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Credit Default Swaps:
An Assessment and Pricing Issues

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CREDIT DEFAULT SWAP BASIS,
PRICING MODEL AND EVALUATION

ABSTRACT

The main purpose of this study is to examine Credit Default Swaps, its specifications and pricing models. Credit default swaps (CDS) played an important role in the financial markets especially during the recent credit. From this point of view examining CDS instrument is considered an important issue to examine.

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I. INTRODUCTION

Over the past five years the market for credit default swaps has well established and trading of them is increasing sharply and they are used as an indicator of credit risk of government and corporate bonds.

This study aims to analyze the Credit Default Swap Contracts and its pricing related with the market conditions. In the first part of the study some introductory information about credit risk will be given as it is important to understand what lies behind the logic of credit default swaps. Then some information on credit derivatives will be provided before focusing mainly on CDS.

The main focus of the study will be in depth analysis of credit default swaps. I will attempt to explain in detail "the definition, pricing, trading and market properties of the credit default swaps." It will be given special importance to the pricing of CDS and the three pricing models that have been created by Hull and White, Turnbull and JPMorgan The study also takes into account the recent credit crisis and its affects on the credit default swap markets. In this context, it will be also explained the roles of regulatory bodies in the credit default swap markets in the necessary parts of the study and the information on the usage of credit default swaps in Turkey.

II. CREDIT RISK

II. a. What is Credit Risk?

Credit risk in its simplest meaning can be defined as the probability that the credit customer or borrower will not be able to meet its obligations. Thus whenever a contractual counterparty does not meet its obligations the creditor is subject to a financial loss.

Credit risk is closely tied to the potential return of an investment, the most notable being that the yields on bonds correlate strongly to their perceived credit risk. The higher the perceived credit risk, the higher the rate of interest investors will demand for lending their capital. Credit risks are calculated based on the borrowers' overall ability to repay. The example is that an individual borrows a loan to set up a firm or to buy car or house at a smaller rate than a big firm and lender should take collaterals such as buildings, land which are difficult to liquidate it. However individual may default in the payment larger than the firm. So the premiums rates cannot be equal between them.

Credit risks are a vital component of fixed-income investing, which is why ratings agencies like Moody's evaluate the credit risks of thousands of corporate issuers and municipalities on an ongoing basis. Ratings are intended to elaborate and explain Moody's Bank Deposit Ratings, which incorporate and reflect such elements of credit risk that are shown in Table 2.1.

Table 2.1 **Credit Ratings (Source: Moody's)**

Aaa	Smallest degree of risk,	Investment High Grade
Aa	Long-term risks appear.	Investment High Grade
A	Offer good credit quality	Upper Medium Grade
Baa	Offer adequate credit quality. Unreliable over any great length of time.	Lower Medium Grade
Ba	Offer questionable credit quality. Obligations may be uncertain	Speculative Low Grade
B	Poor credit quality. Assurance of punctual payment of any long period is small.	Speculative Low Grade
Caa	Extremely poor credit quality. It may be in default, or may be in danger	Substantial Risk
Ca	Be usually in default on their deposit obligations.	Possible Default
C	Be usually in default on their deposit obligations, and potential recovery values are low.	Default

III. THE DEFINITION OF CREDIT DERIVATIVES

Credit derivatives are instruments which isolate credit risk and transfer from one party to another while keeping the loans on their books in return for a fee. It can be considered like an insurance. Credit derivatives became an important source of investment for banks, insurance companies and institutional investors (Hull, 2004).

The contract is related with the single reference entity or more entities. Reference entity is an entity which has created debt. If the default term is realized, it should be paid in cash so a reference entity is needed. Maturities are usually from one to ten years as counterparty credit risk limit liquidity for longer periods.

The main users of credit derivative instruments are banks. Insurance companies are the best protection seller for companies. However, the insurance companies and securities and investors also used credit derivatives in a different reason like shown in Table 3.1.

Table 3.1 **The Credit Derivatives Users**

User	Buyer/Seller	Reason	Disposal
Banks (Legal Capital Management)	Seller	Increasing the equity	High
Banks (Economical Capital Management)	Seller	In the equity, reduce the risks, variety of credit portfolio	Low
Banks(Trading)	Seller/Buyer	Take more risks with leverage	Low
Insurance Companies	Buyer	Lower the insurance premium and hedge factor	High
Securities Companies	Seller	Hedge, portfolio man. and tax man.	Average
Bond Investors	Buyer	Return, provide from credit market	Low/Average

Moreover credit derivatives are also used for hedging purposes, synthetically creating loan or bond for companies that have not issued in markets. They help to improve credit portfolio management and increasing market volatility of spreads.

III.1 Types of Credit Derivatives

There are essentially four basic structures for credit derivatives. They have different names in different firms. These are credit spread option, total rate of return swap, credit linked notes and credit default swap. In this part, the credit derivatives will be briefly explained while credit default swaps will mainly be analyzed.

a. Credit Spread Options

Call option or put option has the right but not the obligation to buy/sell an agreed quantity of a particular commodity or financial instrument. Credit spread option is based on the change of a credit spread of a specific borrower. Credit spreads are the difference yields between an agreed reference rate and specific assets. The credit spread based on a market perception of the credit quality of the underlying asset is compared to benchmark. Spread may reflect the change in credit rating like a wide range of spread would give the signal of default.

Investor apply the credit spread option when the principal payment of debt is effected related to bank ratio. Moreover, investor would like to prevent himself from the decreasing of bond's rating. This makes larger the spread and bond's price will decrease.

The version of credit spread is that the spread relative to benchmark and credit spreads between two credit sensitive assets.

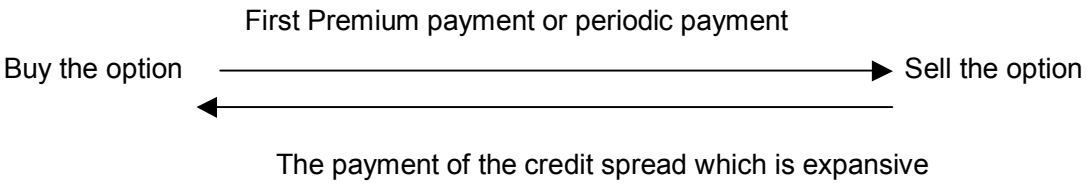


Figure 3.1:Credit Spread Option (Source: Demirer, 2005)

b. Total Rate of Return Swap

Total rate of return swap is usually used. These swaps allow an investor to receive an economic return without buying the asset. In total rate of return swap, one party pays the economic return.

The buyer makes a payment for the gain of capital and the interest rate of an entity in a determinant date. The seller usually makes a payment a floating rate depends on LİBOR and the loss of capital.

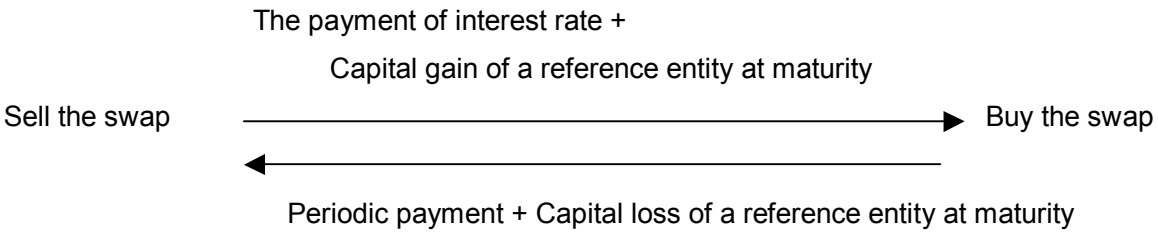


Figure 3.2 Total Rate of Return (Source: Demirer, 2005)

c. Credit Linked Notes

Credit linked notes is a combination of credit default swap and a bond. Like a bond, they have a regular interest rate payment and principal payment at the maturity. Credit Linked notes is found in a balance sheet. They are issued by a SPV (special purpose vehicle) or by a bank. Investor buy credit linked notes from SPV and intermediary institution buy Treasury bond or bond from selling the funds. The bonds should be a guarantee for the portfolio. Banks make a payment to investor and investor creates a LIBOR+ margin to protect themselves against to the default (Özyurt, 2003).

