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EQUITY CLEARING AND SETTLEMENT IN TURKEY

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TEZ DANIŞMANI
Prof. Dr. FERİDE GÖNEL

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İSTANBUL
NİSAN 2018

ABSTRACT

EQUITY CLEARING AND SETTLEMENT IN TURKEY

Anıl Coşkun
April, 2018

This paper examines the role of clearing and settlement system in capital markets and explains how clearing and settlement process works particularly in Turkey. Based on this basic information, this study tries to explain the working mechanism and efficiency of Turkey's experience. Although clearing and settlement processes do not known clearly by end investors, it is very crucial part of financial markets because of its power to decrease risk, increase safety, provide efficiency and stabilize the market. First, we clarify equity clearing and settlement process with daily cycles and examples. In the first part of paper, we start with the main institutions for capital markets and then continue with trading, clearing and settlement processes. In the second part of the study, we explain clearing and settlement in the world by investigating the historical process of post trade institutions, international organizations and standards that are used in the developed countries. Finally, we emphasize on Turkey's effort for efficient mechanism in clearing and settlement system by explaining historical process, services, values, targets and of Takas Istanbul. We aim to detail clearing and settlement process that is not discussed broadly academically before this study and enlighten all stakeholders of the capital market about this process.

Key Words: Clearing, settlement, netting, custody, equity, exchange, real time gross settlement, principles of clearing and settlement, failed settlement, Takas Istanbul, Borsa Istanbul, CSD

ÖZ

TÜRKİYE'DE PAY TAKAS SİSTEMİ
Anıl Coşkun
Nisan, 2018

Bu makale, sermaye piyasalarında netleştirme ve takas sisteminin rolünü ve sistemin nasıl çalıştığını özellikle Türkiye için incelemektedir. Çalışmada, bu temel bilgilere dayanılarak, Türkiye örneğinin çalışma mekanizması ve verimliliği açıklanmaya çalışılmaktadır. Netleştirme ve takas işlemleri yatırımcılar tarafından net bir şekilde bilinmemesine rağmen, riski azaltma, güvenliği arttırma, verimlilik sağlama ve piyasayı istikrarlı hale getirme özellikleri düşünüldüğünde bu işlemler sermaye piyasaları için çok önemlidir. Öncelikle; çalışmanın ilk bölümünde takas süreçleri günlük akışlar ve örneklerle aktarılacaktır. Bu bölümde; sermaye piyasalarındaki temel kurumlar ile başlanacak, sonrasında ise borsa işlemleri, netleştirme ve takas süreçleriyle devam edilecektir. Çalışmamızın ikinci bölümünde, netleştirme ve takas süreçlerinin dünyadaki genel yapısı; takas kurumlarının tarihsel yapısı, uluslararası organizasyonlar ve standartlara değinilerek aktarılacaktır. Çalışmanın son bölümünde ise; netleştirme ve takas sistemlerinin verimli olabilmesi için Türkiye'nin çabaları, hedefleri ve sistemin gelişimi; tarihsel süreç, Takas İstanbul'un servisleri, değerleri ve hedefleri ışığında incelenecektir. Bu çalışmada, daha önce akademik açıdan çok fazla tartışılmayan netleştirme ve takas süreçlerini detaylandırıp tüm sermaye piyasası paydaşlarını bu konuda aydınlatmak hedeflenmiştir.

Anahtar Kelimeler: Takas, saklama, netleştirme, pay, borsa, temerrüt, şartlı virman, takas prensipleri, Takas Istanbul, Borsa İstanbul, Merkezi Kayıt Istanbul

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I would like to thank to my advisor Prof. Feride Gönel for the valuable guidance, advice and support for my study.

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Istanbul; April, 2018 Anıl Coşkun

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ABBREVIATION

AFC : Agent Fund Code
ANNA : Association of National Numbering Agencies
BI : Borsa Istanbul
BIST : Borsa Istanbul
CCP : Central Counterparty
CDB : Common Data Base
CL : Clearing Engine
CM : Collateral Management
CMB : Capital Markets Board of Turkey
CO : Clearing Office
CPSS : Committee on Payment and Settlement Systems
CSD : Central Securities Depositories
CW : Clearing Workstation
DvP : Delivery versus Payment
EACH : European Association of CCP Clearing Houses
EMIR : European Market Infrastructure Regulation
End investor : Client of brokerage house, investor
ESMA : European Securities and Markets Authority
EU : European Union
Equity : Value of a company that divided into equal parts
Eqt : Equity
FaK Order : Fill and Kill Order
FEAS : Federation of European and Asian Stock Exchanges
FIX : Financial Information Exchange
FMI : Financial market infrastructures
FoP : Free of Payment
G-30 : Group of Thirty
GCM : General Clearing Member
ICMA : International Capital Market Association
IIF : International Finance Institution

IOSCO : International Organization of Securities Commissions

IPO : Initial Public Offering

ISIN : International Securities Identifying Number

ISSA : International Securities Services Association

JASDEC : Japan Securities Depository Center

KSD : Korean Securities Depository

Non – CCP : Not central counterparty

OIC : Organization of Islamic Conference

PD : Product Design

PFMI : Principles for financial market infrastructures

Post Trade : Processes which start after the order is matched

PS : Price Server

RM : Risk Management. Calculates margin and stress testing

RTGS : Real Time Gross Settlement

SE : Settlement Engine

TB : Takasbank / Takas Istanbul

TL : Turkish Lira

TW : Trading Workstation

1. INTRODUCTION

The capital market has developed very rapidly all over the world since the second half of the 20th century. Capital markets became the main source of funding for emerging economies and took an important place for the industrialization process of many countries. Capital markets can also increase the economic performances of developed countries. In spite of the advantages, the capital outflow of these resources may cause economic crises in countries, which have distorted macroeconomic indicators. Globalization process also increased financial integration. The transaction volume of international securities has increased with globalization. Importance of clearing and settlement services has also increased with the investors' interest in these markets. Clearing and settlement services also reached from national level to international level.

Securities transactions realized in stock exchanges are finalized within clearing, settlement and depository institutions. Effective, reliable and rapid clearing, settlement and depository services increase the trading volume and ensure liquidity in stock markets. Therefore, these institutions are very crucial for the capital markets. The clearing and settlement process takes place in a number of sequential steps starting with the trading on the stock exchange and ending with a changing the money and security between buyers and sellers. Clearing starts with the matching orders at stock exchange and it ends when the securities are ready for settlement. Settlements refers to the fulfillment the obligations of the buy and sell transactions by clearing members and transfer of securities and cash to the related accounts. As a result of this transaction, the financial instrument and cash are exchanged between the transaction parties.

Despite the fact that there are many studies about the equity market process in Turkey, there are much fewer studies about post trade process and post trade institutions such as clearing houses. Investors (End users / clients) are not well informed on about the post trade as they have an important knowledge about the stock exchange. The purpose of this study is to draw attention to the rules of equity clearing and settlement system and the importance of equity clearing and settlement

in the capital markets by systematically explaining the structure and historical development of Turkey and the rest of the world.

This study includes three chapters. In the first chapter, we try to analyze equity clearing and settlement system in Turkey. Firstly, we investigate equity clearing and settlement principles and general structure of capital market related with equity clearing and settlement. Then, we continue with account and instrument structure. In the next part of this chapter, we summarize basic trading terms and trading protocols. Most importantly, in this chapter, we explain the process of clearing and settlement starts with the trading in the trade day (t) and ends with the transfer of equity and cash in the settlement day (t+2). Finally, we explain failed settlement and real time gross settlement processes.

The second chapter starts with the historical process of post trade institutions in the world. We try to explain historical and current structure of exchanges, clearing houses and depositories. In the second part of this chapter, we present international institutions and organizations about clearing and settlement. Moreover, in this chapter we investigate international standards of clearing and settlement system.

The third chapter emphasis on impact of Takas Istanbul on Turkish financial system. First, we investigate the services of Takas Istanbul and then its legal basis and international memberships. In the third part of chapter, we examine the historical process of post trade institutions in Turkey. We try to explain historical and current structure of clearing house, exchange and depository in Turkey. In the last part of this chapter, we analyze the values and targets of Takas Istanbul by particularly interesting on the targets of being a central counterparty in equity market.

2. EQUITY CLEARING and SETTLEMENT – CASE of TAKAS ISTANBUL

In this chapter, we try to explain equity clearing and settlement system by analyzing Takas Istanbul case. First, we start with main processes and institutions in the capital market related to the equity and settlement system to provide basic information about capital market to understand more complicated parts. Then, we continue with principles of equity clearing and settlement, general structure of equity clearing and settlement system, account and instrument structure, instrument structure, basic trading terms and concepts in equity market, trading process, clearing process, settlement process, failed settlement and lastly with real time gross settlement.

2.1. Main Processes and Institutions

This part presents main terms, processes and institutions related with equity clearing and settlement system.

2.1.1. Issuing

Capital markets provide opportunities to companies that want to increase their funds. Companies that need cash and end investors which have fund come together by the help of the capital market. Company can sell its shares to the investors and it can finance itself. This is called equity capital and company shares its risk with the investors. Equities can be simply defined as the value of a company that divided into equal parts. Equities give partly ownership to investors. An investor that buys companies' equities becomes an owner of that company with the ratio of its equities and investor becomes shareholder. Investors' rights are participation to the general shareholder meeting, vote, dividend rights and subscription rights. By the way, in this part we can explain who the investor is. An investor is a person that invests capital and tries to gain profit. Investors who buy and sell equity think that it is more profitable from investing his/her money in alternative channels. Investors can be individual investors or it can also be institutional investors such as funds.

Investors operate in capital markets by being a client of investment firms which are brokerage houses. Activities of brokerage house are transferring investors' orders to stock exchange, reflecting transaction results, cash and equity obligations to its customers, provide monitoring services for customer account, investment advisory, clearing and settlement services on behalf of its clients.

Issuing equity is releasing and selling the equity to the investors in a first time. A brokerage house coordinates the public offer process for the company. Capital Markets can be divided into the two parts which are primary market and secondary market. The equities that are issued are sold to the public firstly and issued through public offering in the primary market. In the secondary market, the equities that are already issued are traded between investors. In Turkey; both the primary and secondary market transactions are executed in Borsa Istanbul via public offering.

2.1.2. Registration and Depositing

Before equity is traded, it should also be registered and deposited. Depositing equity is to provide safekeeping of security. In Turkey, Merkezi Kayit Istanbul is central securities depository of Turkey (CSD of Turkey).

CSD is one of the most important institutions in the capital markets like clearing and settlement institutions. Central Securities Depository institution maintains a "Security Settlement System", issuing equity service, registration, depository service of equities at account level and monitoring owners' rights

Registration of equity is dematerializing securities by creating and forming it to book entry system. Dematerialization is elimination of physical securities and digitalizing these securities on account base. In Turkey, dematerialization of all securities is finished in 28.11.2005 (History of Central Securities Depositories in Turkey, [16.01.2016]) Registration process starts with the request of issuer. In Turkey, full dematerialization model on a rights owner basis is applied by Merkezi Kayit Istanbul.

The International Securities Identification Number (ISIN Code) should be given to all issued equities in registration process. ISIN Code provides universal uniqueness to the equity in trading, clearing and settlement process. The ISIN code includes 12 alphanumerical characteristic, which starts with the country code. The other characters are the local number of that equity, with a final check digit for controlling

the ISIN code. In Turkey ISIN Codes start with “TR”. Takas Istanbul is the national numbering agency of Turkey and it creates ISIN codes for all securities such as equities, certificates, derivatives, bonds, option contracts, indices, funds, private sector debt instruments, commodities, e-warehouse receipt by using international standards.

2.1.3. Trading

Issued equities are traded in secondary market. Equity trading is matching selling orders and buying orders in the organized and regulated trading platform which is stock exchange. Stock exchange provides a platform for brokerage houses on behalf of investors to sell and buy equities from market. It operates and organizes trading activities and it has to provide safety and efficiency of these activities.

Investors do not have direct access to the exchange. They have to use brokerage houses to send orders to stock exchange. An investor who wants to use this market, it should sign an agreement with brokerage house and being client of that brokerage house. The orders are sent to stock exchange by brokerage house with the investors’ client account number and other related information. Brokerage houses (Clearing members of Takas Istanbul) take orders from investors (clients of brokerage houses) via written document, telephone, fax or internet. In today’s world most of the orders are taken via internet applications. Orders are controlled by brokerage houses. The basic controls are whether investor has equity in his/her account which he/she wants to sell and sufficient amount of cash to fulfill his/ her buy order of equity. In some cases, investors can buy or sell securities when he/ she does not have sufficient amount of cash or related security within limits. The regulation institutions determine the rules and limits of these cases and it is written in the agreement between investors and brokerage houses. After the control of brokerage houses, order is sent to stock exchange. Orders are controlled by exchange and matched (executed) orders’ confirmation information is sent to brokerage house in an electronic environment. Brokerage house also informs investors about orders’ situation.

2.1.4. Clearing and Settlement

After orders are executed, generating and legally formalizing of obligations process starts. Matched orders’ information is sent to clearing house for post trade operations. Clearing house is an institution that clears transaction which is executed

in stock exchange and it calculates obligations of these transactions. It has also an important role in settlement process. In the clearing process, the buyer's cash obligation and seller's equity obligation is defined. Moreover, availability of cash and equity amount is controlled for each parties. Clearing houses also use some precautions and executes some rules for decreasing risks. Some clearing houses are also a central counterparty which is an institution that becomes buyer to seller and seller to buyer for clearing and settlement process.

In Turkey, Takas Istanbul is clearing house in Debt Securities Market, Derivatives Market, Electricity Market, Precious Metals and Diamond Market and Equity Market. Takas Istanbul gets trade information from Borsa Istanbul by using their mutual trading and clearing system and it calculates obligations of brokerage houses.

After clearing, settlement process which finalized the transfer of equity to buyer and cash to seller starts. More clearly, settlement is the process of transferring security from seller of equity to buyer of equity and transferring cash from buyer of equity to seller of equity in simultaneously. Settlement is executed in Takas Istanbul and Merkezi Kayit Istanbul with cooperation.

2.2. Principles of Equity Clearing and Settlement

Clearing and settlement process needs some principles for applying rules, decreasing risks and increasing efficiency in capital market. Netting, delivery versus payment (DvP), book-entry settlement, central settlement and same day value transactions are the main principles of equity and settlement. These principles are used in developed countries and in Turkey also.

2.2.1. Netting

> "Netting means the determination of net payment or delivery obligations among the clearing members of a clearing corporation by setting off or adjustment of the inter se obligations or claims arising out of buying and selling of securities, discontinuation of business, dissolution, winding-up or insolvency or such other circumstances as may be specified in the bye-laws of the clearing corporation" (Bye Laws. [26.04.2016]).

Netting is the one of the main principles of equity clearing and settlement system. All trades executed in Borsa Istanbul are netted in the real time by Takas Istanbul per intended settlement date, clearing member (brokerage house), equity and end investor account level based on equity and total cash. When a clearing member buys and sells same equity in a same day, total sell quantity is subtracted

from total buy quantity. If the result is negative, member is debtor to Takas Istanbul from that equity and vice versa if the result is positive, member is creditor from Takas Istanbul from that equity. In a similar way, buy amount and sell amount is netted and then all equities' net amount of cash is summed. If the result is negative, member is debtor to Takas Istanbul from cash and vice versa if the result is positive, member is creditor to Takas Istanbul from cash. Daily netting is performed. In other words, liability and receivable transitions between days are not possible. For example; if the clearing member is debtor today and it is creditor tomorrow, the debt and credit are not netted and member should consider its obligations separately on a daily basis.

Netting process can be observed better from the example in Table 1. Table 1 shows all trades, prices of equities (assume buy and sell prices are the same for same equity), amount, quantity and netting results of member A in a same day.

Table 1:Netting Example of Clearing Member A

EQUITY	PRICE	BUY QUANTITY	BUY AMOUNT	SELL QUANTITY	SELL AMOUNT	NET QUANTITY (DEBT / CREDIT)	AMOUNT (CASH DEBT/ CREDIT)
SAHOL	10	200	2000	100	1000	100	-1000
GARAN	8	50	400	50	400	0	0
ADANA	5	100	500	200	1000	-100	500
AKBNK	9	50	450	30	270	20	-180
CASH							-680

Author's own calculation

According to the Table 1; member A buys 200 SAHOL and sells 100 SAHOL with the price 10 TL. Buy amount is 2000 TL and sell amount is 1000 TL. Buy quantity is more than sell quantity. Therefore; member A is creditor in SAHOL with the netting process. Member A also buys 50 GARAN and sells 50 GARAN. It has no liability

and receivable from this equity by the help of netting. In the cash side; buy amount of SAHOL is 2000 TL (10TL * 200) and sell amount is 1000 TL. (10 TL * 100) Net amount for this security (SAHOL) is -1000. Net amounts of other securities are 0 for GARAN (if buy and sell price were different, net amount of cash could be different than 0 and member A could have cash obligation for GARAN), 500 TL for ADANA, -180 TL for AKBNK. Sum of all net amounts of securities is – 680(-1000+0+500-180=-680). This shows that member A is debtor to Takas Istanbul in cash. As a result; in settlement day (t+2) member A has to pay 680 TL to Takas Istanbul and in equity side, member A has an obligation of 100 ADANA and it has receivables of 100 SAHOL and 20 AKBNK. There is no obligation or receivable of GARAN because sell and buy quantity is same for this equity.

Table 2 shows the daily average trading and netting volumes in the Borsa Istanbul Equity Market. Netting effect can be observed clearly in the Table 2.

Table 2:Daily Average Trading and Netting Volumes in Borsa Istanbul in 2015 (Million TL)

MONTHS	STOCK EXCHANGE TRADING VOLUME	NET SETTLED CASH	NET SETTLED EQUITIES
January	4.560	285	975
February	4.666	293	931
March	4.735	353	984
April	4.159	277	830
May	4.498	308	906
June	4.043	270	782
July	3.458	259	728
August	3.258	276	698
September	2.862	233	635
October	4.266	304	838
November	4.445	328	912
December	3.916	305	700

Takasbank 2015 Annual Report, 2016, 49

Gross settlement is the exception for the netting principle. Gross settlement means calculating obligation and receivables of equities and cash among clearing members by not using netting method. In gross settlement method, Takas Istanbul does not net off clearing members' equity and cash transactions. In this case; receivables are distributed after end of the due time for settlement fulfillment obligation period (t+2 16:45). Investors that intend to buy equities subject to gross settlement must keep the corresponding amount of cash and investors that intend to sell equities subject to gross settlement must keep the corresponding quantity of equities in their accounts.

Capital Markets Board of Turkey (CMB), Borsa Istanbul or market maker can decide that equities, clearing members or investors can be subject to gross settlement (Directive on Principles Regarding Clearing and Central Counterparty Services, 2013, 13). Abnormal price changes, suspicion of manipulative transactions can be the reason of gross settlement decision. Moreover, equities that have low trading volume can be subject to gross settlement because manipulative transactions can be practiced easily in these equities. Equity which is decided to adopt gross settlement application must declare to Takas bank. This equity is defined to the system; also member and investor information can be defined for gross settlement.

Gross Settlement process can be observed better from the example in the Table 3. Table 3 shows all trades, prices of equities (assume buy and sell prices are the same for same securities), amount and quantity.

Table 3:Gross Settlement Example

EQUITY	PRICE	BUY QUANTITY (CREDIT)	BUY AMOUNT (CASH DEBT)	SELL QUANTITY (DEBT)	SELL AMOUNT (CASH CREDIT)
FENER	25	100	2500	200	5000
AEFES	5	200	1000	75	375
ZOREN	10	50	500	200	2000
ACSEL	8	150	1200	30	240
CASH			5200		5115

Author's own calculation

According to table 3; member A buys 100 FENER and sells 200 FENER with the price 25 TL. Buy amount is 2500 TL and sell amount is 5000 TL. According to gross settlement process; member A is creditor and debtor in FENER at the same time. In the cash side, member A is also creditor and debtor at the same time.

