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AN ANALYSIS OF THE RELATIONSHIP BETWEEN CHOICE OF INTEREST RATE REFERENCE & INTEREST RATE RISKS OF CORPORATE BORROWERS

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An Analysis of the Relationship between Choice of Interest Rate Reference and Interest Rate Risks of Corporate Borrowers 企業融資選取的參考利率及 其利率風險的分析

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by

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Abstract

Corporations that raise funds in the financial markets using a variety of financial instruments, such as bonds and loans, can reduce the volatility risk of interest rate if they choose appropriate *interest rate references*, such as LIBOR, HIBOR or SIBOR, for their floating-rate borrowings.

This study finds that LIBOR is an interest rate at lower volatility significantly amongst all USD reference rates, while HIBOR and SIBOR are not reliable because of several reasons, including the liquidity of money markets, the composition of contributor banks and the guidance and requirement rate contribution.

In conclusion, this thesis recommends *corporations can reduce the interest rate risks and enjoy lower funding cost by selecting LIBOR as reference rate to price their floating-rate loans or bonds instead of using HIBOR and SIBOR.*

Key Words: LIBOR, HIBOR, SIBOR, Fixing, Interest Rate Reference, Offshore Market.

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CHAN Fung Cheung, Wilson

June 2011

The views expressed in this thesis are those of the author and do not reflect those of the Treasury Markets Association nor Thomson Reuters. The usual disclaimers apply.

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List of Abbreviations

Agricultural Bank of China
Association of Bankers in Singapore
Association Cambiste Internationale
Augmented Dickey-Fuller
Adjustable-Rate Mortgage
Australian Dollar
Bank of Communication
British Bankers' Association
Bank of East Asia
Bank for International Settlements
Bank of Tokyo-Mitsubishi
Banque Nationale de Paris
Bank of America
Bank of China
Basis Point
Canadian Dollar
China Construction Bank
Certificates of Deposit
Collateralized Debt Obligation
China Foreign Exchange Trade System

CHF	Swiss Franc
CHIBOR	China Interbank Offered Rate
CITI	Citibank
CNY	Chinese Yuan Renminai
CNY SOR	Renminbi Swap Offered rate
DEUTSCHE	Deutsche Bank
DBS	Development Bank of Singapore
DKK	Danish Krone
ECM	Error Correction Model
EONIA	European Overnight Index Average
EUR	European Euro
EURIBOR	Euro Interbank Offered Rate
FRA	Forward Rate Agreement
FRCD	Floating-Rate Certificate of Deposit
FOMC	Federal Open Market Committee
FRN	Floating Rate Note
GBP	British Pound
GFSR	Global Financial Stability Review
GMT	Greenwich Mean Time
HASE	Hang Seng Bank
HIBOR	Hong Kong Interbank Offered Rate
НК	Hong Kong

HKAB	Hong Kong Association of Banks
HKD	Hong Kong Dollar
HSBC	Hongkong and Shanghai Banking Corporation
ICBC	Industrial and Commercial Bank of China
IDR	Indonesian Rupiah
INR	Indian Rupee
IRS	Interest Rate Swap
JPM	JP Morgan Chase
JPY	Japanese Yen
LDN	London
LIBID	London Interbank Bid Rate
LIBOR	London Interbank Offered Rate
KRW	South Korean Won
MIBOR	Mumbai Interbank Offered Rate
MIZUHO	Mizuho Bank
MYR	Malaysian Ringgit
NAB	National Australia Bank
NZD	New Zealand Dollar
OTC	Over-The-Counter
PHP	Philippine Peso
PRC	People's Republic of China
PRN	Perpetual Note

RBC	Royal Bank of Canada
RBS	Royal Bank of Scotland
Repo	Repurchase Agreement
RMB	Renminbi, or Chinese Yuan
SEK	Swedish Krona
SFC	Securities and Futures Commission
SFEMC	Singapore Foreign Exchange Market Committee
S.G.	Société Générale
SGD	Singapore Dollar
ShaCom	Shanghai Commercial Bank
SIBOR	Singapore Interbank Offered Rate
SING	Singapore
SMBC	Sumitomo Mitsui Banking Corporation
SOR	Swap Offered Rate
S&P	Standard & Poor's
THB	Thai Baht
TIBOR	Tokyo Interbank Offered Rate (for Japanese Yuan)
ТМА	Treasury Markets Association
UBS	Union Bank of Switzerland
USD	United States dollar, or U.S. Dollar
VRN	Variable Rate Note

Chapter I

INTRODUCTION

CHAPTER I INTRODUCTION

1 Financial markets have varied financial instruments and benchmark references, one of which is *interest rate fixing (Fixing)*, that is widely used by corporate borrowers when pricing their bonds and loans. The most common *interest rate fixing* is called LIBOR ⁽²⁾. The similar *fixings* are also founded in Hong Kong and Singapore. This study is to analyze the relationship between choice of these benchmark references and interest rate risks of corporate borrowers.

The statistical results of the study reveal that the two *interest rates fixings* in Hong Kong and Singapore are similar as the correlation coefficient between the two rates is close to perfect. Besides, the Hong Kong *fixing* was the most unstable & unpredictable over the sample periods. On the contrary, the *Fixing* in London is a more appropriate benchmark for corporate borrowings. Having examined the mechanism and the operation of *fixings* in details, this study finds that the reasons for them are the liquidity of money markets and the composition of the contributor banks, etc. In fact, the requirement of attitude of how to contribute rates is another major factor affecting the stability of *fixings*.

The following sections will commence to introduce the relationship of interest

² Please see Section 1.1.1 "Definition of Interest Rate Reference" (page.6) for description.

rate fixings and fund raising by corporations, the definition of different *fixings*, and the moving pattern of *fixings*. Chapter Two will summary the literature review related to this topic. Chapter Three will illustrate the statistic findings on the three *fixings* in London, Hong Kong and Singapore, for which the reasons will be examined in Chapter Four. Finally, Chapter Five will draw the conclusion of the study.

1.1 INTEREST RATE REFERENCE

The interest rates of the United States dollar (USD) ⁽³⁾ are widely used in the world. Although there are many different types of interest rates, such as Federal Fund Rate ⁽⁴⁾, Discount Rate, deposit rate ⁽⁵⁾, Prime lending rate, mortgage rate, coupon rate, etc, the most sensitive and fluctuated one is the *interbank interest rate*. The offered rates of interbank interest rate, or *the interbank offered rates*, at which banks lend unsecured funds to one another based on the preset limits of credit line, vary throughout

³ *United States dollar*, U.S. Dollar, and USD each means the lawful currency of the United States of America.

⁴ *Federal Fed Target Rate* and *Discount Rate* are determined by the Federal Open Market Committee (FOMC) of Federal Reserve in the United States.

⁵ **Deposit rate**, **Prime lending rate** and **mortgage rate** are set by each bank at its own discretion.

the day in the interbank *money market* ⁽⁶⁾. (Figure 1: Illustration of the Operation Flow of Money Market). They can be treated as the actual transacted rates that charged when banks in the interbank market borrow funds from each other at the wholesale levels. This is not a mandatory rate. The rates change continually in a bargaining form based on demand and supply for funds among a lot of financial institutions in the global interbank market. Subject to the borrowing periods, there are many different tenors with maturities ranging from overnight to one year.



Money market is an interbank wholesale market in the form of Over-the-Counter (OTC). Participants who sit in their own offices

⁶ *Money market* is an interbank wholesale market in form of Over-the-Counter for financial instruments transactions with maturities from overnight to one year, such as interbank placement and borrowing, Treasury bills, commercial paper, certificates of deposit, bankers' acceptances, etc.

communicate directly through telephones, dealing machines or indirectly via the money brokers. The transaction prices that are bided and offered by banks, which play the roles as borrowers and lenders, will be matched for entering interbank transactions.

1.1.1 Definition of Interest Rate Reference

The USD interbank bank offered rates have their own official fixing prices at around 11:00 a.m. in London, Hong Kong and Singapore. (Please refer Figure 2:

Illustration of the Fixing Operation Mechanism). Their London names are Interbank Bank Offered rate (LIBOR), Hong Kong Interbank Offered Rate (HIBOR) and Singapore Interbank Offered Rate



At 11:00 a.m., a group of pre-selected Contributor Banks provide their expected "offer" rates (not "bid" rates, nor "mid" rates) to the Calculation Agent, which announces its calculation results to the public after around half an hour. These results are the reference interest rates of *fixing*.

(SIBOR) fixed in the financial markets of London, Hong Kong and Singapore

respectively. ⁽⁷⁾ They are announced each business day, excluding Saturday, for the reference of the financial market participants who use these rates for pricing financial derivative instruments, such as *Interest Rate Swaps* (IRS) ⁽⁸⁾, *Interest Rate Futures*, and *Interest Rate Options*, and also for the reference of the public who use the rates for pricing bonds and loans.

Unlike the interbank offered rates, the official *interest rate fixings* are not good for transactions. They are quoted by banks, without formal commitment, to express their expectation or belief in rates that could lend to others for tenors ranging from below one month to twelve months.

1.1.1.1 LIBOR

London Interbank Offered Rate (LIBOR) represents ten currencies, including USD, British Pound (GBP), European Euro (EUR), Swiss Franc (CHF), Swedish Krona (SEK), Danish Krone (DKK), Canada Dollar (CAD), Japanese Yen (JPY), Australia Dollar (AUD) and New Zealand Dollar (NZD) so that USD LIBOR is only one

⁸ Please see footnote 39 and 44 for the definition of *Interest Rate Swap* and *Interest Rate Futures*.

⁷ There is no USD interbank offered rate *fixing* in New York although New York is also a major financial centre where the interbank activities of borrowing and lending occur frequently. Even there is a reference rate, named "H.15", which is based on the best offered rate on offshore US dollar certificates of deposit at around 9:30 in New York, and it is not used by corporate borrowers. (Reference: www.bog.frb.fed.us/releases/h15 by the Board of Governors of the Federal Reserve System).

of the currencies fixed in London. The USD LIBOR is an arithmetic average of USD interest rates from the view point of a panel of preselected contributor banks in London market. There are sixteen contributor banks, whose interest rates are required to be submitted daily at 11:00 London time by the British Bankers' Association (BBA), and only the eight middle rates, 50% of the contributions, are used for computation. The USD LIBOR *fixings* officially launched in January 1986 after 13-month trial period.

Derivatives written on LIBOR are called LIBOR instruments, notably *Interest Rate Swaps* and *Interest Rate Futures*, becoming apparent in the Eighties that led a strong request for a formal USD LIBOR fixing (Neftci, 2004)⁽⁹⁾. Besides, 6-month USD LIBOR is also used as an index for some US mortgages. Bonds and loans priced with LIBOR are called *floating rate bonds* and *floating rate loans* respectively.

1.1.1.2 HIBOR

Hong Kong Interbank Offered Rate (HIBOR) is the interest rate for both Hong Kong dollar (HKD) ⁽¹⁰⁾ and USD fixed in the Hong Kong interbank wholesale market. The data of HIBOR in HKD (HKD HIBOR) since January 1982 can be found from the website of the Hong Kong Monetary Authority (HKMA) which was quoted by the Standard Chartered Bank. The new and current HKD HIBOR is owned by Hong

⁹ Neftci S.N. (2004), "**Principles of Financial Engineering**". CA: Elsevier Academic Press. P. 74.

¹⁰ *Hong Kong Dollar* (HKD) means the lawful currency of Hong Kong.

Kong Association of Banks (HKAB) that the available data (from January 1996) can be obtained from the HKMA website. Twenty preselected contributor banks are the designators to quote interest bank offered rates. The three highest and the three lowest rates are excluded from the *fixing* that are calculated as the average of the middle fourteen quotations from the contributor banks. More than anything else, the HIBOR *fixing* is a reference rate for HKD lenders and borrowers that participate directly or indirectly in the commercial field.

HIBOR for US dollar (USD HIBOR) was newly launched in December 2006. Similar to the structure of HKD HIBOR, a panel of twenty preselected contributor banks in Hong Kong invited by the Treasury Markets Association (TMA) ⁽¹¹⁾ quotes their expected rates at around 11:00 a.m., and the twelve middle rates are calculated by Thomson Reuters ⁽¹²⁾. If the minimum of ten rates is not submitted by the contributor banks, the particular tenor of HKD HIBOR will not be computed and announced. ⁽¹³⁾ This USD HIBOR will be examined for comparison with LIBOR in the following study,

¹² Thomson Reuters is one of the world's major leading sources of information for business and professionals.

¹¹ Please see www.tma.org.hk for details. Before December 2006, there was only Hong Kong dollar being fixed as interest rate reference in the Hong Kong market.

¹³ USD interest rates in the Hong Kong interbank market are in the tenors of overnight, 1 week, 2 weeks, and 1 to 12 months. A minimum of 10 banks / rates is required. Thomson Reuters is the calculating agent for the fixing. Thomson Reuters RICs <USDHIBOR=>; Thomson Reuters pages <USDHIBOR>.

and all "HIBOR" hereafter represents USD HIBOR.

1.1.1.3 SIBOR

Singapore Interbank Offered Rate (SIBOR) is the interest rate for both the Singapore dollar ⁽¹⁴⁾ (SGD SIBOR) and the US dollar (USD SIBOR) in Singapore interbank market.

Similar to the setup of USD HIBOR, the financial market in Singapore also possesses its USD *interest rate fixing*. SIBOR in USD was formally launched in January 1988 by the Association of Banks in Singapore (ABS). There are seven contributor banks, and only the highest and the lowest rates are eliminated for the calculation of USD SIBOR. The SIBOR rate, at which banks located in Asian time zones can lend unsecured funds to other banks located in the Singapore interbank money market, serves as a benchmark or reference *fixing* for borrowers and lenders in Asia. ⁽¹⁵⁾ The computed *fixings* are available on Thomson Reuters screen (Code: <SIBOR=>). In order to express easily in the following study, all "SIBOR" hereafter represents USD SIBOR.

¹⁴ *Singapore Dollar* (SGD) means the lawful currency of the Republic of Singapore.

¹⁵ See Appendix 4:"Description of ABS Procedures for Interest Rate Fixings" (page. 139), and Appendix 4: "Announcement of HKMA (14 Dec 2006) - Launch of Renminbi Swap Offered Rate Fixing" (page. 142).

1.1.2 Features of USD Interest Rates

According to the historical data, all these interest rates, including LIBOR, HIBOR and SIBOR, quoted in USD have similar patterns moving up and down, and the direction of their movement is the same. A sample of 3-month tenor of these USD rates for the period from January 2009 to June 2010 is plotted in Figure 3 for reference. Although they are fixed on the same day or even at the same time in Hong Kong and Singapore, their rates differ from each other, and this could be found closely in the chart for during the period from March to June in 2010. (Figure 4: 3-Month Tenor of USD Interest Reference Rates (Mar 10 - Jun 10). It induces a chance for the study of this phenomenon, and therefore for a possible contribution to the professional discipline.

Figure 3: 3-Month Tenor of USD Interest Reference Rates (Jan 09 – Jun 10)





Figure 4: 3-Month Tenor of USD Interest Reference Rates (Mar 10 – Jun 10)

1.2 APPLICATION OF INTEREST RATES

Nowadays, there are many different types of products linked to *interest rate fixings*, including standard interbank products, commercial field products and hybrid products (Please see Figure 5: Major Interest Rate Fixings Instruments). The following study will focus on the products that are used by the corporate borrowers.

	Interest Rate Fixings Instruments
Standard Interbank Products:	Forward Rate Agreements (FRA), Interest Rate Futures, Interest Rate Swaps (IRS), Interest Rate Options, Cross Currency Swap, Swaptions, Inflation Swaps
Commercial Field Products:	Floating-Rate Notes / Bonds, Floating-Rate Certificates of Deposit (FRCD), Term Loans, Syndicated Loans, Variable Rate Mortgages, Adjustable-Rate Mortgage (ARM), etc
Hybrid Products:	Range Accrual Notes, Step-Up Callable Notes, Variable Rate Notes (VRN), Structured Floating-Rate Notes, Reverse Notes, Capped FRN, Floored FRN, Collared FRN, Target Redemption Notes, Leveraged FRN, Collateralized Mortgage Obligation, Collateralized Debt Obligation (CDO), Hybrid Perpetual Notes (PRN), etc

Figure 5: Major Interest Rate Fixings Instruments

1.2.1 Funding of Corporations

In addition to the interbank money markets, the *Interest Rate Reference* is frequently applied and used in the commercial world. Nearly all corporations must at varying times obtain funding in two ways, either selling a portion of the firms or borrowing the money.⁽¹⁶⁾ The first method of raising funds is *Equity Financing* by issuing equities, such as common stock. The second and most common method is *Debt Financing* by issuing debt instruments, such as bonds and loans, which is a contractual agreement by the borrowers to pay the holders of the instrument fixed dollar amounts at regular intervals (interest payments) until specified date (the maturity date), when a final payment is made.⁽¹⁷⁾

Term loans, syndicated loans, notes and *bonds* are different long-term financing instruments, maturing normally from one year to ten years, or even longer. The lenders of loans are commercial banks, while the investors of notes and bonds include commercial banks, fund houses, insurance companies, central banks and high net wealth individual investors. They are arranged in forms of bilateral agreement,

¹⁶ Ross S.A., Westerfield R.W. and Jordan B.D. (2000), "Fundamentals of Corporate Finance". 5th edition; U.S.: McGraw-Hill. p.451.

 ¹⁷ Mishkin F.S. (1995), "The Economics of Money, Banking, and Financial Markets". 4th edition;
NY: HarperCollins College Publishers. P.24.

corporate deal, e.g. syndication ⁽¹⁸⁾, *private placement* ⁽¹⁹⁾, or *public offer*. The lenders may directly negotiate prices and terms with the borrowers or the arrangers of syndicated deals, such as the *interest rate reference* embedded in the loans or bonds, and the repricing period. ⁽²⁰⁾

1.2.2 Cost Affected by Interest Rate References

In the commercial world, the interbank interest rates, such as LIBOR, HIBOR and SIBOR, are referred as *interest rate references* for pricing the financial instruments, including bonds, bilateral loans and syndicated loans. For example (see Figure 6: Sample of Floating Rate Bond) ⁽²¹⁾, the coupon of a *floating-rate bond*, which is made of a *credit spread* (a predecided interest rate) of 1.95% and the Interest Rate Reference, will be re-fixed every six months in accordance with the announced new LIBOR fixing.

¹⁸ *Syndication*: please refer footnote 41 for the definition (p.27).

¹⁹ There are several differences between direct loan arrangement and public debt issuances. The former can avoid the cost of SFC registration, and is easier to negotiate the terms of financing, while the latter can reach more lenders or investors.

²⁰ Ross S.A., Westerfield R.W. and Jordan B.D. (2000), "**Fundamentals of Corporate Finance**", 5th edition; U.S., McGraw-Hill.

²¹ Source: Shimao Property Holdings www.shimaoproperty.com/UserFiles/File/Pdf/Announcement21Nov06e.pdf

Figure 6: Sample of Floating Rate Bond		
Issuer (813.hk):	Shimao Property Holdings	
Type:	Floating Rate Note	
Rating:	Baa3 / BB+	
Issued Date:	1 December 2006	
Maturity:	1 December 2011	
Coupon:	LIBOR (6-Month) + 1.95%	
Interest Payment:	Semi-Annual	

Other samples of fund raised by the corporations are the floating rate loans, which also request to reset the interest rates every month or three months based on the new LIBOR rates on each repricing dates. For instance, Henderson Land signed a HKD 13.25 billion five-year *syndicated term loan / revolving credit facility* with a consortium of 18 leading international and local financial institutions on 28 June 2010 ⁽²²⁾. The loan rate is made of a *credit spread* of 0.78% over the *interest rate reference* of HKD HIBOR (see Figure 7: Sample of Floating Rate Loan).

Figure 7: Sample of Floating Rate Loan		
Issuer (12.hk):	Henderson Land	
Type:	5-Year Revolving / Term Loan	
Date:	June 2010	
Coupon:	HKD HIBOR + 0.78%	
Amount:	HKD 13.25 billion	

²² http://www.hld.com/en/press/PressDetail.aspx?id=209®ion=hk

If the benchmark reference is fixed at a relative higher price or at a rate which is relative unstable on the repricing date, the coupon for that period paid by the bond issuer or loan borrower is set at a higher and unexpected level and would cause the corporation to bear a relative expensive cost or a relative high volatility risk of interest rate as a result.

Figure 8: Sample of Fixed Rate Bond		
Issuer (13.hk):	Hutchison Whampoa	
Type:	Fixed Rate Bond	
Rating:	A3/ A-	
Issued Date:	September 11 2009	
Maturity:	September 11 2019	
Coupon:	5.75%	
Interest Payment:	Semi-Annual	

Even for the *fixed rate bonds* (Figure 8: Sample of Fixed Rate Bond) ⁽²³⁾, which are another common financial instruments used by a lot of corporations, the costs of borrowing funds are fixed at constant interest rate (named *Coupon Rate*) during the life of the bond. However the corporations may use the *Interest Rate Swap* (IRS) financial instrument to swap the fixed rate cost into the floating rate cost, of which the floating rate is pegged to an *interest rate fixing* such as LIBOR or HIBOR. Again, LIBOR or HIBOR is fixed at a relatively higher or unstable level on the repricing date, and the bond issuers or the loan borrowers have to bear a relatively expensive or

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²³ Source: Thomson Reuters. http://uk.reuters.com/article/idUKN0861055620090908
unstable cost.