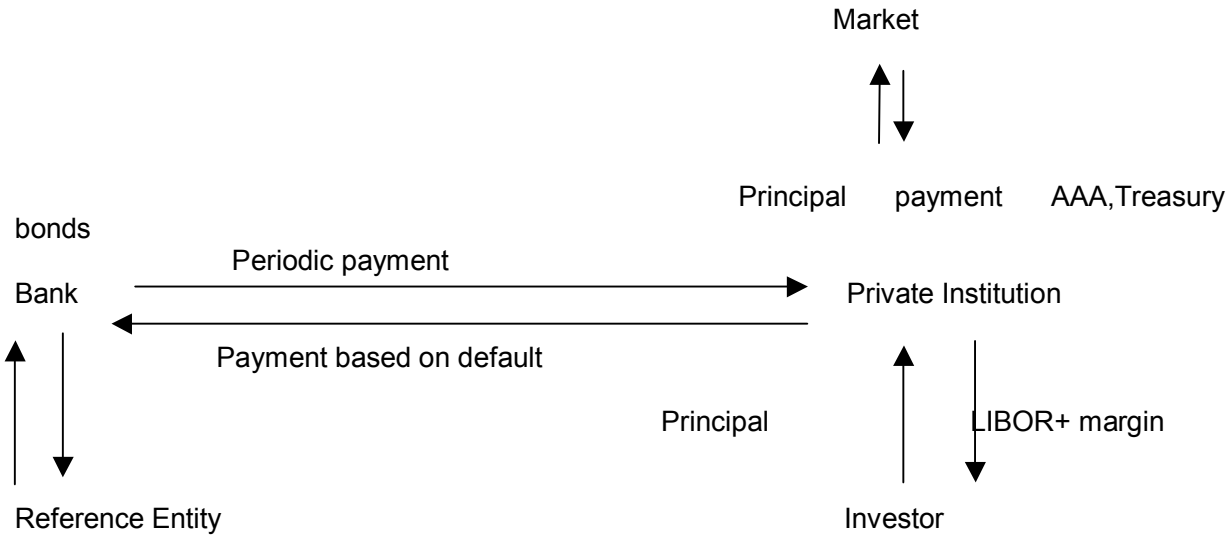


Figure 3.3: Credit Linked Notes (Source: Demirer, 2005)

Besides another type of credit derivatives that is widely used is credit default swap. CDS is that have the greatest share among all credit derivatives and trading volume is greater than those of trading in underlying cash bonds by a considerable margin (see Appendix-I Table 3.2).

IV. CREDIT DEFAUL SWAP

Credit default swap is the most straightforward type of a credit derivative that is the bilateral financial agreement to transfer default risk of a credit between banks, that acts as insurance on debt.

There are two types of reference entity that are used for credit default swap that should be a corporate bond traded at the market. One is Single-name CDS that is the credit derivative where the reference entity is a single name and the other is multi-name CDS which is a contract where the reference entity is more than one name, as in portfolio or basket credit default swaps or CDS indices (www.bloomberg.com).

In this contract, the protection buyer will make a periodic payment to the seller in exchange for a lump sum (lump sum is a one-time payment of money, as opposed to a series of payments) payment in the event of default.

The payoff is contingent on default by a single reference entity. This contract provides insurance against the risk of a portfolio by a company. The buyer of the contract obtains the right to sell a particular bond issued by a company. The bond is known as the reference obligation.

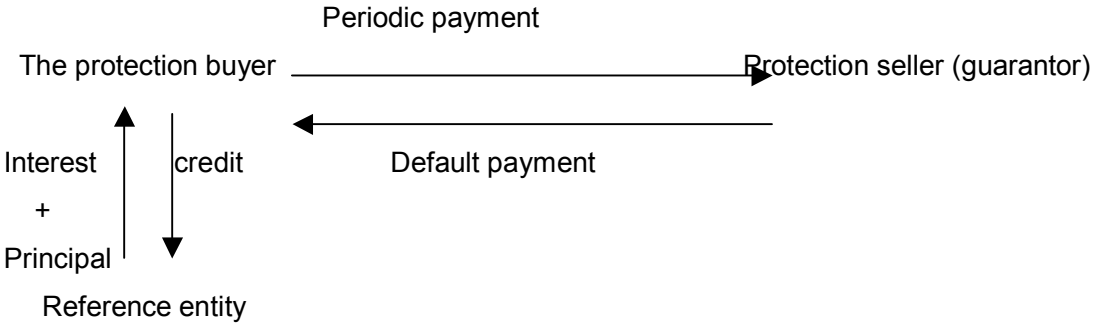


Figure 4.1: Credit Default Swap (Source: Demirer, 2005)

The buyer makes periodic payments to the seller until the event of default occurs. Credit event generally requires final accrual payments by the buyer.

The swap can be settled by either cash or physical. Physical settlement can be bonds. Swap buyer delivers the bonds in exchange for their par value. In contrast to the

physical settlement, cash settlement bond's price is determined in the mid- market such as (100 – Q) % of the notional principal.

When the delivery has to be cash settlement, the seller who is short, should pay the difference between nominal – recovery rate. However, if the delivery has to be physical settlement, in a default swap with physical settlement, in case of a credit event, the protection buyer has to deliver obligations in the set of deliverable obligations for the reference credit. Therefore, the buyer will try to maximize his payoff by delivering the cheapest deliverable obligation so the delivery should be the bond that is cheapest to deliver over the nominal.

IV.1. Recovery Rates

The recovery rate is defined as the percentage of par value return to bondholder if a default occurs. It is a function of several variables. Some of this is the seniority of the bond and its collateral. The recovery rates are affected by economic condition and liquidity of the market.

The way of calculating recovery rate is pursuing all payments made on a defaulted debt instrument, discounted them to the date of default and use the percentage of the par. However, this calculation is not exactly enough. It should be assumed the values of payments as discount rate.

Moody's definition about the recovery rate is the trading prices of default instrument have been used as a proxy for the present value of final recovery. The company collected the prices after the default occurs. So this is the estimation of the actual recovery, not using the percentage of actual issues prices.

If the default event does not occur, the price of a bond is;

$[1-P(T)]100e-y'(T)T+P(T)100\,\mathrm{Re}-y'(T)T$ then

$100e-y(T)T=[1-P(T)]100e-y'(T)T+P(T)100\,\mathrm{Re}-y'(T)T$

Then,

$$P(T)=\frac{1-e^{-\{y(T)-y'(T)\}T}}{1-R}$$

Where
y(T) : Yield on a zero-coupon bond of a corporation with T years of maturity.
y'(T) : Yield on a risk-free zero-coupon bond with T years of maturity.
P(T) : Probability that the corporation will default between time zero and T

The recovery rate and default probability are positively correlated like the recovery rate estimation can have on the performance of an organization, by the resultant improvements in risk estimation and pricing.

IV.2 CDS Market

CDS instruments are traded on Over-The-Counter and as a result standards of the term sheets can change according to agreement between buyer and seller. The majority of trades have a maturity of 5 years and the notional amounts of a single trade usually happen to be 10 or 25 milliıon USD (JPMorgan, 2000).

BIS statistics showed through tables that are the user of CDS at end June 2008 (see Table 4.1-4.4).

Table 4.1 **Credit Default Swaps Market- Single Name Instruments (Source: BIS)**

Credit Default Swaps Market			
Single-name instruments			
Notional amounts outstanding at end June 2008			
In millions of US dollars			
	Notional amounts outstanding bought	Notional amounts outstanding sold	Total
Total Single-name instruments	26,610,244	25,812,040	33,334,056
Reporting dealers	19,139,058	19,037,398	19,088,228
Other financial institution	7,056,529	6,589,431	13,645,960
Banks and security firms	4,069,741	3,744,564	7,814,305
Insurance and Financial guaranty	145,838	95,815	241,653
Other	2,840,950	2,749,052	5,590,002
Non financial institution	414,656	185,210	599,866
Maturity of one year or less	2,293,919	2,149,737	2,785,875
Maturity over 1 year and up to 5 years	17,510,932	17,274,774	21,811,954
Maturity over 5 years	6,805,405	6,387,503	8,736,224
Sovereigns	1,659,492	1,640,949	2,177,364
Non-sovereigns	24,950,772	24,171,100	31,156,712
Investment grade	17,379,858	17,217,692	22,154,782
Below investment grade	5,534,503	5,343,433	6,756,316
Non-rated	3,695,886	3,250,915	4,422,961

Table 4.2 **CDS Gross Market Values (Source: BIS)**

Credit Default Swap Market	
Single-name instruments	
Gross Market Value at end June 2008	
In millions of US dollars	
	Total Gross Market Values
Total CDS Contracts	1,889,079
Reporting dealers	959,465
Other financial institution	893,461
Banks and security firms	450,782
Insurance and Financial guaranty	17,883
Other	424,846
Non financial institution	36,150

Insurance companies do not use much more single-name CDS despite the fact that reinsurance companies have been notable participants in this market.

Corporate credit risk bas been viewed by insurance companies as uncorrelated to other underwritten risks, CDS offers an opportunity to create greater diversification. On the other hand, banks and security firms are the best buyer and seller for the credit. Moreover, the rating as I mentioned is important for buyer and seller protection. Then 65% of the CDS is bought and sold from the Aaa, Aa companies or countries (BBA, 2002).

Table 4.3 **CDS Market - Notional Amounts Outstanding (Source: BIS)**

Credit Default Swaps Market			
Notional amounts outstanding at end June 2008			
In millions of US dollars			
	Notional amounts outstanding bought	**Notional amounts outstanding sold**	**Total**
Total CDS contracts	45,852,804	44,555,188	57,324,560
Reporting dealers	33,308,970	32,857,900	33,083,434
Other financial institution	12,009,726	11,286,947	23,296,672
Banks and security firms	6,984,946	6,698,332	13,683,278
Insurance and Financial guaranty	278,676	119,304	397,980
Other	4,746,104	4,469,311	9,215,414
Non financial institution	534,107	410,342	944,449
Maturity of one year or less	3,326,852	3,092,123	3,968,089
Maturity over 1 year and up to 5 years	29,537,980	29,144,670	36,923,376
Maturity over 5 years	12,987,974	12,318,393	16,433,090
Single-name instruments	26,610,244	25,812,040	33,334,056
Multi-name instruments	19,242,560	18,743,148	23,990,504

Table 4.4 **CDS Market- Gross Market Values (Source: BIS)**

Credit Default Swap Market	
Gross Market Values at end June 2008	
	Total Gross Market Values
Total CDS Contracts	3,172,456
Total CDS contracts	1,678,302
Other financial institution	1,429,520
Banks and security firms	736,566
Insurance and Financial guaranty	25,581
Other	667,373
Non financial institution	64,630
Single-name instruments	1,889,079
Multi-name instruments	1,283,378

We have same results with the gross market value with the single named instruments. Generally, CDS is preferred for the medium term maturity. However, the best trader are the dealers.Investor prefered their intvestment to reduce risk so the biggest ratio about the notional amounts is to reporting dealer. However, 58% of the contracts are dealt with the financial institution are banks.