2.2.2. Other Principles of Equity Clearing and Settlement

Delivery versus payment (DvP), book-entry settlement, central settlement and same day value transactions are the other main principles of equity and settlement. Delivery versus payment (DvP) is a securities settlement process that links securities and cash transfer to guaranty that delivery occurs if the related payment occurs. Unless member covers their debts, it cannot get their receivables. In case of partial coverage of debt, the payment is made in the ratio of covered debt.

According to report prepared by the committee on payment and settlement systems of the central banks of the group of ten countries, principal risk is the most likely risk in the settlement day and this risk can be restricted with the usage of delivery versus payment principle (Delivery Versus Payment in Securities Settlement Systems, [23.03.2016]).

Delivery versus payment can be observed better from the basic example in the Table 4. Table 4 shows all trades, price of equity, amount and quantity (assume that there are only 3 members and 1 security in exchange). According to table; member A sells 100, member B buys 60 and member C buys 40 SAHOL with the price 10 TL. Therefore; in the equity side, member A is debtor, member B and member C are creditor in SAHOL. In the cash side; member A is creditor, member B and member C are debtor. Assume that in the settlement day (t+2), member A fulfills its all equity obligation (100 SAHOL) to Takas Istanbul. Member B fulfills its all cash obligation (600 TL) to Takas Istanbul. Member C fulfills only half of its cash obligation (200TL) to Takas Istanbul. In that case; member B receives 60 SAHOL, member C can receive only half of its buy quantity (20) of SAHOL because of the delivery versus payment (DvP) principle. Member A gets 1000 TL. (200 TL of 1000 TL from the cash that Takas Istanbul get from member C, 600 TL of 1000 TL from the cash that Takas Istanbul get from member B and TL of 200 TL from the cash that Takas Istanbul provides with its own source) In this example, member C is failed for settlement. Failed settlement process is explained in detail in the next sections.

Table 4:Delivery versus payment (DvP) example

MEMBER	EQUITY	PRICE	BUY QUANTITY	BUY AMOUNT	SELL QUANTITY	SELL AMOUNT	NET QUANTITY (DEBT/CREDIT)	NET AMOUNT (CASH DEBT/CREDIT)
A	SAHOL	10	0	0	100	1000	-100	1000
B	SAHOL	10	60	600	0	0	60	-600
C	SAHOL	10	40	400	0	0	40	-400

Author's own calculation

The next clearing and settlement principle is book-entry settlement. It is a settlement process that securities and cash are transferred in electronically not physically. Dematerialization is elimination of physical securities and digitalizing these securities on account base. In Turkey, dematerialization of all securities is finished in 28.11.2005.

Central Settlement is the other equity clearing and settlement principle that except the ones considered as out of scope by the Board of Directors of the Stock Exchange, it is compulsory that the settlement of all stock exchange transactions takes place at the settlement center. Settlement center in Turkey is Takasbank.

The last clearing and settlement principle is "same day value transaction". It means that in principle, members covering their settlement debts on the settlement day get their settlement receivables on the same day. This principle is applied in case of no failed settlement is occurred in settlement day. This process will be explained in Failed Settlement title.

2.3. General Structure of Equity Clearing and Settlement System

Equity clearing and settlement system includes number of products and institutional integration between Borsa Istanbul, Takas Istanbul and Merkezi Kayit Istanbul. Figure 1 shows the relationship between these products and institutions. Corporate actions, external prices integration, technical links, collateral and risk management are out of scope and these subjects are not detailed in our study because of the fact

that these subjects require another proficiency to explain in detail. Moreover, we want to focus on clearing and settlement process in detail.

The main components in the post trade system are Clearing System and Settlement System. Clearing System and Settlement System are connected services. Clearing System is the service that gets trades from Trading System and it nets off these trades. Trades update settlement positions that form the base for creating settlement instructions. It generates settlement instructions and sends to Settlement System. It reports the result when the settlement has occurred. The affected settlement position is then reduced with the result of the settlement. Clearing System establishes connection with risk management, collateral management and price system. Clearing System also connects with Clearing Workstation (CW) interface that clearing members monitor clearing and settlement, and executes Real Time Gross Settlement (RTGS). One of the main internal modules of Clearing System is Common Data Base (CDB). CDB keeps the maintain reference data. These data is integrated with Trading System and Settlement System. Product Design (PD) is the user interface for CDB.

Settlement System keeps settlement pool accounts and executes settlement process. It communicates with Takas Istanbul Banking System for cash movements and Merkezi Kayit Istanbul for security movements.

Real Time Gross Settlement (RTGS) is another important functionality for this system. RTGS is a process of transferring cash and securities simultaneously without any counterparty risk between different clearing members' investor accounts. In addition to normal settlement, Takas Istanbul supports real-time gross settlement (RTGS) of bilateral settlement instructions on DVP basis. RTGS Instructions are entered through the CW. The Settlement System manages and matches such instructions and executes the settlements on a RTGS DvP basis by sending these for external settlement in Merkezi Kayit Istanbul and Takas Istanbul Banking respectively.

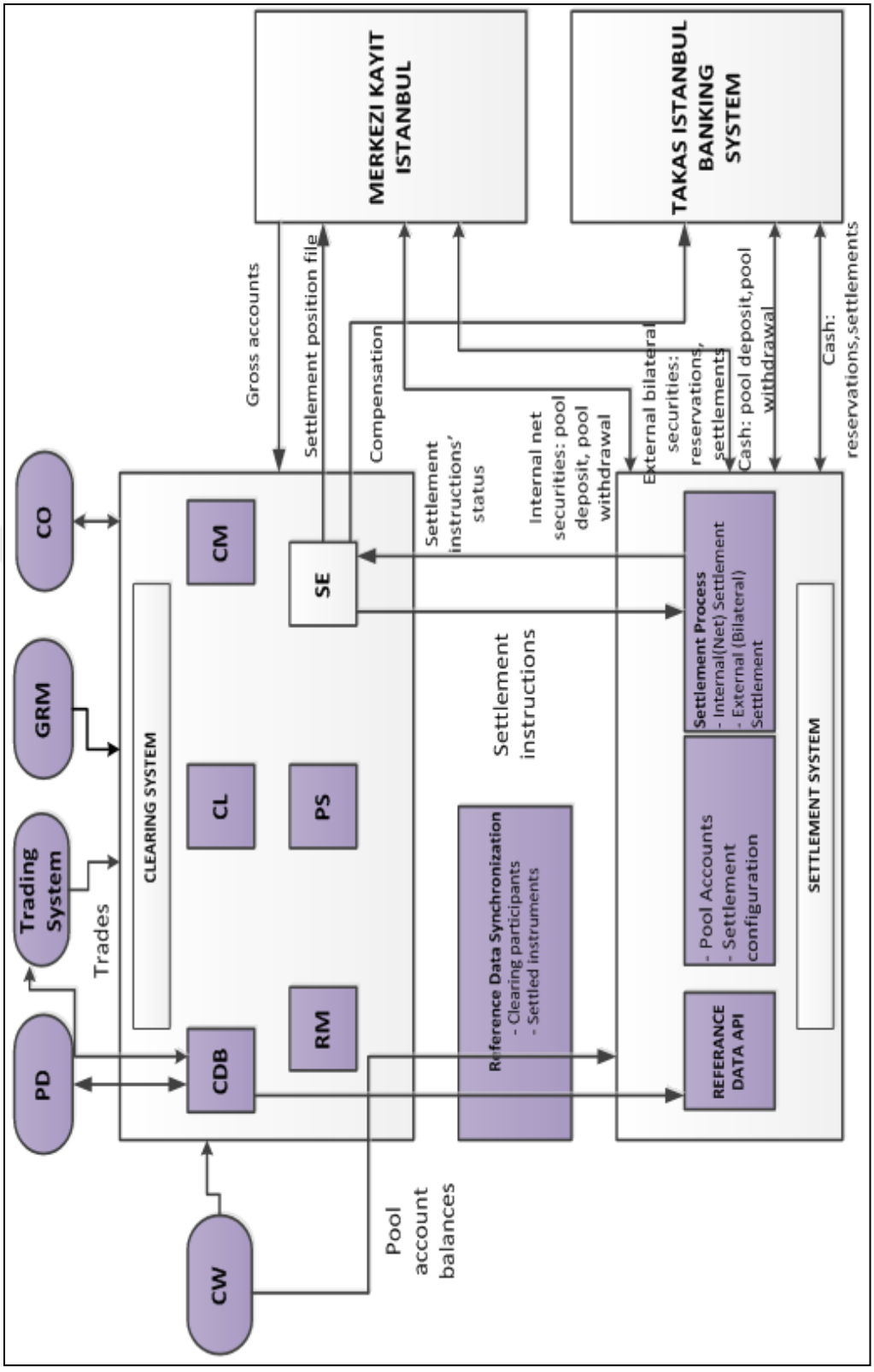

Figure 1: General Structure of Equity Clearing and Settlement System

In summary; Clearing System and Settlement System which are executed by Takas Istanbul are the main components of post trade system. Genium INET Risk Management (GRM), Clearing Office (CO), Clearing Workstation (CW) which are executed by Takas Istanbul and Product Design which is executed by Takas Istanbul and Borsa Istanbul are the front ends. Common Data Base (CDB), Clearing Engine (CL), Settlement Engine (SE), Price Server (PS), Risk Management (RM) and Collateral Management (CM) are the main internal modules of Clearing System. Takas Istanbul Banking System and Merkezi Kayıt Istanbul are the external systems that have connections to Clearing System and Settlement System.

Figure 2 displays the summary of the main flows between the main components during a normal settlement day in the equity market. Clearing starts after trades are matched in Trading System. Trading System transfers trades to Clearing System in the real time. Trades are cleared in Clearing System in trade day (t) and one day after trade day (t+1) day. Settlement institutions are occurred from these cleared trades and transferred to Settlement System in t+1 and also in settlement date (t+2). Settlement System executes settlement by communicating with Merkezi Kayit Istanbul and Takas Istanbul Banking in settlement day. Merkezi Kayit Istanbul and Takas Istanbul Banking shares pool account holdings with Settlement System in this settlement process. At the end of settlement day, failed instructions' information that settlement obligations are not fulfilled by brokerage houses is sent to Clearing System and settlement positions are updated according to this information. The work flow shown in Figure 2 will be detailed in next chapters.

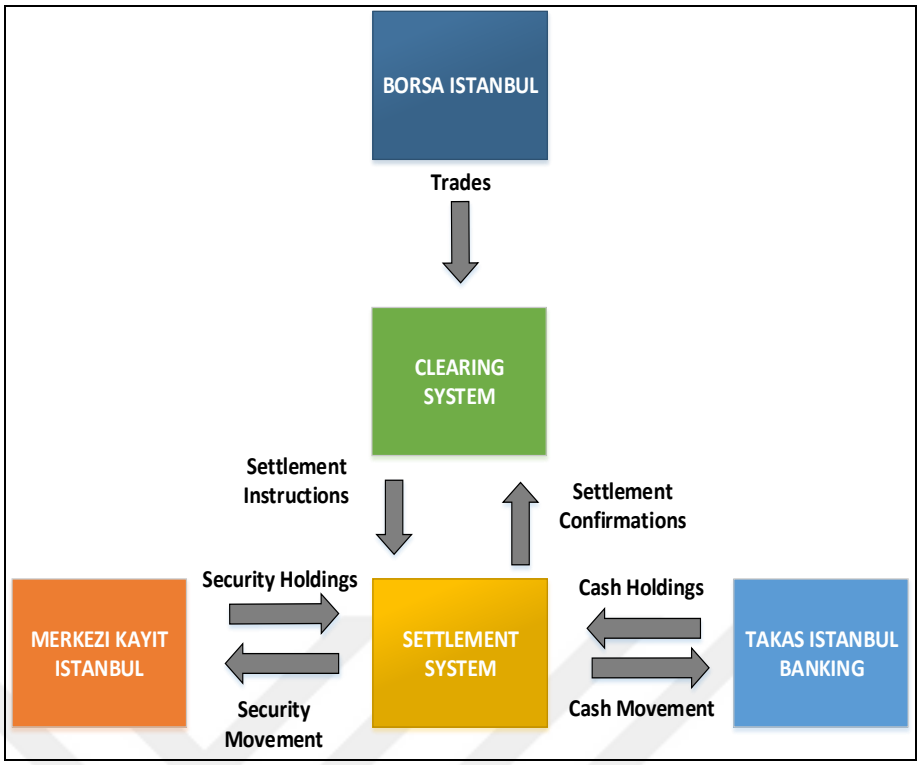

Figure 2: Main Flows between the Main Components

Author's own design

2.4. Account and Instrument Structure

Account structure is very important for trading, clearing and settlement process. Before explaining these processes in a detail, we try to explain account structure of clearing members (brokerage houses), settlement accounts in Takas Istanbul Banking system, settlement accounts in Merkezi Kayit Istanbul and the mirror accounts of these accounts in Settlement System which is executed by Takas Istanbul.

2.4.1. Account Structure of Clearing Members

There are four main types of clearing member accounts:

1- Trading account
2- Settlement position account
3- Margin calculation account
4- Settlement pool account

We can observe these accounts and their connections from Figure 3.

2.4.1.1. Trading Accounts

Brokerage houses use trading accounts for connection to Trading System. These accounts are used for sending buy or sell orders to Borsa Istanbul. Different types of trade accounts are defined in the system because of the separation of the source of trade. By the help of this separation member can follow its trades more easily and separate their own portfolio, aggregate end investor, market maker, fund and bank transactions. Moreover, clearing member can observe trade commission separately with these different accounts. Trades are kept in these accounts based on house, client, market maker, fund/bank segregation. Brokerage house can make transactions for their own account to make profit. In these transactions, house trading account is used. Brokerage house sends order to Borsa Istanbul with the information of house trading account. Brokerage house generally sends orders to stock exchange on behalf of their customers (client / end investor) because of the fact that individual investors don't have direct access to stock exchange. In these orders, client trading account is used and also investor's own client account number is sent to Borsa Istanbul. Default account is used if the system cannot find true trading account. In practice, system finds true account and default account is not used. Funds and banks also don't have direct access to stock exchange. In these type orders, fund/bank trading account is used. In some cases, brokerage house can be a market maker for some equities. In these orders market maker trading account is used.

The account name consists exchange code, clearing member code and account information.

Example of trading accounts for clearing member ABC:

House Trading Account: BI ABC P

Client Trading Account: BI ABC M

Default Account: BI ABC DA

Fund/Bank Trading Account: BI ABC FND

Market Maker Trading Account: BI ABC MM

Abbreviation of accounts:

BI: Borsa Istanbul,

P:Portfoy (Portfoy means portfolio/house in Turkish),

M:Musteri (Musteri means client/investor in Turkish),

FND: Fund code of Member ABC,

9999: Takasbank Banking Code of Member ABC

2.4.1.2. Settlement Position Accounts

Positions which occur from trades are kept in settlement position accounts. There is an also client and house segregation in these settlement position accounts. Trade positions of house and market maker transactions are kept in house settlement position account and trade positions of client and fund/bank transactions are kept in client settlement pool account. This segregation is important because of following positions of client and house separately. Moreover, member can observe settlement commission separately with these different accounts.

Most importantly, matched trades are netted and settlement positions are occurred according to netted trades. Thus, netted trades' information is kept in these settlement position accounts separately house and aggregate client basis.

Settlement position accounts for clearing member ABC:

(TAKAS means settlement in Turkish)

House Settlement Position Account: BI ABC TAKAS-P

Client Settlement Position Account: BI ABC TAKAS-M

2.4.1.3. Margin and Collateral Accounts and Central Counterparty Service

There is a separate margin and collateral accounts for CCP and Non-CCP instruments. Before starting to explain these account types, we want to clarify Central Counterpart Service of Takas Istanbul.

A Central Counterparty (CCP) is an organization that that provides the clearing and settlement process by interposing between seller and buyer and guarantying the occurrence of cash and equity transactions between clearing members. (Ripatti, 2004)

According to Takas Istanbul Incorporation Central Clearing and Settlement Regulation; Takas Istanbul gives a commitment legally to complete the clearing and

settlement process for trades are occurred in Borsa Istanbul by providing collateral, guarantee fund and Takas Istanbul's capital (Istanbul Settlement and Custody Bank Incorporation Central Clearing and Settlement Regulation, [28.04.2016]).

Takas Istanbul started to provide central counterpart service according to the Capital Market Law No: 6362 for the Securities Lending Market in 02.09.2013 and Organized Derivatives Market in 03.03.2014. Takas Istanbul has started to provide central counterpart service in Equity Market since 19.06.2017 (Central Counterparty Service, [21.03.2016]).

Takas Istanbul can decide that some equities are settled as CCP and some of them are not. Thus, in case of fail of these non-CCP equities, Takas Istanbul is not responsible to use its own capital. In member account structure; CCP and Non-CCP equites are stored in the same trading and settlement position accounts.

Instruments can be subject to CCP where the Takas Istanbul takes over the counterparty responsibility for each of the trade legs. Other instruments are not subject to full CCP, even if the same settlement procedures (including failed settlement handling) apply as for the novated trades. The difference is that Takas Istanbul is ultimately responsible for the fulfillment of the trade as CCP.

According to positions in settlement position accounts, system calculates margin and collateral in house for CCP instruments margin-collateral account, client for CCP instruments in margin-collateral account and house/client for non CCP instruments in margin-collateral account. (Figure 3) This segregation can be used for separate collateral calculation method for equities that has different risk level.

Margin and collateral accounts for clearing member ABC:

House CCP Margin and Collateral Account: BI ABC MJ-TM-P-C

Client CCP Margin and Collateral Account: BI ABC MJ-TM-M-C

Non- CCP House and Client Margin and Collateral Account: BI ABC MJ-TM-P NCCP

2.4.1.4. Settlement Pool Accounts

Clearing member cash settlement pool accounts are kept in Takas Istanbul Banking System and clearing member security pool accounts are kept in Merkezi Kayıt

Istanbul. Members use the same pool account for settlement of both CCP and Non-CCP instruments. Mirror of these accounts are kept in Settlement System executed by Takas Istanbul. End investor (client) accounts in the equity market are kept in Merkezi Kayıt Istanbul. Settlement pool accounts are configured and set up in Settlement System to mirror the participants' settlement cash account in Takas Istanbul banking system and the settlement security accounts in Merkezi Kayıt Istanbul.