Borrowings at either floating rate cost or fixed rate cost are negotiable and optional for the corporations. Unfortunately, the borrowers do not know nor pay attention to the difference in these *interest rate fixings* whether, for example, LIBOR is lower than HIBOR or the volatility of LIBOR is higher than the other because all these *interest rate fixings* look likely to go up and come down simultaneously during different economic cycles. Therefore they do not request or insist on choosing the LIBOR *fixing*, for example, instead of others as the benchmark reference for their bond or loan financing.

In order to expand their business, corporations raise their funding frequently by issuing bonds in the markets or borrowing loans from commercial banks. The amount of fund raising is huge ⁽²⁴⁾. Without selecting the stable *interest rate fixings*, the corporations have to bear an unnecessary interest risk. ⁽²⁵⁾

²⁴ The bonds outstanding in the United States was USD 24.62 trillion in 2008. (Source: Bank for International Settlements and AsianBondsOnline). (www.afdc.org.cn/afdc/UploadFile/2009101248182393.pdf)

²⁵ Besides, the new trend of mortgage rates offered to the public in Hong Kong are used interbank rate as a reference rate, such as HIBOR-Linked mortgage loans in Hong Kong.

1.3 MOTIVATIONS OF THE STUDY

When the launch of a new USD interest rate reference in Hong Kong in 2006, this might be a good opportunity in the commercial world for the corporations to raise their funding by using this new *interest rate reference*. Therefore, this following study will examine all the *interest rate fixings* in USD. At the beginning, **the lowest reference rate** among the three *fixings* is expected to be found. Since **the repricing tenors** of the fund raising in form of bonds or debts are normally 6-month, 3-month, or even 1-month, the following examination will focus on these tenors, instead of the tenors of overnight, one-week, two-week, or nine-month, etc. Besides, the interest rate risk of bonds and debts issuance should be based on the stability of repricing so that **the stable of these** *fixings* will simultaneously be examined.

If the result of this study could prove that, for example, USD LIBOR is *significantly* the lowest *Interest Rate Reference* and less volatile, the finding could help corporations raise their funding by using the cheapest and less risk *Benchmark Reference*.

Chapter II

LITERATURE REVIEW

CHAPTER II LITERATURE REVIEW

2 The main purpose of this study is to analyze the relationship between choice of interest rate reference and interest rate risks of corporate borrowers. This Chapter will initially review the interpretation of *Interest Rate References* or *Benchmark Reference Rates* from different literature in order to find out the major features or characteristics of these *fixings* that relate to the interest rate risks of corporate borrowers. In addition, the next section in this Chapter will then clarify certain limitations, assumptions and the scope of study.

2.1 INTEREST RATES AND FIXINNGS

2.1.1 Unsecured Loans in Interbank Money Market

The *interest rate references* are *fixings* of interbank offered prices of deposits available only to banks in the wholesales *money market*. Brooke and Cooper (2000) ⁽²⁶⁾ clearly interpreted the primary role of interbank deposits that it is to permit the transfer of funds from 'cash-surplus' institutions to 'cash-deficit' institutions who hold financial assets but lack a sufficient retail deposit base. Those interbank deposits of the

²⁶ Brooke M. and Cooper N. (2000), "Inferring Market Interest Rate Expectations from Money Market Rates". Bank of England Quarterly Bulletin, November.

cash-surplus institutions are also on the other hands treated as interbank *loans* of cash-deficit institutions. Brooke et al. (2000) further described the interbank loan as a cash loan where the borrower receives an agreed amount of money for a given period of time, at an agreed interest rate. This agrees interbank rate is therefore an offered rate of interest paid on a loan from one bank to another (Gyntelberg and Wooldridge, 2008) ⁽²⁷⁾.

There are several features of interbank deposits or loans which were described in the studies of Brousseau, Chailloux and Durré (2009) ⁽²⁸⁾. The transactions on the unsecured deposit and loan market are the oldest form of interest rate trading. It is a decentralised and over-the-counter (OTC) market segment ⁽²⁹⁾. The loans are not tradable as they must be booked and kept till they mature. The interest rates are the *unsecured rates* in the sense that the borrowing bank does not post any collateral. Instead, credit limits based on the credit ratings or creditability of the borrowers are established in advance for the preparation of lending loans anytime if needed. Brooke et al. (2000) stressed the size of transaction amount that the offered rate is the interest rate at which banks are willing to lend cash to other financial institutions 'in size'. Normally an interbank transaction involves around USD 10 million per transaction for a

²⁸ Brousseau V., Chailloux A. and Durré A. (2009), "Interbank Offered Rate: Effects of the Financial Crisis on the Information Content of the Fixing". Catholic University of Lille.

²⁷ Gyntelbert J, Wooldrideg P. (2008), "Interbank Rate Fixings during the Recent Turmoil". *Bank for International Settlements Quarterly Review*, March.

²⁹ **Over-the-counter** (OTC) is a virtual market where counterparts are making transactions without locating at a same exchange market.

period ranged from overnight to one year. Therefore, it can be imaged that the credit facilities in the interbank wholesale markets are a substantial matter involved huge amount of money. The longer the loan tenor is, the more involvement the credit would be. Credibility 'in size' granted to other institutions for long tenors are extraordinarily smaller than that for other short tenors like overnight or one week.

Besides, the major active interbank deposits markets for USD transacted outside the U.S. have a feature of *Offshore Market*. The famous ones were created in London, and then in Hong Kong and Singapore. Gyntelberg and Wooldridge (2008) pointed out that USD LIBOR is an *offshore rate*. One of the reasons why London replaced New York became the wholesale interbank market for USD is because of a large share of syndicated loans denominated in London. They also explained why the offshore *interest rate fixings* (against the onshore interest rate in the U.S.) are preferred as benchmarks is that they are less likely to be distorted by regulations. At the detailed discussion of Eurodollar ⁽³⁰⁾ arbitrage between the on-shored U.S. market and the off-shored London market, Kreicher (1982) ⁽³¹⁾ expressed that capital controls blocked the chance of banks from taking advantage of arbitrage opportunities. Gyntelberg et al. (2008) echoed that reserve requirements, deposit insurance premiums and other regulations affecting banks' domestic operations tend to reduce onshore rates relative to

³⁰ *Eurodollars* are deposits denominated in U.S. dollars at banks outside the United States.

³¹ Kreicher, L. L. (1982), "**Eurodollar Arbitrage**". *Federal Reserve Bank of New York*, Quarterly Review, Summer.

offshore ones because offshore banks can offer higher rates on wholesale deposits not subject to such regulations under the jurisdiction of the Federal Reserve. Offshore markets are often as liquid, and in some cases more so, than onshore markets. This is especially true of London, where a large share of international banking activity is transacted. Hong Kong and Singapore, with rate *fixings* in US dollars, have liquid international interbank and foreign exchange markets too. The diversity of market participants is often greater in offshore markets, which helps to boost activity. In particular, barriers to entry and exit are typically lower in offshore markets, making them less vulnerable than onshore markets to the actions of a few large institutions.

In conclusion, there is a lot of literature endorsing the study why offshore markets of USD in London, Hong Kong and Singapore should be focused for the analysis of USD interest rate *fixings*.

2.1.2 Fixings of Interbank Interest Rates

The establishment of LIBOR has a short history. Brousseau, Chailloux and Durré (2009) expressed that a by-product of the trading on the interbank money market is the LIBOR index calculated and published by the British Bankers' Association (BBA) since 1986. Diccon Loxton (2008) ⁽³²⁾ pointed out that this rate is designed to represent, or be a prosy for, the cost of funds of participating banks in the money market.

 ³² Loxton D. (2008), "The Crunch: the Fate of LIBOR and Market Disruption Clauses". Banking & Finance, Allens Arthur Robinson, October.

The detailed description of LIBOR fixing is learnt from the study of Gyntelberg and Wooldridge (2008) that compiled by the BBA, LIBOR refers to the interest rate at which banks in London offer to lend funds to each other just prior to 11:00 local time. The BBA collects quotes from a panel of contributor banks. Quotes are ranked in order, the top and bottom quartiles are disregarded, and the middle two quartiles are averaged to compute LIBOR. LIBOR is fixed for fifteen different maturities, from overnight to twelve months.

By studying the offshore market of USD in terms of Eurodollars, Lee Yong-Sook (2000) ⁽³³⁾ interpreted LIBOR as an average of rates at which major international banks are willing to offer term **Eurodollar** deposits to each other. The LIBOR *fixing* published by the BBA is a benchmark rate in the **Euromarket** as well as other financial markets. The actual lending rate in Eurodollar markets is the London interbank rate plus some margin. London Interbank Bid Rate (LIBID), at which major international banks are willing to take deposits from one another, is normally 1/8 percent below LIBOR.

When analyzing the *fixings* of other fifteen currencies, Gyntelberg et al. (2008) discovered that similar fixing arrangements exist in different markets around the world, e.g. AUD LIBOR, CNY CHIBOR, EUR LIBOR, EURIBOR, HKD HIBOR, SGD

³³ Lee Y. S. (2000), "The Federal Funds Market and the Overnight Eurodollar Market". University of California, San Diego.

SIBOR, JPY TIBOR, INR MIBOR, etc. ⁽³⁴⁾ Although these rates copied many features of LIBOR, there are some important differences. These differences influence the representativeness of the *fixings* and can result in systematic discrepancies between rate *fixings* in the same currency. Gyntelberg et al. (2008) claimed that the best known fixing arrangement is LIBOR.

2.1.3 Major Benchmarks: 3-Month and 6-Month Fixing

According to Wooldridge (2001) ⁽³⁵⁾, the liabilities cost of most banks are based on the short-term interbank interest rates, such as the short tenors of LIBOR. 3-month LIBOR was well established as the benchmark rate in the US dollar money market by the late 1980s (Gyntelberg and Wooldridge, 2008).

However, the interbank deposits for tenors over 3-months are now not active. Brousseau, Chailloux and Durré (2009) examined the interbank market activities and claim that 96% of the unsecured interbank average daily turnover is now traded for terms up to one month, both on the lending and the borrowing sides. This trend has been in place for some years. They also highlight that the pool of operation underlying the fixing of money market indices **beyond one month is indeed very shallow**. Their

³⁴ AUD stands for Australia Dollar; CNY CHIBOR for China Interbank Offered Rate of China Yuan; EURIBOR for Euro Interbank Offered Rate; JPY TIBOR for Tokyo Interbank Offered Rate of Japanese Yuan; INR MIBOR for Mumbai Inter-Bank Offer Rate of Indian Rupee.

³⁵ Wooldridge, P. D. (2001), "**The emergence of new benchmark yield curves**". *BIS Quarterly Review*, December.

studies show that the 3-month LIBOR represents less than 3.7% of some banks activities. Brooke and Cooper (2000) also showed that nearly all financial instruments are highly liquid in the very near term (i.e. out to one month) only.

This is because high regulatory capital charges have forcefully pushed banks in recent years, while at the same time hollowing out the liquidity of the traditional money market beyond one month in accordance with the analysis of Brousseau et al. (2009). They presented that over time the traditional funding model of deposit from rich banks using long cash positions to place funds with interbank counterparts has gradually been overtaken by other financial instruments, such as *Repurchase Agreement* (Repo) ⁽³⁶⁾, *Treasury Bills* ⁽³⁷⁾ and short-term *Certificates of Deposit* (CDs) ⁽³⁸⁾, all of which can be sold before maturity.

When analyzing the maturities of *fixings*, ranging from overnight, 1-week to 1-year, Brousseau et al. (2009) trusted that the most important maturities are 3-month, which are the reference values of the principal short-term interest rates future contracts. Both the 3-month and the 6-month *fixings* support the standard and liquid *Interest Rate*

³⁶ A *Repurchase Agreement* (Repo), also known as Sale and Repurchase Agreement, is the sale of securities together with an agreement for the seller to buy back the securities at a later date.

³⁷ The *Treasury bills* are short-term money market instrument that mature in a year or less than that. The Treasury Bills are marketable, affordable and risk free.

³⁸ *Certificates of Deposit* (CD) are basically time deposits that are issued by the commercial banks with maturity periods ranging from three months to five years.

Swaps (IRS)⁽³⁹⁾.

In conclusion, the most important tenors of benchmark references are 3-month and 6-month *fixings* though the actual interbank transactions for 6-month and 3-month are not active (and there even are seldom actual transactions for period over 6-month). *Fixings* as benchmark references for corporate bonds and loans are still commonly used in the commercial field no matter how active the actual transactions are.

2.1.4 Application of Fixings

The interbank interest rates are commonly applied in the world. Gyntelberg and Wooldridge (2008) pointed out that short-term interest rates are referenced in a wide variety of financial contracts. Well established benchmarks are therefore critical to the efficient functioning of markets in these financial instruments. Money market rates have an important impact on market functioning, even for instruments not contractually linked to them. The discount rates used in a wide variety of cash flow models, such as those used to estimate the fair value of bonds or equities, are typically based on these money market rates.

Many literature reviews interpret the *fixings* how they are applied in the commercial world. Brousseau, Chailloux and Durré (2009) expressed that LIBOR

³⁹ An *Interest rate swap* (IRS) is an agreement that two participants agree to pay to the other either a fixed rate or floating rate which is pegged to a reference rate such as LIBOR.

fixing rates have been declarative reference used to provide a benchmark reference on term funding conditions for financial contracts (retail loans, wholesale banking activities, syndicated loans) since 1986. Gyntelberg et al. (2008) even claimed that the use of money market rates to price other financial instruments dates back to at least the 1970s. The pickup as well as the variability in inflation at the time made long-term fixed rate securities unattractive to investors. In response, *floating rate bonds* ⁽⁴⁰⁾ were introduced with coupon payments linked to money market rates plus a credit spread. The *syndicated loan* ⁽⁴¹⁾ market, which began to grow around the same time, adopted a similar pricing mechanism (Blaise Gadanecz, 2004) ⁽⁴²⁾.

Other than the loan products, Stigum and Crescenzi, (2007) in their classic reference of Stigum's Money Markets ⁽⁴³⁾ illustrated that *Future Contracts* ⁽⁴⁴⁾ on money

⁴⁰ Floating Rate Bonds / Floating Rates Notes (FRNs) are bonds that have a variable coupon, equal to a Fixing rate plus a spread. Please refer Section 1.2: APPLICATION OF INTEREST RATES (Page. 11).

⁴¹ A *syndicated loan* is also a loan, but in large amount, that is provided by a group of lenders. It is normally arranged by investment banks, which have the rights to negotiate the loan prices with the borrowers.

 ⁴² Gadanecz B. (2004), "The Syndicated Loan Market: Structure, Development and Implications".
 BIS *BIS Quarterly Review*, December.

⁴³ Stigum, M and A Crescenzi (2007), "Stigum's Money Markets". 4th Edition, McGraw-Hill.

⁴⁴ A *Futures Contract* of interest rate is a standardized contract between two parties to buy or sell a specified asset, under which a Fixing is referred, at a specified future date at an interest rate agreed today.

market rates were the first to emerge amongst other financial instruments. *Forward Rate Agreements* (FRAs) ⁽⁴⁵⁾, along with *Interest Rate Swaps*, were developed in the early 1980s. Numerous other derivatives linked to money market rates followed, such as *Swaptions* ⁽⁴⁶⁾, *Cross-Currency Swaps* ⁽⁴⁷⁾ and *Asset Swaps* ⁽⁴⁸⁾.

These relevant financial products, which are using *fixings* as references, are classified by Brousseau et al. (2009) into over-the-counter (OTC) financial derivatives, (such as *FRAs*, short and long-term *IRSs* and *Swaptions*), and exchange traded financial derivatives, (including *Future Contracts*, and *Options* on those future contracts). On the hand, Brooke and Cooper (2000) described the *Fixing* as a *settlement rate* that interbank loans, *Future Contracts*, *FRAs* and LIBOR *Swaps* all settle on LIBOR rates. As described, a FRA is bilateral or over-the-counter interest rate contract in which two counterparties agree to exchange the difference between an agreed interest rate and an as yet unknown LIBOR rate of specified maturity that will prevail at an agreed date in the

⁴⁶ A *Swaption* is an option granting its owner the right but not the obligation to enter into an underlying swap, e.g. options on Interest Rate Swaps.

⁴⁷ A *Cross-Currency Swaps* agreement between two parties to exchange the principal on loans denominated in two different currencies and also the interest payments that relate to a floating rate reference.

⁴⁸ An *Asset Swap* is an exchange of tangible assets for intangible assets such as interest rate *fixings*, or vice versa.

⁴⁵ A *Forward Rate Agreement* (FRA) is a forward contract in which one party pays a fixed interest rate, and receives a floating interest rate equal to a Fixing of a reference rate.

future.

Diccon Loxton (2008) claimed that the market is extremely huge. Billions of dollars of existing loan transactions are documented on the basis of LIBOR as traditionally set. Brousseau et al. (2009) also said that the reference is used as basis for the setting of money market benchmark essential to the indexing of trillions of derivative contracts and loans. Laura Mandaro (2008) ⁽⁴⁹⁾ showed that loans and derivative contracts totalling roughly \$150 trillion (more than \$20,000 for every person on earth) are indexed or tied to LIBOR in some way.

In summary, the interest rate references have been the important benchmark references for financial instruments as well as for bonds or loans which are commonly used by corporate borrowers. The amount of fund raising is huge that the bonds outstanding in the United States have reached USD 24.62 trillion for 2008 in accordance with Bank for International Settlements.

⁴⁹ Mandaro L. (2008), "N.Y. LIBOR Alternate Tries to Avoid London's Pitfalls", *MarketWatch*, San Francisco, May.

2.2 CHARACTERISTICS OF FIXINGS

2.2.1 Not Reflecting Actual Transactions

Theoretically, the *interest rate fixings* are derived from the interbank interest rates at which banks are lending or borrowing from each other in the wholesale money markets. Brousseau, Chailloux and Durré (2009) found that as long as the underlying market of a particular fixing is active, then the banks have the possibility to contribute by their estimation of the market rate of that existing market. However, Laura Mandaro (2008) expressed that LIBOR has been printing lower than the true cost of interbank borrowings. Gyntelberg and Wooldridge (2008) argued that the rate is typically estimated through a "fixing" arrangement. Diccon Loxton (2008) firmly said that the fixing rates are determined from the screen or from reference banks, but **the rates so determined do not represent the actual cost of funds of participating banks**.

As mentioned in the previous section about the features of *fixings* analysed by Gyntelberg et al. (2008) that the BBA collects quotes, which are not actual transaction rates, from a panel of banks. Lee Yong-Sook (2000) also pointed out that LIBOR is the average of rates at which major international banks are willing to offer term deposits, instead of the actual rates at which banks are trading. The actual lending rate is in fact the London interbank rate plus some margins.

In addition to the quotation mechanism, Brooke and Cooper (2000) explained this result by using the term of "credit premium". It is over the average actual lending cost. LIBOR rates are based on uncollateralised lending within the interbank market and they consequently contain a *credit premium* to reflect the possibility of default. Lee Yong-Sook (2000) pointed out that bank loans are priced at a spread to LIBOR and a bank has to pay some margin over it to borrow. The lending banks based on their own assessment establish credit limits in advance to other banks which may request for borrowing money in the future. This credit lines or credit limits in term of amount and tenors can be changed from time to time without notifying other counterparty banks.

In conclusion, as expressed by Brooke and Cooper (2000), interest rates with a small credit risk premium might be more effective hedging and positioning vehicles because they are closer approximations of the rates faced by banks. Because the *fixings* are not representing the rates of actual interbank transactions, it is only for reference and used as benchmark reference by other corporate borrowers.

2.2.2 For Reference and For Benchmark

As a matter of fact, a survey conducted by the Association Cambiste Internationale (ACI) - Financial Markets Association ⁽⁵⁰⁾ in June 2008 regarding the functioning of the money markets shows that over 80% market practitioners replied that some LIBOR *fixings* do not reflect the actual prevailing money market rates for cash. Laura Mandaro (2008) and others voiced their view of doubts that the LIBOR panel

⁵⁰ See the survey at www.aciforex.com (www.aciforex.org/docs/misc/20080618_ACI_Questionnaire_The_Functioning_of_the_Money_Markets_2008.pdf) banks are contributing to deliberate distortions of the rate.

The analysis of this phenomenon can be learned from the studies of Brousseau, Chailloux and Durré (2009): (i) interbank operations in a narrow sense now represent a much smaller share of banks' market-related funding than in the past; (ii) banks' market funding now is more reliant on banks' access to the Repo market, securitized funding, or on how they raise funds with non-banking entities (*money market funds* ⁽⁵¹⁾, insurance companies and pension funds via *Repos*); and (iii) as a related matter, LIBOR operations represent now only a remote "proxy" of their overall funding costs. Brousseau, et al. (2009) also addressed the issues related to the lack of depth of the unsecured money market on the term, and of the related consequences in terms of accuracy of the *fixings*.

On the other hand, as mentioned by Gyntelberg and Wooldridge (2008), the reliability of such *fixings* as measures of market conditions depends on the willingness of contributing banks to reveal their true, transactable quotes. Most *fixings* are based on non-binding quotes; contributing banks are not obligated to transact at the interest rates they submit.

In summary, the *interest rate fixings* are not accurately reflecting the actual interbank market rates, while the application of the *interest rate fixings* is still valid as benchmark references for pricing of bonds and loans in the commercial world. Therefore, "LIBOR is extremely important" in accordance with Laura Mandaro

⁵¹ A *Money Market Fund* is an open-ended fund that invests in short-term debt securities.

(2008).

2.2.3 Financial Crisis and Interbank Activities

Another finding from literature review is the impact of financial crises on the *fixings*. Gary Gorton (2008) $^{(52)}$ convinced that the panic of 2007 was not so different from, for example, the Panic of 1907 or that of 1893.