It can be asked that why people are buying a credit default swap?

We can define in three reasons.

1) Liquidations of those who sold previously and not able to pay huge margin calls
2) People switching counterparties. If you are long protection on Russia from MS or GS (or Lehman), the counterparty risk can be now non-trivial and I can imagine risk managers coming to tell to switch to another counterparty, and there are not many of them
3) Traders cynically buying resemblance of hedge for their other positions they cannot liquidate. It might be painful to pay 1000 for Russian protection. But say if you are told to be square on country exposure, and you know that half of your department will be cut end of December, you 'd better BE SQUARED when decisions are made, right? And the fact that the bank will be paying 1000 spread on Russia (less likely to default than many G7 countries) or 1300 bps on Kazakhstan (which does not have deliverable bonds to default on, and unlikely to be able to issue those in current environment) are of smaller consideration. So, it is as simple as traders cheating their management.

More interestingly, why nobody is selling?

1) CDS as a product might be a risk. With what is going on, the probability ISDA stops the market is non-trivial.
2) Are you sure the guy who is now promising to pay you this spread during next 5-10 years will be there to honor if spreads collapse and he needs to pay the margin calls? It should be much safer to buy the cash bond.

After Lehman Brothers Holdings Inc. filed for bankruptcy in September, sellers demanded more collateral on existing swaps. That's sucked away cash that could have been offered up for loans or invested elsewhere — one of the many factors that helped put credit markets into a coma (Rubenstein, 2008).

The Lehman bankruptcy, although resulting in sizeable losses for a number of market participants, did not lead to the unraveling of the CDS market. Moody's believed that the losses result of exposure to Lehman as a major counterparty, as opposed to exposure to Lehman as an underlying reference issuer on outstanding CDS. So disruption in or losses through the CDS market due to the Lehman Brothers bankruptcy have not, in and of themselves, resulted in the downgrade of any Moody's-rated

company to date. Moody's continues to see the possible failure of a large CDS market participant, such as a dealer, as a potential source of systemic risk (Moody's, 2008).

IV.3 Risks of Credit Default Swaps

Although CDS has lots of advantages to hedge and to insure the buyer, there are some risks too. This can be the risk of sheer size. Based on the fact that there were many CDS outstanding which is larger than the combined gross domestic product of every country on Earth. Since the market for the swap is larger than initial loans, CDS have magnified risk. The compounding risk is the murkiness of the market. Because of the murkiness of the market for credit default swaps, it's hard to know who would take a financial hit if the swaps were erased.

Delphi was the best example for the credit derivatives defaulted. It can be explained how the company was defaulted. The US car parts maker that went bankrupt in 2005 and which had about $25bn of CDS on the company's debt that exceeded the value of underlying bonds. The credit derivatives industry has taken to deal with the bankruptcy of Delphi Corp. It is related how an auction to determine the price for these bonds was agreed to and acted upon by the industry. Buyers of credit insurance scrambled to buy the bonds, driving up their price to around 70 cents on the dollar, a startlingly high value for defaulted debt. Market participants worked out an auction system where settlements of Delphi contracts could be made even if the bonds could not be physically delivered. This arrangement was done at just over 36 cents on the dollar; so buyers of protection on Delphi who did not have the bonds received $366.25 for every $1,000 in coverage they had bought. Had they been valuing their Delphi insurance coverage at $1,000 per bond, they would have had to write off that position by $633.75 per $1,000 bond. That is why the valuation of these contracts is of such concern to some participants. As with other securities that trade privately and by appointment, assigning values to credit default swaps is highly subjective (Tozum, 2005).

Those defaults make important for the risk management of credit derivatives. One of the researches about the risk management is FitchRatings special report on global credit derivatives in March 2003. The report is about the Fitch-rated entities acting as buying credit risk. The report shows that the credit derivatives have an explosive growth, immaturity, and relative lack of transparency present unique risks.

The survey is approximately 200 banks, insurance companies, reinsures, financial guarantors, and broker-dealers located around the world, focusing primarily on those buying credit risks through credit derivatives. Fitch used its results to date in response to the market's focus on credit derivatives and the relative paucity of hard data. Fitch follows up with the institutions that have reported large exposures to better understand the degree of risk assumed (FitchRatings, 2003).

Banks appear to have been risk transfer product. Fitch recognizes that the credit derivatives market has the potential to benefit the global financial system by promoting greater diversification and diffusion of risk. Banks and broker dealers do seem to be taking the benefits of active portfolio credit risk management techniques utilizing credit derivatives, as well as loan syndications and other hedging techniques (FitchRatings, 2003).

As a result, Fitch believes investors and the market as a whole would benefit from greater transparency and disclosure and anticipates providing additional market commentary as additional information is processed and in response to other market developments (financial reporting and disclosure, hedge funds, and risk management practices, among others).

V.CDS PRICING

In this part pricing modes are explained although BIS' research has already proved that there is not specific CDS pricing model all over the world, the models has been applied without any testing and there is not enough pricing application about the complex product like CDO. The correlation about the basis asset' default founded in portfolio is important.

These models are Jarrow Turnbull (1995) Hull and White Model (2000) and JPMorgan Model. Jarrow Turnbull and Hull and White models calculate the credit default swaps using spread between yields on corporate bonds and treasuries. JPMorgan model explain the issues around trading CDS in Points Upfront which the trade off-market realizes the risks.

For all models, the elements of pricing are the default risk, interest rate risk and the recovery rate risk. In trading market, bond has interest rate risk, the possibility of default such as default risk and the valuation of default for the residual market is the recovery rate risk.

V.1. Jarrow and Turnbull Model (1995)

Jarrow Turnbull model explain a pricing theory with credit risk based on bond market. There are two sources of credit risk. Default risk of reference entity and writer of protection seller.

The model is related with frictionless economy with a trading period $[0, \Pi]$ with default free zero-coupon bond and ABC zero coupon bonds of all maturities is subject to default. When the default occurs the bondholder receives less than face value. The percentage value is fixed for all during the credit event occurs (Jarrow andTurnbull, 1995).

JT models assumes that ABC zero coupon bonds have positive prices. V (t,T) > 0. This means it is not divisible by zero. When the credit event occurs, bondholder receives less than face value and it is fixed for all risky instruments.

ABC zero coupon bonds are divided by two such as the hypothetical currency and it prices in dollars. The currency will have two possible values which one is the company default or not.

At time t;

e (t) = δ with probability λ.μ if default occurs

e (t) = 1 with probability 1-λ.μ if not

where; δ is the recovery rate

λ.μ martingale probability of default *(*a **martingale** is a stochastic process (i.e., a sequence of random variables) such that the conditional expected value of an observation at some time *t*, given all the observations up to some earlier time *s*, is equal to the observation at that earlier time *s)*

Under martingale probability of default there pricing formula will be arbitrage free.

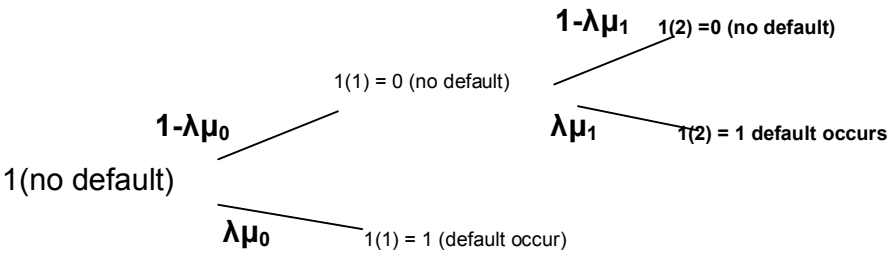
The CDS payment will be

1(t) = 0 with prob. 1-λμ

1 with prob. λμ

1(t) = 0 means that reference entity has not defaulted at time t and 1 when it has defaulted. In the default case face value is 100 and the payment is found by 100 minus value of reference entity.

The payment is shown by using tree at time 0, 1 and 2.



The value of CDS at time 0 is;

$$v_1(0,1) = p_0(0,1)\frac{[\lambda\mu_0\delta + (1-\lambda\mu_0)]}{r(0)}$$

And time 1;

$$v_1(0,2) = p_0(0,2)[\lambda\mu_0\delta + (1-\lambda\mu_0)] * r(1) * p_1(1,2)$$

Where v (t, T) is the value of CDS p is the price of zero coupon bonds at time t paying at time T, δ is recovery rate, λμ is the probability default and r(t) is the money market account's value. We can calculate the CDS valuation with using the equation. However, we should find the assumption for the recovery rate and probability of default. JT model assume the recovery rate is known and fixed for all corporate bonds.