Member Net Cash Settlement Pool Account: 9999-11-1

Member Gross Cash Settlement Pool Account: 9999-88-1

Member Net Security Settlement Pool Account: BI ABC-AKTAH-SERB

Member Gross Security Settlement Pool Account: BI ABC-AKTAH-BRUT

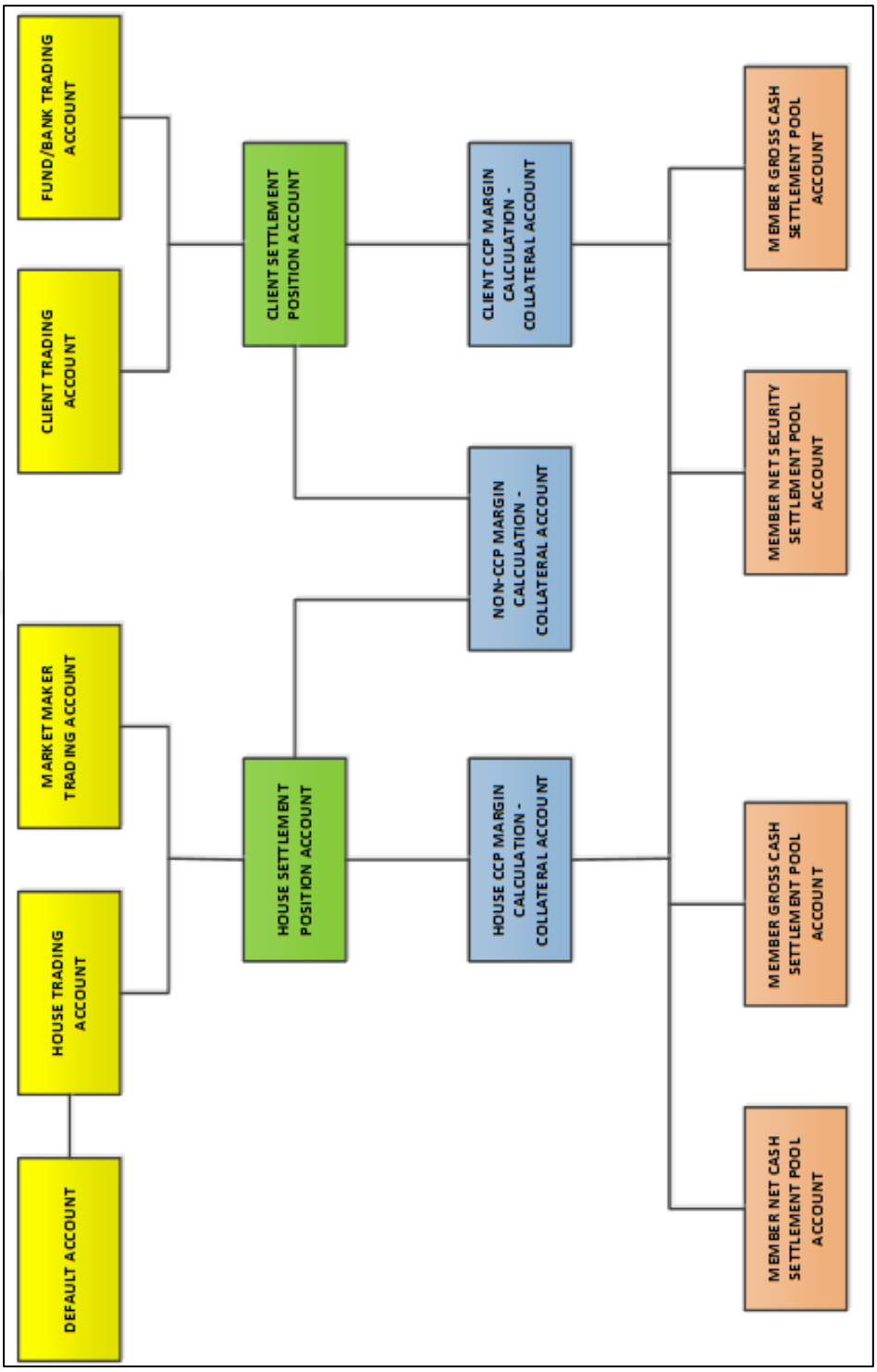

Figure 3: Account Structure of Clearing Member

2.4.2. Settlement Accounts

Accounts that are used for settlement are kept in both Clearing System and Settlement System separately. Settlement accounts in Clearing System are connected to the settlement accounts in Settlement System and from there to Takas Istanbul Banking or Merkezi Kayit Istanbul. We can observe relation of settlement accounts in Merkezi Kayit Istanbul and Takas Istanbul from Figure 4.

Equity settlement system needs pool accounts for cash and equity settlemet. Equity accounts of Takas Istanbul, clearing members' accounts and end investors' accounts are hold in Merkezi Kayit Istanbul. Cash accounts of Takas Istanbul and clearing members' cash accounts are kept in Takas Istanbul Banking system. The accounts that are kept in Merkezi Kayit Istanbul and Takas Istanbul are actual accounts for settlement. Moreover; mirror accounts of these actual accounts are configured in Settlement System for organizing settlement process.

Each clearing members have cash settlement pool accounts in Settlement System corresponds to Takas Istanbul Banking account. These accounts are member net cash settlement account, member cash accounts for gross settled securities. (Fig. 4)

Clearing members have security settlement pool accounts in Settlement System corresponds to Merkezi Kayit Istanbul account. These accounts are member security account for net settled securities and member security accounts for gross settled equities.

Takas Istanbul has CCP cash settlement, non-CCP cash settlement and security settlement pool accounts in Settlement System.

Takas Istanbul pool accounts in Settlement System are mirror accounts in Takas Istanbul Banking and Merkezi Kayit Istanbul. Each of the pool accounts in external systems has connection to provide deposit and withdrawal messages to/from the external systems. These accounts can be displayed in the figure 4.

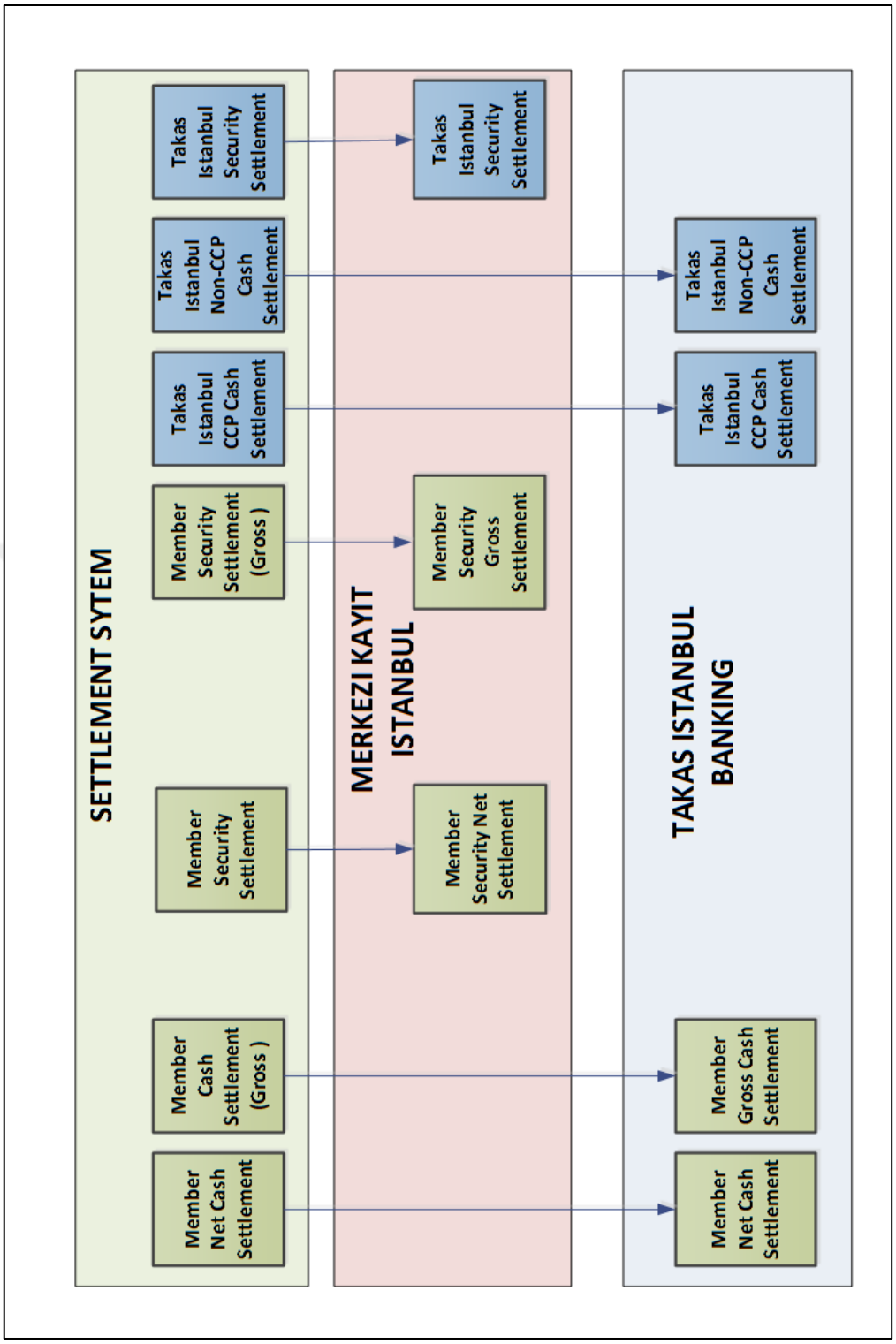

Figure 4: Pool Accounts

Takas Istanbul Equity Clearing Workflow Document,2015

2.5. Instrument Structure

The instrument structure is configured in the Common Data Base (CDB) by Takas Istanbul and Borsa Istanbul collectively. We can observe from figure 5 that "Exchange" is the top of the structure. In our case Exchange is Borsa Istanbul. System is suitable to work with more than one Exchange. This means that Takas Istanbul can clear and settle more than one exchange's transactions in the future. Exchange is divided to markets which are main spot, buy-in, collateral, and so on. Instrument group defines what kind of instruments is traded. Examples are bonds and equities. Instrument type defines which Market and what kind of product is traded by connecting market and instrument group. Examples of instrument types are main spot equity, buy-in equity, collateral equity, collateral bond… etc. Underlying defines the underlying equity, bond or index that the instrument will be based on. Examples are GARAN, SAHOL for equities. The instrument class defines what underlying will be used for certain instrument types by assigning an underlying and instrument type. The Instrument series is the final financial product that will be traded. Examples are GARAN.E, SAHOL.E.

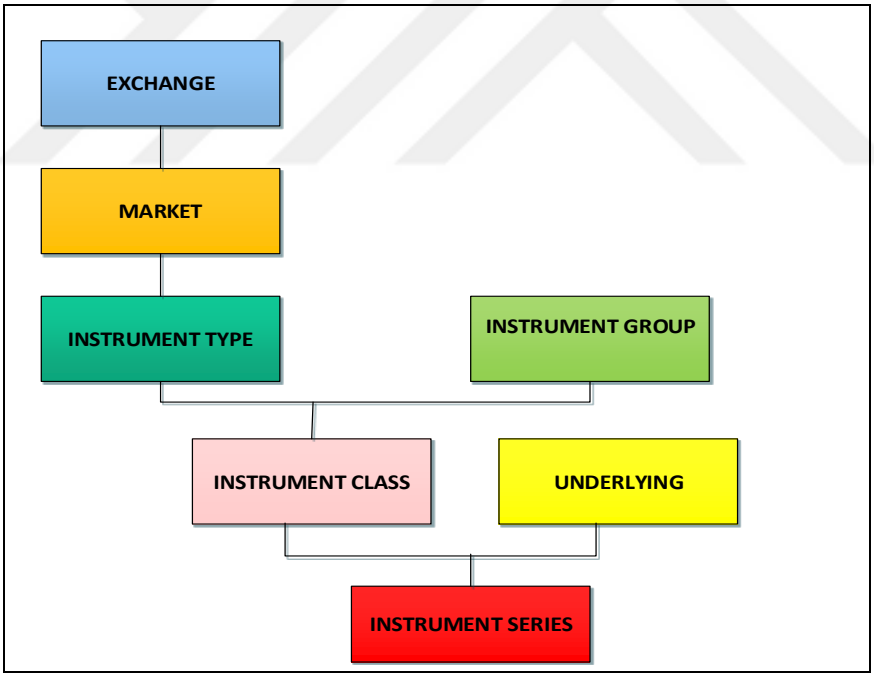

Figure 5: Instrument Structure

2.6. Basic Trading Terms and Trading Protocols

In this section, we try to explain some basic trading terms about equity trading market and summarize trading protocols that will make easier to understand clearing and settlement processes in next sessions.

2.6.1. Order Types and Validity

Different types of orders are used in Borsa Istanbul Equity Market:

Limit Order is an order that price and quantity has to set by the investor. If the order is not matched or partially matched, unmatched part is written as passive order on the order book.

Market Order is an order that quantity has to set by investor without price. Market orders match with the best available price. If there is no bid on the order book, orders are deleted.

Market to Limit Order is an order that quantity has to set by investor without price as market order. If the order is matched partially, remaining part transforms to the limit order with the price of matched part and is written as passive order.

Imbalance Order is an order that executes only on the opening and closing cross. These orders are used to trade with the orders that are not matched at call auction sessions. Unmatched orders are deleted.

Different types of validity can be used in Borsa Istanbul Equity Market:

Fill and Kill (FaK) Order is a validity type that the order is deleted if it is not matched. Moreover, if it is matched partially, the remaining part is also deleted.

Daily Order is a validity type that the order stays at the order book until the end of the day.

Good Till Cancel order is a validity type that is used in the primary market.

2.6.2. Equity Market Types and Trading Hours

BIST Stars Market includes equities that market value of the free float is more than 100 million TL or equities in BIST 100 index.

BIST Main Market includes equities that market value of the free float is between 25 million TL and 100 million TL.

BIST Emerging Companies Market includes equities of companies that have growth potential and less than 25 million TL market value.

Watchlist Market includes equities of companies that are monitored according to their financial structure.

Collective and Structured Products Market includes exchange traded funds, warrants, and certificates.

Equity Market for Qualified Investors Market is for equities that are sold to qualified investors only.

Pre-Market Trading Platform is for equities of companies that are not traded in Borsa Istanbul. This platform is used for evaluation of financial situation of companies before trading of its equities.

Trading in equity market takes place during a single session with the trading hours in Table 5.

Table 5: Trading Hours

Opening (Call Auction)	Order Collection	9:40 - 9:55
	Price Determination and Matching	9:55 - 10:00
Continous Auction	Trading	10:00 - 13:00
Midday (Call Auction)	Call Phase (Order Collection)	13:00 - 13:55
	Price Determination and Matching	13:55 - 14:00
Continuosu Trading	Trading	14:00 - 18:00
Closing (Call Auction)	Margin Broadcast for Closing	18:00 - 18:01
	Call Phase (Order Collection)	18:01 - 18:05
	Price Determination and Matching	18:05 - 18:07
Trades at Closing / Last Transaction Price	Margin Broadcast for Closing	18:07 - 18:08
	Trading	18:08 - 18:10

Borsa Istanbul Trading Hours, [21.05.2016]

2.6.3. Trading Protocols

Brokerage houses can use Trading Workstation and FIX protocol that enables them to trade in Borsa Istanbul. These protocols transfers trading information to Borsa Istanbul and get information from Borsa Istanbul electronically.

FIX means is “Financial Information Exchange”. This protocol is a way for communicating trading information (buy/sell/cancel order…) electronically between clearing house and exchange.

Another way for trade is using Trading Workstation. Brokers use enter order window (Figure 6) in Trading Workstation to send buy or sell order to Borsa Istanbul.

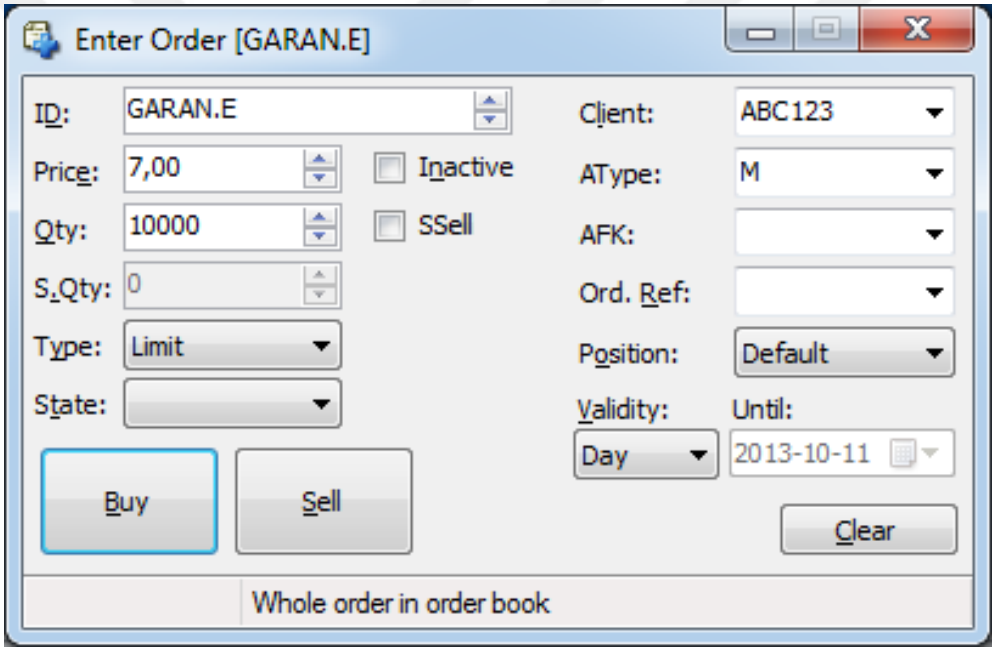

Figure 6: Enter Order Window

Screenshot from Trading Workstation

ID: Traded equity

Price: Traded equity’s price

Qty: Quantity

S.Qty: Shown quantity, which is the part of the total quantity that is shown in the market. Not applicable if executing order with FoK or FaK.

Type: Type of order which are limit, market to limit and market

State: Order will be held until selected state type, then entered into the market.

Client: Client (end investor) account number

AType: Account type which are M for client orders, P for house orders, F for mutual fund orders.

AFC: Banks and funds can not send order to exchange directly. They use clearing houses to send order. AFC (Agent fund code) field includes bank or fund code.

Validity: Order condition which are fill and kill (FaK) order, daily order, good till cancel order.

2.7. Clearing Process

Clearing is the process of preparing, arranging orders transferred from exchange for settlement process and it starts with matching orders in the trade day (t) until the settlement day (t+2). In this part, we try to analyze clearing process with explaining important terms and daily cycles of clearing and settlement terms.

2.7.1. Trade Day (t)

The Clearing System receives matched orders from the Trading System. Trades are placed on trading account are received by clearing system. (Figure 3: Account Structure of Clearing Member) Trade can be placed on house, client, bank/fund, market maker account according to trade information. If there is a missing information in trade, system puts trade on default account and clearing member put the trade to the right account manually or trade is transferred to house position account automatically at the end of day.

Settlement positions are updated in the real time. All trades include information about the end investor (client account). That information is sent to Merkezi Kayit Istanbul with special file at the end of day (trade day-t) and at the end of t+1.

If the end investor is a fund, this is given by information in the "client category". This information is also sent to Merkezi Kayit Istanbul with a file at the end of trade day and t+1. Also this file is used by Takas Istanbul for custody process for funds.

Clearing System shares netting information to Clearing Workstation in the real time and clearing members can view and control their results. Clearing System also creates settlement instructions on participant level and sends settlement instructions to Settlement System at the end of day. The trade day (t) flow is shown in the Figure 7.