In the study of the market disruption clauses of loan agreements where the interest rates were priced over published or determinable interbank market rates such as LIBOR, HIBOR and SIBOR, Diccon Loxton (2008) assumed that the rate would not represent the actual cost of funds of participating banks. In the credit crunch, LIBOR rocketed in comparison with treasury rates, as banks lost faith in each other's credit. He believed that the market has seen 'tiering' when some banks were forced to pay significantly higher rates for their deposits than others. It is felt that the panel of banks who quotes for the calculation of LIBOR is not necessarily representative of the bank market. Even if it is broadly representative, there has been such tiering that it does not represent the cost of funds of many participants. Calomiris and Gorton (1991) ⁽⁵³⁾ had already claimed that banking panics only occurred in banking systems characterized by

⁵² Gorton G. (2008), "**The Subprime Panic**". *NBER Working Paper* 14398, National Bureau of Economic Research, October.

⁵³ Calomiris C. W. and Gorton G. (1991), "The Origins of Banking Panics: Models, Facts, and Bank Regulation", University of Chicago.

many smaller banks.

Both Gyntelberg and Wooldridge (2008) and Brousseau, Chailloux and Durré (2009) studied the detailed modalities of money market *fixings*. According to Gyntelberg et al. (2008), deterioration in market liquidity, increase in interest rate volatility and differences in the composition of the contributor panels were the main causes. Brousseau, et al. (2009) highlighted the dynamics of money market *fixings* during the turmoil by slicing the crisis into three sub-periods (pre-turmoil (i.e. before August 2007), turmoil until Lehman's demise, and post Lehman, i.e. after September 2008). They concluded that *interest rate fixings* had worked well in a context of market dislocation and that the dispersion within the dataset used to determine the references was a consequence of the market turmoil, and not a symptom of a flawed fixing process after the examination of both pre- and post-turmoil period.

Although higher dispersion in quotes among surveyed banks and more volatile term spreads are normal features in crisis periods due to the prevailing uncertainties, the key issue is to know whether these crisis phenomena are also reflecting higher distortions in the market dynamics. Brousseau et al. (2009) argued that **the safeguards used to avert the risks of gaming of the index worked well by trimming of the extremes** in this context.

The findings from Brousseau, et al. (2009) may imply, among other things, that the *fixings* could be the result of converging pricing among prime banks not entirely reflecting market conditions, hence making the *fixings* entirely virtual. Nevertheless, it

cannot changes the fact that *fixings* are still commonly applied as benchmark reference for bonds and loans nowadays.

2.3 DIFFERENCE IN DIFFERENT FIXINGS

Although Peebles and Wilson (1996)⁽⁵⁴⁾ found that SIBOR had moved with LIBOR since the mid-1980s based on their observation on the movements of the 6-month SIBOR and the 6-month LIBOR, the USD *fixings* in Europe and Asia in fact are not exactly the same.

According to the studies of Gyntelberg and Wooldridge (2008), who compared around 30 different *fixings* covering 16 major currencies including AUD LIBOR, CNY CHIBOR, EURIBOR, HKD HIBOR, SGD SIBOR, etc. ⁽⁵⁵⁾, there are some important differences in these *fixings* though they copy many features of USD LIBOR. These differences are the **liquidity of the market**, the **composition of the contributor panel**, and the **design of incentives to contribute accurate quotes**. ⁽⁵⁶⁾ These differences influence the representativeness of the *fixings* and can result in systematic discrepancies between rate *fixings* in the same currency.

2.3.1 Market Liquidity

In general, market participants are often willing to pay a higher price (receive

⁵⁴ Peebles G. and Wilson P. (1996), "**The Singapore Economy**". Cheltenham, Edward Elgar.

⁵⁵ See Appendix 6: Features of Selected Money Market Fixings. (Page. 144) (Source: Gyntelberg and Wooldridge, 2008).

⁵⁶ Gyntelberg and Wooldridge (2008) also classified another difference, named type of rate quoted, which means to us different channels to quote the reference rate.

a lower yield) to hold instruments that are more liquid and that are likely to be easier to trade in distressed market conditions. There is no unique measure of liquidity, but turnover, market size, and bid-offer spreads may provide some indication of differing liquidity conditions.

Gyntelberg and Wooldridge (2008) expressed that a key requirement of a benchmark is its liquid. Liquidity is arguably the most important determinant of whether rate *fixings* accurately represent conditions in money markets. Barriers to entry and exit are typically lower in offshore markets, like London, Hong Kong and Singapore, making them less vulnerable than onshore markets to the actions of a few large institutions. The diversity of market participants is often greater in offshore markets, which helps to boost activity. Offshore markets are often as liquid, and in some cases more so, than onshore markets. They point out that this is especially true of London, where a large share of international banking activity is transacted. Singapore too has relative liquid international interbank and foreign exchange markets.

2.3.2 Composition of Contributor Banks

When comparing with the *interest rate fixings* in different currencies, Gyntelberg and Wooldridge (2008) pointed out that rate *fixings* based on a large sample of banks are likely to be more representative of market conditions than those derived from a small sample. However, they also believed that there is a trade-off (of having a large sample of banks) because banks are not equally active. A few banks might account for a disproportionately large volume of transactions, and so a panel of many small banks might be less representative of overall activity than a panel of a few large banks. Contributing banks are selected based on their reputation, credit quality and activity in London.

Gyntelberg et al. (2008) also studied the relation between the natures of contributor banks and *fixings*. Contributor panels differ in the kinds of banks included. Foreign banks – in particular large, internationally active ones – dominate the LIBOR panels but are in the minority on most others. For example, 15 of the 16 banks on the Tokyo panel and 13 of the 16 banks on the Shanghai panel are domestic banks, headquartered in the country. The credit quality and business models of these banks are often different from those of foreign banks. Even with 12 to 16 banks, the average can be unduly influenced by unusually high or low quotes.

In addition, *interest rate fixings* are typically based on a trimmed average. Most *fixings* follow LIBOR and exclude the top and bottom 25% of contributed quotes. They even find that EURIBOR excludes the top and bottom 15%. The Mumbai interbank offered rate (MIBOR) identifies outliers using a statistical bootstrapping method. A few fixings, including those in Jakarta and Kuala Lumpur, include all submitted quotes and, consequently, are likely to be more affected by extreme quotes.

Finally, Gyntelberg et al. (2008) argued that the panel composition is usually not an important source of volatility in rate *fixings* because most contributor banks have a high credit standing. The average credit rating of banks in almost all LIBOR panels is AA. The design of the *fixing* mechanism can mitigate the influence of extreme quotes from contributor banks by trimming the extreme quotes.

2.3.3 Incentives to Contribute Accurate Quotes

According to the studies of Gyntelberg and Wooldridge (2008), since most of the *fixings* obtained from transactions or transactable quotes are available usually only for *overnight interest rates* ⁽⁵⁷⁾, the reliability of *fixings* at other maturities depending on the willingness of contributing banks to reveal their true and transactable quotes becomes difficult. Hurwicz et la. (2007) ⁽⁵⁸⁾ found that this depends on the incentives which give to market participants to reveal private information truthfully. Brousseau et la. (2009) expressed that the contributor banks have all sort of incentives, including reputation, as they are chosen among the major players of that market. They should be effectively in a better position to correctly gauge the market. As it follows, they all contribute accurate estimates of a same figure, and therefore the dispersion is low. Conversely, if the dispersion is high, it follows that the market does not follow the "*Law of One Price*" ⁽⁵⁹⁾, sparking questions about the nature of the underlying market and a

⁵⁷ According to Gyntelberg and Wooldridge, examples include the federal funds effective rate in the US dollar market and the European overnight index average (EONIA) in the euro market.

⁵⁸ *Mechanism Design Theory*, or *Reverse Game Theory*, developed by Leonid Hurwicz, Eric Maskin, and Roger Myerson, is a field in game theory about solution concepts for a class of private information games, which was awarded Nobel Memorial Prize in Economic Sciences in 2007.

⁵⁹ The *Law of One Price* is an economic law: In an efficient market all identical goods must have only one price.

potential dis-anchoring.

Gyntelberg et al. (2008) suggested that one way in which *interest rate fixings* seek to be incentive compatible is by publishing individual banks' contributed interest rates. Transparency exposes the banks to reputational risk because their customers will penalise them for transacting at rates significantly different from their submitted rates. However, transparency raises questions about the information signalled by contributing banks through their quotes. There may be circumstances in which contributing banks deliberately choose to disclose biased quotes. If there is uncertainty about the liquidity position of a contributing bank, the bank will be wary of revealing any information that might add to this uncertainty for fear of increasing its borrowing costs. Therefore, for the purposes of the *fixing*, the bank has an incentive to quote a lower interest rate publicly than it might be prepared to pay in a private transaction.

Gyntelberg et al. (2008) highlighted the potential biases related to the contributor banks' strategic behanviour. Ewerhart et al (2007) ⁽⁶⁰⁾ discovered that market participants with large positions in derivative contracts referencing a rate fixing might seek to move the fixing higher or lower by contributing biased quotes. Alternatively, they might indirectly influence the accuracy of the *fixing* by choosing not to join the contributor panel. Similar *findings* are also argued by Diccon Loxton (2008). Some have even alleged that quotes by the contributor banks are not always a reflection

⁶⁰ Ewerhart C., Cassola N., Ejerskov S. and Valla N. (2007), "Manipulation in Money Markets". *International Journal of Central Banking*, March. of their own true deposit rate. They say that banks may be quoting different rates to suit their circumstances, for example, quoting as low as possible if paying a large close-out of a swap or out of concern for market perceptions, if they were to quote a higher rate.

Although Gyntelberg et al. (2008) did not further interpret the difference in detail, especially about the USD *fixings* in London, Hong Kong and Singapore, they argued that the scope for such strategic behaviour to influence the *fixings* can to some extent be limited by trimming, in which biased or extreme quotes are disregarded.

2.4 CONCLUSION

According to the literature review mentioned above, an initial conclusion can be drawn. *Interest rate fixings* in USD that are commonly used by a lot of corporate borrowers though *Interest Rate References* or *Benchmark Reference Rates* are not the actual interbank transacted rates based on the view of Brousseau, Chailloux and Durré (2009). Instead, **they are for reference only**, especially for tenors at 3-month or 6-month, and therefore they, as reference, are not affected significantly by financial crises and had worked well in a context of market dislocation. The USD *fixings* established in the offshore markets, like London, Hong Kong and Singapore are not the same (and neither do the volatilities). They are difference resulting in the liquidity of the market, the composition of the contributor panel, and the design of incentives to contribute accurate quotes in accordance with the examination by Gyntelberg and Wooldridge (2008), but the can avert the risks **by trimming of the extremes** (Brousseau et al., 2009).

All the available literature review is neither aware the USD HIBOR, nor analyses the volatilities risk for the corporate borrowers by using different USD *fixings*. Since 3-month fixing and then 6-month fixing are common used for the pricing of commercial loans and bonds, the following study will therefore focus on these areas.

Chapter III

DATA, METHODOLOGY AND FINDINGS

CHAPTER III DATA, METHODOLOGY AND FINDINGS

3 As discussed in the previous sections, the long end of interbank interest rates, i.e. tenors over 6-month, is inactive in reality (Section 2.2.2: For Reference and For Benchmark). Transactions seldom occur in this segment, especially for 12-month activities, and the *fixings* quoted by the contributor banks are unlikely to become actual transaction prices. On the other hand, significant amount of funds are exchanged for shorter tenors, such as 1-month, of which the transacted prices are expected to reflect in the short-dated *fixings*. In view of this, the following study and examination will emphasize on the interpretation of *interest rate references for 1-month and 3-month tenors, which are also commonly used as benchmark references by bonds and loans borrowers*.

3.1 RESEARCH OBJECTIVES AND HYPOTHESIS

According to the literature review in Chapter Two, the *fixings* quoted in interbank money markets are influenced by different factors, including market liquidity, composition of contributor banks, incentives to contribute quotes, etc. Given the significant differences in infrastructure and the participants of London, Hong Kong and Singapore markets, this study hypothesizes that LIBOR, HIBOR and SIBOR have systematic differences in levels and volatilities. *T-tests* and *F-tests* are applied to verify if systematic differences in levels and volatilities exist between the three *fixings* over the sample period.

Daily LIBOR, HIBOR and SIBOR *fixings* for the 907 days between 02 Jan 2007 to 30 Jun 2010 provided by Thomson Reuters are primary input data of the study. The tenors studied are 1-month, 3-month, 6-month and 12-month. All days with <u>one</u> of the <u>three fixings</u> missing are deleted to maintain synchronicity. As a result, 164 days are removed and the final sample has 743 days with quotes for all three *fixings*. To better understand the behaviours of the *fixings* under different macroeconomic conditions, the study divides the overall sample period into 4 sub-periods:

- 1) 02 Jan 2007 to 31 Dec 2007,
- 2) 02 Jan 2008 to 31 Dec 2008,
- 3) 02 Jan 2009 to 31 Dec 2009,
- 4) 02 Jan 2010 to 30 Jun 2010.

3.2 METHODOLOGY

Before testing the differences between the mean levels of LIBOR, HIBOR and SIBOR, and the differences in standard deviations (volatilities) of spreads between LIBOR, HIBOR and SIBOR, the following sections will first test *the stationary time series* whether the data are random variables with their distributions and summary statistics, such as mean and variance, being constant over time.

3.2.1 Stationary Test

3.2.1.1 Augmented Dickey-Fuller (ADF) Test

To ensure the robustness of the statistical results in this study, the *Augmented Dickey-Fuller* (ADF) Test (Dickey and Fuller, 1981) is applied to test whether the *fixing* series were stationary over in the sample period. The hypotheses to be tested are listed below.

HIBOR	LIBOR	<u>SIBOR</u>
$H_0: H_M$ is non – stationary $H_1: H_M$ is stationary	$H_0: L_M$ is non – stationary $H_1: L_M$ is stationary	$H_0: S_M$ is non – stationary $H_1: S_M$ is stationary
Where $M = 1$ -month, 3-month, 6-month or 12-month tenor	Where M = 1-month, 3-month, 6-month or 12-month tenor	Where M = 1-month, 3-month, 6-month or 12-month tenor

The hypotheses are tested by estimating coefficients for the regression model recommended by Dickey and Fuller.

$$\Delta H_{1,t}^{1M} = \gamma^{H1M} + \kappa_{1,t-1}^{H1M} H_{i,t-1}^{1M} + \sum_{k=1}^{5} \varpi_{1,k}^{H1M} \Delta H_{1,t-k}^{1M} + \varepsilon_{k,t}^{H1M}$$

Where

- $\Delta H_{1,t}^{1M}$ = Current (contemporaneous) 1st-differenced value of 1-month HIBOR
- γ^{H1M} = Intercept of auto-regression model for 1-month HIBOR
- $\kappa_{1,t-1}^{H1M}$ = Auto-correlation coefficient for 1st-lagged value of 1-month HIBOR
- $H_{i,t-1}^{1M} = 1^{\text{st}}$ -lagged value of 1-month HIBOR
- $\varpi_{1,k}^{H1M}$ = Auto-correlation coefficient for the kth-lagged value of $\Delta F_{1,t}^{HIM}$
- $\Delta H_{1,t-k}^{1M} = k^{\text{th}}$ -lagged value of 1st-differenced 1-month HIBOR
- $\varepsilon_{k,t}^{H1M}$ = Error term of auto-regression model for $\Delta F_{1,t}^{H1M}$

To reject the null hypothesis, t-values for the regressors have to be greater than -2.902358, the ADF statistic at 5% significance level, in absolute terms. In that case, 1-month HIBOR is initially assumed to follow a stationary process. All 4 tenors (1-month, 3-month, 6-month and 12-month) of the three *fixings* (HIBOR, LIBOR and SIBOR) are tested with the same procedures.

3.2.1.2 Co-integration Tests

Co-integration is a statistical property of time series variables. The concept implies that a stationary linear combination existed between two non-stationary time series. In more simple terms, if two or more time series are co-integrated, they share a common stochastic drift. Co-integrated series are popular in finance researches and more advanced econometric technique. For example, the *Error Correction Model*

(ECM) is required to model co-integrated series. In this study, the relationship of interest is HIBOR and LIBOR, and therefore, the four pairs of HIBOR and SIBOR are tested to verify if they are co-integrated. The co-integration tests are done in two parts and the procedures adopted in this Section in accordance with *Engle and Granger* (1987) ⁽⁶¹⁾

• Regress 1-Month LIBOR (L_t^{1M}) on 1-Month HIBOR (H_t^{1M}) and generate the residual series $\varepsilon_{L,t}^{1M}$:

$$L_t^{1M} = \alpha_L^{1M} + \beta_L^{1M} H_t^{1M}$$

• Test whether or not $\varepsilon_{L,t}^{1M}$ is stationary. If $\varepsilon_{L,t}^{1M}$ series were non-stationary then L_t^{1M} and H_t^{1M} are said to be co-integrated. As in previous section, the hypothesis to be tested is:

$$H_0: \varepsilon_{L,t}^{1M}$$
 is non – stationary
 $H_1: \varepsilon_{L,t}^{1M}$ is stationary

An auto-regression model with the specification below is estimated to test the hypothesis.

$$\Delta \varepsilon_t^{L1M} = \gamma_L^{1M} + \kappa_{L,t-1}^{1M} \varepsilon_{L,t-1}^{1M} + \sum_{k=1}^5 \varpi_{L,k}^{1M} \Delta \varepsilon_{L,t-k}^{1M} + error_{k,t}$$

Where

• $\Delta \varepsilon_t^{1M}$ = Contemporaneous 1st-differenced error terms of 1-Month LIBOR

⁶¹ Engle, Robert F. and Granger, Clive W. J. (1987), "**Co-integration and error correction: Representation, estimation and testing**", *Econometrica*, 55(2), pp.251-276.

- γ_L^{1M} = Intercept of auto-regression model for error terms of 1-month LIBOR
- $\kappa_{L,t-1}^{1M}$ = Auto-correlation coefficient for 1st-lagge value of $\varepsilon_{L,t-1}^{1M}$
- $\varepsilon_{L,t-1}^{1M} = 1^{\text{st}}$ -lagged value for error terms of 1-month LIBOR
- $\varpi_{L,k}^{1M}$ = Auto-correlation coefficient for kth-lagged value of $\Delta \varepsilon_t^{1M}$
- $\Delta \varepsilon_{L,t-k}^{1M} = k^{\text{th}}$ -lagged value of 1st-differenced value of error terms of 1-month LIBOR
- $error_{k,t}$ = Error term of auto-regression model for $\Delta \varepsilon_{L,t}^{1M}$

3.2.1.3 Lead-lag Relation Test

Lead-lag relation refers to the situation in which one (leading) variable is correlated with the values of another (lagging) variable at later times. In this Chapter, a set of simultaneous equations are estimated to verify whether HIBOR is moving ahead of LIBOR or vice versa. The same procedures are repeated for all four tenors (1-month, 3-month, 6-month and 12-month).

$$\Delta H_t^{1M} = \gamma_H^{1M} + \sum_{\substack{k=-3 \\ 3}}^{3} \varpi_{H,k}^{1M} \Delta L_{t+k}^{1M} + \varepsilon_{H,t}^{1M}$$
$$\Delta L_t^{1M} = \gamma_L^{1M} + \sum_{\substack{k=-3 \\ k=-3}}^{3} \varpi_{L,k}^{1M} \Delta H_{t+k}^{1M} + \varepsilon_{L,t}^{1M}$$

In the 1st equation, the current (contemporaneous) HIBOR at day *t* is regressed on three lead (t - 3) and three lag (t + 3) LIBOR. In the 2nd regression, LIBOR is the dependent variable and lead, and the lag HIBOR data are the independent variables.