The model is based on risky bonds prices with using recovery rate like δ*100 when the default occurs.

Pricing two period bonds is slightly different from one period bond. The reason is interest rates can go up or down. Therefore interest rates and default situation are unstable. For each state we need to multiply separate probabilities of interest rate going up or down. Therefore the value of two-year credit risky bond is calculated as follows:

$$v(0,2) = \{p(0,1)[(1-\pi) * p_d(1,2) + p_u(1,2)]\lambda(0)\delta\} + \{p(0,1)[(1-\pi) * p_d(1,2) + p_u(1,2)][1-\lambda(0)][(1-\lambda(1)] + I(1)\delta$$

In general

$v(0,T) = p(0,T)E_0[e_T / default]$ if no default

$v(0,T) = p(0,T)\delta$ if default

Therefore

$$E_0[e_T / default\ ] = \frac{v(0,T)}{p(0,T)}$$

The present value of the expected payoff for the protection seller is:

$p(0,1)*\lambda(0)*(1-\delta) + (1-\lambda(0))* p(0,2)*\lambda(1)*(1-\delta) * (1-\lambda(1)) + p(0,3)*\lambda(2)*(1-\delta) + (1-\lambda(2)) * p(0,4)*\lambda(3)*(1-\delta) + (1-\lambda(3)) * p(0,5)*\lambda(4)*(1-\delta) + (1-\lambda(4))$

where

$\lambda(0) = p(0,1) - v(0,1) / p(0,1)*(1-\delta)$

$\lambda(1) = p(0,2)(\lambda(0) (\delta-1)+1) - v(0,2) / p(0,2)*(\lambda(0)-1) (1-\delta)$

and so on…

$p(0,1)*\lambda(0)*(1-\delta)$ is the probability of default at time 1 multiplied by present value of 1 minus recovery rate.

V.2. Hull and White (2000)

HW model is pricing the CDS with payoff on unpredictable default and no counterparty default risk. The prices and yields of the defaultable bonds and the risk free bonds are two main sources of data for calculation.

The valuation of CDS requires estimates of the probability that the reference entity will default at some time in future. According to HW, there is only one reason a corporate bond sells more yields than a similar Treasury bond. This reason is possibility of default.
Therefore Hull and White calculate the present value of cost of defaults using the following formula.

By using the relationship, it can be calculated the value of cost of default and also can be made an assumption about the recovery rates (HW, 2000).

"***PV of Cost of Defaults = Value of Treasury Bonds – Value of Corporate Bonds***"

The following example can explain this equation: Five years zero coupon Treasury bond with face value of 100 yields 4.23% 4 similar five years zero coupon bonds issued by a corporation yields 5%. The value of the bond is 100e-.0423*5 or 80.9369 and the value of corporate bond is 100e-.05*5 or 77.8801.
80.9369 - 77.8801 = 3.0568

The difference between these two values is the present value of cost of default.
If we assume that there are no recoveries, the probability of default is 100*p*e-.0423*5

Therefore we can calculate the probability *p* :

100*p*e-.0423*5 = 3.0568

Then, *p* = 0.0377 or 3.77%.

However there are two main reasons not to calculate default probabilities in this way. First, recovery rate is generally different from zero and the other reason is that most corporate bonds are not zero coupon bonds.

In this model, the payoff from CDS in the event of default is face value minus market value of reference entity after default. This model assumes market value of reference entity after default is recovery rate times the sum of face value and accrued interest.

Then payoff is:

$$L - RR \times L \times (1 + A(t)) = L \times (1 - RR - A(t))$$

where L = face value

RR= recovery rate

A(t)=accrued interest

Now we need a set of N bonds that is considered to have the same risk of default as the reference entity. For the time being default can only happen at the maturity dates.

Also we assume that interest rates are deterministic and both recovery rates and claim amounts are known. The price at time *t* of no default value of the *j*th bond is F*j*(*t*). If there is a default than:

$$a_{ij} = v(t_i)\left[F_j(t_i) - RR(t_i)C_j(t_i)\right]$$

where

a_{ij} *= PV of loss*

$v(t_i)$*=PV of bond*

$F_j(t_i)$ *=Forward price of risk free rate*

$RR(t_i)$ *=Recovery rate*

$C_j(t_i)$*= Claim made by holders*

There is a probability of pi of the loss of a_{ij} being incurred. The total present value of the losses is:

$$P_{RiskFree} - B\sum p_i a_{ij} = 1$$

$P_{Risk\ Free}$ = *Price of risk free bond*

B_j = *Price of jth bond today*

As I mentioned earlier recovery rates are known.

HW also assumes that in the event of a default, risk free interest rates and recovery rates are mutually independent.

If defaults happens at time t, the present value of the payments is *w*[*u(t) +e(t)*]. If there is no defaults the payments is *wu(T)*

where

u (t) = Present value of payments at the rate of $1 per year on payment dates between time zero and time t.

w = Total payments per year made by buyer

e (t) = Present value of accrued payments at time t

The value of the CSD to the buyer is:

$$\int_0^T [1 - RR - A(t)RR]q(t)v(t)dt - w\int_0^T q(t)[u(t) + e(t)]dt - pwu(T)$$

CDS spread is:

$$s = \frac{\int_0^T [1 - RR - A(t)RR]q(t)v(t)dt}{\int_0^T q(t)[u(t) + e(t)]dt - \pi u(T)}$$

where RR = Recovery rate

A(t) = accrued interest on reference entity

q(t) = default probability

v(t) = present value of $1 received at time t

u(t) = present value of payments at the rate of $1 per year on payment dates between time zero and time t.

w = total payments per year made by buyer

e(t) = present value of accrued payments at time t

p = risk neutral probability of no credit events

With the approximation, the equation will be:

$$s = \frac{s^{*} \times (1 - RR - \alpha RR)}{(1 - RR)(1 + \alpha)}$$

where a = average value of A(t) for 0 < t < T ,

s* = difference between the yield on corporate bond and Treasuries.

This equation assumes that interest rates are constant and treasury yield curve is flat.

,

V.3. How to trade CDS?

1. Trading

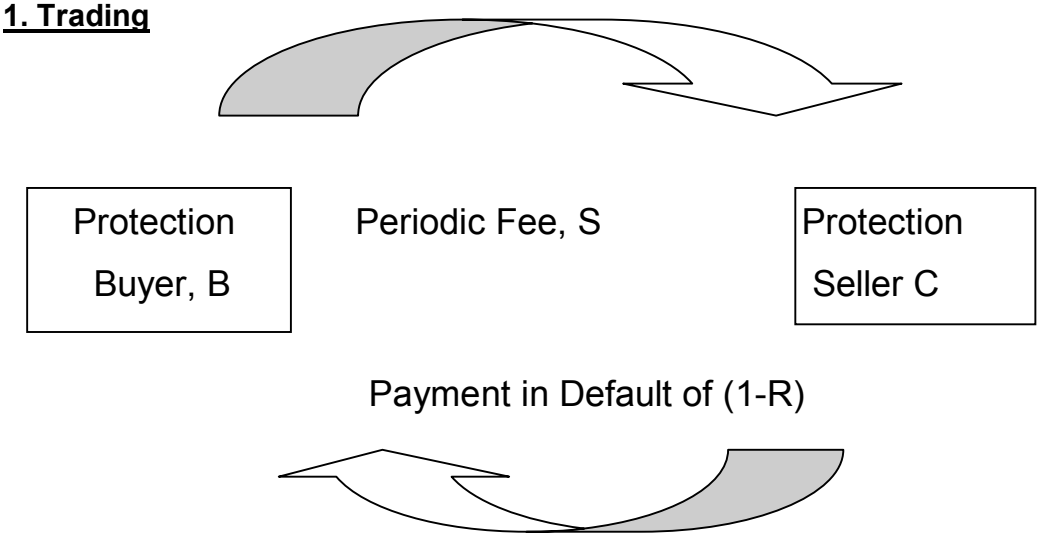


Figure 5.1 CDS Structure (JPMorgan, 2008)

When a credit event occur, the buyer of protection will deliver defaulted bonds with a notional equal to that of the CDS contract and in return he will receive 100% of the notional. We call the price of these defaulted bonds the Recovery-rate (usually a % of the notional). The net result is that the buyer pays S annually and receives (100%-Recovery) in the event of a credit event (JPMorgan, 2008).

This is not new phenomena and is frequently employed when CDS spreads trade at very high spread level. In this part of the study, the trading CDS in upfront format and direct the risks that result from unwinding off market CDS contract are explained.

Firstly, it should be defined what the upfront contract is. The deal spread is fixed at the start of the contract rather that using the prevailing market spread. This results in an upfront payment as we would get from an off market.

CDS point upfront contract can be compared with the discount high yield bonds. In the bond world, buying the CDS protection is comparable to a company issuing floating rate note, where the coupon above Libor is equivalent to the additional yield, above the risk free rate, that the company pays on its debt.

Why trading in Points Upfront is normal when spreads become very high. It can be defined three reasons for this condition such as CDS is that protection buyers do not want to commit to paying high coupons and sellers do not want to bear such high coupons and full notional, is that trading in points upfront facilitates trading as

counterparties do not have to agree on the recovery rate and curve used before trading and is that have a lower duration than Par CDS and are easier to risk manage (JPMorgan, 2008).