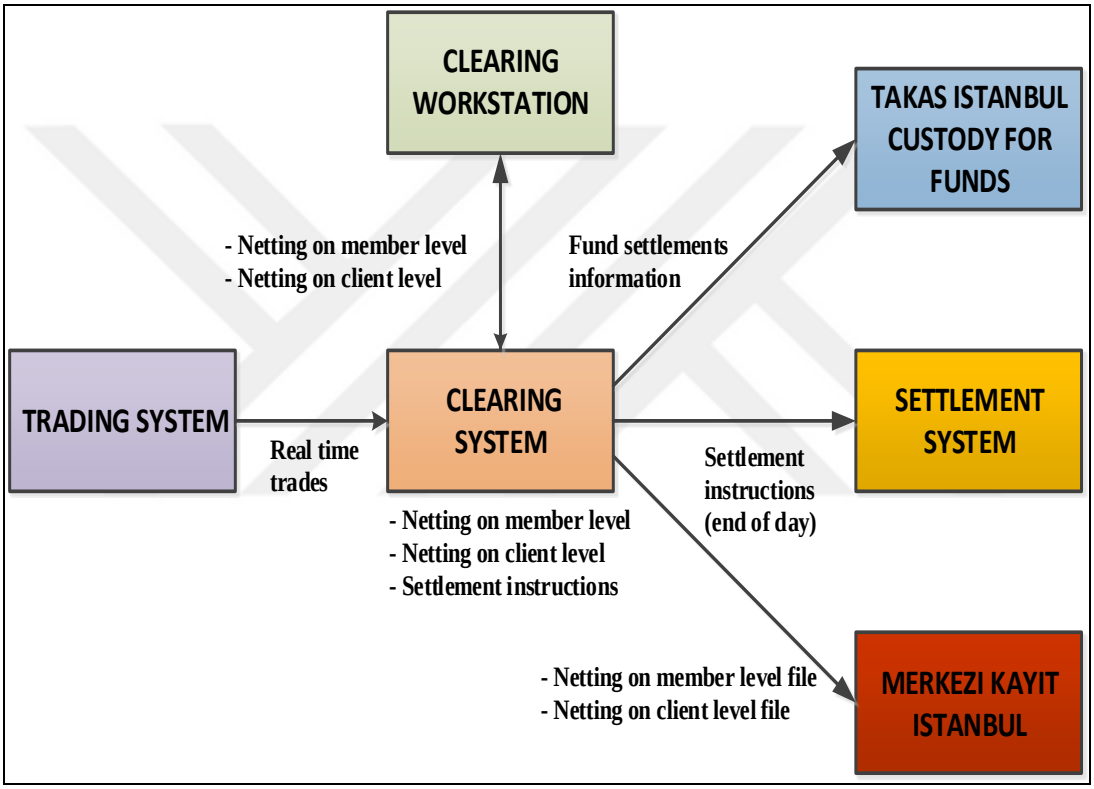

Figure 7: Trade Day Flow (t)

2.7.2. T+1 Day

Members can change limited amount of data on trades. Changes are only allowed to account, client category and end investor account in Merkezi Kayit Istanbul. Rectify trade cannot be used to move the trade to an account within another participant.

The system handles trades that are rectified by creating two new trades; one that completely reverse the original and one that replaces the original trade. Trades generated as part of a rectify trade have references back to the original trade in order to enable audit trail. Table 6 shows this process. This example shows the process of rectify end investor account.

Table 6: Rectify End Investor Example

Rectifying End Investor	Account	End Investor	Equity	Price	Buy/Sell	Quantity
Original Trade	BI ABC M	Investor 1	Eqt. X	10	5	-50
Reversing Trade	BI ABC M	Investor 1	Eqt. X	10	-5	50
Replacing Trade	BI ABC M	Investor 2	Eqt. X	10	5	-50

Author's own calculation

Clearing System sends result of rectified trades to Clearing Workstation and clearing members can view and control their results. The settlement instruction is created end of day t+1 and sent for settlement at t+2. Final trade and netting results of end investor is sent to Merkezi Kayit Istanbul after rectified process completed. This file is created end of day t+1. Also a fund file is sent to Merkezi Kayit Istanbul and Takas Istanbul at the end of day t+1. Figure 8 shows this process.

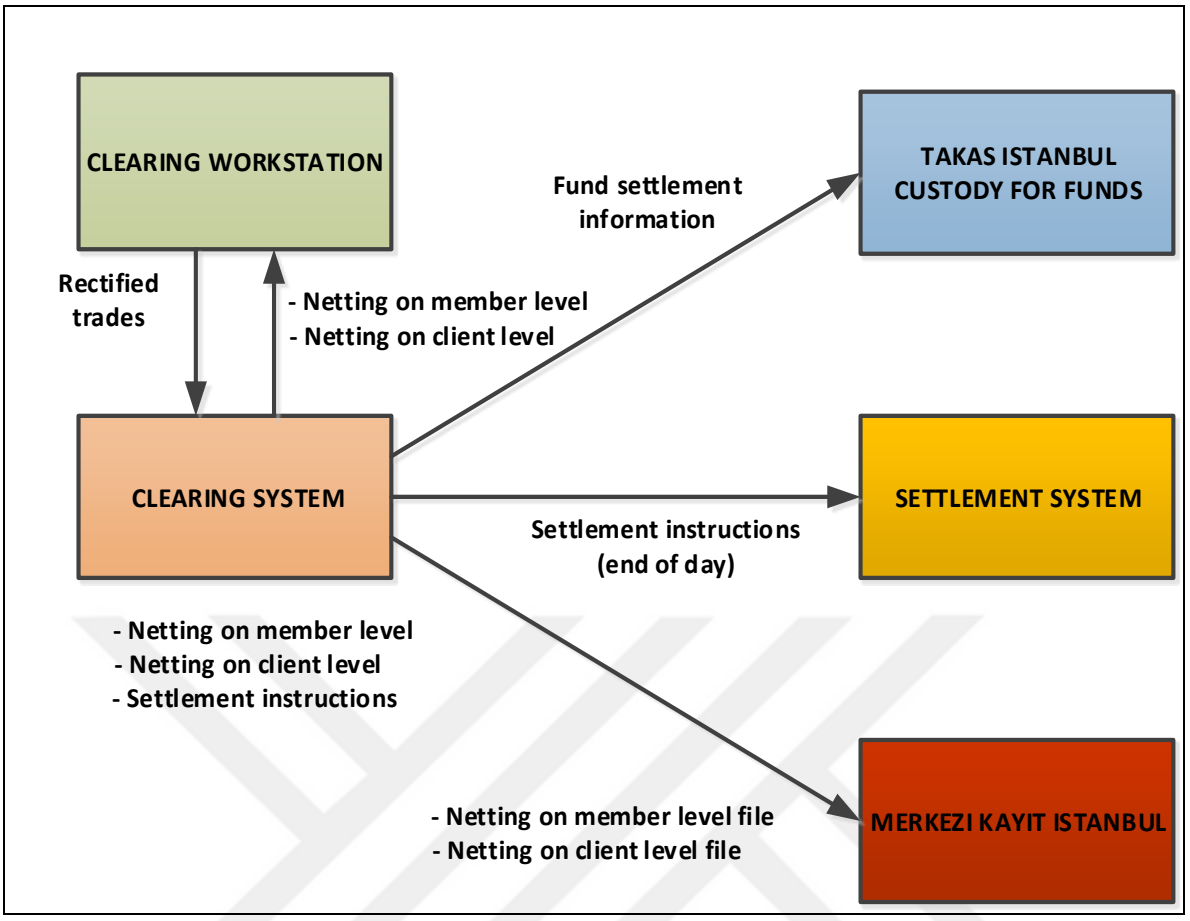

Figure 8: t+1 Flow

2.7.3. Settlement Day (t+2)

All trades matched at Borsa Istanbul are settled in t+2 with netting by Takas Istanbul. Trades can be rectified at t+1. The settlement instruction is created end of day t+1 and sent for settlement at t+2.

Settlement instructions are generated for participant level settlement within the Settlement System. The settlement System interacts with Merkezi Kayit Istanbul and Takas Istanbul Banking for achieving delivery versus payment settlement of settlement. Settlement instructions may also be settled partially on a proportional basis, if there is a lack of assets and partial settlement is allowed. Settlement status is sent back to Clearing System for position

update. Clearing system also reflects this information to Clearing Workstation and clearing members monitor and control the settlement information.

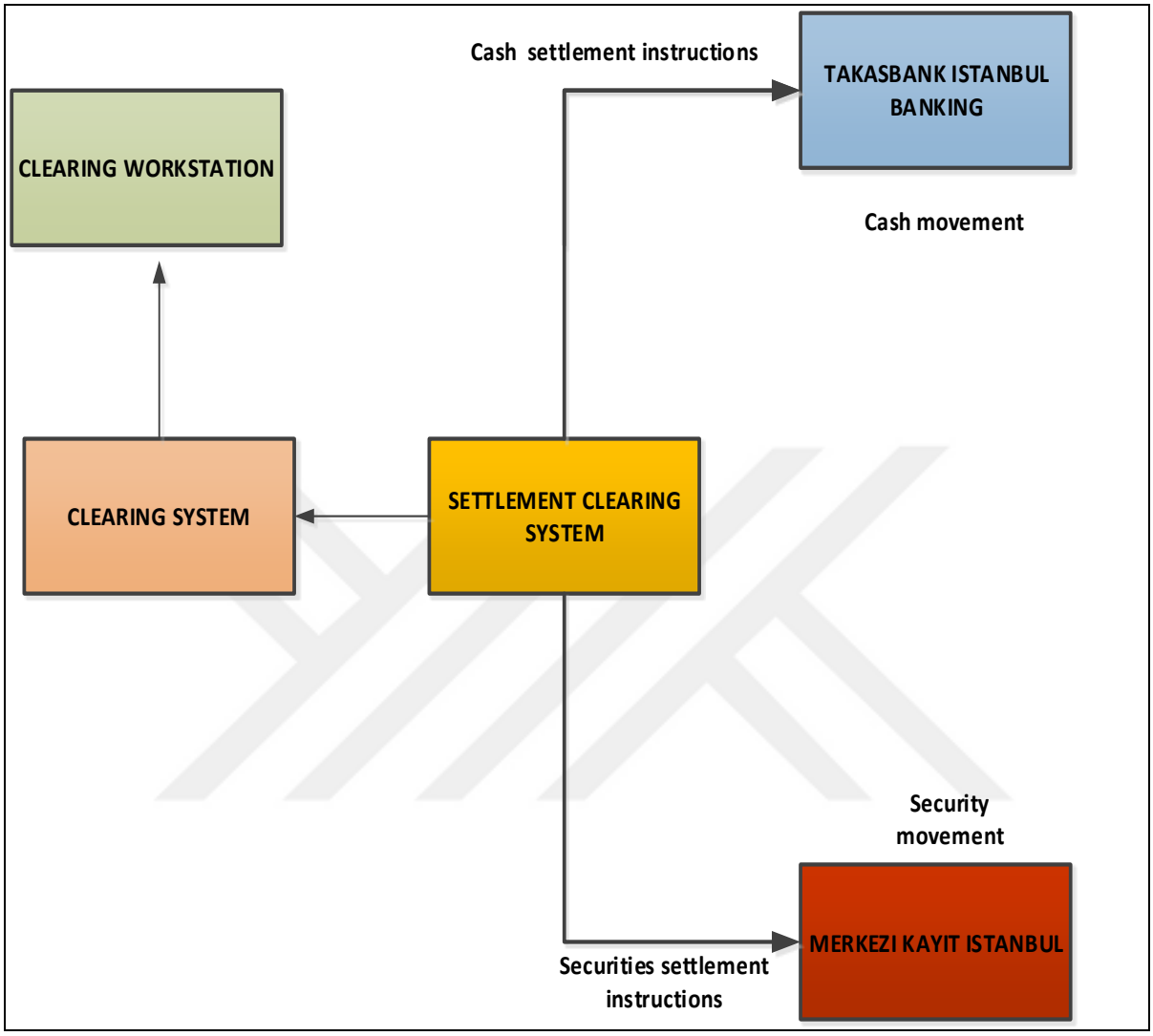

Figure 9: Settlement Day (t+2) Flow

2.8. Settlement Process

In this section, we try to explain settlement process.

2.8.1. Settlement Positions and Settlement Instructions

The settlement position shows the quantity of net delivered or received equity and cash amount to pay or get. Settlement positions are updated in the trade day and also in t+1 day after rectify process in real time.

Settlement positions are used as base for creating settlement instruction that are sent to Takas Istanbul Banking and Merkezi Kayit Istanbul for actual switch of cash and security. When the result of the settlement instruction is returned, the settlement position is updated.

Main information in the settlement position is:

Member code

Settlement account

Equity

Intended settlement date

Settlement date

Buy/sell

Amount

Quantity

Gross/Net

Settlement position state

Settlement instructions are created from settlement positions within Clearing System and are transferred to the Settlement System for the settlement process. Every settlement instruction that is created in the system is stored internally with a reference to the settlement position it belongs to.

A settlement instruction can have the following states:

Created

Pending (sent to place of settlement and waiting for result)

Rejected (rejected by place of settlement)

Settled

Cancelled

Partly settled

Failed

Settlement position and settlement instruction can be understood better with the following example. In the example below, settlement instruction (Table 7) is created to buy 100 Eqt X for 242 TL from settlement position. This means that member has obligation to pay 242 TL and receivable of 100 Eqt X in the settlement day (t+2). Then settlement position is updated after settlement instruction is created. (Table 9) When the instruction has been successfully executed, the settlement position will be updated as Table 10.

Table 7: Settlement Position

Acc.	Equity	Net/ Gross	Buy quantity	Buy amount	Sell quantity	Sell amount	Net quantity	Net Amount	Pending Instruction buy quantity	Pending Instruction buy amount
House	Eqt. X	Net	□□□	□□□	□□□	□□□	□□□	□□□□		

Author's own design

Table 8: Settlement Instruction

Account	Security	Settlement date	Buy/sell	Quantity	Amount	Priority
Member A House	Eqt. X	t+2	Buy	100	-242	Normal

Author's own design

Table 9: Settlement Position after Settlement Instruction is created

Acc.	Equity	Net/ Gross	Buy quantity	Buy amount	Sell quantity	Sell amount	Net quantity	Net Amount	Pending Instruction buy quantity	Pending Instruction buy amount
House	Eqt. X	Net	200	500	100	258	100	-242	100	242

Author's own design

Table 10: Settlement Position after Settlement Instruction is executed successfully

Acc.	Equity	Net/ Gross	Buy quantity	Buy amount	Sell quantity	Sell amount	Net quantity	Net Amount	Pending Instruction buy quantity	Pending Instruction buy amount
House	Eqt. X	Net	0	0	0	0	0	0	0	0

Author's own design

As we mentioned earlier; gross settlement is the exception for the netting principle. In gross settlement, system calculates obligation and receivables of equities and cash among clearing members by not using netting method.

In case of gross settlement, trades are not netted in terms of quantity and total cash and cash transactions and receivables are distributed after end of the due time for settlement period (t+2 16:45). Because of this, two settlement instructions (Table 12 and Table 13) are created for settlement position. (Table 11)

Table 11: Settlement Position of Gross Settled Equity Y

Acc.	Equity	Net/ Gross	Buy quantity	Buy amount	Sell quantity	Sell amount	Net quantity	Net Amount
Member A House	Eqt. Y	Gross	200	500	100	252	100	-248

Author's own design

Table 12: Settlement Instruction

Account	Security	Settlement date	Buy/sell	Quantity	Amount	Priority
Member A House	Eqt. Y	t+2	Buy	200	-500	Normal

Author's own design

Table 13: Settlement Instruction

Account	Security	Settlement date	Buy/sell	Quantity	Amount	Priority
Member A House	Eqt. Y	t+2	Sell	100	252	Normal

Author's own design

2.8.2. Equity Settlement

Equities traded in Borsa Istanbul are settled in T+2 by Takas Istanbul. Settlement System sends cash settlement instructions to Takas Istanbul Banking and security settlement instructions to Merkezi Kayit Istanbul. Equity obligations are fulfilled in Merkezi Kayit Istanbul custody system by clearing members. Clearing member settlement pool accounts and client (end investor) accounts are kept under Merkezi Kayit Istanbul.

Figure 10 shows the accounts, which are used in equity settlement. In settlement system, there are three types of accounts, which are Takas Istanbul CCP Account (TB CCP), members' pool accounts and Takas Istanbul Settlement Pool Account. These accounts are mirror accounts of accounts in Merkezi Kayit Istanbul. Actual transfer of equities is executed in Merkezi Kayit Istanbul system.

Clearing member settlement pool accounts, Takas Istanbul equity accounts (TVS) which are TB CCP, TB Settlement Pool Account, and Default Account are kept in Merkezi Kayit Istanbul system. Also end investors' accounts are kept in Merkezi Kayit Istanbul system as a book entry. Merkezi Kayit Istanbul has a connection with Settlement system to send messages about account holdings and take massages about settlement process.

We can see the general picture of equity settlement in Figure 10. In settlement day (t+2) if the end investors have equity obligation, equities are transferred from client accounts to member settlement pool accounts. When the clearing house fulfilled its obligation, equities are transferred to the Takas Istanbul Settlement Pool Account under Merkezi Kayit Istanbul system. When equities come to TB settlement pool account, Merkezi Kayit Istanbul sends reservation message to Settlement System. According to this message, clearing member accounts are updated. After the batch process run in Settlement system, equity receivables are transferred to clearing member pool accounts if the member fulfilled its cash obligation of that equity. This information is sent to Merkezi Kayit Istanbul with release message. According to this message, clearing member settlement pool accounts are updated and equities are transferred to client accounts from member settlement accounts.

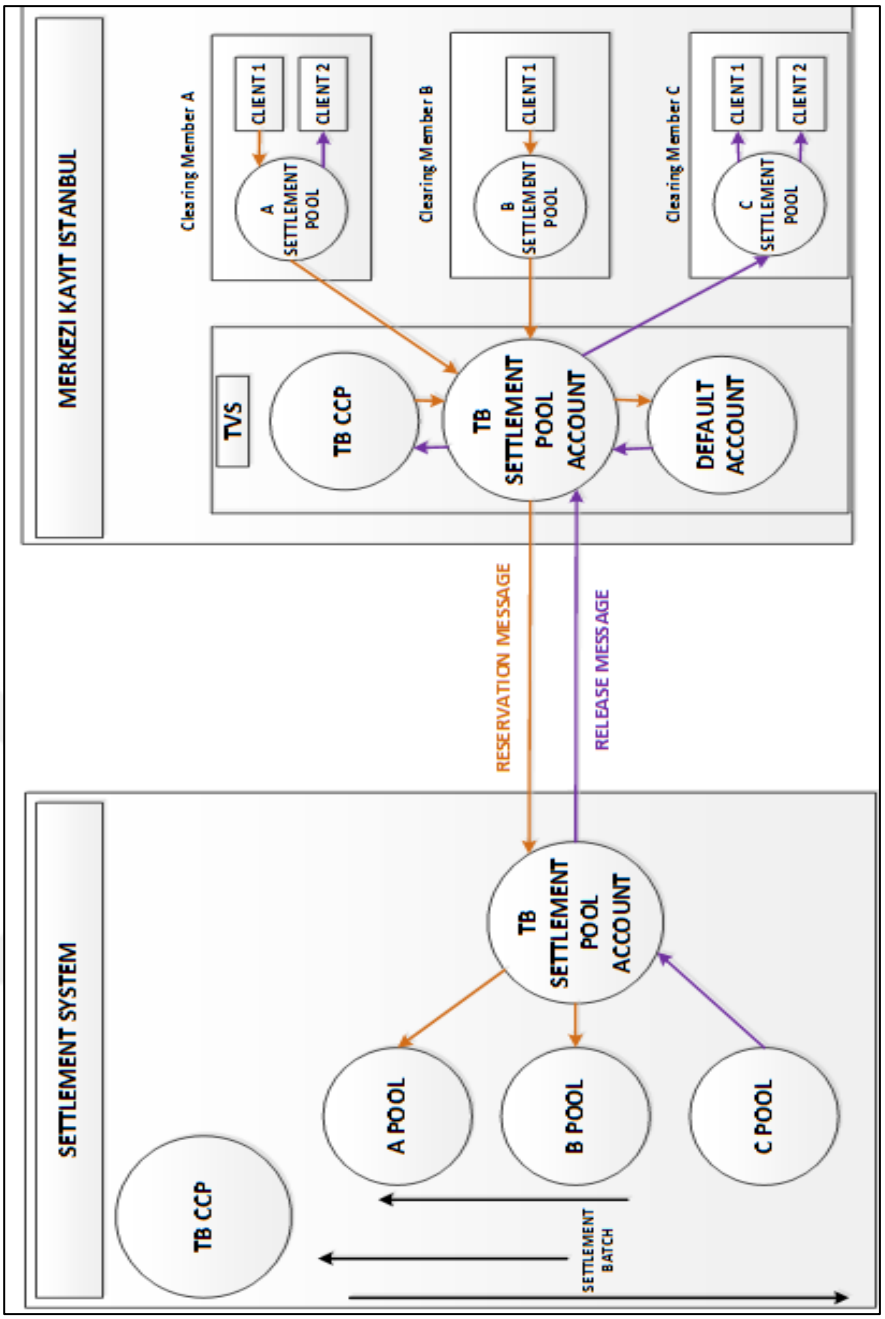

Figure 10: Settlement Process – Equity Side

2.8.3. Cash Settlement

Cash obligations are fulfilled in Takas Istanbul Banking System (TB Banking) based on clearing member level. End investor's accounts are not kept in Takas Istanbul Banking system. These accounts are kept and monitored by clearing members' own system. Member net banking pool accounts, member gross poll accounts, member free banking pool accounts are kept under Takas Istanbul Banking.