3.2.2 Pair-wise t-Tests of Differences between Mean Levels

Pair-wise t-test is applied to check whether significant differences exist between mean levels of LIBOR, HIBOR and SIBOR for 1-month, 3-month, 6-month and 12-month tenors. The hypotheses to be tested are:

LIBOR vs. HIBOR	LIBOR vs. SIBOR	<u>SIBOR vs. HIBOR</u>
$H_0: \mu_M^L < \mu_M^H$	$H_0: \mu_M^L < \mu_M^S$	$H_0: \mu_M^S < \mu_M^H$
$H_1: \mu_M^L \ge \mu_M^H$	$H_1: \mu_M^L \ge \mu_M^S$	$H_1: \mu_M^S \ge \mu_M^S$
Where	Where	Where
L = LIBOR,	L = LIBOR,	S = SIBOR,
H = HIBOR	S = SIBOR	H = HIBOR
and	and	and
M = 1-month, 3-month,	M = 1-month, 3-month,	M = 1-month, 3-month,
6-month or 12-month tenor	6-month or 12-month tenor	6-month or 12-month tenor

3.2.3 Pair-wise F-Tests of Differences in Standard Deviations

Similarly, pair-wise F-test is used to check for differences in standard deviations (volatilities) of spreads between LIBOR, HIBOR and SIBOR for 1-month, 3-month, 6-month and 12-month tenors. The hypotheses to be tested are:

WhereWhereWhereWhere $H - S = HIBOR - SIBOR$, $H - S = HIBOR - SIBOR$ $S - L = SIBOR - LIBOR$ $H - L = HIBOR - LIBOR$ $S - L = SIBOR - LIBOR$ $H - L = HIBOR - LIBOR$ andandand $M = 1$ -month, 3-month, $M = 1$ -month, 3-month, $M = 1$ -month, 3-month, 6 -month or 12-month tenor 6 -month or 12-month tenor 6 -month tenor	$ \frac{H-S \text{ vs. } H-L}{\left\{ H_0: \sigma_M^{H-S} < \sigma_M^{H-L} \right.} \left\{ H_1: \sigma_M^{H-S} \ge \sigma_M^{H-L} \right. } $	$\frac{\mathbf{H} - \mathbf{S} \text{ vs. } \mathbf{S} - \mathbf{L}}{\begin{cases} H_0: \sigma_M^{H-S} < \sigma_M^{S-L} \\ H_1: \sigma_M^{H-S} \ge \sigma_M^{S-L} \end{cases}}$	$\frac{\mathbf{S} - \mathbf{L} \text{ vs. } \mathbf{H} - \mathbf{L}}{\begin{cases} H_0: \sigma_M^{S-L} < \sigma_M^{H-L} \\ H_1: \sigma_M^{S-L} \ge \sigma_M^{H-L} \end{cases}}$
	Where	Where	Where
	H - S = HIBOR - SIBOR,	H - S = HIBOR - SIBOR	S - L = SIBOR - LIBOR
	H - L = HIBOR - LIBOR	S - L = SIBOR - LIBOR	H - L = HIBOR - LIBOR
	and	and	and
	M = 1-month, 3-month,	M = 1-month, 3-month,	M = 1-month, 3-month,
	6-month or 12-month tenor	6-month or 12-month tenor	6-month or 12-month tenor

Similarly, pair-wise F-test to check for differences in standard deviations (volatilities) between HIBOR, LIBOR and SIBOR for 1-month, 3-month, 6-month and 12-month tenors. The hypotheses to be tested are:

$\frac{\text{Vol}(L) \text{ vs. Vol}(H)}{\{H_0: \sigma_M^L < \sigma_M^H \\ H_1: \sigma_M^L \ge \sigma_M^H \}}$	$ \frac{\text{Vol (L)} \text{ vs. Vol (S)}}{\begin{cases} H_0: \sigma_M^L < \sigma_M^S \\ H_1: \sigma_M^L \ge \sigma_M^S \end{cases}} $	
Where	Where	Where
H = HIBOR	L = LIBOR	H = HIBOR
L = LIBOR	S = SIBOR	S = SIBOR
and	and	and
M = 1-month, 3-month,	M = 1-month, 3-month,	M = 1-month, 3-month,
6-month or 12-month tenor	6-month or 12-month tenor	6-month or 12-month tenor
3.3 FINDINGS

3.3.1 Stationary Test

3.3.1.1 Augmented Dickey-Fuller (ADF) Test

In general, the patterns for the twelve regression models were similar. All of the $\varpi_{1,1}$ terms were statistically significant at 5% level. However, for the higher ordered $\varpi_{1,k}$ terms, many of them were insignificant. This implied that the evidences were not strong enough to reject the null hypotheses. In the sample period, LIBOR, HIBOR and SIBOR were said to be non-stationary. The results are typical as financial time series normally exhibited auto-correlation effect and macroeconomic changes in London, Hong Kong and Singapore will gradually reflect on changes in the level of LIBOR, HIBOR and SIBOR.

3.3.1.2 Co-integration Tests

The ADF test was applied to evaluate results of the auto-regression models. Similar to the previous section of ADF statistic at 5% significance level, if the t-values for $\varpi_{L,k}$ terms were less than -2.902358, LIBOR and HIBOR fixings were co-integrated series. All four tenors (1-month, 3-month, 6-month and 12-month) were tested with the same procedures.

Unlike results for stationarity tests, in which many of the $\varpi_{1,k}$ terms were statistically significant at 5% level for 1-month, 3-month and 12-month tenors, nearly all

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parameters for the 6-month tenor regression were statistically insignificant. In sum, evidences in the sample were not sufficient to conclude that LIBOR and HIBOR were co-integrated except for 6-month tenor. The results are corollary of the *fixing* mechanisms as LIBOR and HIBOR are determined by two distinct groups in two cities based on considerations of different macroeconomic conditions.

3.3.1.3 Lead-lag Relation

Standard t-Test is applied to evaluate results of the lead-lag regressions. Results for all four tenors were mixed. Most of the $\varpi_{i,k}$ terms were statistically insignificant at the 5% level. There was insufficient evidence in the sample to conclude that LIBOR leads HIBOR or the other way round. The results are consistent with the observations that levels of previous HIBOR *fixings* are not determining factor for current LIBOR *fixings*, or vice versa.

3.3.2 Distribution of LIBOR, HIBOR and SIBOR

Over the sample period, *the co-movement between HIBOR and SIBOR is close to perfect with correlation coefficient of ~0.99*. (Please refer Appendix 2 for all statistic results, pp. 121). As Hong Kong and Singapore are both financial centres in Asia, the results would reinforce that the two *interest rates fixings* of Asian markets are similar. As the statistical results show that HIBOR is less stable compared with SIBOR and some qualitative factors to be discussed in next Chapter, the study in this section focuses on examining the systematic differences between London and Hong Kong markets.

Before diving into all the statistics, the overall distribution of the spreads between LIBOR and HIBOR *fixings* are firstly revealed. For the whole sample period, the mean value of HIBOR is much higher than that of LIBOR with spreads ranged from nearly 600 basis points (BPs) $^{(62)}$ (0.0598) for 1-month tenor to around 400 BPs (0.0444) for 12-month tenor. This is consistent with the skewness coefficients. 1-month tenor of HIBOR has the greatest skewness (7.8859) and 12-month tenor of HIBOR is the lowest (2.6617).

Volatilities of the spreads between LIBOR and HIBOR also have similar patterns. The *fixing* for 1-month tenor of HIBOR has the highest standard deviation (0.1344) whereas the number for 12-month tenor is only 0.0705. The highly volatile spreads of 1-month tenor indicate that the underlying *fixings* are very unstable in the sample period. Furthermore, the mechanism of removing extreme quotes from the *fixings* causes the spreads to be clustered around the mean, i.e. the spreads have a peaked distribution evidenced by the highly positive kurtosis.

Some more interesting observations are reported for the sub-periods. Spreads for 1-month tenor exhibit cyclical behaviours over the sample periods. In sub-period 1 (Jan 2007 – Dec 2007), the spread is 0.0097 (97 basis points), increasing drastically to 0.1395 (1,395 BPs) in period 2 (Jan 2008 – Dec 2008), falling to 0.0112 (112 BPs) in

⁶² One *Basis Point* (BP) equals to 0.01%, or 0.001.

period 3 (Jan 2009 – Dec 2009) and bouncing back to 0.0416 (416 BPs) in period 4 (Jan 2010 – Jun 2010). This confirms the propositions that *fixings* for the short tenors reflect the reality of money market transactions that follows the fluctuation of macroeconomic.

The study finds similar variations in volatilities. Standard deviations for 1-month tenor is 0.0248 in sub-period 1 (Jan 2007 – Dec 2007), jumping to 0.2309 in sub-period 2 (Jan 2008 – Dec 2008) and coming down to 0.0112 and 0.018 in sub-periods 3 (Jan 2009 – Dec 2009) and 4 (Jan 2010 – Jun 2010) respectively. There is clear evidence for *fixings* of other tenors. This is clear evidence that the *fixings* are contingent upon prevailing macroeconomic conditions.

Results for the F-tests clearly indicated that volatilities between LIBOR, HIBOR and SIBOR for all tenors were very close. No significant differences existed between them in the overall and the sub-sample periods. Exceptions occurred in 2008 where the inter-bank markets were impacted by the financial tsunami. 1-month and 3-month HIBOR were significantly higher than LIBOR and SIBOR. The results were in line with the hypothesis that short tenor *fixings* were more responsive to changes in macroeconomic environment and Hong Kong market was more vulnerable to external shocks. This caused HIBOR to experience greater fluctuation than LIBOR and SIBOR.

3.3.3 Differences between Long & Short Tenors

The empirical evidence is that all pair-wise differences between the *fixings* for

12-month tenor are statistically insignificant. This supports the proposition that *the fixings for the long end are only "price tags" on the shelf with no actual transaction taken place.* Hence, this echoes the focus on the short end of the market, as stated in the beginning of this Chapter.

Unlike the fixings for 12-month tenor, some transactions take place around the fixings for 6-month tenor. Over the 3½ year sample period, LIBOR and HIBOR for all tenors moved closely together with correlation coefficients of 0.98+. A closer look at the summary statistics reveals that 6-month LIBOR is significantly lower and less volatile than 6-month HIBOR. The relationship breaks down in sub-periods 2 (Jan 2008 – Dec 2008) and 3 (Jan 2009 – Dec 2009) with correlation coefficients dropping to 0.87 and 0.3 respectively. Although the *fixings* for 6-month tenor exhibit some fluctuations over the economic cycles, they do not represent as transaction volumes in this market segment that is insignificant in comparison with the shorter tenors.

Summary statistics for the average spreads outline their behaviours over the sample periods. To better understand the forces underlying the movements, the study have to dive deeply into the statistics for LIBOR and HIBOR *fixings*. In sub-period 3 (Jan 2009 – Dec 2009), both 1-month and 3-month LIBOR are significantly lower than the corresponding HIBOR but only 1-month LIBOR is significantly lower than 1-month HIBOR in sub-period 4 (Jan 2010 – Jun 2010). This again leads us to believe that **the short end of the market was seriously hit by some macroeconomic shocks in 2008 because the** *fixings* **of 1-month was reflecting the actual transactions. The Hong Kong economy is a relative crushing economy than London because of its size and**

structure. The standard deviations of LIBOR and HIBOR are strong support for the propositions. In sub-period 1 (Jan 2007 – Dec 2007), standard deviations for LIBOR and HIBOR are 0.246 and 0.2383 respectively. The numbers soar to 0.8307 and 0.8999 in sub-period 2 (Jan 2008 – Dec 2008). Volatilities continued to rise in sub-period 4 (Jan 2009 – Dec 2009) and LIBOR less volatile than HIBOR (0.9371 vs. 1.0445). Undoubtedly, *the USD interest rate market in Hong Kong is more volatile and unstable*.

3.4 CONCLUSIONS

In 2010, both the USD interest rate markets in London and Asia markets were hit by a new wave of shocks. The spreads for 1-month tenor *fixings* widened significantly. This is in line with the hypothesis that **the short end of the market activities is more active and the** *fixings* **in this segment are reflective of prevailing market conditions**. The sub-prime mortgage crisis and subsequent credit crunch occurred during 2008 and 2009 squeezed the supply of USD in the Hong Kong market and drove up 1-month and 3-month HIBOR substantially. ⁽⁶³⁾ Compared with HIBOR, LIBOR is relatively stable over the same period of time.

The sample statistics provide strong evidence that the Hong Kong interbank market is relatively small and open economy, being prone to external shocks. HIBOR has greater fluctuations between normal and turbulent conditions. As HIBOR is relatively more unstable based on the statistical test, corporations should avoid adopting it as reference rate for corporate borrowings to reduce their interest risks.

⁶³ To check for robustness, the study repeated the analysis based on alternative sub-sample periods. The same set of data was divided into 4 sub-periods: 1) 02 Jan to 31 Mar 2008, 2) 01 Apr to 30 Sep 2008, 3) 02 Oct to 31 Dec 2009 and 4) 02 Jan to 30 Jun 2010, to verify if the results were significantly different under crisis situations. However, compared with the preliminary findings, no material differences were found except the magnitude of the statistics. Chapter IV

EXPLANATIONS AND APPLICATIONS

CHAPTER IV EXPLANATIONS AND APPLICATIONS

4 The statistical results revealed that significant differences in average levels and fluctuations (volatilities) existed between LIBOR, HIBOR and SIBOR. In general, levels and volatilities of HIBOR did not have a consistent pattern over time and its behaviors were relatively unstable in the sample periods. Persistent pricing anomalies limit the usefulness of a benchmark as a hedging or positioning vehicle. (Gyntelberg and Wooldridge, 2008)

The section finds the key factors to explain the systematic difference in *Interest Rate References* and justify LIBOR as the benchmark for corporation borrowing.

4.1 WHAT CAUSES SYSTEMATIC DIFFERENCES BETWEEN THE RATES?

4.1.1 Differences in Timing and Location

Major cause of differences between LIBOR, HIBOR and SIBOR is timing. LIBOR is quoted at 11:00 a.m. Greenwich Mean Time (GMT) every business day, whereas HIBOR and SIBOR interest rates are reported daily eight hours ahead of LIBOR (GMT +08). As supply and demand change continually, the *fixings* in London and in Asia are unlikely to coincide.

4.1.2 Difference in Market Conditions

The individual interest rate quotations contributed by the panel contributor banks in London, Hong Kong and Singapore respectively reflect the most current information prevail in both global and local interbank money market. This available information assists the bankers in forming their expectations of potential movements of However local market information would not be a unique set of interest rate. information available simultaneously for everyone in the world. At least the interpretation is not the same for each banker. Besides, the quotations also reflect the liquidity in different markets and liquidity is arguably the most important determinant of whether interest rate fixings accurately represent conditions in money markets (Gyntelberg and Wooldridge, 2008). London, as an offshore market of the U.S. dollar, has been established since the 1960s resulting in the Marshall Plan⁽⁶⁴⁾ and the Cold War ⁽⁶⁵⁾, and has higher liquidity than the markets of Hong Kong and Singapore. That explains why systematic differences existed in the three *interest rate references*.

4.1.3 Differences in Composition of Contributor Banks

The contributor banks and the number of them are different from one city to another so that identical *interest rate fixings* at three cities are unlikely.

⁶⁴ The *Marshall Plan* is a European Recovery Program during 1947–1951 for rebuilding and creating a stronger economic foundation for the countries of Europe after the Second World War.

⁶⁵ The *Cold War* was the continuing political conflict between the Soviet Union and the United States after the Second World War.

Figure 9: The Contributor Banks of Fixings as of July 2010

London (16 panel banks):

3 U.S. banks (BOA, JPM and Citi), **4 U.K. banks** (HSBC, RBS, Lloyds and Barclays), **6 European banks** (UBS, Credit Suisse, West LB, Rabobank, Deutsche and S.G.), **2 Japanese banks** (BTM UFJ and Norinchukin Bank), and **1 Canadian bank** (RBC). ⁽⁶⁶⁾

Hong Kong (20 panel banks):

2 U.S. banks (JPM and Citi), **3** U.K. banks (HSBC, RBS and SCB), **2** European banks (SG and BNP Paribas), **3** Japanese banks (BTM UFJ, SMBC and Mizuho), **1** Singaporean bank (DBS), **5** PRC banks (ICBC, BOC, CCB, ABC and BankComm), **3** local banks (HASE, BEA and ShaCom), and **1** Australian bank (NAB). ⁽⁶⁷⁾

Singapore (7 panel banks):

2 U.S. banks (BOA and Citi), **3 European banks** (RBS, UBS and Deutsche), **1 Japanese bank** (BTM UFJ), and **1 local Singaporean bank** (DBS).

Figure 9 (The Contributor Banks of Fixings as of July 2010) shows the contributor banks of *interest rates fixings* at three cities as of July 2010. The numbers

⁶⁶ BOA stands for Bank of America, Citi for Citibank, JPM for JP Morgan Chase; HSBC for Hongkong and Shanghai Banking Corporation, RBS for Royal Bank of Scotland, S.G. for Société Générale, UBS for Union Bank of Switzerland, Deutsche for Deutsche Bank, BMT UFJ for Bank of Tokyo-Mitsubishi, and RBC for Royal Bank of Canada.

⁶⁷ SMBC stands for Sumitomo Mitsui Banking Corporation, Mizuho for Mizuho Bank, DBS for Development Bank of Singapore, BOC for Bank of China, ABC for Agricultural Bank of China, ICBC for Industrial and Commercial Bank of China, CCB for China Construction Bank, BankComm for Bank of Communication, HASE for Hang Seng Bank, BEA for Bank of East Asia, ShaCom for Shanghai Commercial Bank, and NAB for National Australia Bank. of contributor banks are sixteen, twenty and seven in London, Hong Kong and Singapore respectively. The difference in numbers of contributor banks being taken into the computation of the *fixings* makes the arithmetic results various.

It is also found (refer to Figure 10) that only three banks were the same contributors in the three cities (i.e. Citi, RBS and BTM UFJ). Two were the same panel banks in both London and Hong Kong (i.e. JPMorgan and HSBC), and another three in both London and Singapore (i.e. BOA, UBS and Deutsche); and only one bank was the same in Hong Kong and Singapore (i.e. DBS). The difference in the composition of contributor banks enhances the findings why their *fixings* differ amongst each other.

Figure 10: List of Contributor Banks Highlighted by Peers									
LIBOR:	"Citi, RBS, BTM UFJ";	"JPM, HSBC";	"BOA, UBS, Deutsche", etc.						
HIBOR: etc	"Citi, RBS, BTM UFJ";	"JPM, HSBC"";		"DBS",					
SIBOR:	"Citi, RBS, BTM UFJ";		"BOA, UBS, Deutsche";	"DBS"					

4.1.4 Differences in Handling Persons

Banks having local offices/branches in London, Hong Kong and Singapore setup their operations separately in different cities. The operation of each bank providing the interest rates for fixing calculation relies on the local staff even for the same contributor banks. They do not centralize the function of lending funds in one local money market by a same group of dealers, say, located in their head office or in one of the centers. This operation can further explain on the other hand why the *fixings* are different even though some banks are the same contributors in two or three cities.

4.2 WHY LIBOR IS MORE STABLE?

The statistical result reveals that HIBOR is unstable and LIBOR relatively stable. Going into deeply examinations, the study identifies the following explanations of the phenomenon in this regards.

4.2.1 Trading in a Mature Market

London is a more mature market, and the transaction volumes and funding sources in London are relatively larger on daily basis. ⁽⁶⁸⁾ According to the survey announced by The Bank for International Settlements (BIS) in 2010, Singapore was ranked the second in the examined cities, while Hong Kong was the last amongst these three cities. The turnovers of both cities were significant lower than that of London. Since the appearance of Eurodollar in London in the Sixties, London has been an active interbank market. Global international banks whose ratings are higher can normally lend out their surplus funding or borrow deficit demand in London market without facing serious credit quality problem by riding on and setting up their major branches in the U.K.

Figure 12: Rating of Contributor Banks as at July 2010) shows that Triple A

⁶⁸ The Bank for International Settlements (BIS) triennial survey on foreign exchange and derivatives market turnover in 2010 showed the ranking by countries: U.K. (37%), U.S. (18%), Japan (6.3%), Singapore (5%), Switzerland (5%), Hong Kong (5%) and Australia (4%).
According to this survey, the turnovers of both Hong Kong and Singapore were only around 5%

According to this survey, the turnovers of both Hong Kong and Singapore were only around 5% separately, while the turnover of London was 37%.

rating (including *Aaa* for Moody's and *AAA* for Standard & Poor's (S&P) ⁽⁶⁹⁾) for the contributor banks of LIBOR and SIBOR counted 6~13%, but none for HIBOR. If both *Triple A* and *Double A* ratings (including *Aa* for Moody's and *AA* for S&P) are counted together ⁽⁷⁰⁾, only 25% of the panel banks for HIBOR obtained the ratings offered by Moody's while 81% and 76% of the panel banks of LIBOR and SIBOR obtained Moody's ratings respectively. When the lowest rating of *Triple B* (among all reviewed ratings in Figure 12) assigned by both Moody's and S&P is considered, only the contributor bank of HIBOR, i.e. Bank of Communication, is found, but none for the panel banks of LIBOR or SIBOR.

The rate *fixings* measure conditions in a given market segment in accordance with the studies of Gyntelberg and Wooldridge (2008). If the market segment has a lot of high rating banks, it leads to less impact on credit quality during the volatile crises periods because of greater uncertainty. Hence there could be more dispersion on interest rates in Hong Kong and Singapore than in London especially during any uncertainty circumstances over a long period of time. As a result, the *fixings* to some extent reflect the actual transactions occurring in the money markets, especially for the short tenor transactions. The more the turnover is, the reliable the *interest rate fixings*

⁶⁹ Both Moody's Investors Service, Inc. (Moody's) and Standard & Poor's Financial Services LLC (S&P's) are credit rating agencies and issue credit ratings for the debt of public and private corporations.

⁷⁰ At least 25% or above of the panel contributor banks of all three fixings had both Triple A and Double A ratings gained by S&P.

would be.