One Time Step Pricing

PV (Expected Spread Payments) = PV (Expected Payout from Default)
PV (E [Spread Payments]) = PV (E [Payout from Default])
S = PD x (1-R)

S is spread
PD is probability of default
R is recovery rate in %

The important point to note is that a change to any one of these three components
must change at least one of the others for the equation to balance.

Multiple Time Step Pricing

The standard Par CDS – contract with the initial spread equal to the prevailing market spread, the interception of the trade, neither the buyer nor the seller pay anything to the counterparty until the expected value of the default payment equal to the expected value of spread payment. The spread payment means the **Fee Leg**, and the default payment of the swap is the **Contingent Leg**.

We can define the equation like;

$$\underbrace{S_N \times \sum_{i=0}^{N} \Delta_i \cdot PS_i \cdot DF_i + AI}_{PV\ (ExpectedSpread)} = \underbrace{(1 - R) \times \sum_{i=0}^{N} PD_i \cdot DF_i}_{PV\ (ExpectedDefaultPayout)}$$

Where;
S_N is the spread protection for N years, as time t_0
Δ_i is the length of time i in years
PS_i is the probability survival to time i at time t_0
PD_i is the probability default at time i
DF_i is the risk free discount factor to time i, as at time t_0
R is the recovery rate on default in %
AI is the accrued interest on default.

Now since the risky annuity tells the present value of 1bp, it can be also used to tell us the present value of SN basis points.

The method of Points Upfront is used when the buyer do not want to pay more annually and it should be compensated the protection seller with paying an upfront amount equal to the risky present value that buyer is paying underpaying annually.

$$\underbrace{Upfront + Running \times \sum_{i=0}^{N} \Delta_i \cdot PS_i \cdot DF_i + AI}_{PV(ExpectedSpread)} = \underbrace{(1-R) \times \sum_{i=0}^{N} PD_i \cdot DF_i}_{PV(ExpectedDefaultPay.)}$$

Where;
Upfront is the payment on the contract at the interception
Running is the fixed spread for the contract.

These two equations are combined and CDS pricing equation is;

$$Upfront = (S_N - Running) \times \sum_{i=0}^{N} \Delta_i \cdot PS_i \cdot DF_i + AI$$

Points Upfront trading has no difference with the CDS contract where the market spread has moved away from the initial deal spread. For a Par CDS, there is any upfront amount paid. Nevertheless, when the spreads will be different from the initial, the contract will have a mark to market based on the current market spread is related with the initial spread.

2. Unwinding CDS Contracts

Firstly we define what the unwinding CDS is and its importance for the risky annuity. Unwinding is the creation of the mark-to-market of CDS contract where counterparties exchanges payment based on market-to market. The payment is same as with the upfront payment such as the upfront + running.

$$MtM_T = [S_T - S_0] \times Annuity + AI$$

Where AI is accrued interest

The cash flow becomes more risky because of the default occurs.

The equation becomes;

$$
\begin{aligned}
&MtM_{\,t} = Value_{\,t} - Value_{\,0} + AI \\
&= \left[PV_t(Contingent\ Leg) - PV_t(FeeLeg)\right] - \left[PV_0(Contingent\ Leg) - PV_0(FeeLeg)\right] + AI \\
&= \left[PV_t(E(1-R)) - S_{N,0} \times Annuity_{\,N,t}\right] - \underbrace{\left[PV_0(1-R) - S_{N,0} \times Annuity_{\,N,0}\right]}_{=0} + AI \\
&= \left[PV_t(E(1-R)) - S_{N,0} \times Annuity_{\,N,t}\right] + AI \\
&= \left[S_{N,t} \times Annuity_{\,N,t} - S_{N,0} \times Annuity_{\,N,t}\right] + AI \\
&= \left[S_{N,t} - S_{N,0}\right] \times Annuity_{\,N,t} + AI
\end{aligned}
$$

Suppose that an investor buy a protection on company ABC at time 0 for the spread. When he wants to sell the protection at time T the price of protection will be S_T – S_0 unless the default event occurs. However, there is a risk to be defaulted. It should be calculated mark-to-market as shown above, the annuity and accrued interest should be known. Suppose that there is zero interest rate and find the annuity using the equation is;

$$RiskFreeAmuity_N = \sum_{i=0}^{N} \Delta_i \cdot DF_i$$

where $DF_i = \dfrac{1}{(1 + RiskFreeRate_i)^i} = DiscountFactorforMaturity, i$

If spreads increase, the probability of default increase does the risky annuity resulting in a present value.

It can be best understood with giving an example about the marking to market a CDS contract.

Suppose an investor buys protection on company ABC at a spread of 100bp and the market spread on company ABC raises to 450bp. So the MtM of the contract is shown in figure equal to 1,372,870.98 for a $10m notional trade. However, it should be known that this is not equal to (450-100)bp times spread DV01. (Which is 350*3,393,39=1,187,686,5) This is because the spread DV01 and the risky annuity are not the same as the contract moved away from Par. We can find a more correct risk

annuity by using the MtM equation. We put a par contract with a deal spread and current spread.

$$MtM = [S_T - S_0] \times Annuity_T + AI$$
$$= [450 - 100] \times 3{,}920.98 + 0(Figure\ 2)$$
$$= \$1{,}372{,}343$$

There are examples about the CDS with using Bloomberg that are shown in graphs 5.1 and 5.2.

3. Risk Management

The risk of discounted FRN compensated with hedging these with Par FRN and the factors affected by risk annuity are the spreads, CDS maturity curves and recovery rates. Because given the current volatile market conditions, risk management of off-market CDS contracts has become increasingly important. With spreads moving more, offsetting annuity streams are becoming larger and risky annuities more volatile. This risk therefore needs to be monitored and hedged.

If CDS contract wanted to close out, an investor can either to unwind or to offset the contract. In an unwinding trade, investor closes out the contract for a gain or loss and came back to initial situation. An example about it such as the investor bought a contract a spread of 500bp and closes his position at 800bp so he gains present value about 300bp (800bp – 500bp) annuity stream. Assume that the risky annuity is 3 times, the investor receives;

$$Unwind = (S_T - S_0) \times RiskyAnnuity$$
$$= (800 - 500) \times 3$$
$$= 9\%$$

The offset CDS trading is 300bp.

If the investor prefers offsetting trade rather than unwinding the contract, he will receive 300bp per year as a running annuity. However, if the company ABC issues the underlying bond defaults, then the payment will stop. The initial annual payment is equal to MtM from unwinding trade as we saw earlier. As the spread changes, the risky annuity payment also changes (JPMorgan, 2008).

In practice is different from theory. The dealer is unable to find easily to the original counterparty to close the trade with unwinding. Rather, he will enter the offset at prevailing market spread of 800bp, he just receives 300bp from the annuity but the annuity is risky because of not having any payment in default. The risk is related with spreads, CDS maturity curve and recovery rate.

There are three factors that affect the annuity risk. These are the spreads, curves and recovery rates. We now analyze these three factors partially.

The first effect is the change of spread on the annuity risk. Spreads is the clearest and easiest hedging factor that affect the risk annuity. If the dealer cannot unwind the contract and he has to be faced an offsetting trade he will receive S_t - S_0 annuity stream. Since the spreads increase, the survival probability declines like the risk annuity declining because the future of the spreads becomes uncertain. The value of income is less than mark-to-market at time T. However, it the spreads fall, annuity risk raise and the value of income stream will be greater than the mark-to-market (See Table 5.1)(JPMorgan,2008).

Table 5.1 **Impact of spreads on the Risky Annuity and P&L for investor receiving a Running Annuity**

	Spread Increase	**Spread Decrease**
Risk Annuity	Decrease	Increase
P&L	Down	Up

Source: JPMorgan, 2008

When the dealer sell the protection on a par CDS contract, investor who has bought a contract with a spread of S_0 has a DV01 mismatch of $DV01_0$ - $DV01_T$. This is the annuity risk and the additional amount of protection the investor needs to buy. In order to hedge his spread exposure, the dealer will have to trade a different notional amount in his hedge as he has in his original positions. This will result in net default exposure which has to be managed at a cost.

The other effect on changing curves on annuity risk. The shape of the curves is important when the spreads changes. The curves affect the annuity risk depends on shapes according to changes the valuation of a trade. If the dealer has an offset trade contract, he is exposed to unilateral risk (JPMorgan, 2008).

When curves changes leads to change risky annuities which will affect mark-to-markets. The short end rising causes flattening and the risky annuity declines. The risky

income stream becomes less valuable. This risk is difficult to hedge particularly if there is not a liquid market in the full CDS maturity curve, as is often the case (See Table 5.2).

Table 5.2 **Impact of Curves on the Risky Annuity and P&L for investors receiving a Running Annuity**

	Curves Flatter	**Curves Steeper**
Risk Annuity	Increase	Decrease
P&L	Up	Down

Source: JPMorgan, 2008

The last change about risky annuity is the changing recovery rate. The change of recovery rate is based on prices. For recovery rates too, the dealer unwind the contract and he does not pay the running annuity he is exposed to risk about default and the recovery rate changing affects the risky annuity.