Figure 11 shows cash settlement process. When the members pay their cash obligations, cash is transferred to TB settlement pool account. When cash is come to TB Settlement pool account, Takas Istanbul Banking sends reservation message to Settlement System. According to this message, clearing member pool accounts are updated. After the batch process in Settlement System, cash receivables are transferred to clearing member cash pool accounts if the member fulfilled its equity obligation. This information is sent to Takas Istanbul Banking with release message. According to this message, clearing member cash settlement pool accounts are updated.

Settlement is the process that combines both cash and equity transfers. In Figure 10 and Figure 11 we explained this process separately. Figure 12 gets together both processes. There are three main parts of this settlement process: Settlement system, Takas Istanbul Banking (cash side) system and Merkezi Kayit Istanbul (equity side). Settlement system uses both the equities and cash sides for one batch settlement with the timeline and the communication with depository and cash system.

When the clearing members fulfilled its cash and equity obligation, cash is blocked in Takas Istanbul Banking System and equity is blocked in Merkezi Kayit Istanbul system. After blockage, Takas Istanbul Banking and Merkezi Kayit Istanbul send reservation message to Settlement System. Settlement System also sends confirmation message. According to this message, clearing member pool accounts are updated in Settlement System and batch process starts. After the batch process in Settlement System, cash and equity receivables are transferred to clearing member cash pool accounts and settlement pool accounts if the member fulfilled its obligation. This information is sent to Takas Istanbul Banking and Merkezi Kayit Istanbul with release messages. According to this message, clearing member cash settlement pool accounts

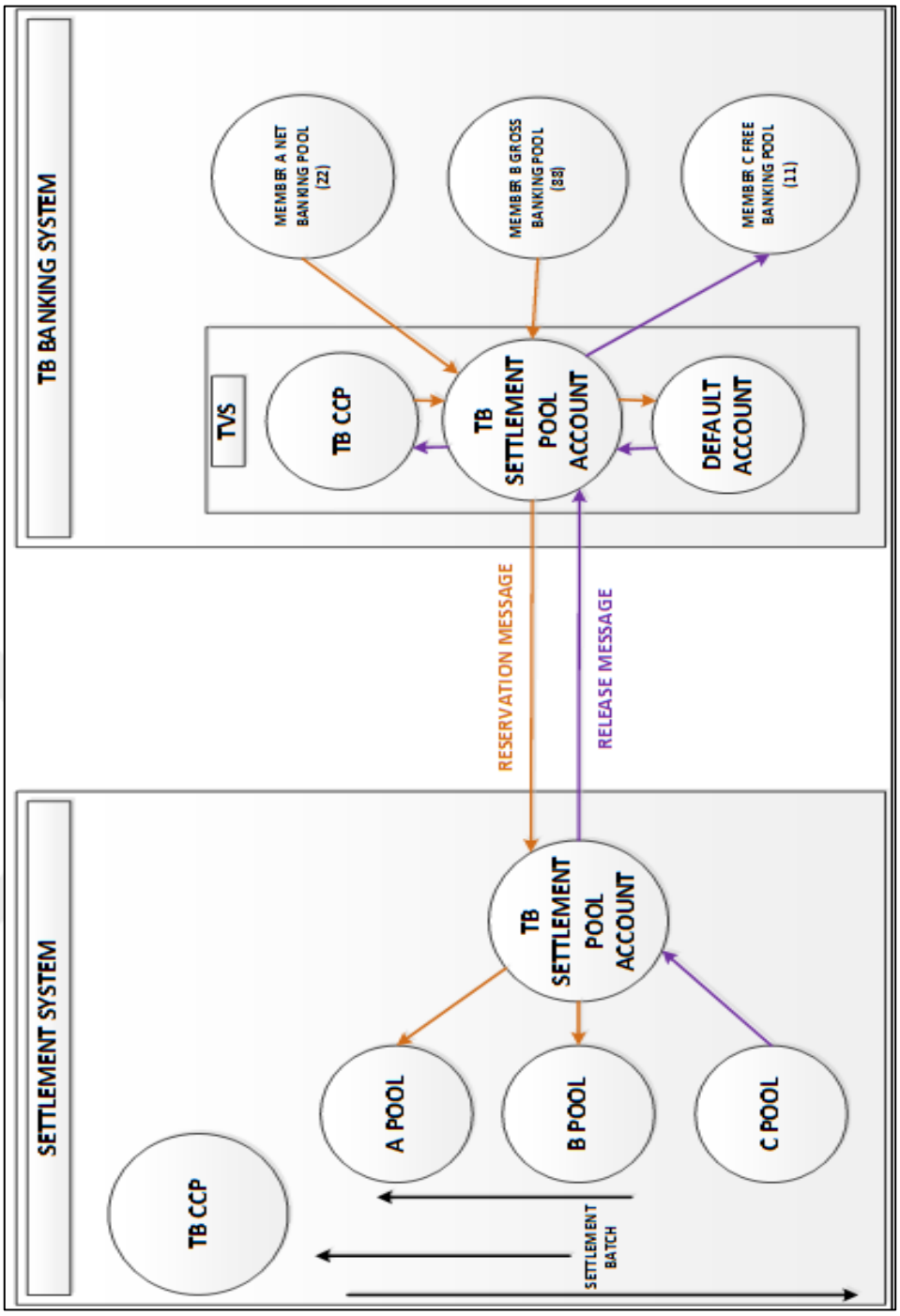

Figure 11: Settlement Process – Cash Side

and settlement pool accounts are updated. After this process, Takas Istanbul Banking and Merkezi Kayit Istanbul send release confirmation messages and settlement is completed.

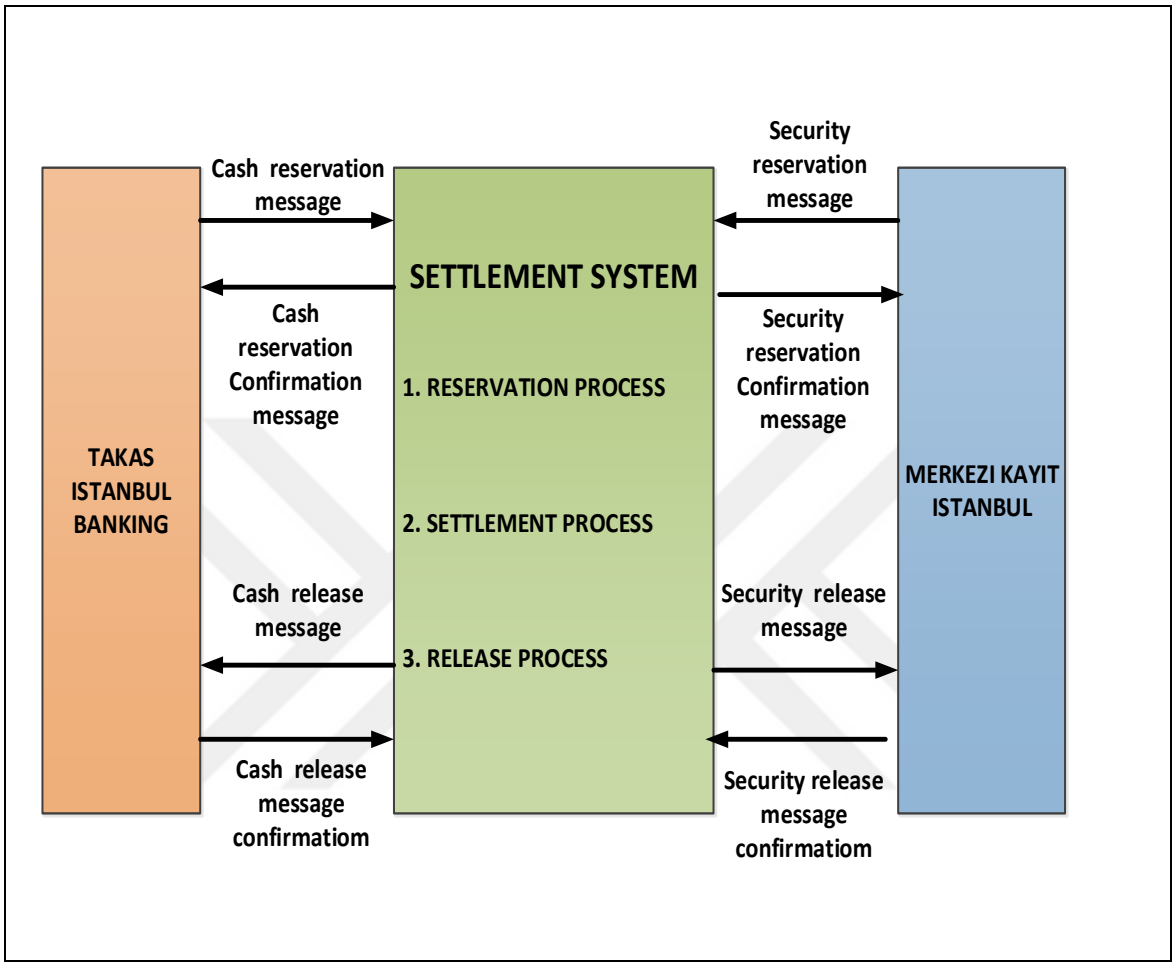

Figure 12: Settlement Process – Cash and Equity Sides

Author's own design

2.9. Failed Settlement

Clearing members should pay their cash and equity obligations until 16:45 (cut-off time) in settlement day. If the member does not pay its obligation, settlement instruction not is settled and failed settlement occurs. This member is called defaulting party. The member that cannot

get its receivable because of defaulting party is called wronged party. Defaulting party should pay penalty payment to Takas Istanbul. If the wronged party cannot get its receivable before the closing of the settlement day (at 21:00), it gets compensation payment.

If the defaulting party does not provide equity until 11:00 in day t+3, Takas Istanbul buys this security from the market on behalf of the defaulting party. The cash provided from the wronged buy side will cover all or the main part of the buy-in trade, the defaulting party has to provide cash to cover the additional cash needed to cover the buy in as soon as the trade is done. If it does not pay this amount, Takas Istanbul use defaulting party's collateral to pay this amount.

If the defaulting party does not provide cash, Takas Istanbul provides cash from own resources to pay the seller on the intended settlement day. In this case Takas Istanbul put blockage to defaulting party's receivables from other trades. If the defaulting party does not provide cash until 11:00 in day t+3, Takas Istanbul can sell defaulting party's blocked receivables in the market and pay this member's obligation with this amount.

Compensation and penalty fee shall be calculated when the defaulting settlement is done. Penalty fee is charged from the failing party according to the table for when it was settled. If the defaulting party fulfills the settlement after the cut-off time at settlement day but before the close of the settlement day, then a penalty fee is charged. Compensation payment is paid if the settlement is finalized on a date after the intended settlement date (t+2).

Table 14: Failed Settlement

Days	**Settlement Day: t+2**			**t+3**	**t+4**
Time	until 16:45	between 16:45 and due time of EFT (approximatetly)	between due time of EFT and closing of the day (21:00)		
Penalty Fee	No	Yes	Yes	Yes	Yes
Compensation Payment	No	No	No	Yes	Yes

Author's own design

Penalty Fee: base value * interest rate * number of days * default coefficient /360

Interest rate: Market overnight interest rate (highest of the Borsa Istanbul Repo-Reverse Repo Market or the CBT)

Base value for cash: Amount of default

Base value for equity: amount of default * weighted average of the end of day market value of the equity realized in Borsa Istanbul

Default coefficient is

1 if obligations are fulfilled after 16:45 but within the working hours of Central Bank's National Payment System (EFT) on the settlement date (t+2)

3 if obligations are fulfilled after the working hours of Central Bank's National Payment System (EFT)

Compensation Payment: Penalty fee * 2/3

(Compensation payment is paid if the settlement is finalized on a date after the intended settlement date)

Penalty payment is paid by defaulting party to Takas Istanbul and compensation payment is paid to wronged party if it gets its receivables after settlement day.

2.10. Real Time Gross Settlement

Real Time Gross Settlement RTGS is a process of transferring cash and securities simultaneously without any counterparty risk between different clearing members' investor accounts. In addition to normal settlement, Takas Istanbul supports real-time gross settlement (RTGS) of bilateral settlement instructions on DvP basis.

RTGS instructions can be defined to the system by 2 ways. RTGS settlement instructions can be entered separately by both clearing members and then matched by the settlement system. Instruction is approved by the system automatically if mandatory areas of the instructions are the same. If one party of the settlement instruction enters it first, the counterparty may select the settlement instruction and create a matching. The counterparty then only needs to enter the private information such as investment account.

Merkezi Kayit Istanbul integration is provided for equity transfers and Takas Istanbul Banking system is used for cash transfers. Equity obligations that are matched are closed automatically by transferring to investor RTGS blockage account in Merkezi Kayit Istanbul. Cash obligations are transferred from free account of member in Takas Istanbul to blockage account. After obligations are fulfilled, equities are transferred in Merkezi Kayit Istanbul system and cash transferred in Takas Istanbul system simultaneously. The instructions that have partial transaction type, take place partially in proportion to the fulfilled equity and cash obligations.

The figure 13 shows the real time gross settlement flow. Clearing members enter settlement instructions by using Clearing workstation. Settlement instructions are matched in the Settlement system. Settlement system sends reservation messages to Merkezi Kayit Istanbul for security reservation and to Takas Istanbul Banking for cash reservation simultaneously. If security reservation is successful status: securities locked-in MKK. Cash reservation request is sent to Takas Istanbul Banking system. If cash reservation is successful status: cash locked-in. After both security and cash is reserved, settlement equity request is sent to Merkezi Kayit Istanbul, payment request is sent to the Takas Istanbul Banking system. Security is transferred in Merkezi Kayit Istanbul system and cash is transferred in Takas Istanbul Banking system.

If partial settlement is indicated by both parties, the settlement instructions will settle partially. If one of the parties indicated no partial settlement, the settlement can only settle in full.

Cancellation is possible until the settlement process has started, which generates the securities settlement execution sent to the external systems.

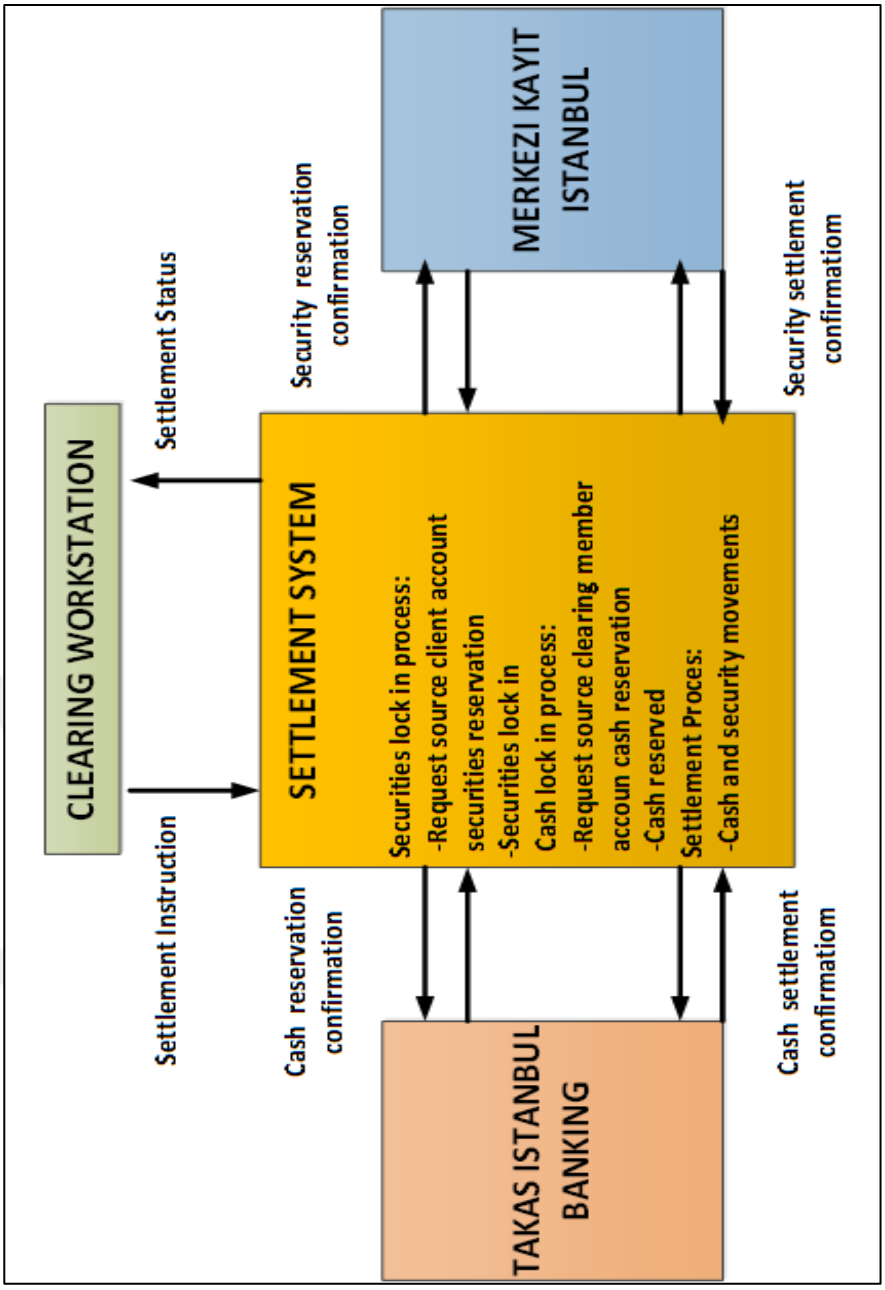

Figure 13: Real Time Gross Settlement Process

Author's own design

3. CLEARING AND SETTLEMENT IN THE WORLD CAPITAL MARKET

Clearing and settlement institutions have critical role for stability, safety, and efficiency of capital markets in the world. Equity market includes trading, clearing, settlement, custody and regulatory institutions. Exchanges are places for trading that end investors buy and sell securities. End investors use intermediary institutions – brokerage houses (clearing members) to reach security market. After buy and sell orders are matched in exchange; clearing process starts and also counterparties become legally responsible to fulfill cash and security obligations on the settlement day (t+2).

In this part of our study, we try to analyze the clearing and settlement system in the world by investigating historical process, institutions, organizations and standards.

3.1. Historical Process of Post Trade Institutions

Financial markets have changed dramatically especially by the help of technological progress, innovations in financial instruments, foundation of global institutions, increase in capital flows between countries. These developments affected security trading, custody, clearing and settlement systems all over the world.

Before these institutions were founded as it is now, settlement can be finalized with the physical delivery of security and cash payment. Securities were not dematerialized, so securities had to be kept paper based in central securities depositories. Securities markets structure has changed with the technological changes in computer systems and this helped cross border transactions. Securities are dematerialized and settlement started to be electronic.