(Moody's/S&P)	LIBOR	HIBOR	SIBOR
No. of banks Triple A :	2/1 (13%/6%)		1/1 (13%/13%)
Double A:	11/3 (69%/19%)	9/5 (45%/25%)	5/2 (63%/25%)
Single A :	3/11 (19%/69%)	8/12 (40%/60%)	2/5 (25%/63%)
Triple B :	0/1 (0%/6%)	1/1 (5%/5%)	
Non-Rated :		2/2 (10%/10%)	
Triple + Double A :	(81%/25%)	(45%/25%)	(76 %/ 38 %)

Figure 11: Rating Summary of Contributor Banks as at July 2010

Country	ISSUER	Moody's	S&P	LIBOR	HIBOR	SIBOR
U.S.	JP Morgan Group	Aa3	A+	$2_{\rm A} / 1_{\rm A}$	$2_{\rm A} / 1_{\rm A}$	-
	Bank of America Group	A2	Α	$1_{\rm A} / 1_{\rm A}$	-	$1_{\rm A} / 1_{\rm A}$
	Citigroup Inc.	A3	Α	$1_{\rm A} / 1_{\rm A}$	$1_{\rm A} / 1_{\rm A}$	$1_{\rm A} / 1_{\rm A}$
Britain	HSBC	Aa2	AA	$2_{\rm A}/2_{\rm A}$	$2_{\rm A}/2_{\rm A}$	-
	Barclays Banks	Aa3	AA-	$2_{\rm A}/2_{\rm A}$	-	-
	Lloys TSB Bank	Aa3	A+	$2_{\rm A}/1_{\rm A}$	-	-
	Royal Bank of Scotland	Aa3	A+	$2_{\rm A}/1_{\rm A}$	$2_{\rm A}/1_{\rm A}$	-
	Standard Chartered Bank	A2	A+	-	$1_{\rm A} / 1_{\rm A}$	-
Canada	Royal Bank of Canada		AA-	3 _A / 2 _A	-	-
France	BNP Paribas		AA	-	$2_{\rm A}/2_{\rm A}$	-
	Societe Generale	Aa2	A+	$2_{\rm A}/1_{\rm A}$	$2_{\rm A}/1_{\rm A}$	-
Germany	Deutsche Bank	Aa3	A+	$2_{\rm A}/1_{\rm A}$	-	$2_{\rm A}/1_{\rm A}$
	WestLB AG	A3	BBB+	$1_{\rm A} / 3_{\rm B}$	-	-
Switzerland	Credit Suisse Group AG	Aa2	Α	$2_{\rm A}/1_{\rm A}$	-	-
	UBS AG	Aa3	A+	$2_{\rm A}/1_{\rm A}$	-	$2_{\rm A}/1_{\rm A}$
Netherlands	Rabobank Nederland	Aaa	AAA	$3_A/3_A$	-	$3_A/3_A$
Japan	BoT-Mitsubishi UFJ	Aa2	A+	$2_{\rm A}/1_{\rm A}$	$2_{\rm A}/1_{\rm A}$	$2_{\rm A}/1_{\rm A}$
	Norinchukin Bank	Aa3	A+	$2_{\rm A}/1_{\rm A}$	-	-
	Mizuho Banking Group	NR	Α	-	$_{\rm NR}/1_{\rm A}$	-
	Sumitomo Mitsui Bank	NR	Α	-	$_{\rm NR}$ / $1_{\rm A}$	-
Singapore	DBS Bank Ltd	Aa1	AA-	-	$2_{\rm A}/2_{\rm A}$	$2_{\rm A}/2_{\rm A}$
Australia	National Australia Bank	Aa1	AA	-	$2_{\rm A}/2_{\rm A}$	$2_{\rm A}/2_{\rm A}$
China	Agricultural Bank of China	A1	NR	-	$1_{\rm A}/_{\rm NR}$	-
	China Construction Bank	A1	A-	-	$1_{\rm A} / 1_{\rm A}$	-
	ICBC	A1	A-	-	$1_{\rm A} / 1_{\rm A}$	-
	Bank of China, Ltd.	A1	A-	-	$1_{\rm A} / 1_{\rm A}$	-
	Bank of Communications	Baa1	BBB+	-	$3_{\rm B} / 3_{\rm B}$	-
H.K.	Hang Seng Bank	Aa2	AA	-	$2_{\rm A}/2_{\rm A}$	-
	Bank of East Asia Ltd.	A2	A-	-	$1_{\rm A} / 1_{\rm A}$	-
	Shanghai Commercial Bank	A2	NR	-	$1_{\rm A}/_{\rm NR}$	-
Statistics:	by rating band categorization					
No. of banks in	Triple A (3_A) : Aaa /AAA	(Moody's	/S&P)	2 / 1		1/1 (13%/13%)
				11/2	0/5	5/2
cc >>	Double $A(2_A)$: Aa /AA	(Moody's	/S&P)	(69%/19%)	(45%/25%)	(63%/25%)
""	Single A (1_A) : A/A	(Moody's	/S&P)	3 / 11 (19%/69%)	8 / 12 (40%/60%)	<mark>2 / 5</mark> (25%/63%)
۰۰ ۲۲	Triple B (3_B) : BBB/Baa	(Moody's	/S&P)	<mark>0</mark> / 1 (0%/6%)	1 / 1 (5%/5%)	
	Non-Rated (_{NR}): NR/NR	(Moody's	/S&P)		2 / 2 (10%/10%)	
" "	Triple A + Double A			(81%/25%)	(45%/25%)	(76%/38%)

Figure 12: Rating of Contributor Banks as at July 2010

4.2.2 Removing the Extreme Quotes Based on Statistics

In computing LIBOR *fixing*, a higher percentage of outliners are removed. According to the definition of each *Fixing*, the number of extreme quotes removed is <u>eight</u> (4 highest and 4 lowest) from sixteen for LIBOR, <u>six</u> (3 highest and 3 lowest) from twenty for HIBOR, and <u>two</u> (1 highest and 1 lowest) from seven for SIBOR. This makes LIBOR the most stable reference rate as 50% of the outliners are removed from calculation of LIBOR, compared with only 30% from HIBOR and 28% from SIBOR.

This endorses the findings by Gyntelberg and Wooldridge (2008) that "the influence the fixing can to some extent be limited by trimming, in which biased or extreme quotes are disregarded". Even with 12 to 16 banks of Tokyo fixing in Japanese Yen, the average result can be unduly influenced by unusually high or low quotes. As a result, *fixings* are typically based on a trimmed average. This can explain to some extent why HIBOR a more unstable fixing than LIBOR or SIBOR.

4.2.3 Quoting Reliable Rates by Professional Contributors

4.2.3.1 Contributing by International Banks

DBA Thesis (2011): Wilson CHAN

Gyntelberg and Wooldridge (2008) found that the contributor panel of USD LIBOR is made up by, in particular large, internationally active banks.⁽⁷¹⁾ The top

⁷¹ Gyntelberg and Wooldridge (2008) studied different currencies fixings and found that contributor panels included a lot of foreign banks – in particular large, internationally active ones – dominate the Libor panels but are in the minority on most other fixings. For example, 15 of the 16 banks on

name international banks have economies of scale equipped by specialists to manage their funding positions. Almost all contributor banks in London and Singapore were the top 100 banks ranked by The Bankers in 2010, while some banks in Hong Kong were ranked in the 206th (Bank of East Asia) and 357th (Shanghai Commercial Bank) (please refer to *Figure 13 Ranking of Contributor Banks by The Bankers in 2010*). If the considerable number of the top banks is narrowed to 50, the panel banks in London still counted 94%, but 86% in Singapore and 80% in Hong Kong.

Figure 13: Ranking of Contributor Banks by The Bankers in 2010

In London, <u>94% panel banks were the top 50 banks</u>:

BOA (1^{st}) , JPMorgan (2^{nd}) , Citi (3^{rd}) , RBS (4^{th}) , HSBC (5^{th}) , Barclays (10^{th}) , BTM UFJ (11^{th}) , Lloyds (12^{th}) , S.G. (19^{th}) , Deutsche (20^{th}) , Rabobank (24^{th}) , Credit Suisse (31^{st}) , UBS (35^{th}) , RBC (36^{th}) , Norinchukin (44^{th}) , and West LB (104^{th})

In Hong Kong, 80% panel banks were the top 50 banks:

JPM (2^{nd}) , Citi (3^{rd}) , RBS (4^{th}) , HSBC (5^{th}) , ICBC (7^{th}) , BNP (8^{th}) , BTM UFJ (11^{th}) , BOC (14^{th}) , CCB (15^{th}) , SG (19^{th}) , SMBC (23^{rd}) , Mizuho (26^{th}) , ABC (28^{th}) , NAB (32^{nd}) , SCB (42^{nd}) , BankComm (49^{th}) , DBS (62^{nd}) , HASE (-), BEA (206^{th}) , and ShaCom (357^{th}) .

[If HASE is considered as HSBC group, the percentage of panel banks is changed to 85% from 80%.]

In Singapore, <u>86%</u> panel banks were the top 50 banks:

BOA (1^{st}) , Citi (3^{rd}) , RBS (4^{th}) , BTM UFJ (11^{th}) , Deutsche (20^{th}) , UBS (35^{th}) , and DBS (62^{nd}) .

(Remarks: DBS was the largest commercial bank in Singapore).

the Tokyo panel and 13 of the 16 banks on the Shanghai panel are domestic banks, headquartered in the country.

Although the level of credit rating of panel banks would reflect the actual interest rates, Gyntelberg et al. (2008) discovered that panel composition for LIBOR is not an important source of volatility in *interest rate fixings* because most contributor banks in London have a high credit standing. (Please refer *Section 4.2.1: Trading in a Mature Market, Page. 66*). Furthermore, the money market funding transacted by these banks in USD is relative large so that their quotations for *interest rate fixings* (for short tenors) can reflect the actual interest rates trading in the markets and are more liable. On the contrary, some panel banks in Hong Kong are mixing with several small local banks and non-international Chinese banks. Their ratings would not be high enough because the sovereign rating for the Republic of China is single A only, and therefore no bank in the PRC can obtain rating above its sovereign rating. As a result it would affect the level of trustworthy of their quotations.

The expertise and specialization of international banks which have higher credit ratings with higher ranking in terms of assets and capital enable them to provide more precise quotations and this makes LIBOR a more stable fixing.

4.2.3.2 Contributing by Small Team of Chinese Banks

Gyntelberg and Wooldridge (2008) argued that contributor banks should be selected based on their reputation, credit quality and activity. Otherwise, even though there are a large number of contributor banks, they are not equally active and might account for a disproportionately large volume of transactions, and so a panel of many small banks might be less representative of overall activity than a panel of a few large banks.

In the case of HIBOR, although the big five Chinese banks that are all ranked in the top 50 by The Bankers are the contributor banks in Hong Kong, some of them are using other small arms located in Hong Kong to contribute the interest rate quotations. For example, there are at least three operations for ICBC group in Hong Kong managing their USD funding, i.e. ICBC Beijing, representing the positions of Mainland China; ICBC Hong Kong Branch, representing a small balance sheet operated in Hong Kong; and ICBC (Asia), a local commercial bank ranked behind Shanghai Commercial Bank in Hong Kong in accordance with The Bankers. Having interviewed with the dealers of ICBC group, the author of this study obtained more supporting information in this regard. Their contributing job relies on ICBC Hong Kong Branch, where had no dealer, and all their jobs including rates contribution were outsourced to the staff of ICBC (Asia) as non-paid part-time task. Unfortunately, all dealers in ICBC (Asia), including the operations on forex, capital and other markets, were still less than 30 persons, which is a small number.

The relative small team of dealers could not be the type of specialists in comparison with the dealers of other international banks ⁽⁷²⁾ at a size of over 100-200

⁷² The rates must be submitted by members of staff at a bank with primary responsibility for management of a bank's cash, rather than a bank's derivative book. (Brousseau, Chailloux, and Durré, 2009)

dealing staff ⁽⁷³⁾. For the Chinese banks ⁽⁷⁴⁾, counting 25% of the total contributor banks, and also for the small local banks ⁽⁷⁵⁾, ranked from the top 200 to 300, the number of expertise and specialists in these banks (except for Bank of China) is scarce for quoting HIBOR reference rates. Therefore, the credit quality and business models of the local banks and small Chinese banks in Hong Kong are different from those of foreign banks or panel banks in London and Singapore so that HIBOR is not reliable than LIBOR or SIBOR.

4.2.3.3 Contributing by Banks in Terms of Trading Volume of Lending

Finally, even the same banks contributing interest rates for *interest rate fixings* in different cities, their setup in terms of size is still relative small in Hong Kong than their operation in London. This could be found the case of Citibank, RBS, Deutsche Bank, and Bank of Tokyo-Mitsubishi. ⁽⁷⁶⁾ This is because London is the large money market in USD in the world and it attracts the higher level of participation by banks.

⁷⁵ The number of dealers in Shanghai Commercial Bank was less than 20 persons in July 2010. There was around 80 dealers in Bank of East Asia, and 100 dealers in Hang Seng Bank.

⁷³ There were around 300 dealers in HSBC in Hong Kong in July 2010, 200 dealers in Standard Chartered Bank, 150 dealers in Citibank in Hong Kong.

⁷⁴ There were around 10 dealers in Agricultural Bank of China in Hong Kong in July 2010, 20 dealers in China Construction Bank, and 200 dealers in Bank of China.

⁷⁶ The numbers of dealers of Citibank as were over 300 in London, around 150 in Hong Kong, and 200 in Singapore respectively.

Again, by using the same explanation mentioned in the previous section, the more the specialization of dealers is, the more precise quotations and the more stable *fixings* would be obtained.

4.2.4 Applying Conscientious Standard

The contributor banks in London have more rigid contractual obligations to observe. According to the definition stipulated in the agreement between the British Bankers' Association (BBA) and the contributor banks, all banks must quote "The rate at which an individual contributor panel bank could borrow funds, were it to do so by asking for and then accepting interbank offers in reasonable market size just prior to 11 Brousseau, Chailloux, and Durré, (2009) found that to comply with the rules am". treasury dealers in the London markets are more cautious in quoting rates. Therefore, submissions are based upon the lowest perceived rate that a bank could go into the interbank money market and obtain sizable funding, for a given maturity. Unfortunately, unlike LIBOR and SIBOR, there is no similar requirement for HIBOR fixings. Without clear guidance of providing interest rate reference, dealers are impossible to quote the correct rates for the *fixings*. Gyntelberg and Wooldridge (2008) found that the contributing banks are not obliged to transact at the interest rates they submit, and *fixings* are based on non-binding quotes. Therefore, the reliability of such *fixings* as measures of market conditions depends on the willingness of contributing banks to reveal their true, transactable quotes.

I asked several dealers who were responsible for quoting the interest rate

references in Hong Kong. Obviously, none of them could tell the similar requirement requested in London. In this regards, LIBOR *fixings* are obviously more reliable and also stable.

4.2.5 Committing to be Contributor Banks

The mechanism of forming the panel contributor banks is different in three cities. In Hong Kong, the Treasury Markets Association as the *fixing* owner invited some international banks, major Chinese banks, and local banks to form the panel banks. During an interview with the Head of Treasury Content EMEA of Thomson Reuters, he explained his findings that BBA opens the chance of being the panel contributor banks to all banks in London which could lead to a better commitment of them. If they submit their application for the panel bank, they should not only understand the definition of the *fixing*, but also ensure their ability of quoting the required rates.

On the other hand, BBA would also consider the level of participation in the USD money market to ensure their abilities. By applying this mechanism, although the submission offered rates are not based on actual transaction, they are intended to be in line with the dealing rates for all tenors. All these mechanisms can also be found in Singapore. ⁽⁷⁷⁾ Otherwise, the Association of Banks in Singapore (ABS) may at its sole

⁷⁷ The requirement: "Contributor Panels will broadly reflect the balance of activity in the inter-bank money market and/or swap market. Individual Contributor Banks are selected by the ABS on the basis of reputation, scale of activity in the Singapore market, perceived expertise in the currency concerned and credit standing." (Please refer Appendix 3)

discretion exclude the bank from the contributor panel. ⁽⁷⁸⁾ The contributor banks are chosen on the based on credit rating that is subject to an annual review. The model differs from that of LIBOR where contributors apply to the BBA and are initially rated on turnover in the currency of the panel in which they seek to gain admittance. Should

into account.

I have further discussed the operation with several dealers in Hong Kong about their attitude of quoting reference *fixings*. The responses are predictable that there is no control matching with no requirement. One of the dealers even expressed that his bank did not want to be the contributor bank because they treated it as a burden. However, the *Fixing* owner in Hong Kong declined his request.

two banks have identical turnover, credit rating and market experience are then taken

In addition, based on the studies of Brousseau, Chailloux and Durré (2009), "the international contributor banks in London have all sort of incentives, among which the reputation, to effectively behave so, reflecting that, as they are chosen among the major players of that market, they should be effectively in a better position to correctly gauge the market". They all contribute accurate estimates of a same figure, and therefore the dispersion is low. Gyntelberg and Wooldridge (2008) expressed that one way in which *fixings* seek to be incentive compatible is by publishing individual banks'

⁷⁸ If an individual Contributor Bank ceases to comply with the spirit of the ABS procedures for Interest Rate Fixings and/or Instructions to ABS Contributor Banks, the ABS may issue a warning requiring the Contributor Bank to remedy the situation.

contributed interest rates. Transparency exposes these big banks in London to reputational risk because their customers will penalise them for transacting at rates significantly different from their submitted rates. The incentive rewards for the international banks in London snowing their commitment enhance the liable and stable of LIBOR. On the contrary, there is no control whether the banks submit their perceived rates in Hong Kong that makes HIBOR unreliable and unstable.

4.3 CONCLUSION

What causes systematic differences between the *interest rate fixings* of LIBOR, HIBOR and SIBOR are the differences in timing and location, in market conditions, in composition of contributor banks, and in handling persons.

The finding of why LIBOR is more stable can be explained by the many different reasons: having traded in a maturing market, removing the extreme quotes based on statistics, (professional contributors quoting reliable rates, contributing by international banks, contributing by small team of Chinese banks, contributing by banks in terms of trading volume of lending), applying conscientious standard, and committing to be contributor banks. Chapter V

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER V CONCLUSIONS AND RECOMMENDATIONS

5 This Chapter discusses the conclusions drawn from the findings of Chapter Three (Data, Methodology and Findings) and Chapter Four (Explanations and Applications) with an emphasis on the contributions and implications of this study. The second and final sections of this Chapter delineate the limitations of this thesis and the future research directions.

5.1 SUMMARY OF THIS STUDY

The objective of this study is to find out the lowest volatility amongst three USD *interest rate fixings* for corporate borrowers when they raise funds in forms of floating-rate bonds or loans in order to bear less interest rate risks. Based on the quantity research and analysis in this study, all three *fixings* are confirmed not to be identical. In addition, the LIBOR *fixing* has the lowest volatility and thus is a relative stable benchmark reference. On the contrary, the HIBOR *fixing* is relative unstable with higher volatility.

What causes systematic differences in *interest rate fixings* are Differences in Timing and Location (page.61), Difference in Market Conditions (page. 62), Differences in Composition of Contributor Banks (page. 62) and Differences in Handling Persons (page. 64). The reasons why LIBOR is more stable are Trading in a Mature Market (page. 66), Removing the Extreme Quotes (page. 70), Quoting Reliable Rates by

Professional Contributors (page. 70) (Contributing by International Banks, Contributing by Small Team of Chinese Banks, and Contributing by Banks in terms of Trading Volume of Lending), Applying Conscientious Standard (page. 75), and Committing to be Contributor Banks (page. 76). Thus, the thesis can draw the conclusion that *corporations can reduce the interest rate risks by selecting LIBOR as reference rate to price their floating-rate bonds or loans instead of using SIBOR and HIBOR*.

Besides, the additional contributions to academic studies in this these that the previous literature has not been examined include the following areas:

5.1.1 Consideration of new USD Fixing in HK - USD HIBOR

First of all, the USD HIBOR is rarely studied by the academia (it should be none of literature has been found) although it has been launched since 1996. Hong Kong is definitely one of the important USD money markets in the world, and there is no capital control, at which the third interest rate fixing in USD was established. Unfortunately, it seems that there is no awareness of its appearance or its importance while the owner, i.e. the Financial Markets Association (TMA), even has not promoted it. According to the announcement of Hong Kong Monetary Authority (HKMA) in Dec 2006, it was only a piece of news about the launch of Renminbi Swap Offered Rate (CNY SOR) Fixing (please refer to Appendix 5: Announcement of HKMA (14 Dec 2006) - Launch of Renminbi Swap Offered Rate Fixing, Page. 138). The main purpose of establishment of USD HIBOR is to find out the CNY SOR fixing, which is calculated from three parameters: "(a) Spot US dollar / renminbi exchange rates published by the

China Foreign Exchange Trade System ⁽⁷⁹⁾; (b) renminbi non-deliverable forwards rates; and (c) US dollar interbank rates in Hong Kong". The last item of US dollar interbank rates in Hong Kong, i.e. USD HIBOR, is therefore only a by-product of CNY SOR.

As a result, this thesis (Chapter Four) also finds that some dealers of the contributor banks treat the quotation operation of USD HIBOR as an unimportance job. They do not realize the need or the requirement of their quotation, nor even do their quotation property.

It is crucial for all market participants not only to know the existing of USD HIBOR but also treat its operation serious. Going forward, it is also expected to consider how to use and apply this new *fixing* in the commercial world. If this consideration can be delivered to them as well as to the *fixing* owner of TMA, the improvement of the *fixing* of USD HIBOR could be expected and its contribution to the society may also be foreseen.

5.1.2 Consideration of Comparison of Three USD Fixings Simultaneously

Secondly, this study enriches the existing literature by emphasizing on the comparison of USD amongst three cities because the scholars have not been aware the

⁷⁹ The China Foreign Exchange Trade System (CFETS), a division of the People's Bank of China, provides a platform for facilitating interbank activities, including foreign exchange market, RMB money market, and bond market.

appearance of USD fixing in HKD, i.e. USD HIBOR. Gyntelberg and Wooldridge (2008) compared different *fixings* covering 16 major currencies including AUD, CAD, CNY, DKK, EUR, HKD, IDR, INR, JPY, KRW, MYR, NZD, PHP, SGD, THB and USD. ⁽⁸⁰⁾ Some currencies have more than one fixing existing in both onshore local market and overseas offshore markets, which made the *interest rate fixings* comparison reaching 30 items (please refer Appendix 6: Features of Selected Money Market Fixings (by Gyntelberg and Wooldridge), Page. 140). However, Gyntelberg et al. (2008) only selected LIBOR and SIBOR as USD money market rates for comparison although their analysis was relatively comprehensive. Obviously, by considering the mechanism of USD *fixing* in the case of Hong Kong, there are many experience being found, such as the fixing operation/mechanism that is not the same as the arrangement in London and

Singapore. The attitude and the setup of Hong Kong's contributor banks are also not the same as other two cities. Thus, this thesis provides more new and innovative information for the academic study.