When the spreads do not change but recovery rate raise, this means the default probability will increase and so does the risky annuity. Thus the mark-to-market becomes negative (See Table 5.3).

Table 5.3 **Impact of Recovery rates on the Risky Annuity and P&L for investors receiving a Running Annuity**

	R.Rates Increase	**R.Rates Decrease**
Risk Annuity	Decrease	Increase
P&L	Down	Up

Source: JPMorgan, 2008

The dealer is exposed to risk in any case. He has two choices for risky annuity either he has Annuity Spread Risk and the MtM associated with it, or he hedges this and takes on default expose. He cannot hedge both at the same time and dealers are likely to charge for being put into such a position.

CDS raise the annuity risk affected by spread, curves and recovery rate is shown in Table 5.4. In theory the risk can be declared but in practice is not possible easily.

Table 5.4 **Annuity Risk Assuming $S_T > S_0$ for Long Protection Position**

Annuity Risk	**Effect**	**DV01**	**Mark-to-Market**
Annuity Spread Risk	Rising Spreads	Declines	Loss
Annuity Curve Risk	Short-End Rising	Declines	Loss
Annuity Recovery-Rate Risk	Increasing R.Rates	Declines	Loss

Source: JPMorgan, 2008

The important and dangerous risk is the Annuity Spread Risk, can be hedged through DV01 hedging of trades although there is a cost with remain DV01 neutral. On the other hand hedging with a Par contract will entail selling less than the full notional of protection. This will leave the investor with a long default protection position as they have sold less protection than the full notional.

At some future date, when the client comes to unwind the trade, the dealer is left with the original annuity stream. If they are unable to close out this original hedge but can only enter an offset trade at the prevailing market spreads, they will be left with an annuity stream that they need to hedge. Dealers are likely to charge for the additional cost of risk management of off-market trades. Additionally, dealers need to hedge the curve risk as well as the recovery rate risk, which are much more difficult to hedge. New trades do not attract these risk management costs as they can be offset with par trades in the market (JPMorgan, 2008).

VI.CREDIT DEFAULT SWAP IN TURKEY

Credit default swaps were not very popular among Turkish companies and financial institutions last years in applications of credit default swaps in Turkey. However, different from 2001 financial crisis, public finance is better, banking system and fiscal policy is stronger than 2001. The long term debt in reel sector is increasing but the longer the maturity makes lower the risks.

In applications of credit default swaps in Turkey, Turkish Banks are risk buyers. Foreign financial institutions that are in long position in Turkish Bonds, deals CDS contracts with Turkish Banks. Examples of credit default swap contracts in Turkey are given in the Appendix-I to show how they are used in business life in Turkey. In Turkish applications of credit default swaps, foreign financial institutions that want to decrease their risk exposure on Turkish sovereign bonds, pay premium to private Turkish banks and buy risk protection.

If there is a Turkey credit event, how does a CDS meet his obligation? They should sell 25% amount from bonds at current market price? In fact it should be sold at the cheapest to deliver term if there has been any agreement before.

For example, estimate that current price of a bond is 25 per 100 nominal 1mio USD. CDS is implied payment of 250k amount of Turkish bonds how can be implied recovery rate? For cash settlement, the seller makes a payment for the loss about 750k for recovery 25. For physical settlement, He wants to transfer the bond that he chose for having 1mio par value. Thus, the seller transfers 1mio to the buyer unless there is a collateral changing. The smaller the recovery rate the larger the loss for the seller. Before the agreement, the recovery rate can not be known, in the day of credit event occur, what is the cheapest to deliver bond is, recovery rate should be the rate of this bond.

Here there is a Table 6.1 shows the correlation between Turkey CDS and Eurobond.

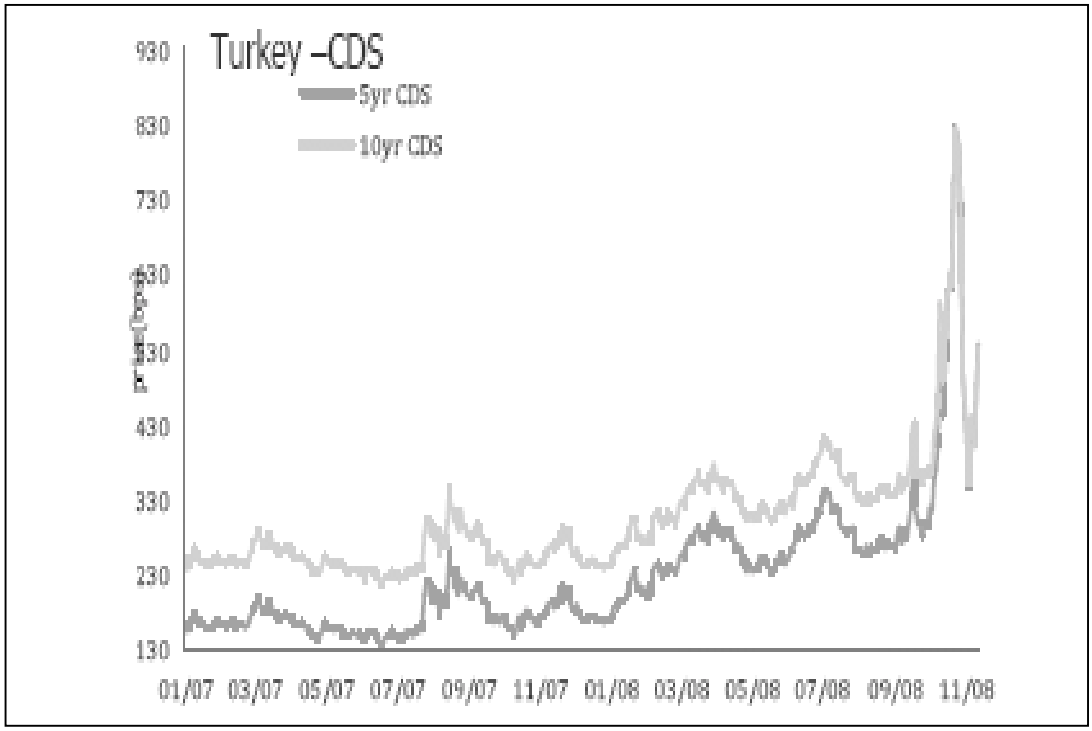
Table 6.1 **Correlations between Turkish credit default swaps and Eurobond.**

Security	TURKEY	TURKEY	TRABNB	TURKEY
TURKEY	1,000	0.922	0.598	0.785
TURKEY	0.922	1,000	0.598	0.778
TRABNB	0.598	0.598	1,000	0.574
TURKEY	0.785	0.778	0.574	1,000

SOURCE: Bloomberg

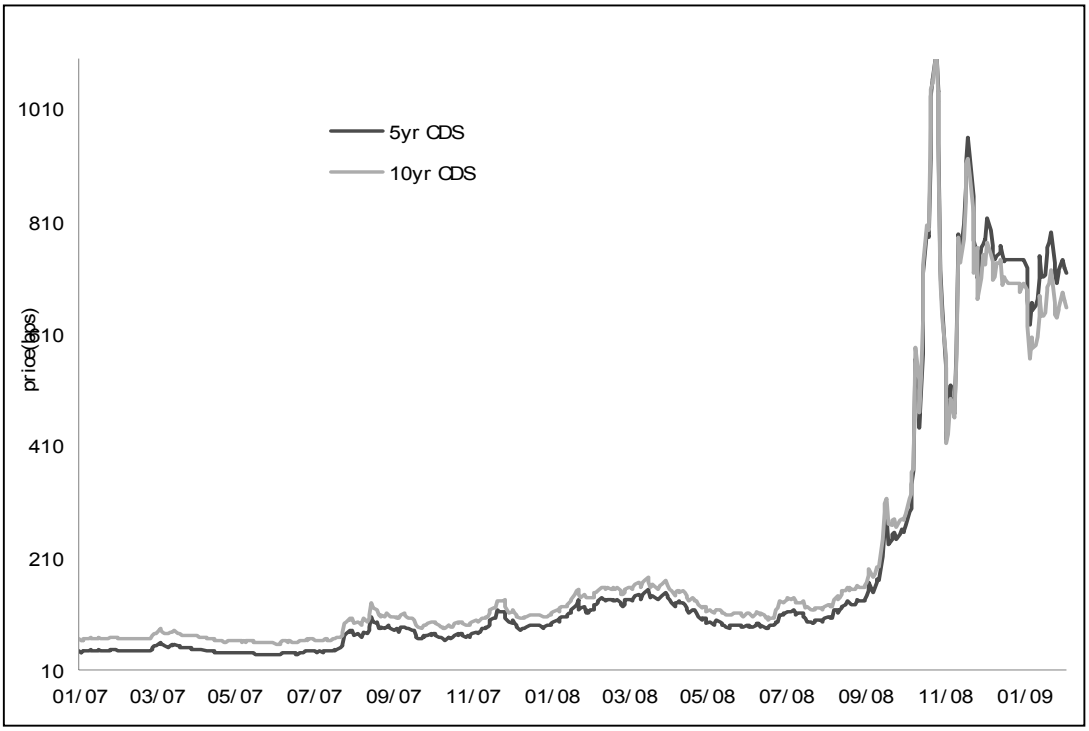
Here there is a figure of changing Turkey CDS from January 2007 to November 2008