History of clearing houses is as old as stock exchanges. These institutions are now transforming into central counterparties and have undergone a significant change and development in terms of their services and their position in the capital markets. The history of clearing houses established for the purchase and sale of agricultural products and commodities goes up to the 13th century. The first clearing house for equity market was

established in England in 1874 under the London Stock Exchange. It was followed in 1888 by the London Clearing House, which provides clearing services for commodity contracts. (Wrobel and others, 2009, 50)

Clearing houses are transformed into central counterparties. Central counterparty (CCP) is a clearing and settlement institution that is buyer to seller and seller to buyer and guarantees settlement by using its own capital in case of collateral of clearing member is not enough in failed settlement situation. During the 1880s, in trading cities of continental Europe and UK, CCP clearing activities appeared for supporting traders who were using futures and options against risks. Shortly after, new and modern type of clearing practices have been seen in North America. The number of central counterparty institutions has been increased in the last 20 years. The reason for this development is the complexity of modern capital markets, the growth of international transactions and huge volume of transactions for risky instruments. More sophisticated risk management mechanisms have been needed to manage systemic risks in the local and global financial system and CCPs have emerged as the most important institutions that serve this purpose.

In general, clearing houses initially started to be CCP in derivatives market. Then they started to provide this service in equities, bonds and bills market. Today, in developed countries, clearing house provides central counterparty service in almost all type of markets. In the framework of global financialization, developing emerging economies have also started to regulate and establish their own clearing services. Similar process occurred in Turkey's clearing and settlement case which will be explained in the next chapter.

Central depositories have also developed in parallel with the developments in financial markets. The development of central depositories and clearing has been similar. Just as in Turkey, the functions of these institutions have been operated by a single institution in many countries in the past. With the growth of capital markets around the world and the increasing transaction volumes, operational problems such as the prolongation of clearing hour of physical securities have begun to occur. These problems are largely solved by holding securities (immobilization) in a single central institution rather than physical delivery. Security transfers with the centralization of the securities have begun to take place through book-entry settlement between member accounts in the central depository rather than physical transfer. With the development of technology, securities started to be dematerialized.

Dematerialization refers to the storage and transfer of certificates indicating that the registered securities or securities ownership has been physically printed as electronic records in electronic form. Dematerialization of securities has resulted in significant operational efficiencies in capital markets, as well as positive consequences such as the prevention of forgery, decreasing the cost of printing paper, physical storage, insurance and personnel. It also enables transactions to be safe, quick and efficient. The country that first registered its securities in the world was Denmark. (Chan, Fontan and others, 2007, 7). Currently, securities are dematerialized in all developed capital markets. The depositories around the world may differ in terms of securities that they provide clearing and custody services. For example, in some countries such as the US and Turkey, Central Banks function as depository for bonds, while other securities, are kept in separate central depository.

In some countries, central banks or custodian banks are used as depository institutions while in many countries institutions that provide central custody services have been established under the name of central depository.

3.2. Institutions, Organizations and Standards for Trade and Post Trade

In this part we try to analyze the institutions, organizations and standards that aim to develop safe and efficient processes and establish unique standards. We also give some examples of trade and post trade institution in the world.

3.2.1. Trading, Clearing and Settlement Institutions in the World

There are lots of trading institutions in the world for equity trading. Although there is only one stock exchange in some countries, there can be more than one stock exchange especially in developed countries. United States is one of the example that it has more than one stock exchange two of them are New York Stock Exchange and Nasdaq OMX. In Turkey, Borsa Istanbul is the only stock exchange for equity market.

Table 15 shows domestic market capitalization, value of share trading, number of trades and number of listed companies for some stock exchanges in the world equity market.

Table 15: Stock Exchanges in the World (2015)

Exchange	Domestic Market Capitalisation (USD millions)	Number of listed companies	Value of share trading (in millions)	Number of trades
BM&FBOVESPA S.A.	758.565,92	349	523.693,50	NA
NYSE Group	19.573.073,69	2307	17.317.900,00	356.130,17
Nasdaq - US	7.779.127,03	2897	11.070.930,00	259.235,05
TMX Group	1.993.522,74	3419	1.169.538,46	149.714,00
Hong Kong Exchanges and Clearing	3.193.235,54	1973	1.349.803,85	3.703.029,87
Japan Exchange Group	4.955.299,65	3541	5.625.900,92	597.304,96
Korea Exchange	1.254.541,18	2059	1.664.871,63	261.692,78
National Stock Exchange of India Limited	1.539.585,49	1840	692.422,12	247.501,00
Shanghai Stock Exchange	4.098.789,30	1182	7.510.104,61	2.383,18
Shenzhen Stock Exchange	3.212.671,30	1870	11.613.063,96	4.980.681,00
Abu Dhabi Securities Exchange	120.976,73	68	13.335,76	NA
Athens Stock Exchange	37.163,05	218	14.249,96	22.256,01
BME Spanish Exchanges	704.551,33	3506	684.803,55	177.768,00
Borsa Istanbul	**171.764,94**	**381**	**327.583,05**	**167.310,00**
Deutsche Börse AG	1.716.041,51	592	1.310.417,16	35.549,88
Euronext	3.459.874,27	1051	1.771.879,39	79.160,44
Nasdaq Nordic Exchanges	1.248.179,48	938	712.487,95	90.620,00
SIX Swiss Exchange	1.403.355,61	264	865.737,23	18.026,39

WFE Annual Statistics Guide 2015. [27.04.2016]

According to The European Securities and Markets Authority (ESMA), there are more than 900 Clearing Members in Europe and 17 of them are CCP. (Questions and Answers on ESMA's EU-wide Stress Tests for CCPs, [27.04.2016])

Table 16 shows the clearing houses that provide CCP service in the European Union.

Table 16: CCP service in the European Union

CCP	Country
Nasdaq OMX Clearing AB	Sweden
European Central Counterparty N.V	Netherlands
KDPW_CCP	Poland
Eurex Clearing AG	Germany
Cassa di Compensazione e Garanzia S.p.A. (CCG)	Italy
LCH SA	France
European Commodity Clearing	Germany
LCH Ltd	United Kingdom
Keler CCP	Hungary
CCP Austria	Austria
LME Clear Ltd	United Kingdom
BME Clearing	Spain
OMIClear - C.C., S.A.	Portugal
ICE Clear Netherlands	Netherlands
Athens Exchange Clearing House (Athex Clear)	Greece
ICE Clear Europe Limited	United Kingdom

List of Central Counterparties authorized to offer services and activities in the Union. [27.04.2016].

3.2.2. International Organization of Securities Commissions (IOSCO)

IOSCO is an institution that represents regulatory institutions for the equity and futures markets in the world. IOSCO was founded in 1983 and currently regulates more than 95% of the world's securities markets. The most important objective of IOSCO is to bring the securities regulators in the world together and establish international standards for capital markets. Other objectives of IOSCO are to protect end investors, increase efficiency, provide market transparency, decrease systemic risks, strengthen international cooperation and experience. (About IOSCO, [30.08.2016])

One of the members of IOSCO is CMB that became a member in 1988. CMB is actively working in IOSCO's committees and working groups. CMB served as IOSCO's Emerging Markets Committee-EMC Presidency during 2002-2006 and 2010-2013. Moreover, CMB was deputy chairman of the board of directors in 2012-2013 and member of the board of directors in 2014-2016. (Uluslararası Menkul Kıymet Komisyonları Örgütü (IOSCO), [17.10.2016])

In 2013, IOSCO published "Principles for Financial Benchmarks" to create a regulatory and inclusive framework for financial indicators calculated in global financial markets in July 2013. Borsa Istanbul made is fully compatible with IOSCO's Principles for BIST Indexes. Borsa Istanbul handles the items it has adapted in the Borsa Istanbul Statement of Compliance (Principles and Responses). (Borsa Istanbul, Letter of Compliance with the IOSCO Principles for Financial Benchmarks. [17.10.2016])

IOSCO published Objectives and Principles of Securities Regulation (IOSCO Principles) in 1998. These principles are used as internationally regulation methods. These principles are updated in 2010. Objectives and Principles of Securities Regulation are Principles Relating to the Regulator, Principles for Self-Regulation, Principles for the Enforcement of Securities Regulation, Principles for Cooperation in Regulation, Principles for Issuers, Principles for Auditors, Credit Rating Agencies, and other information providers, Principles for Collective Investment Schemes, Principles for Market Intermediaries, Principles for Secondary Markets. This Document includes 38 Principles of securities regulation which are useful for both developed and developing countries.

In April 2012, the then Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) published the standards report which is Principles for Financial Market Infrastructures (PFMIs). These principles are:

General Organisation:

Principle 1

> "Legal basis: An FMI should have a well-founded, clear, transparent, and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, all of FMI's activities must have a legal basis. These legal regulations must be clear, consistent and legally enforceable. Furthermore, there must be a high level of certainty that the actions to be carried out in accordance with the rules that cannot be canceled.

Principle 2

> "Governance: An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI, and support the stability of the broader financial system, other relevant public interest considerations, and the objectives of relevant stakeholders." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, FMI's priority is to ensure high efficiency and safety. FMI's objectives should support public interest and financial stability. The FMI should have clear written governance arrangements with the public. FMI should have the necessary knowledge and experience.

Principle 3:

> "Framework for the comprehensive management of risks: An FMI should have a sound risk-management framework for comprehensively managing legal, credit, liquidity, operational, and other risks." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, An FMI should manage and direct the risks at their disposal. The FMI should improve the technology of risk systems and manage its procedures accordingly. FMI should also monitor the risks and take the necessary precautions.

Credit and liquidity risk management:

Principle 4:

> "Credit risk: An FMI should effectively measure, monitor, and manage its credit exposures to participants and those arising from its payment, clearing, and settlement processes. An FMI should maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence. In addition, a CCP that is involved in activities with a more complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions. All other CCPs should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

Credit risk can be current risks, future potential risks, or both. According to this principle, an FMI should regularly monitor these risks, establish measurable and appropriate risk

structures. A CCP should set transaction guarantees accordingly, taking into account potential risks. Apart from the guarantees received from customers, it should also keep its financial resources at a sufficient level. Risk measurements should be made instantaneously following the market situation. A financial market infrastructure entity must establish clear rules and procedures that fully show losses that participants may incur because of individual or collective default on their obligations to them. These rules and procedures should also include the process of ensuring that financial market infrastructure establishments continue to reestablish financial resources to be used during a stressful situation and thus to work in a healthy and safe manner.

Principle 5

> "Collateral: An FMI that requires collateral to manage its or its participants' credit exposure should accept collateral with low credit, liquidity, and market risks. An FMI should also set and enforce appropriately conservative haircuts and concentration limits." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should generally choose collaterals that have low credit, liquidity and market risks. Stress tests should be performed to determine the collateral coefficients. It should also set forth cautious, feasible, stable and conservative coverage coefficients to cover stressed market conditions. In order not to be affected by unpredictable price movements, the FMI should diversify in its collateral and protect its liquidity in a negative situation.

Principle 6

> "Margin: A CCP should cover its credit exposures to its participants for all products through an effective margin system that is risk-based and regularly reviewed." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

A CCP must have a margin system that determines the level of collateral, which is proportional to the risks and specific characteristics of each portfolio, product and market served. A central counterparty must follow a default probability of its members and use a collateral model that accurately calculates the potential risk.

Principle 7

> "Liquidity risk an FMI should effectively measure, monitor, and manage its liquidity risk. An FMI should maintain sufficient liquid resources in all relevant currencies to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the FMI in extreme but

> plausible market conditions." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should have a robust framework for managing liquidity risks arising from its members, banks, custodians, liquidity providers and other correspondent institutions. The FMI should be able to identify funding flows on a continuous and timely basis. In this direction, it should have enough resources in each currency to meet its minimum liquid resource requirements. A financial market infrastructure entity must have sufficient knowledge to understand and manage its liquidity risks. In addition, the FMI must have written procedures to perform all of these and make necessary updates.

Settlement

Principle 8

> "Settlement finality: An FMI should provide clear and certain final settlement, at a minimum by the end of the value date. Where necessary or preferable, an FMI should provide final settlement intraday or in real time." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle the FMI should clearly define the accuracy of the settlement time. That is, a financial market infrastructure organization must clearly define the cut off time when any participant will not be able to recover from unfulfilled payments, transfer orders or other obligations.

Principle 9

> "Money settlements: An FMI should conduct its money settlements in central bank money where practical and available. If central bank money is not used, an FMI should minimize and strictly control the credit and liquidity risk arising from the use of commercial bank money." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle; an FMI should conduct money settlement with the central bank, wherever possible, in order to avoid infrastructure and credit risks. In the event that central bank money is not used, the financial market infrastructure organization must conduct money settlement by using a reconciliation asset with low or no credit or liquidity risk. If the financial market infrastructure company conducts with the commercial bank, the credit and liquidity risks must be monitored, regulated and restricted.

Principle 10

> "Physical deliveries: An FMI should clearly state its obligations with respect to the delivery of physical instruments or commodities and should identify, monitor, and manage the risks associated with such

> physical deliveries." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should clearly state its obligations with regard to the custody, delivery and risks of physical instruments or commodities.

Central securities depositories and exchange-of-value settlement systems

Principle 11

> "Central securities depositories: A CSD should have appropriate rules and procedures to help ensure the integrity of securities issues and minimize and manage the risks associated with the safekeeping and transfer of securities. A CSD should maintain securities in an immobilized or dematerialized form for their transfer by book entry." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, a Central Securities Depository shall have appropriate rules, procedures and controls, accounting practices to protect the rights of issuers of securities. It should prevent unauthorized creation or deletion of securities, and to ensure periodic and minimum daily reconciliation of securities that they are holding. A Central Custodian should also store securities in a dematerialized or immobilized format.

Principle 12

> "Exchange-of-value settlement systems: If an FMI settles transactions that involve the settlement of two linked obligations (for example, securities or foreign exchange transactions), it should eliminate principal risk by conditioning the final settlement of one obligation upon the final settlement of the other." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI acting as an exchange-of-value settlement system should remove the principal risk by performing the ultimate settlement of an obligation if it does not meet the gross or net basis, and only when the ultimate settlement of the related obligation is made.

Default management

Principle 13

> "Participant-default rules and procedures: An FMI should have effective and clearly defined rules and procedures to manage a participant default. These rules and procedures should be designed to ensure that the FMI can take timely action to contain losses and liquidity pressures and continue to meet its obligations." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should have default procedures to fulfill its obligations for default of participant. A financial market infrastructure should have default rules and

procedures, including the appropriate measures it may take at its own discretion. An FMI must include its participants in testing and review processes of the default and liquidation procedures.

Principle 14

> "Segregation and portability: A CCP should have rules and procedures that enable the segregation and portability of positions of a participant's customers and the collateral provided to the CCP with respect to those positions." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, a central counterparty should have segregation and portability arrangements that effectively separate its members' customer positions and related collateral provided to CCP for the possibility of default of the participant.. A central counterpart must use an account structure that allows the participant to easily identify its position with the customer and to separate the related collateral.

General business and operational risk management

Principle 15

> "General business risk: An FMI should identify, monitor, and manage its general business risk and hold sufficient liquid net assets funded by equity to cover potential general business losses so that it can continue operations and services as a going concern if those losses materialize. Further, liquid net assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should identify, monitor and manage general business risks. By specifying business strategy in this direction, it should be able to avoid negative cash flows or unexpectedly high operational expenses. An FMI should have sufficient funds, so that it can maintain its services and operations without any problem if exposed to general business losses. A financial market infrastructure must substitute an applicable liquidation plan and it must have net liquid assets sufficient to fund to realize the plan. Assets held to cover general business risk should be liquid at a high level and highly sufficiently so that the FMI can meet its current and projected operating expenses under various scenarios, including unexpectedly negative market conditions.

Principle 16

> "Custody and investment risks: An FMI should safeguard its own and its participants' assets and minimize the risk of loss on and delay in access to these assets. An FMI's investments should be in instruments with minimal credit, market, and liquidity risks." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should keep assets in supervised and regulated entities. A financial market infrastructure organization should be able to access both its own assets and the assets offered by the participants as soon as it is needed. A financial market infrastructure should assess and understand its risks to its own custodial institutions.

Operational Risks

Principle 17

> "Operational risk: An FMI should identify the plausible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures, and controls. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfillment of the FMI's obligations, including in the event of a wide-scale or major disruption." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should have suitable systems, policies, procedures and controls to manage and minimize operational risks. A financial market infrastructure organization must have clearly defined operational reliability objectives and a policy to implement them. An FMI must have comprehensive physical security and information security policies addressing all possible system vulnerabilities and hazards of the organization. It is necessary for a financial market infrastructure establishment to identify, monitor, and manage the risks that key participants, other financial market infrastructure organizations, service providers and support providers create for their operations.

Access

Principle 18

> "Access and participation requirements: An FMI should have objective, risk-based, and publicly disclosed criteria for participation, which permit fair and open access." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should be able to provide accessible access to its services for all financial market infrastructure institutions, within the framework of risk-based reasonable participation requirements. Participation requirements of a financial market infrastructure entity need to support the security and efficiency of markets served by the financial market infrastructure establishment and the financial market infrastructure entity, specific preparation according to specific risks and disclosure to the public.

Principle 19

> "Tiered participation arrangements: An FMI should identify, monitor, and manage the material risks to the FMI arising from tiered participation arrangements." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should identify, monitor and manage the major risks arising from its own rules, procedures and agreements and from tiered participation arrangements. An FMI should regularly monitor the risks arising from tiered participation arrangements and, where necessary, take risk-reducing measures.

Principle 20

> "FMI links: An FMI that establishes a link with one or more FMIs should identify, monitor, and manage link-related risks." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should be able to manage the risks arising from connections with one or more financial market infrastructure institutions. Links with these institutions must have a well-established and links should be in legal basis. A CCP must also identify and manage linked institutions' default risk.

Efficiency

Principle 21

> "Efficiency and effectiveness: An FMI should be efficient and effective in meeting the requirements of its participants and the markets it serves." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should be structured in such a way that it meets the needs of both its participants and the markets it serves. It should provide necessary technological improvements to be efficient and effective.

Principle 22

> "Communication procedures and standards: An FMI should use, or at a minimum accommodate, relevant internationally accepted communication procedures and standards in order to facilitate efficient payment, clearing, settlement, and recording." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, an FMI should use or at least comply with internationally recognized relevant communication procedures and standard to ensure payments, clearing, settlement.

Transparency

Principle 23

> "Disclosure of rules, key procedures, and market data: An FMI should have clear and comprehensive rules and procedures and should provide sufficient information to enable participants to have an accurate understanding of the risks, fees, and other material costs they incur by participating in the FMI. All relevant rules and key procedures should be publicly disclosed." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, the FMI should have clear and comprehensive rules and procedures. In these procedures, the risks to which the members are exposed, the fees and other material costs must be clearly stated. An FMI must announce its service fees and discount to the public. The financial market infrastructure entity must also disclose at least the basic data on transaction volumes and amounts.

Principle 24

> "Disclosure of market data by trade repositories: A TR should provide timely and accurate data to relevant authorities and the public in line with their respective needs." (Committee on Payment and Settlement Systems, Principles for financial Market Infrastructures, [18.10.2016])

According to this principle, trade repositories should share data with relevant authorities and the public in parallel with legislative and industrial expectations, and these data should be both in scope and in sufficient detail to support both market transparency and other public policy objectives.