5.1.3 Consideration of Ratings and Rankings Supported by Quantitative Figures

Thirdly, ratings and rankings by the rating agencies and top financial magazines, such as Moody's, Standard & Poor's, and The Bankers, were identified as a factor of influence on the liquidity of money markets by several scholars. For example,

⁸⁰ DKK stands for Danish Krone; IDR for Indonesian Rupiah; INR for Indian Rupee; KRW for South Korean Won; MYR for Malaysian Ringgit; PHP for Philippine Peso; THB for Thai Baht.

Gyntelberg et al. (2008) pointed that "panel composition is usually not an important source of volatility in rate *fixings* because most contributor banks have a high credit standing. The credit rating of banks in almost all LIBOR panels averages AA." However they did not clarify and list the exact rating of the panel banks during their examination. In this thesis, the ratings of all examined contributor banks of LIBOR, HIBOR and SIBOR as at July 2010 were found and examined (please refer to Section 4.2.3.1: Contributing by International Banks, page. 70). The examination is therefore quantified as, for instance, only 25% of the panel banks of LIBOR and SIBOR obtained the ratings of AA or above while 81% and 76% of the panel banks of LIBOR and SIBOR obtained the same ratings respectively. Another quantitative sample is the number of top 50 bankers ranked by The Bankers. It shows that the contributor banks in London took the most of these top 50 positions at a percentage of 94%; the contributor banks in Singapore took the second counting 86%, and the Hong Kong's banks were the last at

80%.

As result, the explanation of why HIBOR is relative unstable could be supported by relevant quantitative factual factor, instead of by conceptual thought only.

5.1.4 Consideration of Small Operation for the Large Banks by Empirical Studies

Fourthly, riding on the relationship and networking in the financial markets for 30 years, the author of this study contacted a lot of market participants, including the fixing calculator, i.e. the calculation agent (Thomson Reuters), the fixing owner (TMA) and some dealers who are responsible for contributing the individual interest rate reference. The surprised finding goes into the operation of the relative small department of contributor banks in Hong Kong. No matter how large the contributor banks are in terms of ranking issued by The Bankers or credit rating issued by the rating agencies, their operation in Hong Kong is still a small. Some of them, especially Chinese banks, are using their Hong Kong branches, which only hold their own independent and small balance sheet, to contribute the interest rate references by their relative small working team. (Please refer to Section 4.2.3.2: Contributing by Small Team of Chinese Banks, Page. 72). It is difficult for their small operation team to allocate appropriate staff for the purpose of job specialization and division. Therefore, the relevant contributing interest rate references in Hong Kong do not truly reflect the actual transacted rates and make the USD HIBOR unreliable and unstable.

This finding enriches the proposition that high credit rating and high ranking of the contributor banks are an important source of volatility in *interest rate fixings*. Instead, to be more precise for the argumentation, *the size of the branches of contributor banks in different cities would also have various impacts on the interest rate fixings* in addition to the credit rating of the contributor banks.

5.2 LIMITATIONS OF THIS STUDY

There are several limitations of this study, such as Daily Individual Data Contributed by all Panel Banks, Periodic Review of Changes in Panel Banks, Attitude of Operators of Contributor Banks, and Operational Measurement of Fixing Owners that are modified from time to time cannot be obtained.

5.2.1 Quantitative Data

5.2.1.1 Daily Individual Data Contributed by all Panel Banks

In the quantitative analysis in the study, all *interest rate fixings* from LIBOR, HIBOR and SIBOR are captured for statistical review. However, the analysis does not cover all individual data provided because each *fixing* is composed of individual reference rates provided by all contributor banks. Unfortunately these individual reference rates have not been stored making available for study in details.

5.2.1.2 Periodic Review of Changes in Panel Banks

The panel banks are reviewed annually. Individual banks may be replaced because of the request of the *fixing* owners (the British Bankers' Association, the Treasury Markets Association and the Association of Banks in Singapore), or may abandon voluntarily because of merger and acquisition or other reasons. The record of these changes could not be easily obtained thoroughly that leads to the difficult for the analysis completely.

5.2.2 Quantitative Information

5.2.2.1 Attitude of Operators of Contributor Banks

Because nearly all the contributor banks are big names and major banks in the markets, their operational staff are reluctant to make response to any interview regarding the sensitive questions. Thus, it is extremely difficult to do survey or questionnaire for all contributor banks. The full pictures of the attitude of operations of the contributor banks cannot be exposed for entirely analysis.

5.2.2.2 Operational Measurement of Fixing Owners

All the *fixing* owners in London, Hong Kong and Singapore are governmental or semi-governmental organizations. They would not freely and openly discuss their operation with outsiders. Some internal information is even not allowed to be disclosed to the public for examination, except for their own release when they think it is suitable. This again makes the examination difficult.

5.3 DIRECTIONS FOR FUTURE RESEARCH

5.3.1 Whether LIBOR Reflecting the Actual Interest Rate

The overall study of this thesis could illustrate the fact that LIBOR is relatively stable than the *fixings* of HIBOR and SIBOR. However it still leaves a question whether LIBOR is truly reflecting the actual interbank transacted rates
although it has no absolutely influence on the application of *interest rate fixings* for the corporate borrowers to use LIBOR as benchmark reference rates.⁽⁸¹⁾

Since the turmoil in global interbank markets occurred in the second half of 2007, there has been a question about the robustness of *interbank rate fixings* (Gyntelberg and Wooldridge, 2008). More and more reports were addressing this issue that *LIBOR benchmark rate is under suspicion*. Dolan (2008) in The New York Time reported the market concerned that "doubts about the accuracy of LIBOR, the global bellwether of bank-to-bank lending rates, caused dollar rates to rise almost a fifth of a percentage point last week, but suggestions that banks had been keeping the rate artificially low do not stand up to scrutiny". ⁽⁸²⁾ Obviously, some of the contributor banks understated their true cost of funds when they contributed quotes to daily *fixings* after the financial turmoil.

Carrick and Whitehouse (2008) ⁽⁸³⁾ argued that the LIBOR *fixing* during the

⁸¹ Jeff Horwitz (2010), "Questioning Libor as a Peg for Loans in the U.S. - Europe Woes Revive Doubts About Index's Accuracy". American Banker, May 26. (www.americanbanker.com/issues/175_100/libor-1019808-1.html)

⁸² Mike Dolan (2008), "London Benchmark Rate under Suspicion". The New York Times, April 24. (www.nytimes.com/2008/04/24/business/worldbusiness/24iht-libor.4.12319468.html)

⁸³ Carrick M. and Whitehouse M. (2008), "Study Casts Doubt on Key Rate - WSJ Analysis Suggests Banks May Have Reported Flawed Interest Data for Libor". *The Wall Street Journal*, May. The authors found that the contributor banks could borrow funds for three months were about 0.87 % lower at that moment. 2008 financial turmoil could have created an impression that banks could borrow from other banks more cheaply than they could in reality so that the contributing banks pretended themselves to be more healthier. On the other hand, Loxton (2008) also found that LIBOR *fixing* did not truly represent the actual interbank interest rates or the cost of funds of contributor banks when he studied the clauses of syndicated loans agreement.

However, Gyntelberg et al. (2008) published his contrary view in BIS Quarterly Review in March that "available data do not support the hypothesis that contributor banks manipulated their quotes to profit from positions based on *fixings*". The IMF's Global Financial Stability Report (GFSR) (2008), an authoritative survey that has been translated into many different languages including Chinese, Japanese, German, French, Arabic, Russian, Spanish, etc., also claimed in October that "although the integrity of the U.S. dollar LIBOR-fixing process has been questioned by some market participants and the financial press, it appears that U.S. dollar *LIBOR remains an accurate measure of a typical creditworthy bank's marginal cost of unsecured U.S. dollar term funding*". ⁽⁸⁴⁾ It seems likely that BBA considers LIBOR continuously to be reliable even in times of financial crisis although there are rooms for improvement. All these arguments form an informative platform for facilitating our future studies.

⁸⁴ Global Financial Stability Report (2008), "Financial Stress and Deleveraging Macrofinancial Implications and Policy". International Monetary Fund, World Economic and Financial Surveys, October. (www.imf.org/external/pubs/ft/gfsr/2008/02/pdf/text.pdf)

5.3.2 Future Studies

Although the conclusion of this study has recommended LIBOR to be the most suitable benchmark reference for the USD corporate borrowers for issuance of floating-rate bonds and loans, the examination in this study does not rule out the fact that **all USD fixings do not truly reflect the actual transacted rates** in the interbank money market. Loxton (2008) and other academics compared this unsecured LIBOR rate with the secured money market instrument, i.e. treasury yield. The advantage of using treasury yield as another benchmark reference is the active realistic transactions of its related financial products of *Treasury Bills*. However, there is also a disadvantage that it involved the U.S. onshore market which was judged by scholars and economists to be an illiquid market since the 1960s.

In fact, there are many different interest rate products nowadays, such as *Certificates of Deposit* (CDs), *Treasury Bills, Repurchase Agreement* (Repo) (with government or non-government collateral), *Commercial Paper* (CP), *Notes* and *Bonds* (remaining maturity within one year), etc. These new financial instruments will widen the consideration to find a new benchmark reference to replace LIBOR, HIBOR or SIBOR. Thus, one of the future studies would examine different comparisons between the existing benchmark reference and the new potential benchmark.

Another challenge of future study will be **the improvement of the fixing mechanism for the existing interest rate references**. As the analysis in the Consultation Paper (2008) by the British Bankers' Association, there are several aspects for **the fixing mechanism** to be further strengthened though LIBOR has been believed to continue to be reliable even in times of financial crisis. In Hong Kong, the future study will focus on the fixing mechanism of HIBOR because it could combine the analysis by the global academics and the findings obtained in this thesis.

The final and most challenge future study is a new HIBOR *fixing* for Renminbi (RMB). Because of the new development of RMB offshore centre in Hong Kong announced in August 2010 by the PRC government, it is important to have a fixing fo RMB in this offshore centre of Hong Kong. The background situation of Hong Kong offshore centre is not the same as that of Eurodollar market centre established in London in the Sixties. However, many experience learnt from this thesis could also be applied to RMB HIBOR.

5.4 CONCLUSIONS

This comes to the conclusion of this study. Initial consideration was from the corporations who have to raise funds in the markets by using a variety of financial instruments, such as floating-rate bonds and loans. USD has been the major currency in the world for fund raising, while the *interest rate reference* including LIBOR, HIBOR and SIBOR could be considered as benchmark reference to price the bonds and loans.

Although all *interest rate fixings* could not truly reflect the actual interest rates transacted in the interbank market, they could not be replaced for the application for pricing floating-rate bonds and loans at the moment as well as for the reference of other financial derivative instruments.

Based on the quantitative research and qualitative analysis in this study, all three *interest rate fixings* are confirmed not to be identical. The volatility of LIBOR *fixing* is the lowest amongst three examined *fixings*, and HIBOR is relative unstable with higher volatility. These because: Trading in a Mature Market, Removing the Extreme Quotes, Quoting Reliable Rates by Professional Contributors, Applying Conscientious Standard, and Committing to be Contributor Banks. As a result, this thesis recommends *corporations can reduce the interest rate risks by selecting LIBOR as reference rate to price their floating-rate bonds or loans instead of using SIBOR and HIBOR*. ---- END ----

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APPENDIX

Appendix

Appendix 1: Data Base of LIBOR, HIBOR & SIBOR (18/12/2006-30/6/2010)

	Date	3-LIBOR	3-HIBOR	3-SIBOR	6-LIBOR	6-HIBOR	6-SIBOR
1st wk	12/18/06	5.36500	5.36452	5.37000	5.37000	5.37647	5.38333
	12/19/06	5.36500	5.36287	5.36775	5.37000	5.37122	5.37750
	12/20/06	5.36500	5.36389	5.36850	5.37063	5.37053	5.37333
	12/21/06	5.36563	5.36643	5.37000	5.37000	5.37179	5.37500
	12/22/06	5.36250	5.36167	5.37000	5.36000	5.36292	5.36667
2nd wk	12/25/06	5.36250	5.36167	5.37000	5.36000	5.36292	5.36667
	12/26/06	5.36250	5.36167	5.37000	5.36000	5.36292	5.36667
	12/27/06	5.36375	5.36500	5.37000	5.36063	5.36385	5.37000
	12/28/06	5.36000	5.36208	5.36500	5.36688	5.36800	5.36250
	12/29/06	5.36000	5.36000	5.37000	5.37000	5.36808	5.37667
-	Average	5.36319	5.36298	5.36913	5.36581	5.36787	5.37183
			lowest	highest	lowest	highest	
1st wk	1/1/2007	5.36000	5.36000	5.37000			
	2/1/2007	5.36000	5.36042	5.36375	5.37000	5.37125	5.37500
	3/1/2007	5.36000	5.35923	5.36250	5.36688	5.36692	5.37000
	4/1/2007	5.36000	5.36000	5.36250	5.36000	5.36000	5.36500
	5/1/2007	5.36000	5.35625	5.36000	5.34938	5.35333	5.35333
2nd wk	8/1/2007	5.36000	5.36000	5.36083	5.37000	5.36083	5.37000
	9/1/2007	5.36000	5.36000	5.36313	5.37563	5.37167	5.37375
	10/1/2007	5.36000	5.36000	5.36167	5.37188	5.37625	5.38000
	11/1/2007	5.36000	5.36000	5.36167	5.37688	5.37308	5.38000
	12/1/2007	5.36000	5.36042	5.36833	5,38313	5.37917	5.38667
3rd wk	1/15/07	5 36025	5 36000	5 36667	5 38500	5 38167	5 39000
ord wit	1/16/07	5 36000	5 36042	5 36733	5 38688	5 38625	5 39333
	1/17/07	5 36000	5 35909	5 36750	5 38688	5 38500	5 39000
	1/18/07	5.36000	5.36000	5.36800	5 39063	5.38864	5,39375
	1/19/07	5.36000	5.36000	5.36667	5.39000	5.38818	5.39000
4th wk	1/22/07	5.36000	5.35917	5.37000	5.39438	5.39167	5.39875
	1/23/07	5.36000	5.36091	5.36667	5.39063	5.39409	5.39833
	1/24/07	5.36000	5.35962	5.36750	5.39875	5.39462	5.40000
	1/25/07	5.36000	5.35769	5.36500	5.39875	5.39385	5.39875
	1/26/07	5.36000	5.35917	5.36400	5.40000	5.39625	5.40667
5th wk	1/29/07	5 36000	5 35864	5 37000	5 40000	5 39455	5 40333
our wit	1/30/07	5.36000	5.36042	5.37000	5 40063	5.39708	5.40625
	1/31/07	5 36000	5 35885	5 37000	5 40000	5 39846	5 41000
	2/1/2007	5.36000	5.35875	5.37000	5,40000	5.39583	5,40000
	2/2/2007	5.36000	5.35864	5.37000	5.40125	5.39909	5.40750
6th wk	2/5/2007	5.36000	5.35773	5.37000	5,40000	5.39545	5.40000
our ou	2/6/2007	5.36000	5.35909	5.37000	5 40000	5.39818	5,40000
	2/7/2007	5.36000	5.35923	5.37000	5,40000	5.39769	5.40250
	2/8/2007	5 36000	5 35708	5 37000	5 39813	5 39458	5 40250
	2/9/2007	5.36000	5.35773	5.37000	5.39750	5.39409	5.40000
7th wk	2/12/2007	5.36000	5.35800	5.36667	5,40000	5.39900	5.40000
	2/13/07	5.36000	5.35950	5.36667	5.40000	5.39900	5.40333
	2/14/07	5.36000	5.35875	5.36750	5.40000	5.39917	5.40500
	2/15/07	5.36000	5.35500	5.36333	5,39000	5.39417	5.39833
	2/16/07	5.36000	5.35542	5.36500	5.38500	5.38250	5.39250
8th wk	2/19/07	5,36000	5 35542	5 36500	5 38813	5.38250	5 39250
our ma	2/20/07	5,36000	5.35542	5.36500	5,38750	5.38250	5,39250
	2/21/07	5.36000	5.35682	5.36500	5,38000	5.38182	5,39250
	2/22/07	5 36000	5,35850	5,37000	5 38813	5,38550	5,39250
	2/23/07	5.36000	5.35875	5.36333	5,39000	5.38583	5.39000
9th wb	2/26/07	5 36000	5 3586/	5 36333	5 37875	5 38501	5 38333
JUI WK	2/20/07	5.50000	5.55604	5.30333	3.3/8/3	5.56591	5.30333

	2/27/07	5.36000	5.35591	5.36000		5.37188	5.37227	5.37000
	2/28/07	5,34813	5.34115	5,35000		5.33000	5.31577	5.32000
	3/1/2007	5 34750	5 34409	5 35333		5 32813	5 32636	5 33333
	3/1/2007	5 34625	5 24264	5 25222		5 21029	5 32000	5 20222
10.1 1	3/2/2007	5.34023	5.34304	5.33333		5.31938	5.32000	5.52555
10th wk	3/5/2007	5.33000	5.33667	5.33667		5.25913	5.28125	5.27667
	3/6/2007	5.34000	5.33423	5.34000		5.29750	5.28462	5.29000
	3/7/2007	5.34000	5.33792	5.34125		5.29000	5.29708	5.30000
	3/8/2007	5.34000	5.33375	5.34167		5.28750	5.28375	5.29000
	3/9/2007	5.34000	5.33773	5.34167		5.29688	5.29227	5.30000
11th wk	3/12/2007	5.35500	5.34167	5.35500		5.34250	5.32750	5.34333
	3/13/07	5.35488	5.34667	5.36000		5.33000	5.32833	5.33333
	3/14/07	5.35000	5.34625	5.35250		5.29625	5.29958	5.31000
	3/15/07	5 35000	5 34458	5 35333		5 31438	5 30792	5 31800
	3/16/07	5 35000	5 34708	5 35500		5 32063	5 31208	5 32500
12th ml	2/10/07	5 35000	5 24625	5 35125		5 32500	5 32702	5 22275
12th wk	3/19/07	5.55000	5.34023	5.55125		5.33300	5.32192	5.55575
	3/20/07	5.55000	5.34634	5.35625		5.34000	5.55558	5.34/50
	3/21/07	5.35000	5.34679	5.35250		5.34000	5.33857	5.348/5
	3/22/07	5.34631	5.34583	5.35000		5.313/5	5.31458	5.32000
-	3/23/07	5.34788	5.34571	5.35250		5.32000	5.32500	5.32875
13th wk	3/26/07	5.35000	5.34731	5.35000		5.32875	5.32808	5.34667
	3/27/07	5.35000	5.34583	5.35250		5.32969	5.32833	5.33875
	3/28/07	5.35000	5.34923	5.35333		5.32375	5.32962	5.34000
	3/29/07	5.34938	5.34750	5.35000		5.32000	5.32125	5.33667
	3/30/07	5.35000	5.34333	5.35000		5.32969	5.32542	5.34000
14th wk	4/2/2007	5.35000	5.34667	5.35333		5.32906	5.32458	5.33833
	4/3/2007	5.35000	5.34708	5.35500		5.33000	5.32917	5.34000
	4/4/2007	5 35000	5 34654	5 35500		5 33563	5 33077	5 34500
	4/5/2007	5 35000	5 34654	5 35500		5 33210	5 33077	5 34250
	4/5/2007	5 35000	5 34654	5 35500		5 33219	5 33077	5 34250
15th mlr	4/0/2007	5.35000	5 24654	5 25025	•	5 22210	5 22077	5 27000
13th WK	4/9/2007	5.55000	5.34034	5.55925		5.55219	5.55077	5.37000
	4/10/2007	5.35500	5.34958	5.36000		5.36438	5.35792	5.37000
	4/11/2007	5.35500	5.35462	5.36000		5.36250	5.35885	5.37000
	4/12/2007	5.35563	5.35091	5.36000		5.37000	5.36318	5.37250
-	4/13/07	5.35688	5.35385	5.36000		5.37000	5.36538	5.37750
16th wk	4/16/07	5.35875	5.35583	5.36333		5.37406	5.37125	5.38000
	4/17/07	5.35988	5.35583	5.36250		5.37156	5.36750	5.38000
	4/18/07	5.35813	5.35231	5.36250		5.36063	5.35885	5.37000
	4/19/07	5.35500	5.35500	5.36000		5.34938	5.35208	5.35333
	4/20/07	5.35500	5.35458	5.36000		5.35438	5.34958	5.35667
17th wk	4/23/07	5.35500	5.35346	5.36000		5.35938	5.35192	5.36000
	4/24/07	5,35500	5.35192	5.36000		5.35313	5.35269	5.35333
	4/25/07	5.35500	5.34964	5.35833		5.34688	5.34321	5.35000
	4/26/07	5 35500	5 35423	5 35875		5 35500	5 34769	5 35000
	4/27/07	5 35625	5 34909	5 36000		5 36000	5 35591	5 36333
19th rule	4/20/07	5 35500	5 25615	5 35000	•	5 36000	5 35602	5 36000
1001 WK	5/1/2007	5.35500	5 25615	5 35900		5.36000	5 35602	5.30000
	5/1/2007	5.55500	5.55015	5.33900		5.30000	5.55092	5.30000
	5/2/2007	5.55500	5.55565	5.36000		5.55000	5.55077	5.36000
	5/5/2007	5.55500	5.55500	5.36000		5.50000	5.55045	5.30000
	5/4/2007	5.35563	5.35231	5.36000		5.35813	5.36038	5.36500
19th wk	5/7/2007	5.35656	5.35308	5.36000		5.36813	5.35538	5.37000
	5/8/2007	5.35688	5.35583	5.36000		5.36000	5.35917	5.37000
	5/9/2007	5.35813	5.35538	5.36000		5.36000	5.35692	5.36750
	5/10/2007	5.36000	5.35464	5.36000		5.37000	5.36107	5.37000
_	5/11/2007	5.36000	5.35679	5.36000		5.35875	5.36036	5.36000
20th wk	5/14/07	5.36000	5.35808	5.36000	-	5.36500	5.36077	5.37000
	5/15/07	5.36000	5.36000	5.36000		5.36688	5.36773	5.37000
	5/16/07	5.36000	5.35917	5.36000		5.36000	5.36375	5.37000
	5/17/07	5.36000	5.35893	5.36000		5.36094	5.35964	5.37000
	5/18/07	5.36000	5.35682	5.36000		5.37000	5.36136	5.37000
21st wk	5/21/07	5 36000	5 35821	5 36000	•	5 37563	5 37107	5 37625
2150 WK	5/22/07	5 36000	5 35803	5 36000		5 37/60	5 37170	5 37/00
	5/22/07	5.30000	5 35885	5 36000		5 38000	5 37760	5 37800
	5/23/07	5.50000	5 3 5 9 9 5	5.30000		5.30000	5 37203	5 3 2 5 0 0
	5/24/07	5.50000	5 35000	5 36000		5 20000	5.57209	5 20000
	5/25/07	5.30000	5.55021	5.30000		5.30000	5.57423	5.36000
∠∠na wk	5/28/07	5.36000	5.35864	5.36000		5.38000	5.3/636	5.38125
	5/29/07	5.36000	5.358/5	5.36000		5.38438	5.37750	5.38375