Figure **6.1 Turkey 5 yrs – 10 yrs Credit Default Swaps**



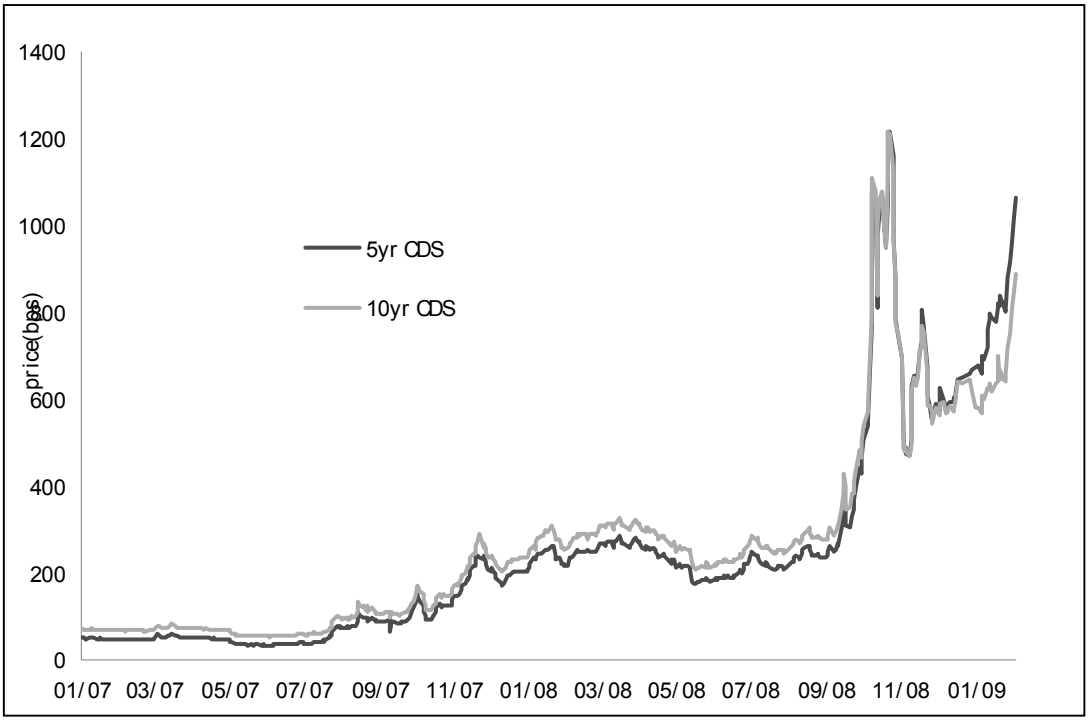
Source: TSKB Research Department, 2008

Figure 6.2 **Russia 5 yrs – 10 yrs Credit Default Swaps**



Source: TSKB Research Department, 2008

Figure 6.3 **Kazakhstan 5 yrs – 10 yrs Credit Default Swaps**



Source: TSKB Research Department, 2008

As the graphs of CDS are the emerging markets basis points are observed, it is seen that, the basis rate is much correlated with local and global economic conditions. In general, sharp increases of credit default swap basis occur with high probabilities of default of countries. It is accepted that, default probability increases with economic, politic, diplomatic or governmental crisis. On the other hand, a sharp increase in the

default risk and CDS basis may occur when default probability of any other emerging market increases. Moreover, there are correlations between them like Kazakhstan and Russia. For example, in the period of September-November 2008, CDS basis had increased sharply. Besides economic conjuncture of the world, the dramatic increase in these countries means the risk of probability of default effect.

On the other hand, another important event that effected the CDS is that the February 2001 crisis. CDS basis rates increased dramatically to 1.200 bps because of the economic crisis so the default probability of Turkish government had increased very much. The other sharp increase becomes in July 2002. This was because of government crisis and upcoming elections. As it is known, in July 2002 one of the members of the coalition government requested an early election. After that point, election economy was on the scene. And, political uncertainty caused default risk to increase with CDS basis points.

VII. CONCLUSION

Use of credit derivatives among financial institutions for risk management purposes is increasing sharply in last years. Especially with the standardization of the documentation of credit derivatives, this increase will continue in an accelerating way.

On the other hand, credit derivatives are new to Turkish institutions. After the economic crisis of 2001 in Turkey, it is seen that traditional way of credit risk management does not work efficiently in bad times. This does not mean that Turkish Banks are using credit derivatives for risk management purposes actively at present. Use of credit derivatives in Turkey is almost negligible when compared with other markets.

In our study we preferred to study credit default swaps because it is the most preferred kind of credit derivative, especially in emerging markets.

Firstly it is tried to state the current situation of use of credit default swaps. It is seen that some banks are taking role as protection sellers to foreign institutions that have Turkish government Eurobonds in their portfolio.

In this study it is also shown that Credit Default Swaps play more than one role. They have magnified crisis, because most of the largest players in finance have bought swaps to protect the debt that they hold, and also have sold swaps if banks default. Actually, in real market CDS is a just an indicator. Because it just shows the country mood but it does not work physically.

As a result, during the economic crisis of 2001 in Turkey, it is seen that traditional way of credit risk management doesn't work efficiently in bad times. But that does not mean Turkish Banks are using credit derivatives for risk management purposes actively at present and it is not possible to say that, an unexpected economic crisis won't happen or foreign investments won't fly away unexpectedly.

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APPENDIX-I EXAMPLE OF CREDIT DEFAULT SWAP CONTRACTS IN TURKEY.

CREDIT DEFAULT SWAP TRANSACTION INDICATIVE TERMS & CONDITIONS	
Definitions	The definitions and provisions contained in the 2000 ISDA Definitions (the "**2000 Definitions**"), as published by the International Swaps and Derivatives Association Inc.,("**ISDA**") and the definitions contained in the 2003 ISDA Credit Derivatives Definitions as supplemented by the May 2003 Supplement to the 2003 ISDA Credit Derivatives Definitions (together the "**Credit Derivatives Definitions**") as published by ISDA are incorporated into this Termsheet. In the event of any inconsistency between the 2000 Definitions and the Credit Derivatives Definitions, the Credit Derivatives Definitions shall prevail. In the event of any inconsistency between the Credit Derivatives Definitions and provisions in this Termsheet, the provisions of this Termsheet will govern.
Parties	M International Dbank ("**Counterparty**")
Transaction type	A Credit Default Swap Transaction (the "**Transaction**"). For the avoidance of doubt, the Credit Default Swap shall form one Transaction for the purposes of the ISDA Master Agreement between the parties.
Trade Date	August 9, 2004
Effective Date	August 13, 2004
Termination Date	The earliest of (i) **May 15, 2008 ("Scheduled Termination Date");** (ii) the date on which the TRS Reference Asset ceases to exist or are redeemed in full; (iii) the date on which an event of default (as described in the terms and conditions of the TRS Reference Asset) occurs; (iv) the date on which an Event Determination Date in respect of the Credit Default Swap has been determined and (v) the Early Termination Date.
CREDIT DEFAULT SWAP	
General Terms	
Buyer:	M International
Seller:	Dbank
Trade Date:	August 9, 2004
Effective Date:	August 13, 2004
Scheduled Termination Date:	May 14, 2008
Calculation Agent:	M International
Calculation Agent City:	London
Business Days:	New York, London and Istanbul
Business Day Convention:	Following (which, subject to Sections 1.4 and 1.6 of the Credit Derivatives Definitions, shall apply to any date referred to in this Term Sheet that falls on a day that is not a Business Day).
Fixed Rate Payer & Floating Rate Payer Calculation Amount:	USD 20,000,000
Credit Details:	
Reference Entity:	Republic of Turkey
Reference	The obligation identified as follows:
Obligation:	

Primary Obligor:	Republic of Turkey		
Maturity:	January 15, 2030		
Coupon:	11.875%		
CUSIP/ISIN:	US900123AL40		
Original Issue Amount:	USD 1,500,000,000		
Reference Price:	100.00%		
All Guarantees	Applicable		
Buyer ("Fixed Rate Payer") Payments:			
Fixed Rate:	**3.45%**		
Day Count Fraction:	30/360		
Payment Dates:	Semi-Annually in arrears		
Seller ("Floating Rate Payer") Payments:			
Conditions to Settlement:		Credit Event Notice Notifying Party: Buyer or Seller	
Notice of Physical Settlement			
Notice of Publicly Available Information Applicable			
Credit Events:		Failure to Pay Payment Requirement: $ 1 million Grace Period Extension Applicable Grace Period: 30 calendar days Obligation Acceleration Restructuring Default Requirement: $10 million Multiple Holder Obligation : Not Applicable Repudiation/Moratorium	
Obligations:		Category:	Characteristics:
		Bond	Not Subordinated Not Domestic Law Not Domestic Currency Not Domestic Issuance
Settlement Terms:			
Settlement Method:		Physical Settlement	
Physical Settlement Period:		The longest of the number of Business Days for settlement in accordance with then current market practice of such Deliverable Obligation, as determined by the Calculation Agent, after consultation with the parties (in accordance with Section 8.6 of the Credit Derivatives Definitions).	
Deliverable Obligations:		Exclude Accrued Interest	
Deliverable Obligation Category:		Bond	
Deliverable Obligation Characteristics:		Not Subordinated, Standard Specified Currencies, Not Domestic Law, Not Domestic Issuance, Not Contingent, Not Bearer, Transferable	
Escrow:		Applicable	
OTHER TERMS			
Documentation	ISDA Master Agreement and Confirmation using the 2000 Definitions in respect of the Credit Derivative Definitions in respect of the Credit Default Swap, to be provided by M International. Note that this Term Sheet shall be superseded upon the execution of a Confirmation between the parties. M International and Counterparty shall also execute a		

