund contributions. With skin-in-the-game, the CCP ends up with 32 million less capital (and the surviving banks retain 32 million) in scenario 2.

12. Although the Lehman default is still the largest default to date in the US history, its posted margin was sufficient in every CCP it was a clearing member.

Example Cover 2 CCP with skin-in-the-game

EUR millions	CM <i>a</i>	CM <i>b</i>	CM <i>c</i>	CM <i>d</i>	CCP (total)
<i>Ex ante Waterfall</i>					
Margin	200	160	240	100	700
Skin-in-the-game					32
Default fund	40	32	48	20	140
CCP capital					8
<i>Scenario 2 loss of 560 given default of CM a (260) and CM c (300) with skin-in-the-game</i>					
Margin	0	160	0	100	260
Default fund defaulters	0	-	0	-	0
Skin-in-the-game	-		-		0
Default fund survivors		32		20	52
CCP capital					8