	5/30/07	5.36000	5.35846	5.36375		5.38475	5.38115	5.38500
	5/31/07	5,36000	5 35857	5 36375		5 38475	5,38036	5 38500
	6/1/2007	5 36000	5 35923	5 36500		5 39000	5 38346	5 39250
	6/1/2007	5.36000	5.33723	5.36360	-	5.39000	5.30340	5.39230
23rd WK	6/4/2007	5.36000	5.36046	5.36/50		5.39344	5.39273	5.398/5
	6/5/2007	5.36000	5.36000	5.36750		5.39188	5.38917	5.40000
	6/6/2007	5.36000	5.36000	5.36667		5.39594	5.38958	5.40000
	6/7/2007	5.36000	5.35692	5.36667		5.39250	5.39192	5.40000
	6/8/2007	5.36000	5.35923	5.36667		5.40188	5.39423	5.40333
24th wk	6/11/2007	5 36000	5 35864	5 36600	-	5 39781	5 39682	5 40400
21111 014	6/12/2007	5 36000	5 36000	5 36600		5.40000	5 30708	5 40200
	6/12/07	5.36000	5 25022	5.27040		5.40006	5 40154	5.40000
	0/13/07	5.50000	5.55925	5.57040		5.40900	5.40154	5.40900
	6/14/07	5.36000	5.36000	5.36600		5.40500	5.40462	5.41400
_	6/15/07	5.36000	5.36000	5.36333	_	5.40813	5.40273	5.41000
25th wk	6/18/07	5.36000	5.36000	5.36750		5.40000	5.40042	5.41000
	6/19/07	5.36000	5.36000	5.36500		5.39813	5.40042	5.40000
	6/20/07	5.36000	5.36000	5.36500		5.39313	5,39462	5.39875
	6/21/07	5 36000	5 36000	5 36667		5 39344	5 39269	5 40333
	6/22/07	5 36000	5 36000	5 36500		5 39000	5 30269	5 39750
2641	6/25/07	5.30000	5.30000	5.30500	-	5.37000	5 29246	5.39750
20th WK	6/25/07	5.30000	5.36000	5.36500		5.57625	5.58540	5.38/50
	6/26/07	5.36000	5.35846	5.36560		5.37500	5.37423	5.38100
	6/27/07	5.36000	5.35846	5.36750		5.37500	5.37577	5.38000
	6/28/07	5.36000	5.35846	5.36750		5.38000	5.37808	5.38500
	6/29/07	5.36000	5.35846	5.36667		5.38625	5.38462	5.39000
27th wk	7/2/2007	5.36000	5.35846	5.36600	-	5.38000	5.38462	5.38200
2701 010	7/3/2007	5 36000	5 35923	5 36750		5 38000	5 38000	5 38250
	7/4/2007	5 36000	5 35846	5 36600		5 38063	5 38269	5 38440
	7/5/2007	5.36000	5 25946	5.26800		5 29625	5 29209	5 28000
	7/5/2007	5.50000	5.55640	5.50800		5.58025	5.56506	5.58900
-	//6/2007	5.36000	5.35923	5.36660	_	5.39063	5.39000	5.40000
28th wk	7/9/2007	5.36000	5.35923	5.37625		5.39625	5.39385	5.40500
	7/10/2007	5.36000	5.36000	5.37050		5.39469	5.39538	5.40750
	7/11/2007	5.36000	5.35846	5.37000		5.38000	5.38308	5.39500
	7/12/2007	5.36000	5.35917	5.37000		5.38600	5.38542	5.39750
	7/13/07	5.36000	5.35923	5.36800		5.38750	5.38808	5.39540
29th wk	7/16/07	5 36000	5 36000	5 36800	-	5 38656	5 38692	5 39400
2)th wk	7/17/07	5 36000	5 3 5 0 2 3	5 36600		5 29699	5 28577	5 20050
	7/17/07	5.30000	5.33923	5.30000		5.30000	5.30377	5.39030
	7/18/07	5.36000	5.35923	5.36200		5.38250	5.38385	5.38600
	7/19/07	5.36000	5.35923	5.36200		5.38438	5.38308	5.38900
_	7/20/07	5.36000	5.35923	5.36000	_	5.38113	5.38231	5.39000
30th wk	7/23/07	5.36000	5.35846	5.36333		5.37000	5.37269	5.37000
	7/24/07	5.36000	5.35857	5.36000		5.37406	5.37214	5.37563
	7/25/07	5.36000	5.35929	5.36000		5.37031	5.36929	5.37450
	7/26/07	5,36000	5 35929	5,36000		5 36938	5 36857	5 37500
	7/27/07	5 35750	5 34214	5 34333		5 32688	5 32071	5 31833
21 at mile	7/20/07	5.35730	5 2 4 9 2 1	5 25000	-	5.21250	5 21107	5 20667
51St WK	7/30/07	5.55025	5.54621	5.55000		5.51250	5.31107	5.30007
	//31/07	5.35866	5.35375	5.35373		5.32688	5.318/5	5.31833
	8/1/2007	5.35953	5.34950	5.35833		5.30063	5.29/14	5.32000
	8/2/2007	5.36000	5.35571	5.36000		5.31813	5.31464	5.32438
_	8/3/2007	5.36000	5.35643	5.36000	_	5.31438	5.31000	5.30833
32nd wk	8/6/2007	5.35625	5.34077	5.35333		5.25688	5.24000	5.25000
	8/7/2007	5.36000	5.35375	5.36450		5.28000	5.27917	5.28000
	8/8/2007	5,38000	5,35643	5,36450		5,33875	5.31286	5.31500
	8/9/2007	5 50000	5 39464	5 36400		5 38875	5 36107	5 31500
	8/10/2007	5.57500	5 52667	5 53200		5 40125	5 41167	5 36200
	0/10/2007	5.57500	5.52007	5.55200	-	5.40000	5.429.46	5.30200
33rd WK	8/13/07	5.55/50	5.56462	5.55500		5.40000	5.42846	5.41250
	8/14/07	5.53000	5.55571	5.54600		5.39875	5.40643	5.40400
	8/15/07	5.52000	5.53714	5.53800		5.39125	5.39857	5.40200
	8/16/07	5.51000	5.52692	5.52000		5.37875	5.38846	5.38000
	8/17/07	5.50000	5.52214	5.52750		5.35500	5.37571	5.39500
34th wk	8/20/07	5.49500	5,50429	5,52500	-	5,34750	5,35643	5,37250
,	8/21/07	5 49438	5 49786	5 49667		5 32875	5 34571	5 35000
	8/22/07	5 /0875	5 /0857	5 /00/		5 27212	5 3/71/	5 3/600
	8/22/07	5 50500	5 50215	5 50000		5 12125	5 20215	5 20227
	0/23/07	5.50500	5.50015	5.50000		5.45125	5.58015	5.3800/
	8/24/07	5.50563	5.50/86	5.50600	_	5.41125	5.41/14	5.41800
35th wk	8/27/07	5.50563	5.51143	5.51100		5.41125	5.42429	5.43000
	8/28/07	5.51000	5.50929	5.51800		5.42750	5.41214	5.41000
	8/29/07	5.54125	5.52231	5.52400		5.42750	5.40077	5.40600

	8/30/07	5.58000	5.59571	5.59800		5.46250	5.45000	5.45400
	8/31/07	5.62125	5.66143	5.63000		5.53500	5.48357	5.49500
36th wk	9/3/2007	5.66875	5.68643	5.67250	-	5.54875	5.54643	5.55500
	9/4/2007	5.69813	5.71923	5.71800		5.56375	5.57308	5.58600
	9/5/2007	5.72000	5.74286	5.75500		5.59500	5.59214	5.60000
	9/6/2007	5.72375	5.75714	5.75000		5.56250	5.59714	5.58333
	9/7/2007	5.72500	5.75571	5.74500	_	5.57250	5.59000	5.60000
37th wk	9/10/2007	5.70375	5.72857	5.72000		5.47875	5.51500	5.50667
	9/11/2007	5.70313	5.69615	5.70800		5.48875	5.46923	5.49000
	9/12/2007	5.70313	5.71214	5.70750		5.51875	5.49643	5.50500
	9/13/07	5.69438	5.70214	5.70000		5.50938	5.50357	5.51667
	9/14/07	5.64625	5.68000	5.67750	-	5.45750	5.49929	5.49750
38th wk	9/17/07	5.59750	5.61786	5.64750		5.42000	5.46286	5.47250
	9/18/07	5.58/50	5.5/500	5.59/50		5.42000	5.42429	5.42/50
	9/19/07	5.25730	5.20371	5.30000		5.06028	5.09657	5.15000
	9/20/07	5.21000	5 22043	5.23000		5.00938	5 11538	5 12000
30th wk	9/24/07	5 20000	5 22523	5 21750	-	5 10625	5 10714	5 10500
JJIII WK	9/25/07	5 20000	5 21857	5 21800		5 14125	5 12500	5 12400
	9/26/07	5.19813	5.21857	5.21700		5.14250	5.12500	5.14700
	9/27/07	5.23063	5.22143	5.23300		5.14438	5.13357	5.14600
	9/28/07	5.22875	5.22857	5.22125		5.13250	5.13000	5.13750
40th wk	10/1/2007	5.23000	5.22857	5.24250	-	5.14625	5.13000	5.14750
	10/2/2007	5.24000	5.23714	5.23800		5.16250	5.16143	5.17000
	10/3/2007	5.24375	5.24286	5.24625		5.16625	5.17250	5.16750
	10/4/2007	5.24375	5.25286	5.25250		5.17813	5.18250	5.17500
	10/5/2007	5.24313	5.24714	5.24833	-	5.17500	5.18143	5.17667
41st wk	10/8/2007	5.25313	5.25786	5.26333		5.21750	5.20429	5.20000
	10/9/2007	5.24875	5.25714	5.25750		5.21250	5.21143	5.21500
	10/10/2007	5.24750	5.25429	5.25760		5.22125	5.21857	5.21800
	10/11/2007	5.24250	5.25385	5.24917		5.20500	5.22154	5.2166/
40	10/12/2007	5.22575	5.24357	5.22600	-	5.13750	5.19043	5.15600
42nd WK	10/15/07	5.21438	5.23134	5.22575		5.14025	5.15709	5.14250
	10/10/07	5.20875	5 21071	5 21340		5 10625	5 13714	5.13000
	10/18/07	5 18000	5 19643	5 19300		5.07875	5 09857	5 08000
	10/19/07	5.15125	5.19643	5.16000		5.00563	5.09857	5.04667
43rd wk	10/22/07	5.09250	5,10357	5.14000	-	4.92500	4.97071	4,99000
	10/23/07	5.08375	5.08857	5.09300		4.93875	4.95143	4.92800
	10/24/07	5.06500	5.06643	5.08600		4.90000	4.94357	4.92700
	10/25/07	5.01063	5.03429	5.03400		4.83563	4.87929	4.86800
	10/26/07	4.98375	5.00154	5.00100	_	4.83188	4.84154	4.83200
44th wk	10/29/07	4.96000	4.97000	4.97750	-	4.83125	4.82357	4.83750
	10/30/07	4.91125	4.94769	4.96667		4.81813	4.83538	4.84667
	10/31/07	4.89375	4.90786	4.91500		4.80625	4.82643	4.82000
	11/1/2007	4.87750	4.89000	4.90500		4.84625	4.81000	4.83500
	11/2/2007	4.86500	4.88000	4.88250	-	4.79375	4.82571	4.81000
45th wk	11/5/2007	4.8/500	4.8/214	4.8/625		4.81063	4.79929	4.80500
	11/0/2007	4.89750	4.880/1	4.89000		4.85250	4.82280	4.82000
	11/7/2007	4.89023	4.89709	4.09033		4.83873	4.84092	4.04333
	11/9/2007	4.87938	4 88929	4 89000		4 76250	4 79500	4 80000
46th wk	12/11/2007	4 87000	4 88500	4 88250	-	4 74375	4 75571	4 75750
Total wik	13/11/2007	4 86875	4.87357	4 88333		4,73750	4 74071	4,76667
	14/11/2007	4.87750	4.88286	4.88500		4.77500	4.76714	4.77500
	15/11/2007	4.90500	4.88857	4.90000		4.79125	4.77500	4.79000
	16/11/2007	4.94875	4.94214	4.93250		4.80875	4.79857	4.80000
47th wk	19/11/2007	4.98188	4.97786	5.00000	-	4.84500	4.81500	4.84000
	20/11/2007	5.00000	5.00077	5.02500		4.85625	4.84000	4.85500
	21/11/2007	5.01500	5.03214	5.02250		4.85250	4.87000	4.87250
	22/11/2007	5.03000	5.03786	5.02000		4.85500	4.83071	4.83500
	23/11/2007	5.04000	5.04071	5.04333	-	4.85625	4.85643	4.85667
48th wk	26/11/2007	5.05313	5.07000	5.04500		4.89375	4.87500	4.85500
	27/11/2007	5.06188	5.07571	5.06667		4.86250	4.86643	4.85333
	28/11/2007	5.08125	5.10643	5.07900		4.90625	4.8835/	4.88400
	27/11/200/	5.12575	5.14045	5.11/50		4.91230	+.7103/	4.90230

	30/11/2007	5.13125	5.16154	5.14400	4.91000	4.92385	4.90400
49th wk	12/3/2007	5,14063	5.16286	5 14250	 4.89563	4 90143	4 90000
19 th 011	12/4/2007	5 15000	5 16786	5 15000	4 90875	4 90214	4 89500
	12/5/2007	5 15063	5 17000	5 15625	4 90375	4 90429	4 89500
	12/6/2007	5 14625	5 17714	5 15600	4 90125	4.91786	4.02200
	12/7/2007	5 14063	5 16857	5 15625	4.03188	4.02420	4.92000
50411-	12/1/2007	5.12050	5.17296	5.15125	 4.95100	4.92429	4.92000
50th WK	12/10/2007	5.15250	5.17280	5.15125	4.96750	4.95500	4.968/5
	12/11/2007	5.11125	5.15857	5.12/50	4.95625	4.96429	4.96500
	12/12/2007	5.05/50	5.12/86	5.10250	4.92875	4.93786	4.93000
	12/13/2007	4.99063	5.06154	5.03800	4.82875	4.88846	4.86200
	12/14/2007	4.96625	5.01786	4.99400	 4.84875	4.84929	4.85600
51st wk	12/17/2007	4.94125	5.01846	4.97800	4.84875	4.87615	4.86600
	12/18/2007	4.92625	5.00846	4.97900	4.82500	4.87077	4.86000
	12/19/2007	4.91000	4.98786	4.94875	4.77750	4.83643	4.82500
-	12/21/2007	4.85750	4.94286	4.87900	 4.72750	4.78143	4.74600
52nd wk	12/24/2007	4.84250	4.92357	4.87400	 4.71750	4.77286	4.75000
	12/27/2007	4.83000	4.88714	4.84250	4.71750	4.75857	4.72625
	12/28/2007	4.72875	4.76357	4.73750	4.64875	4.72429	4.68500
•	12/31/2007	4,70250	4.76143	4,70700	 4,59625	4 67857	4 60600
•	Average	5 30052	5 30556	5 30776	 5 25585	5 25798	5 26116
	Trendge	3.30032	5.50550	3.30110	 3.23303	5.25170	3.20110
		lowest		nignest	lowest		nignest
	01/0/2000		1	1		1 (07)	1
	01/2/2008	4.68063	4./2571	4.69750	4.56625	4.63714	4.59375
	01/3/2008	4.64625	4.68571	4.65000	4.47375	4.56214	4.54000
	01/4/2008	4.62000	4.65786	4.63667	 4.46750	4.50643	4.46667
1st wk	01/7/2008	4.54313	4.58929	4.56700	4.36375	4.41286	4.38200
	01/8/2008	4.50500	4.50500	4.53200	4.32875	4.35714	4.35500
	01/9/2008	4.44250	4.44643	4.48300	4.26250	4.30500	4.28800
	01/10/2008	4.37688	4.38286	4.41200	4.19375	4.24714	4.23900
	01/11/2008	4.25750	4.27357	4.32100	4.08125	4.12214	4.15300
2nd wk	01/14/2008	4.05500	4.15429	4.16200	3.85375	3.97286	3.99000
	01/15/2008	3.99750	4.02714	4.04500	3.82750	3.82857	3.84750
	01/16/2008	3.95125	3.98786	4.00200	3.79375	3.80071	3.80800
	01/17/2008	3.92625	3.93643	3.94500	3.81125	3.78714	3.80500
-	01/18/2008	3.89375	3.90857	3.90500	 3.75375	3.75357	3.76750
3rd wk	01/21/2008	3.84750	3.88286	3.85500	 3.67438	3.71643	3.70000
	01/22/2008	3.71750	3.80571	3.80200	3.49000	3.58643	3.60400
	01/23/2008	3.33125	3.40000	3.40200	3.16375	3.23714	3.26600
	01/24/2008	3.24375	3.27571	3.30500	3.15000	3.17071	3.17750
	01/25/2008	3.30625	3.26214	3.30500	3.30000	3.21143	3.25500
4th wk	01/28/2008	3.25125	3.29714	3.30000	3.18375	3.20786	3.22375
	01/29/2008	3.24375	3.26214	3.25400	3.18188	3.16000	3.17400
	01/30/2008	3.23938	3.24714	3.25750	3.18625	3.17214	3.19750
	01/31/2008	3,11188	3.10929	3.11000	3.04125	3.04357	3.03500
	02/1/2008	3.09500	3.10357	3.10500	3.01625	3.02429	3.02200
5th wk	02/4/2008	3,14500	3.11214	3.13600	 3.09750	3.04143	3.05800
	02/5/2008	3.16188	3,15500	3,15000	3.11125	3.10000	3,09400
	02/6/2008	3.12750	3.14167	3.14600	3.00250	3.02250	3.04800
6th wk	02/11/2008	3 07000	3 09786	3 09250	 2,96250	2,99071	2 98500
our wit	02/12/2008	3.06750	3 09643	3 07750	2.95875	2 96929	2.96750
	02/13/2008	3.06500	3 08500	3.07667	2.95438	2.96571	2.96667
	02/14/2008	3.06500	3 07714	3.07000	2.95430	2.96143	2.96750
	02/15/2008	3 07000	3 08923	3.07500	2.96938	2 97385	2.96250
7th wk	02/18/2008	3.07000	3.08020	3.07750	 2.90930	2.97363	2.90230
/ul wK	02/10/2008	3.07000	3.00929	3 08250	2.28000	2.20337	2.27073
	02/19/2008	3.07000	3 10000	3.06230	2.20000	2.99500	2.99000
	02/20/2008	3.07013	3.10000	3 109500	3.01930	3 03642	3.02300
	02/21/2008	3.09230	3 109/00	3.100/3	2 00020	3.03043	3.030/3
0411	02/25/2000	2,00000	2 10420	2 00750	 2.77730	2 02714	2.00250
ou'i WK	02/25/2008	2.00000	3.10429	3.09/30	3.03023	3.03/14	3.02/30
	02/20/2008	2.09000	3.10429	3.09300	3.03/30	3.03337	3.00000
	02/27/2008	3.08500	3.1035/	3.09500	3.01088	3.035/1	3.0466/
	02/20/2008	3.0/303	3.09338	3.08000	2.708/3	3.00077	2.99300
041 1	02/29/2008	3.05/50	3.08043	3.03/30	 2.93123	2.93000	2.91500
9th wk	05/5/2008	3.01438	3.05286	5.01600	2.86250	2.885/1	2.85000