	Credit Support Agreement to cover the collateral arrangements related to this Transaction.
Governing Law	Unless otherwise provided in the Agreement, this Term Sheet will be governed by and construed in accordance with the laws of England and Wales.
Key Risks	The Counterparty is exposed to M International for performance of its obligations under the Transaction. In addition, the Counterparty is also exposed to: Under the terms of the **Credit Default Swap**, the risk on the Reference Entity and any change in the market value of the Credit Default Swap
Other Terms:	Each party represents to the other party that it is acting for its own account, and has made its own independent decisions to enter into this Transaction and as to whether this Transaction is appropriate or proper for it based on its own judgment and upon advice from such legal, tax, regulatory, accounting and/or other advisors as it has deemed necessary. It is not relying on any communication (written or oral) of the other party as investment advice or as a recommendation to enter into this Transaction, it being understood that information and explanations related to the terms and conditions of this Transaction shall not be considered investment advice or a recommendation to enter into this Transaction. No communication (written or oral) received from the other party shall be deemed to be an assurance or guarantee as to the expected results of this Transaction.
Collateral terms in respect of the Transaction	
SUMMARY OF COLLATERAL TERMS	The terms outlined herein will form part of the terms of the Credit Support Agreement executed between the Parties in respect of the Transaction.
Minimum Transfer Amount	USD 250,000
Business Days	London, New York and Istanbul
MTM Threshold Amount	USD 16,000,000

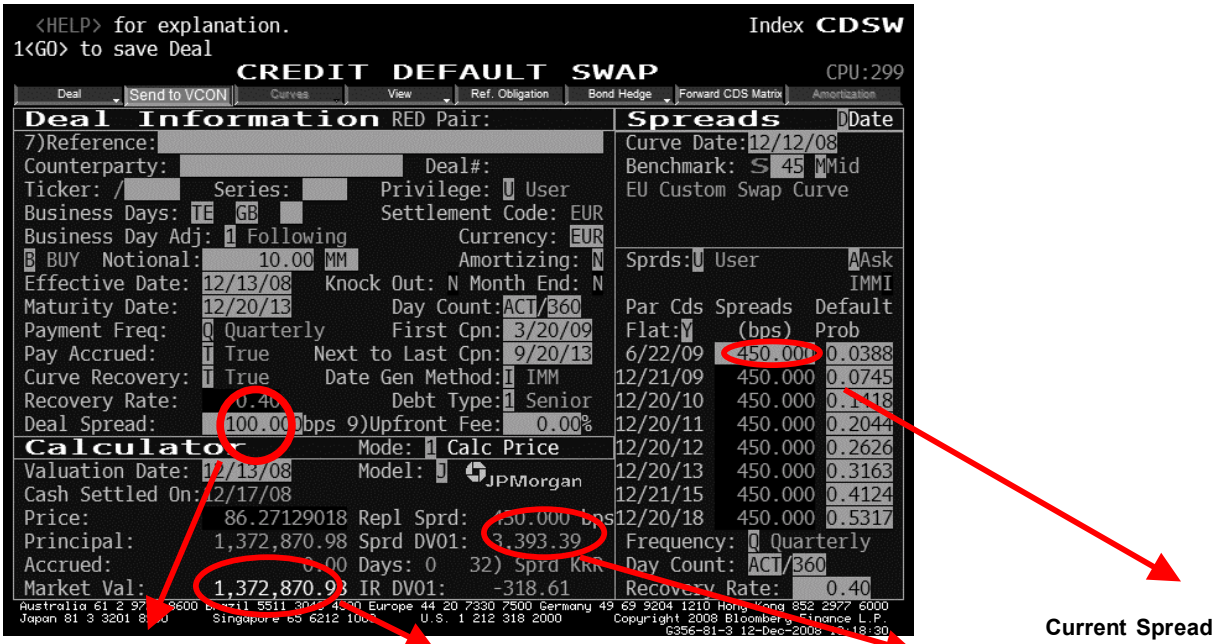
Collateral Arrangements	"Eligible Collateral" means cash. "Eligible Currency" means United States dollars "**Additional Cash Collateral**" means amounts, determined pursuant to the provisions below, in United States dollars. If the MTM Value falls below the MTM Threshold Amount the Counterparty is required to post Additional Cash Collateral to M ınternational in an amount equal to the difference between the USD 18,000,000 and MTM Value, provided, however, that on the first occasion on which such Additional Cash Collateral is required to be posted, such difference must exceed the Minimum Transfer Amount. On each subsequent Business Day, if the MTM Value plus the aggregate of all Additional Cash Collateral posted (the "Aggregate MTM Value") falls below USD 18,000,000 the Counterparty is required to post Additional Cash Collateral in an amount equal to the difference between USD 18,000,000 and the Aggregate MTM Value provided, that such difference exceeds the Minimum Transfer Amount. Any requests for Additional Cash Collateral will be made by way of written notice from M International to the Counterparty prior to 3 p.m. local time in London on a given Business Day (the "Collateral Call Date"), and the Counterparty shall be required to post the Additional Cash Collateral amount on the Business Day following the Collateral Call Date. M International shall confirm with the Counterparty that any transmitted notice has been received. If the request for Additional Cash Collateral is made after 3 p.m. London time on any Business Day, then such notice shall be deemed to have been given on the next Business Day.
Collateral Arrangements (continued)	If the MTM Value exceeds the MTM Threshold Amount, M International shall, within 1 Business Days of receipt of a notice from the Counterparty requesting the return of the Additional Cash Collateral, return to the Counterparty any amounts of Additional Cash Collateral posted in excess of the Minimum Threshold Amount provided, however, that the amount to be returned must be in excess of the Minimum Transfer Amount. For the avoidance of doubt, M International shall only be under an obligation to return amounts of Additional Cash Collateral to the extent that they have been posted pursuant to these terms, and in no circumstances shall be required to refund any amounts if the MTM Value exceeds the MTM Threshold Amount if the Counterparty has not posted any Additional Cash Collateral.

APPENDIX-II

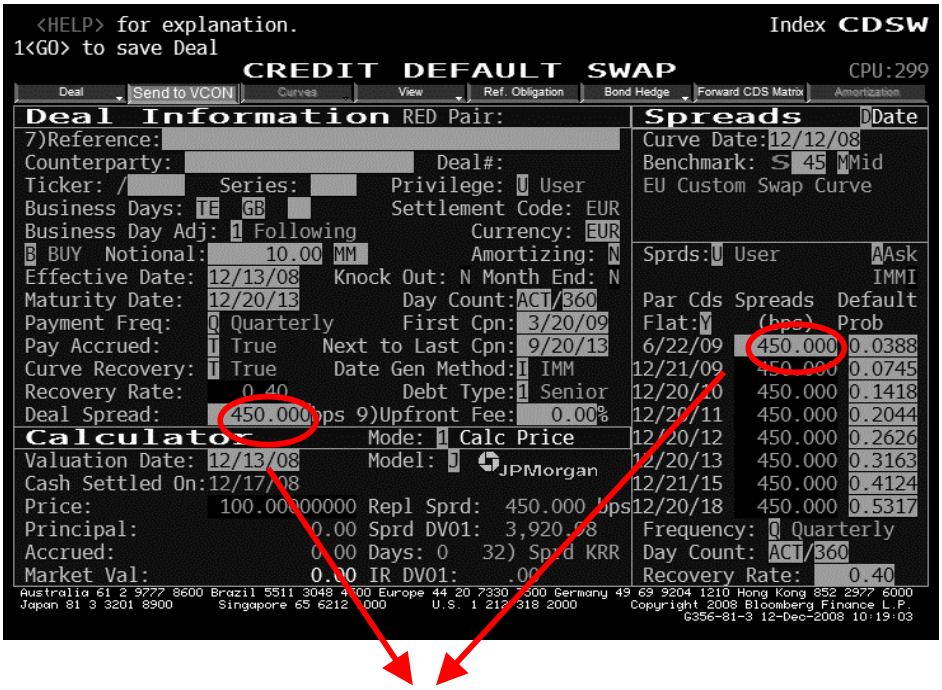
Table 3.2 **BBA,2006 Credit Derivative Products.**

Type	2000	2002	2004	2006
Credit Linked Notes	10.0%	8.0%	6.0%	3.1%
Credit Spread Option	5.0%	5.0%	2.0%	1.3%
Single Name CDS	38.0%	45.0%	51.0%	32.9%
Swaptions	n/a	n/a	1.0%	0.8%
Others	41.0%	36.0%	8.0%	5.7%

Graph 5.1 **Spread Change, the MtM change**



Graph 5.2 **We can calculate the Risky Annuity as the DV01 in a Par CDS contract**



Put the same deal spread and current spread