Takasbank also declared the suitability of these principles. Takasbank's CCP activities in derivatives market have been dealt with all principles except principle 11 that related to Central Securities Depository and principle 24 which is related with Trade Repository. (Takas Istanbul MKT Duyurusu, [18.10.2016])

3.2.3. European Securities and Markets Authority (ESMA)

European Securities and Markets Authority (ESMA) is a European Union institution for providing reliability and regulations for EU financial markets. ESMA is an independent institution but it has responsibility for accountability to European Parliament, Council of the European Union and European Commission (European Securities and Markets, 2016). Though ESMA has similar responsibilities to Capital Markets Board of Turkey, ESMA is in charge of all European Union countries not only one country. Moreover, ESMA is the official register for clearing houses that wants to provide CCP service. Clearing houses CCP service

should approved by ESMA according to European Market Infrastructure Regulation (EMIR). In 2012, ESMA also started to give technical advice on equivalence between EU regulation system and non EU countries' regulation system.

3.2.4. International Capital Market Association (ICMA)

ICMA represents central banks, clearing houses, custody institutions, investment banks, banks, law firms and fund managers. ICMA has more than 500 members in 60 countries. (About ICMA, [01.02.2017])

ICMA focuses legal and financial regulation in capital markets. Its aim is to promote the formation of flexible and well-functioning capital markets. These markets are necessary for economic growth and will contribute to market participants and investors as well. ICMA also develop internationally accepted standards for capital markets.

3.2.5. ISSA (International Securities Services Association)

ISSA plays an important role in increasing the effectiveness of global capital markets and managing risks. It was founded in 1979 in Zurich, Switzerland. ISSA is an independent private company. ISSA's financing providers are institutions operating in global capital markets and representatives of these institutions are involved in the ISSA's governing board.

ISSA is actively involved in the development of international standards such as management, technological infrastructure, transparency, reliability, protection of investors, reduction and management of risks, and legislation that can be applied in securities markets. ISSA first published four proposals in 1988. These proposals led to the proposals proposed in 1989 and the proposals of the G30 group. In 2000, eight new ISSA proposals were published. In 2001, the G30 Group's new proposal was published. Moreover, G30 Group proposed action plan in 2004.

The objectives of the ISSA are to develop appropriate solutions in capital market, to increase efficiency in reducing risk in the securities services sector, to increase international cooperation in the sector and to strengthen communication between service providers and regulatory agencies. ISSA Symposiums, meetings and conferences are organized, working groups are established and various information materials are published for these purposes.

Members of ISSA are financial institutions such as banks, financial institutes, brokerage houses, stock exchanges, clearinghouses, securities custody institutions. Today, more than 1000 subscribers from 43 countries of the ISSA all over the world. Takasbank and Central Registry Agency are the members of ISSA. ISSA has Contribution to Standardization of format for physical Eurobond Certificates, ISIN Code, Corporate Action Types, Clearstream - Euroclear Bridge and Contribution to G30 Recommendations.

3.2.6. CSD Conferences

Central banks, regulatory and supervisory agencies, clearing and custody institutions, banks, regional clearing and custody institutions with intermediary institutions are the participants of CSD conferences. CSD Conferences meet every two years to review market developments in securities custody systems, to increase confidence in custody and to exchange views on risk reduction. The current regional and global issues of custody custodians, the role of capital markets, changes in emerging markets, Infrastructure issues, new service areas and topics, risk management, payment models applied to securities exchanges, regulations on relevant tax legislations are the main items of the participants.

3.2.7. Group of Thirty

Group of 30 founded in 1978. This organization is an objective and independent organization that does not aim for private profit. The group aims to conduct research in international economic and financial matters, examine decisions taken by the public and private sectors, and provide alternative solutions. The Group of 30 holds annual meetings and publishes reports in line with these objectives. (About the Group of Thirty. [18.10.2016].)

The G-30 consists of representatives of banks, brokerage houses, exchanges and clearing houses of developed markets around the world. It has published 20 recommendations on reducing the risk and improving efficiency of clearing and settlement. In the next part, we will explain these recommendations. (Group of Thirty, Global Clearing and Settlement- A plan of Action, [22.10.2016])

Recommendation 1: Eliminate Paper and Automate Communication, Data Capture and Enrichment

All market participants should eliminate paper work for issuance, transfer and retention of securities. Full automation systems should be used for every transaction related with securities. Security movements, cash movements and all kinds of information flow should be in electronic environment. Also these systems should prevent duplication of the transfer data and manual intervention.

Recommendation 2: Harmonize Messaging Standards and Communication Protocols

There should be used automated systems in communication and data collection that do not require human intervention. To provide this; all market participants should use ISO15022 for security messaging system, over time, XML should be used to complete these messages and open, standard and IP based communication network protocols should be used for securities transactions.

Recommendation 3: Develop and Implement Reference Data Standards

Reference data standards should be developed to meet the needs of the market. All relevant institutions such as exchanges, issuers should submit all the relevant data to the market at a fair price in accordance with the standards of the reference data.

Recommendation 4: Synchronize Timing Between Different Clearing and Settlement Systems and Associated Payment and Foreign Exchange Systems

Institutions that offer settlement services should not increase the risk and should not decrease their effectiveness of the institutions they interact with in terms of operational timetables, cut off times of cash and equity. Time synchronization should be done in clearing and payment systems in different time zones.

Recommendation 5: Automate and Standardize Institutional Trade Matching

Matching trades should be automated and compatible to the universal standards. Market participants should be informed about trade details in the trade day.

Recommendation 6: Expand the Use of Central Counterparties

Central counterparty applications should be widespread. Market participants should cooperate in assessing the risks and benefits of CCP applications.

Recommendation 7: Permit Securities Lending and Borrowing to Expedite Settlement

Securities lending and borrowing applications should be developed to expedite settlement.

Recommendation 8: Automate and Standardize Asset Servicing Processes, Including Corporate Actions, Tax Relief Arrangements, and Restrictions on Foreign Ownership

Services such as Corporate Actions, Tax Relief Arrangements, and Restrictions on Foreign Ownership should be automated and standardized. Information that is relevant to corporate actions should be presented to the investors in a timely and accurate manner. Market participants and public authorities should work together to reduce costs in the services of tax relief arrangements and to provide this, these services should be given in electronic environment.

Mitigating Risk

Recommendation 9: Ensure the Financial Integrity of Providers of Clearing and Settlement Services

The financial integrity of the institutions that provide clearing services should be ensured. The risk frameworks of clearing institutions should be set rules and procedures should be determined accordingly. Risk management structures should be audited in an impartial manner.

Recommendation 10: Reinforce the Risk Management Practices of Users of Clearing and Settlement

Those who benefit from or want to benefit from the services of clearing and settlement should establish counterparty risk management controls and procedures. These procedures should include how to measure, monitor and control the risks that may arise from the customer activities.

Recommendation 11: Ensure Final, Simultaneous Transfer and Availability of Assets

Settlement service providers should apply delivery versus payment in security and cash transfers to reduce credit risk.

Recommendation 12: Ensure Effective Business Continuity and Disaster Recovery Planning

All market participants should reduce the risks that may arise in case of temporary problems or disasters by carrying out effective business continuity and contingency planning.

Recommendation 13: Address the Possibility of Failure of a Systemically Important Institution

Market participants are carrying out joint works with many institutions. Systemically important institutions can fail despite of recovery plans. In this situation, the effects and how to provide business continuity should be evaluated. In such a case, the cost and benefit analysis of the solutions that can be applied should be done. Regulatory agencies should ensure to spread these plans across the market.

The solutions should be analyzed if the problems cannot be resolved despite emergency plans in the event of disruption in the operation of the institutions or in case of a possible disaster.

Recommendation 14: Strengthen Assessment of the Enforceability of Contracts

The enforcement power of contracts must be strong. Basic controls such as the validity and conditions of contracts should be made correctly by market participants in the process of supervision of the institutions receiving services.

Recommendation 15: Advance Legal Certainty Over Rights to Securities, Cash, or Collaterals

Market participants should be able to determine what their rights are, which laws that determine them are, and how they can be implemented with reasonable effort and cost.

Recommendation 16: Recognize and Support Improved Valuation Methodologies and Closeout Netting Arrangements

Market participants should have contracts that allow the valuation to be made in such a way as to produce the commercially reasonable valuation if the obligation is fulfilled before the cut of time. Market participants should also have closeout netting provisions in their contract.

Improving Governance

Recommendation 17: Ensure Appointment of Appropriately Experienced and Senior Board Members

The board members must have the sufficient knowledge and experience in strategic, risk and operational issues that are among their responsibilities.

Recommendation 18: Promote Fair Access to Securities Clearing and Settlement Networks

The clearing house, other relevant organizations and public authorities should ensure membership criteria that allow fair and easy access to clearing and settlement systems. The clearing and settlement services should be given to all members who have succeeded financially in risk surveillance and security processes with transparent and fair pricing policies.

Recommendation 19: Ensure Equitable and Effective Attention to Stakeholders Interests

The interests of all parties should be managed in an impartial and effective manner. Board members must be composed in a balanced manner. Besides the stakeholders, user representatives should also be present in the board of directors.

Recommendation 20: Encourage Consistent Regulation and Oversight of Securities Clearing and Settlement Service Providers

All regulations and oversights of the institutions that provide clearing services should be transparent and consistent. Regulatory standards and arrangements for cross-border transactions should be complementary applied across jurisdictions. In the long run, it is aimed to harmonize different legal regulations and standards in accordance with other application processes.

Takasbank also declared the suitability of these recommendations. (Recommendation 6 is suitable for derivatives now but in the second half of 2017, it will also be suitable for equity market.) (G30 Öneriler i- Takasbank Uyumu, [12.11.2016])

4. THE IMPACT OF TAKAS ISTANBUL ON TURKISH FINANCIAL SYSTEM?

In this part of our study, we try to analyze the impact of clearing and settlement system executed by Takas Istanbul on Turkish financial system by investigating services of Takas Istanbul, historical process of Clearing and Settlement System in Turkey, values, targets and importance of Takas Istanbul on Turkish financial system.

4.1. Services of Takas Istanbul

In this part, we try to summarize services of Takas Istanbul apart from equity

clearing and settlement.

4.1.1. Market Operations

Takas Istanbul operates market in Takas Istanbul Money Market, Securities Lending Market and Turkish Electronic Fund Trading Platform.

Clearing members cannot get cash credit from Central Bank as banks do. For this reason, Takas Istanbul has been providing clearing members with cash credit in Takas Istanbul Money Market since 1999. The credit provided by Takas Istanbul helps to increase efficiency and market depth in capital markets.

Takas Istanbul determines the limit of cash credit to be provided to members according to their risk and members can get credit from Takas Istanbul Money Market by pledging collateral that is determined by Takas Istanbul. In case of settlement failure of member, Takas Istanbul use this collateral to fulfill members' obligation. (Pay Piyasası Prosedürü, [15.01.2017])

Table 17 shows the amount and quality of Takas Istanbul Money Market operations. This table shows that money market operations have been increased between 2008 and November of 2016.

Table 17: Amount and quality of Takas Istanbul Money Market

Year	Volume				Quantity	
	Total (Million TL)	Total (Million $)	Daily Average (Million TL)	Daily Average (Million $)	Total	Daily Average
2016*	355,649	120,353	1639	555	172,505	795
2015	257,237	94,374	1017	373	147,843	584
2014	234,764	107,475	935	428	139,391	555
2013	233,997	122,787	936	491	140,396	562
2012	180,776	100,909	715	399	132,741	525
2011	96,996	57,478	383	227	81,535	322
2010	48,272	32,198	193	129	36,533	146
2009	38,468	25,085	153	100	37,208	148
2008	38,059	29,623	152	118	42,474	169

Takas Istanbul,Amount and quality of Takas Istanbul Money Market, [12.11.2016]

Takas Istanbul Securities Lending Market is an organized market that aims to bring lenders and borrowers of equities together. Investors (via clearing houses) use this market to make profit, fulfill equity obligations timely for safe equity settlement, market making, hedging, collateral management. Takas Istanbul is central counterparty (CCP) in Securities Lending Market in Turkey.

Table 18 shows the volume of Takas Istanbul Securities Lending Market operations. This table shows that money market operations have increased between 2008 and November of 2016.

Table 18: Volume of Takas Istanbul Securities Lending Market

Year	Volume (Billion TL)	Volume (Billion $)
2016	6,31	2,14
2015	5,56	2,10
2014	6,30	2,88
2013	3,02	1,61
2012	2,94	1,64
2011	2,69	1,65
2010	2,93	1,96
2009	2,05	1,34
2008	1,33	1,04

Takas Istanbul, Volume of Takas Istanbul Securities Lending Market, [12.11.2016]

Takas Istanbul has been operating market in Turkish Electronic Fund Trading Platform (TEFAS) since January of 2015. This platform enables investors to sell and buy funds in a single platform and provides settlement system for them by the help of its integration to MKK.

Volume and netted settlement amount can be observed from Table 19.

Table 19: Volume and netted settlement amount of TEFAS

Year	Volume (Billion TL)	Daily Average Volume (Million TL)	Netted Settlement Amount (BillionTL)
2015	13,61	53,79	3,89
2016	18,68	86,09	3,88

TEFAS Statistics, [01.02.2017]

4.1.2. Clearing and settlement services

Takas Istanbul provides clearing and settlement services in Debt Securities Market, Derivatives Market, Electricity Market, Precious Metals and Diamond Market and Equity Market.

Takas Istanbul provides clearing and settlement service for derivatives transactions executed at Borsa Istanbul Derivatives Market. Takas Istanbul also have begun to provide central counterparty (CCP) services since 2014 in this market in compliance with the new capital market law.

Takas Istanbul also provides settlement service for electricity market. It is also market participant to provide continuous cash flow and increase efficiency in the market.

Takas Istanbul have been providing cash settlement service for Borsa Istanbul Precious Metals and Diamond Market since February of 2013.

Debt Securities Market includes Stock Market of Istanbul Debt Instruments Market, Outright Purchases and Sales Market, Offering Market for Qualified Investors, Repo-Reverse Repo Market, Repo Market for Specified Securities, Interbank Repo-Reverse Repo Market and Equity Repo Market. Takas Istanbul provides clearing and settlement service for these markets. The settlement of Debt Securities Market is performed in the trade day (t+0) with multilateral netting. Netting effect which is similar to equity market can be observed from Table 20.

Table 20: Netting effect in Debt Securities Market

Months	Securities Settlement Volume	Cash Settlement Volume	Stock Exchange Trading Volume
January	22	3,9	33,5
February	21,4	4,5	31
March	23,4	4,4	33
April	23,2	4,9	34,1
May	20,3	4,3	35,7
June	20,9	4,8	40,4
July	20,1	4,9	39,5
August	19,8	3,9	43,9
September	18,6	4,3	49,3
October	17,7	3,9	49,2
November	16,4	3,9	47,2
December	15,5	4,4	48,7

Takas Istanbul 2015 Annual Report, [10.11.2016]

4.1.3. Other Services

According to Takas Istanbul's annual report (Takas Istanbul 2015 Annual Report, [10.11.2016]), Takas Istanbul's provides collateral management services which are

Electricity Market Collateral Management Service

Guarantee Fund Collateral Management Service

Leveraged Trading Transactions Collateral Management and CMB Reporting Service

Debt Securities Collateral Monitoring Operations

Derivatives Market Collateral Management Service.

Takas Istanbul provides the settlement services of the markets mentioned above. In this respect, acceptance of the assets received as collateral from the clearing members, custody, reporting to the members and the Exchange, collateral deposit and withdrawal transactions, valuation of collaterals, margin call transactions are executed out by Takas Istanbul.

Takas Istanbul provides custody service in

Precious Metals Custody Service: Precious metals in the portfolios of collective investment institutions are kept in Takas Istanbul.

Debt Securities Corporate Action Service: Takas Istanbul pays the redemption coupons and certificates for all debt securities instruments.

Administration Service for Private Pension Funds Unit Shares: Private Pension Funds participants' fund shares are monitored by Takasbank on a participant basis and in a way that participants can follow.

Portfolio Custody Service: The custody of financial assets belonging to collective investment institutions and the keeping of records are executed by Takas Istanbul.

Physical Custody Service: Shares that are not registered and not traded in the Exchange are physically kept in Istanbul.

Local Custody Service: Takas Istanbul provides custody services for corporate investors residing abroad.

Global Custody Service: Clearing members use Takas Istanbul global custody service for clearing and settlement of the transactions they have done for themselves or on behalf of their clients in foreign stock markets.

Share Certificates Corporate Action Service: Takas Istanbul executes capital increase and dividend distribution for the share certificates for the physical custody.

Book-Entry Custody Service: Collective investment institutions' assets are custodied by Takas Istanbul.

Takas Istanbul provides asset transfer services in

Debt Securities Transfer Service: Debt Securities transfer transactions are made by Takas Istanbul

Equities and Other Equity-like Instruments Transfer Service: Debt Securities transfer transactions are made by Takas Istanbul

Local Currency Payment and Transfer Service: Local currency payment and transfer transactions are carried out by Takas Istanbul for the clearing, guarantee fund and credit activities.

Foreign Currency Payment and Transfer Service: With this service, clearing members can use the amounts that they send in USD and EURO as the correspondent banks of Takasbank for settlement and collateral transactions.

Exchange Traded Fund Service: Transfers of exchange traded funds are provided by Takas Istanbul.

Takas Istanbul provides Numbering Services, which are

International Securities Identification Number (ISIN) Service

Legal Entity Identifier (LEI) Service: Clearing Istanbul is responsible for the creation of codes used for follow-up of financial transaction parties.

Moreover; Takasbank also provides these services:

Information Transfer Service to the Data Vendoring Companies

Electronic Warehouse Receipts Service

Takasbank Real Estate Title Deed Transfer Service

Collateral Agency Service

MKK TL Cash Correspondence Service

Fund Valuation and CMB Reporting Service

MKK FX Cash Correspondence Service

Closed Brokerage Houses Transactions Service

Fund Information Platform Service

Repo-Reverse Repo Transactions Monitoring and Reporting Service

Equity Related Collateral Safekeeping of Brokerage Houses

4.2. Historical Process of Clearing and Settlement System in Turkey

Turkish capital market basically includes exchange (Borsa Istanbul), clearing and settlement institution (Takas Istanbul), custody institutions (Central Bank of the Republic of Turkey for bills and bonds and Central Registery Agency (Merkezi Kayit Istanbul) for equities, Takas Istanbul for funds), clearing members, banks, investment trusts, funds etc. Now we would like to briefly discuss the historical development of Borsa Istanbul as its critical importance for our study.

After the Kirim War of 1854, Ottoman Empire began to borrow via government bonds. These bonds were sold in Galata by non-Muslim bankers. In 1864, Galata bankers founded an association among themselves and that paved the way the establishment of the stock exchange. Dersaadet Bond Exchange (Dersaadet Tahvilat Borsası) was established with the support of the creditors from the Ottoman Empire in 1866. This exchange was transformed into the Esham and Bond Exchange (Esham ve Tahvilat Borsası) with a regulation issued in 1906, which continued until the foundation of Turkish Republic. (Karslı, 1989).

The basis of the current system in the stock exchange was introduced with a new regulation in 1922. Istanbul Stock Exchange started to operate under this title after the Securities and Exchange Trades Law No. 1447 and a regulation no 8172 in 1929.

In the early Turkish Republic era, transactions of foreign exchange were performed besides stocks. After 1931, due to the increasing volume of foreign exchange control, foreign exchange transactions became meaningless. After 1959 the role of the stock exchange on foreign exchange buying and selling was completely abolished. (Beşirli, 2009)

In July 1981, the Capital Market Law numbered 2499 was published in order to organize the activities of the capital markets in Turkey more efficiently and reliably. The regulation of the establishment and activities of the stock exchanges required by the Capital Markets was brought into effect on 3/10/1983 by the Council of Ministers on the basis of the authority

given by the Law No. 2810 dated 5/4/1983. The purpose of this regulation was to ensure confidence, stability and to play an active role in the economic development of the capital market through the organization, management, and supervision of the regulations. (Resmi Gazete Tarihi:06.10.1983, Resmi Gazete No:18183). Istanbul Stock Exchange (ISE) was established on December 26, 1985 and its activities started in 1986.

The name of the Istanbul Stock Exchange was changed to Borsa Istanbul as of 30 December 2012 by the publication of the Capital Markets Law No. 6362 in the Official Gazette. Moreover, Borsa Istanbul changed to corporation.

Clearing and settlement institutions in Turkey have evolved from a sub-unit in the exchange to separate institutions performing clearing, custody and settlement functions similar with the developed countries' case in the world.

Before Takas Istanbul was founded, settlement was executed between buy and sell sides of trade without clearing house interference between 1986 and 1988. This service was provided in Borsa Istanbul by settlement department (Takas Istanbul, 2016). In 1992, Istanbul Stock Exchange Settlement Inc.-Takasbank was founded and started to provide clearing and settlement service.

After the 1994 Economic crisis, some clearing houses were ruined. As a result of this, Capital Markets Board (CMB) assigned Takasbank for establishing an immobilized central custody system for equities based on end investors.

(Türkiye'de Merkezi Saklamanın Tarihçesi, [01.02.2017])

The equities had been kept at the clearing member accounts in Takasbank system without segregation of pool account and investor account until 1995. The customer based custody system was adopted in 1995 and the accounts of the clearing members were segregated into the customer and pool accounts. After this adaptation, equities were started to monitored under clearing member account based on end investor detail in Takas Istanbul. (TSPB, 2003).

In 1996 Takas Istanbul acquired banking license and increased its services via Capital Market Law and Banking Act based on Official Gazette issued number 22236 on 23 March 1995. In 2013, name of Istanbul Stock Exchange was changed to Borsa Istanbul and the name of ISE Settlement and Custody Bank Inc. was changed to Istanbul Clearing, Settlement and Custody Bank Inc.-Takasbank. In 2017, name of Takasbank was changed to Takas Istanbul.

1999 was a milestone for clearing and custody operations. In 1999, end investor based custody started and with this application, the end investors were registered in the identity information system.

Merkezi Kayit Istanbul was founded in 2001 based on Article 1 of Law No. 4487 dated in December 15, 1999 and Article 10 / A of the Capital Markets Law No. 2499 but until 2005 the function was fulfilled by Takas Istanbul.

Dematerialization of equities started in 2005 within the MKK. The equities that is hold physically in Takas Istanbul counters and end investor accounts are transferred to Merkezi Kayit Istanbul. Today, all equities, mutual fund shares, warrants, bonds and bills are monitored by Merkezi Kayit Istanbul account base and electronically. The rights related to these assets are legally reflected in the MKK records. With all these functions of MKK, it is a Central Securities Depository (CSD) for Turkish Capital Market. (About MKK, [14.01.2017]

4.3. Values, Targets and Importance of Takas Istanbul

Increasing economic welfare in a country is directly proportional to the ability of transferring savings into profitable investment opportunities. One of the most effective and fast way of transferring savings into investment opportunities is undoubtedly the capital markets. However, in order for savings to be invested in capital markets, people need to be convinced that these assets can be reliably managed. In order to ensure confidence in the capital markets, there is a need to ensure that transactions are performed reliably and quickly, and that the parties fully fulfill their obligations to each other following their purchase and sale.

Capital markets have crucial role for economy in establishing a close relationship with the money market. Capital markets have to work efficiently to increase confidence of the Money market. Capital markets redirect savings to business and provide opportunities for society. Trading, clearing, settlement and custody systems must work effectively to support economic development. In capital markets, post clearing and settlement may not be considered as crucial as trading. As long as they function effectively, we cannot realize its importance but if the system fails and it does not maintain its business, participants of capital market can be exposed to losses and the losses can increase risk in economy as a whole. In this part we try to analyze the importance of clearing houses in the World capital market and also in Turkey.

In the capital markets; equity and cash settlement is one of the most important risk areas for both domestic and foreign investors. Clearing institutions are crucial for attracting investors by reducing these risks and increasing efficiency. Therefore, these institutions should be reliable, efficient, able to follow innovations in the market, be high-tech, innovative, competitive and cost-effective.

As in the whole world, the efficiency of clearing and settlement systems in Turkey is very important for the capital market. Turkish capital market is regulated and supervised by Capital Markets Board of Turkey (CMB) according to Capital Markets Law. CMB aims to provide safe, effective and transparent environment in capital markets with the protection of end investors' rights. (Capital Markets Board of Turkey, 2016) For this purpose; Takas Istanbul is an important institution for Turkish capital market. Main purpose of Takas Istanbul is to increase competitive power in Turkish capital and money market by providing custody, market operating clearing, settlement and finance services. (Capital Markets Board of Turkey, 2013) It defines its own vision as "Reliable, effective, innovative clearing, banking and central risk management services with standards similar with international quality. (Takas Istanbul, 2017)

We can summarize Takas Istanbul's values as (Takas Istanbul, 2017):

Trust: Takas Istanbul provides its services timely and completely based on the principle of honesty in relation to its customers, partners, stakeholders and employees.

Stability: Takas Istanbul contributes to financial stability in Turkey by providing effective clearing and custody services as an important infrastructure of the capital market.

Customer Orientation: Takas Istanbul provides clearing, custody and banking services and develops projects for meeting customers' current and future demands.

Effectiveness: Takas Istanbul uses investigative approach for developing clearing, custody and banking services and it also gets benefit from professional memory and corporate memory.

Transparency: Takas Istanbul makes necessary disclosures and announcements to the

public and interested parties in a timely and accurate manner.

Sustainability: Takas Istanbul uses continuous improvement approach, innovative and creative solutions to reduce risks in its services.

Robust Financial Structure: This principle is also very important for Takas Istanbul to meet the commitments in its all services but especially in central counterparty services.

Legal framework of Takas Istanbul is determined according to "Takas Istanbul -Articles of Association", "General Regulation on The Establishment and Operating Principles of Central Clearing and Settlement Institutions", "Istanbul Settlement and Custody Bank Incorporation Central Clearing and Settlement Regulation" and "Istanbul Settlement and Custody Bank Incorporation Central Counterparty Regulation".

(Legal Framework, [14.01.2017].)

According to "Takas Istanbul -Articles of Association", main business activities of Takas Istanbul are

Establishing, operating and managing financial services especially centralized clearing and settlement services, central counterparty services, market making, payment, transfer and reconciliation systems.

All kinds of payment, transfer, clearing, settlement, custody and reconciliation systems for international financial markets.

To make all kinds of contracts and legal transactions related to its services

To issue of any kind of capital market instruments within the framework of Capital Markets legislation,

Getting into partnerships with domestic and foreign organizations and participate in existing partnerships. (Takas Istanbul, Articles of Association, [14.01.2017])

Takas Istanbul is a member of European Association of CCP Clearing Houses (EACH), Association of National Numbering Agencies (ANNA), ISO TC68/SC4 Committee, Euro-Asian Stock Exchanges Federation (FEAS), Organization of Islamic Conference (OIC) Member States' Exchanges Forum, International Finance Institution (IIF), International Securities Services Association (ISSA) and SWIFT. Takas Istanbul also has cooperation agreements with international institutions such as Japan Securities Depository Center-JASDEC/Japan, SIX Securities Services (X-clear & SIS)/Switzerland, Korean Securities

Depository-KSD/ Korea, Abu Dhabi Securities Exchange/United Arab Emirates and Tunisian Depository & Clearing- TDC/Tunusia. (Takas Istanbul, Memberships, [14.01.2017])

We can also see Takas Istanbul as one of the institutions that provide the relationship between capital markets and Money markets in Turkey. The reason is that; some of the activities of Takasbank are similar to those of the Central Bank in terms of the features we mentioned in the previous sections of this study. There are significant similarities between the two banks as both the Central Bank and Takas Istanbul are transfer banks, both of them have credit mechanisms, currency markets operating systems, cash and securities settlement transactions. (Catana, 2002)

Providing financing of the capital market is one of the functions of Takas Istanbul. For this reason, Takasbank also acts as a serious bridge between capital markets and money markets. One side of the transactions on the capital markets is money and money transfers need very rapid transition. This happens with a very fast transfer system. In Turkey, the Central Bank is the final settlement institution of the TL. The national payment system of the Central Bank (EFT) is available only for banks. By the help of the protocol between Takas Istanbul and the Central Bank; brokerage houses can perform similar transactions with banks through Takas Istanbul's system. This liquidity opportunity provided by Takas Istanbul is also one of the most important effects in the development of capital markets. Considering all of these functional similarities, Takas Istanbul can be called the central bank of the capital market.

All over the world, it is very important to make the capital markets more efficient to decrease the damage caused by the financial crises and to prevent possible crises. One of the most important criteria that meet this basic objective is to strengthen the operational infrastructure of capital markets. The role of clearing and settlement institutions is crucial in capital markets in order to make clearing and settlement processes more efficient and secure. Because of this reason; clearing houses should provide a risk decreasing services such as Central Counterparty (CCP) service.

A Central Counterparty (CCP) is an organization that provides the clearing and settlement process by interposing between seller and buyer and guarantying the occurrence of cash and equity transactions between clearing members. (Ripatti, K. 2004)

The main function of CCP is to minimize the counterparty's risk in trading through modern risk management systems and security - cash clearing and settlement practices. CCP is in buyer position for each seller and seller position for each buyer and they guarantee the settlement of transactions. CCP uses methods of margining, mark-to-market valuation of transaction values on a daily basis, guarantee funds for risk management. In case of a member default, clearing members of CCP should fulfill membership requirements.

Recommendation documents issued by CPSS-IOSCO for securities exchange systems have been one of the factors accelerating the widespread use of CCPs today. These proposals demanded cost-benefit analyzes from the regulatory agencies and central banks of the countries to assess the establishment of CCP.

Since the CCPs minimize the counterparty risk in derivative instruments, the role they undertake in the crisis period especially has been increased especially after 2008 crises. After the crisis, transaction of default swaps which has reached considerable volume in international trade and some kind of derivative instruments became a legally obligatory in developed markets, especially in the USA. In fact, The Dodd-Frank Act, which entered into force in 2010, obliged the exchange of standard derivative instruments to be realized through CCPs in the USA. Similar arrangements have been introduced for European Union members' markets with regulations published by the European Securities and Markets Authority (ESMA). Before 2008 crises; most derivatives transactions were unregulated. With the regulations of ESMA and The Dodd-Frank Act, clearing institutions give CCP service and become buyer to every seller and seller to every buyer. Thus, clearing house guaranties the transactions to be settled and limits the risk in financial market.

Providing central counterparty service is also an important purpose of Takas Istanbul to reach developed countries' standards in the clearing and settlement service. According to international practices for capital market infrastructure institutions such as the CPSS-IOSCO Principles, establishment of CCP in equity market is inevitable for Turkey. In order to respond to this need and in the frame of CMB's Article of 6362, establishment of CCP has been accelerated. According to Official Gazette in 14 August 2013, Takas Istanbul was charged for giving CCP service in related markets.

Takas Istanbul became CCP in Securities Lending Market in September 2013, in Organized Derivatives Market in March 2014 and in Equity Market in June 2017 based on the Capital Market Law Number 6362. Collateral and risk management services have started to be provided by Takas Istanbul with central counterparty service. According to Istanbul Settlement and Custody Bank Incorporation - Takas Istanbul Central Clearing and Settlement Regulation; Takas Istanbul commits itself to complete the clearing and settlement process for trades which occur in Borsa Istanbul by providing collateral, guarantee fund and Takas Istanbul's capital. (Takas Istanbul Central Clearing and Settlement Regulation, 2016) With the start of providing CCP service in Equity Market, one of the main purposes of Takas Istanbul was achieved.

The central counterparty service is a financial market infrastructure service that can be requested by both the market participants and supervisory authorities for legal and financial consequences.

According to Takas Istanbul; the main advantages of CCP services to the market and investors can be summarized as follows;

• To manage and decrease Central Counterparty risk

• To establish legal liability for clearing members by CCP institution

• To decrease liquidity and operational risk,

• To manage information asymmetry,

• To increase financial reliability and efficiency,

• To increase the effectiveness of surveillance activities,

• To reduce brokerage and transaction costs,

• To reduce systemic risk

(Takas Istanbul, CCP, [14.01.2017])

In the World, there are two basic models for central counterparty services. In the first model namely, 'Principal model', legal responsible against clearing house is clearing members. In the agency model, legal responsible is investors. Takas Istanbul applies principal method for its

CCP service. Takas Istanbul is not responsible for the obligations of investors to clearing members. Takas Istanbul does not directly deal with the investors of the clearing members.

According to the CCP Market Risk Management General Application Principles; it is essential that risks are effectively measured and monitored in order to ensure timely and complete fulfillment of the obligations of the clearing members of Takas Istanbul. In this scope, duties of Takas Istanbul are:

a) Calculation and monitoring the initial margin level and revision of this in case of changing market conditions

b) Calculation of the guarantee fund by using the confidence levels which consider highly volatile financial fluctuations with low probability.

c) Monitoring variation margin for intra-day price and position changes,

d) Stress tests for margin requirements, guarantee fund contributions and sufficiency of CCP capital sources at regular intervals.

e) Monitoring of the financial sufficiency of the members and limiting their transactions according to their financial strength.

(Takas Istanbul, CCP Market Risk Management General Application Principles, [14.01.2017])

In Takas Istanbul risk and collateral management system, house and client CCP margin calculation – collateral accounts are kept separately. Margin calculation – collateral account of Non CCP account will include house and clients requirements in one account. (Figure 3: Account Structure of Clearing Member)

The margin requirements in the Equity Market will be calculated based on the positions that the members have carried. A position occurs when the order is matched on trade day (t). Total margin requirement is the sum of initial margin and variation margin.

Initial margin is requested against potential future exposures if any future default occurs. In the Equity Market, initial margin is required for each account with a position will be calculated by using Delta Hedge method. Variation margin is the difference between the market price and settlement price. Accordingly, variation margin is required for current exposures.

Guarantee fund will also be established for using default of members in case the default amount exceeds collateral of those members. This fund will be used for the equities that CCP service is provided by Takas Istanbul. Takas Istanbul will calculate the contributions of each member to the guarantee fund and can change the amount of contribution at the beginning of each month.

As we discussed earlier, we can divide Takas Istanbul's services as market operations, clearing and settlement, custody, collateral, asset transfer, data vendoring, international numbering. When we consider these different roles of Takas Istanbul in various areas and also the roles for increase efficiency and decrease risk which are mostly explained in this part of study, we can conclude that Takas Istanbul has crucial role for financial markets.

CONCLUSION

Capital markets which have developed rapidly all over the world since the second half of the 20th century are very important both for developed and developing countries because of their power to increase the economic performance of these countries. The transaction volume and interest of investors have increased with capital markets' integration all over the world. Clearing and settlement services also reached from national level to international level and the importance of these services are increased for the capital markets.

Securities transactions realized in stock exchanges are finalized within clearing, settlement and depository institutions and these institutions have crucial role in capital markets in the world because of its power to increase efficiency, competitiveness and stability of financial services.

There are a lot of studies about equity trading process in Turkey and also in the world but there are much fewer studies about clearing and settlement process. In this study, we have attempted to explain how clearing and settlement system works in Turkey and importance of Takas Istanbul on Turkish financial system.

The clearing and settlement process have a lot of steps starts with the trading, continues with clearing and ends with settlement which is changing the money and security between buyers and sellers. Clearing is the process between the trading and settlement which provides securities and cash to be ready for settlement. In the first part of our study, we explained clearing and settlement process with the help of main processes and institutions, principles of equity clearing and settlement, general structure of equity clearing and settlement system, account structure, instrument structure, basic trading terms and trading protocols, clearing process, settlement process, failed settlement and real time gross settlement. In this part, we explained the process day by day which start with the trade day (t) and finalized with the settlement day (t+2). We also tried to explain failed settlement process that occurs if the members do not fulfill its cash or security obligation.

In the second part, we have analyzed clearing and settlement system in the World. Firstly, we explained historical process of post trade in the world. Then we investigated institutions and organizations for trade and post trade such as IOSCO, European Securities and Markets Authority (ESMA), International Capital Market Association (ICMA), ISSA (International Securities Services Association). We also analyzed standards of the world post trade system by investigating standards of Group Thirty and Principles for Financial Market Infrastructures (PFMIs) which published by Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO). In this chapter, the most important reason for us to focus on the standards and principles of clearing and settlement is how this process should be organized. Correctly designed financial institutions increase the confidence by reducing risks in the market. This enables the markets to operate more efficiently and prevents the deepening crisis. One of the most important reasons for this view is the examples of the 2008 economic crisis. In addition to many macroeconomic factors, high leverage ratios, high volumes and complex operational processes in derivative markets were effective in the reasons of this crisis. During this crisis, the importance of the central counterparty's risk calculation systems has been understood more clearly. For example, Lehman Brothers' position in LCH.Clearnet could be successfully managed through effective collateral and risk calculation mechanisms. On the other hand, Lehman's position has suffered losses as much as 157 million Hong Kong dollars through the Hong Kong Stock Exchange. Because of this, HK Securities Clearing Company demanded 394 million Hong Kong dollar supplementary guarantee funds from the other members. HK Securities Clearing Company has failed when LHC Clearnet shows a successful CCP example. (Gregory, 2014, 43). As mentioned in this study; after 2008 Global Financial Crisis, many standarts and principles have been developed and the importance of post trade institutions has increaded.

Clearing and settlement institutions are crucial for capital markets because of the fact that clearing and settlement is one of the most important risk areas. Therefore, these institutions should be reliable, efficient, able to follow innovations in the market, be high-tech, innovative, competitive, cost-effective and have power to decrease risk.

When we consider Takasbank's compliance with the standards mentioned in the second section, we can say that Takasbank has similar structures with the leading clearing institutions

in the world. Takasbank, as the Central Counterparty (CCP), carries out efficient risk management with the collaterals it receives and its resources for the potential member bankruptcies. Takas Istanbul uses multilateral risk netting method in many markets and monitor members' portfolios and end investors' risks in real time through specific algorithms. Takasbank's these mechanisms help to prevent the deepening crisis. Moreover; in the last part, we have emphasized the development of Turkish clearing and settlement system and efforts based on Takas Istanbul case by explaining services of Takas Istanbul, historical process of clearing and settlement system in Turkey, values, targets and importance offTakas Istanbul.

In conclusion; we aimed to detail clearing and settlement process that is not discussed academically before this study and enlighten all stakeholders of the capital market about this process and Takas Istanbul's mechanisms for decreasing risks, increasing efficiency and reliance of capital market.

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Business Analyst –Manager at Ak Investment, Istanbul
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- Analyzing and planning business requirements
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- Projects:
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Business Analyst - Vice President at Garanti Securities, Istanbul
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Business Analyst – Assistant Manager at Ak Investment, Istanbul
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Business Analyst – Specialist at Takasbank, Istanbul - Stockholm
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- Worked in Nasdaq OMX – Borsa Istanbul – Takasbank Integration Project
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Stock Settlement Assistant Specialist at Takasbank, Istanbul
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- Responsible of clearing and settlement operations
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Middle East Technical University, Ankara - Research Assistant at Economics Department
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CONFERENCE TALKS AND SEMINARS

- Equity Clearing and Settlement in Turkey, 2nd Annual Int.Conf. on Social Sciences AICSS, June 2016
- Clearing and Settlement Traning to Macedonian CSD, FEAS Training Program, September 2014
- Clearing and Settlement Traning to SDC Jordan, FEAS Training Program, January 2014
- Clearing, Settlement and Real Time Gross Settlement Presentation to Nasdaq OMX,June 2013

PARTICIPATION IN SEMINARS AND CONFERENCES

- 2nd Annual Int.Conf. on Social Sciences AICSS (June 2016)
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- Euroclear Bank Clearing and Settlement, Belgium (September 2012)
- Turkish University Students Economics Congress, METU Economics Society (2007, 2009, 2011)
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