	03/4/2008	3.00813	3.01214	3.01200		2.87688	2.88143	2.87800
	03/5/2008	3.00000	3.01000	3.01500		2 89250	2 89500	2 90300
	02/6/2008	2,00000	2 00602	2 00400		2.09250	2.090022	2.90500
	03/0/2008	2.99000	3.00092	3.00400		2.69230	2.09923	2.90000
	03/7/2008	2.93875	2.98429	2.97625		2.78438	2.83286	2.85125
10th wk	03/10/2008	2.90125	2.91929	2.91000		2.78125	2.76571	2.79500
	03/11/2008	2.86750	2.88429	2.88625		2.74000	2.74929	2.75250
	03/12/2008	2 85000	2 87143	2 87100		2 78750	2 80071	2 77600
	02/12/2008	2.05000	2.07145	2.87100		2.70730	2.00071	2.77000
	05/15/2008	2.80000	2.64214	2.85000		2.09938	2.74929	2.75500
	03/14/2008	2.76375	2.80000	2.76333		2.6/125	2.70143	2.66833
11th wk	03/17/2008	2.57875	2.56000	2.52500		2.36625	2.42143	2.31500
	03/18/2008	2.54188	2.55615	2,54250		2,38250	2.39769	2,39500
	03/19/2008	2 59875	2 57500	2 57000		2 49750	2 50000	2 45667
	03/19/2008	2.59675	2.57500	2.57000		2.49730	2.50000	2.45007
	03/20/2008	2.60625	2.60571	2.59500		2.53938	2.52000	2.50250
12th wk	03/25/2008	2.65500	2.66846	2.63625		2.63375	2.64308	2.61000
	03/26/2008	2.67125	2.70857	2.65250		2.63188	2.65000	2.62500
	03/27/2008	2,69625	2.74214	2.67667		2,63000	2.65786	2.62333
	03/28/2008	2 60750	2 78500	2 67750		2,62250	2 66714	2 62000
	03/28/2008	2.09730	2.78500	2.07730		2.03230	2.00714	2.02000
13th wk	03/31/2008	2.68813	2.78308	2.70200		2.61438	2.65769	2.62400
	04/1/2008	2.68375	2.80077	2.69250		2.61625	2.65615	2.60000
	04/2/2008	2.70000	2.82000	2.70900		2.67000	2.72714	2.65400
	04/3/2008	2 72750	2 85429	2 72125		2 72000	2 77000	2 70250
1 4411-	04/7/2008	2,71000	2.02.122	2.72500	•	2.02000	2.74071	2.0500
14th WK	04/7/2008	2.71000	2.82500	2.72500		2.68000	2.74071	2.68500
	04/8/2008	2.71000	2.80286	2.72125		2.68000	2.73357	2.68250
	04/9/2008	2.71563	2.80643	2.72600		2.69875	2.76143	2.70000
	04/10/2008	2.71000	2.80357	2.71625		2.68375	2.75143	2.69125
	04/11/2008	2 71313	2 78429	2 72125		2 71125	2 75286	2 70000
154 1	0 1/11/2000	2.71915	2.70122	2.72125		2.71129	2.73200	2.70000
15th WK	04/14/2008	2.70875	2.11351	2.71200		2.68688	2.73429	2.69400
	04/15/2008	2.71594	2.76000	2.71700		2.71688	2.73571	2.70300
	04/16/2008	2.73375	2.78357	2.72900		2.75875	2.79071	2.74600
	04/17/2008	2.81750	2.85769	2.79750		2.88188	2.89154	2.82500
	04/18/2008	2 90750	2 92500	2 79750		3 01875	3 00714	2 96750
164 1	04/01/2000	2.90750	2.92300	2.17130		2.02125	2.06071	2.01000
16th WK	04/21/2008	2.92000	2.97000	2.91125		3.02125	3.06071	3.01000
	04/22/2008	2.92000	2.99071	2.92400		3.03750	3.07786	3.02200
	04/23/2008	2.92000	2.99714	2.91900		3.04625	3.07143	3.03400
	04/24/2008	2,90688	3.01000	2,92400		3 02813	3.08214	3.04200
	04/25/2008	2 91250	3 00000	2 92000		3 08000	3 08786	3.04667
1.7.1 1	04/20/2000	2.91230	3.00000	2.92000		3.00000	3.00700	3.04007
1 /th wk	04/28/2008	2.89938	2.98929	2.92500		3.04188	3.09429	3.06/50
	04/29/2008	2.87281	2.95571	2.90200		2.98625	3.05857	3.03000
	04/30/2008	2.85000	2.94357	2.87200		2.96500	3.01929	2.97600
	05/1/2008	2.78438				2.88250		
	05/2/2008	2 77000	2 85000	2 80250		2 87375	2 94429	2 90500
10/1 1	05/2/2000	2.17000	2.05000	2.00250		2.07575	2.05142	2.90300
18th wk	05/5/2008		2.85/86	2.77500			2.95143	2.8/380
	05/6/2008	2.75750	2.82929	2.79000		2.87625	2.93214	2.88750
	05/7/2008	2.73438	2.80500	2.76250		2.84875	2.89143	2.86750
	05/8/2008	2.71563	2.78714	2.73600		2.82000	2.86214	2.84100
	05/9/2008	2 68500		2 70500		2 78000		2 79000
10th mlr	05/12/2008	2,602.00		2.60280	•	2.00000		2,70500
1901 WK	05/12/2008	2.0/813	0.0001	2.09380		2.80438	0.0551.4	2.79500
	05/13/2008	2.67563	2.75714	2.68300		2.82750	2.85/14	2.81000
	05/14/2008	2.72000	2.77429	2.71800		2.93875	2.92357	2.90000
	05/15/2008	2.71875	2.80643	2.73200		2.94125	2.96214	2.92600
	05/16/2008	2 69500	2 79143	2 70400		2 88625	2 94000	2 90300
20th mlr	05/10/2008	2,67250	2.77126	21/0100	•	2.00020	2.97500	200000
20th WK	05/19/2008	2.07750	2.74280	• • • • • • •		2.84500	2.87500	• • • • • • •
	05/20/2008	2.65750	2.72000	2.68000		2.80063	2.83286	2.84000
	05/21/2008	2.63813	2.72000	2.64750		2.78375	2.84143	2.78000
	05/22/2008	2.63813	2.73357	2.64130		2.80875	2.88214	2.79750
	05/23/2008	2 64563		2 65750		2 84875		2 84000
21 at1	05/26/2000	2.01000		2.55750		2.51075		2.01000
∠1st WK	05/20/2008	0	0.0000	2.05800		0.01000	0.0000	2.83800
	05/27/2008	2.64438	2.72571	2.65900		2.84938	2.87786	2.85200
	05/28/2008	2.64938	2.73455	2.66500		2.85875	2.89818	2.86200
	05/29/2008	2.68188	2.75786	2.68800		2.92750	2.92714	2.88800
	05/30/2008	2 68063	2 79286	2 71000		2 91063	2 95929	2 92750
22. 1 7	06/0/2000	2.00003	2.17200	2.71000	•	2.71005	2.73747	2.72130
22nd wk	06/2/2008	2.67625		2.70200		2.89688		2.91800
	06/3/2008	2.67313	2.76571	2.70900		2.88375	2.92786	2.90600
	06/4/2008	2.67188	2.76286	2.71250		2.89125	2.92500	2.91000
	06/5/2008	2.67688	2.76857	2.72200		2.91875	2.93000	2.90800
	06/6/2008	2 60563	2 78214	2 72600		2 96038	2 96286	2 9/1800
	00/0/2008	2.07505	2.70214	2.72000		2.70750	2.70200	2.74000

23rd wk	06/9/2008	2.69125		2.72400		2.95750		2.93400
	06/10/2008	2.78625	2.85154	2.80800		3.17000	3.15231	3.16300
	06/11/2008	2 78813	2 88071	2 83750		3 15375	3 20929	3 19750
	06/12/2008	2.70015	2.00071	2.03750		2 12212	2 16714	2 15000
	00/12/2008	2.77025	2.00043	2.82400		2.25500	2.25957	3.15000
	06/13/2008	2.81375	2.91286	2.86600		3.25500	3.25857	3.26400
24th wk	06/16/2008	2.81250		2.85000		3.24063		3.27600
	06/17/2008	2.80875	2.94143	2.85200		3.21500	3.30357	3.27200
	06/18/2008	2 80250	2 91429	2 84600		3 19375	3 23357	3 22800
	06/10/2000	2.00250	2.01796	2.01000		2 10100	2 21000	2 20800
	00/19/2008	2.60125	2.91780	2.84400		5.16166	5.21000	5.20800
	06/20/2008	2.80188	2.90/14	2.84800		3.18000	3.21429	3.21800
25th wk	06/23/2008	2.80438		2.84800		3.18000		3.21600
	06/24/2008	2.80938	2.91143	2.86000		3.18563	3.22286	3.20800
	06/25/2008	2 80813	2 89500	2 83000		3 17125	3 20857	3 18200
	00/25/2000	2.00013	2.00714	2.83000		2 12275	2 21000	2 15 400
	06/26/2008	2.80065	2.90/14	2.82000		3.13375	3.21000	3.15400
	06/27/2008	2.79125	2.90462	2.81130		3.15375	3.16462	3.13000
26th wk	06/30/2008	2.78313		2.81380		3.10875		3.10250
	07/1/2008	2,78750		2.82500		3 12250		3.12500
	07/2/2008	2 70125	2 86857	2.81630		3 13375	3 1/1500	3 13500
	07/2/2008	2.79125	2.80857	2.81030		2 12000	2 15000	2 12250
	07/3/2008	2.79125	2.80/80	2.81750		3.13000	3.15000	3.12250
	07/4/2008	2.78938	2.87357	2.81500		3.11313	3.14357	3.12500
27th wk	07/7/2008	2.79125		2.82000		3.11563		3.11200
	07/8/2008	2 79000	2 87500	2 81800		3 09750	3 13429	3 10600
	07/0/2008	2.79000	2.87/20	2.82400		3 11313	3 13286	3 11400
	07/9/2008	2.79100	2.07429	2.82400		2.00275	2.10142	2.00600
	0//10/2008	2.78813	2.8/85/	2.82200		3.09375	3.12143	3.09600
	07/11/2008	2.79063	2.88000	2.81750		3.12125	3.13500	3.10500
28th wk	07/14/2008	2.79063		2.82000		3.12250		3.12330
	07/15/2008	2 78938	2 89214	2 80800		3 09250	3 14929	3 11600
	07/16/2008	2.78500	2.80000	2.00000		2 07125	2 121/2	2 08600
	07/10/2008	2.78500	2.89000	2.81200		2.00/123	2.12(42	3.08000
	0//1//2008	2.78625	2.89000	2.81000		3.08438	3.13643	3.09250
	07/18/2008	2.79063	2.89214	2.81000		3.10000	3.14714	3.09400
29th wk	07/21/2008	2.79938		2.82200		3.14813		3.11600
	07/22/2008	2 79625	2 89643	2 82800		3 13938	3 16429	3 13200
	07/22/2008	2.0000	2.00043	2.02000		2 17125	2 10071	2 14400
	07/23/2008	2.80000	2.09371	2.84000		3.17123	3.19071	3.14400
	07/24/2008	2.79500	2.90000	2.83000		3.15688	3.20214	3.16200
	07/25/2008	2.79313	2.89214	2.83000		3.11188	3.17643	3.13200
30th wk	07/28/2008	2,79625		2.83750		3.13500		3.14000
both wit	07/29/2008	2 79875	2 89857	2 82300		3 11625	3 17214	3 13400
	07/29/2008	2.79075	2.09037	2.82300		2 12500	2 17071	2 1 4000
	07/30/2008	2.80065	2.89/80	2.85550		3.12500	5.17071	3.14000
	07/31/2008	2.79125	2.89000	2.82250		3.08375	3.15286	3.11250
	08/1/2008	2.79438	2.88357	2.82670		3.07500	3.12929	3.09000
31st wk	08/4/2008	2 79813		2 82875		3 09063		3 09625
5150 WK	08/5/2008	2.0188	2 80071	2.82400		3 11375	3 13786	3 12000
	08/5/2008	2.00100	2.89071	2.83400		2.10125	5.15760	3.12000
	08/6/2008	2.80250		2.83667		3.10125		3.10333
	08/7/2008	2.80250	2.89286	2.83500		3.10250	3.15000	3.12000
	08/8/2008	2.80375	2.89786	2.83400		3.09125	3.13929	3.11400
32nd wk	08/11/2008	2.80375		2.81875		3,09375		3,10250
o zna mi	08/12/2008	2 80/38	2 80607	2 82300		3 10313	3 1/786	3 11400
	08/12/2008	2.00430	2.89007	2.82300		2.00500	2 12057	2 10900
	00/15/2008	2.80438	2.09043	2.62700		5.09500	5.1385/	5.10800
	08/14/2008	2.80688	2.89643	2.83140		3.10375	3.14214	3.12600
	08/15/2008	2.80875	2.89500	2.83140		3.11813	3.14857	3.11800
33rd wk	08/18/2008	2.81000		2.82900		3.13625		3.12800
bord wit	08/19/2008	2 81125	2 89071	2 83325		3 13375	3 15214	3 1/375
	00/17/2000	2.01125	2.09071	2.03323		2 12275	2 15071	2 12(00
	08/20/2008	2.81188	2.88043	2.82300		3.12375	5.150/1	5.12000
	08/21/2008	2.81063	2.88929	2.82400		3.10250	3.14357	3.11400
	08/22/2008	2.81000		2.81600		3.11375		3.10800
34th wk	08/25/2008	2.80938	2.89143	2,82500		3.11625	3,15571	3,11625
	08/26/2008	2 81000	2 80000	2 81500		3 11750	3 16071	3 12750
	08/27/2008	2.01000	2.0000	2.01300		2 11500	2 12571	2 10000
	08/27/2008	2.81000	2.89929	2.83800		5.11500	3.105/1	5.10900
	08/28/2008	2.81063	2.89857	2.83875	_	3.11750	3.16000	3.11750
35th wk	09/1/2008	2.81000		2.84125		3.11250		3.11825
	09/2/2008	2.81313	2,89929	2.83900		3,11938	3,16571	3,12460
	09/3/2009	2.01010	2 90000	2 83860		3 10975	3 16357	3 11200
	09/3/2008	2.013/3	2.20000	2.03000		3.100/3	2.10337	3.11300
	09/4/2008	2.81500	2.900/1	2.83860		3.11313	3.16357	5.12400
	09/5/2008	2.81438	2.89929	2.83260	_	3.10250	3.15500	3.10460
36th wk	09/8/2008	2.81688		2.84167		3.12250		3.10933
	09/9/2008	2.81813	2.89071	2,83750		3.09688	3.14071	3,09650

	09/10/2008	2.81875	2.89071	2.83300	3.08750	3.12357	3.08300
	09/11/2008	2 81875	2 88571	2 83500	3 08438	3 12429	3 09020
	00/10/2000	2.01075	2.00371	2.03500	2,000430	2 12000	2.00750
-	09/12/2008	2.818/5	2.88357	2.83625	3.08938	3.12000	3.08/50
37th wk	09/15/2008	2.81625		2.80750	3.00125		3.00250
	09/16/2008	2.87625	2,90500	2.84300	3.01625	3.05214	2,99600
	00/17/2008	2.06250	2 1 4 6 4 2	2,00000	2 25250	2 21796	2 10667
	09/17/2008	5.06250	5.14045	5.00000	5.23230	5.21780	5.19007
	09/18/2008	3.20375	4.03077	3.56250	3.38500	3.73077	3.62750
	09/19/2008	3.21000	4.27714	3.40000	3.45750	3.99143	3.51250
20411-	00/22/2009	2 10750		2 27500	2 42975		2 4(250
38th WK	09/22/2008	3.19/50		3.37500	3.428/5		3.40250
	09/23/2008	3.21125	4.06071	3.41200	3.46500	3.98571	3.50000
	09/24/2008	3 47625	4.06786	3,44800	3,70125	4.01071	3.67000
	00/25/2008	2 76975	4 21571	2 60222	2 07500	4 16296	2 80222
	09/23/2008	5.70875	4.213/1	5.09555	3.97300	4.10280	5.69555
-	09/26/2008	3.76188	4.27357	3.77500	3.87625	4.24929	3.99000
39th wk	09/29/2008	3.88250		3.80200	3,83375		3,87400
<i>b)</i> (11 mil	00/20/2008	4.05250	4 50857	2 00200	2 08125	1 20057	2 00000
	09/30/2008	4.05250	4.39637	3.90200	3.98123	4.38637	3.90000
	10/1/2008	4.15000	4.90818	4.15667	4.03750	4.61455	4.05667
	10/2/2008	4.20750	4.86000	4.26500	4.05250	4.55929	4.10500
	10/3/2008	1 33375			4 13125		
	10/3/2000	4.33373			4.13123		
40th wk	10/6/2008	4.28875		4.22400	4.05250		4.05200
	10/7/2008	4.32000		4.24200	4.01625		4.03200
	10/8/2008	4 52375	4 86214	4 31250	4 10750	4 54143	4.05500
	10/0/2000	4.52575	5.07257	4.51250	4.10750	4.60500	4.05500
	10/9/2008	4.75000	5.07357	4.52000	4.37500	4.69500	4.17400
	10/10/2008	4.81875	5.29643	4.76000	4.39375	4.84143	4.38800
Alst wk	10/13/2008	4 75250		4 78000	4 37625		4 43750
TISU WK	10/14/2000	4.73230	5 17205	4.10000	4.35500	176520	4 20000
	10/14/2008	4.03500	5.1/385	4.0100/	4.25500	4./0538	4.20000
	10/15/2008	4.55000	5.00857	4.53000	4.22125	4.63000	4.21400
	10/16/2008	4.50250	4.87286	4.53000	4.17875	4.57571	4.22400
	10/17/2008	4 41875	4 76214	4 44800	4 13000	1 17113	4 15000
	10/17/2008	4.41075	4.70214	4.44000	4.13000	4.4/143	4.15000
42nd wk	10/20/2008	4.05875		4.17667	3.82875		3.83667
	10/21/2008	3.83375	3.99357	3.88750	3.70000	3.89143	3.73500
	10/22/2008	3 5/1125	3 831/13	3 61500	3 48250	3 74714	3 52000
	10/22/2000	3.54125	2.60071	2.51.667	3.48230	2.60214	3.32000
	10/23/2008	3.53500	3.690/1	3.51667	3.53000	3.60214	3.49000
	10/24/2008	3.51625	3.70643	3.51333	3.52750	3.65500	3.51667
43rd wk	10/27/2008	3 50750			3 51250		
4510 WK	10/20/2000	2.46500	2 (0714	2 49667	2 40000	2 (121 1	2 40222
	10/28/2008	3.46500	3.68/14	3.48667	3.48000	3.64214	3.49333
	10/29/2008	3.42000	3.65429	3.41667	3.42750	3.61500	3.44333
	10/30/2008	3,19250	3 43571	3.28400	3,26500	3 4 1 0 7 1	3,33000
	10/21/2008	2 02625	2 25602	2 10600	2 12125	2 27529	2 21200
-	10/31/2008	5.02025	5.55092	5.10000	5.12125	5.57556	5.21200
44th wk	11/3/2008	2.85875		2.91250	3.08500		3.08750
	11/4/2008	2.70625	2.99077	2.77600	2.96875	3.15231	3.01600
	11/5/2008	2 50625	2 81500	2 53400	2 82375	3 0/357	2 88000
	11/5/2008	2.30023	2.61300	2.33400	2.82373	3.04337	2.88000
	11/6/2008	2.38/50	2.66214	2.37600	2.698/5	2.92500	2.73000
	11/7/2008	2.29000	2.53571	2.30000	2.63875	2.82714	2.66000
15th wk	11/10/2008	2 23500		2 26667	2 62125		2 63000
+Jui wk	11/10/2000	2.25500	2 40214	2.20007	2.02123	0 70014	2.03000
	11/11/2008	2.1/500	2.40214	2.19200	2.54500	2.72214	2.57200
	11/12/2008	2.13250	2.33929	2.14000	2.52500	2.64214	2.53000
	11/13/2008	2.14875	2.28714	2.10000	2.59500	2.63643	2.53200
	11/14/2008	2 23625	2 33214	2 22222	2 71275	2 70071	2 67333
	11/14/2000	2.23023	2.55214	2.22555	2.71373	2.70071	2.07333
46th wk	11/17/2008	2.23875		2.28000	2.71375		2.74800
	11/18/2008	2.21750	2.36143	2.22400	2.63125	2.72643	2.64800
	11/19/2008	2 17250	2,32643	2 19000	2 58375	2 71143	2 62000
	11/10/2000	2.17250	2.52045	2.17000	2.50575	2.71145	2.02000
	11/20/2008	2.15515	2.29929	2.14200	2.54375	2.08043	2.57800
	11/21/2008	2.15750	2.28071	2.14500	2.56875	2.63357	2.52750
47th wk	11/24/2008	2 16875		2 13600	2 57500		2 53400
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	11/25/2000	2.10675	2 20786	2,20250	2,67105	266612	2,61250
	11/2.0/2008	2.19025	2.29/80	2.20250	2.02125	2.00043	2.01250
			2 2 2 2 1 4	2.18900	2.54375	2.70000	2.58400
	11/26/2008	2.18125	2.33214				
	11/26/2008 11/27/2008	2.18125 2.20250	2.34357	2.21000	2.56750	2.73286	2.56200
	11/26/2008 11/27/2008 11/28/2008	2.18125 2.20250 2.21688	2.34357	2.21000	2.56750	2.73286	2.56200
10.1 .	11/26/2008 11/27/2008 11/28/2008	2.18125 2.20250 2.21688	2.34357 2.37143	2.21000 2.22600	2.56750 2.59125	2.73286 2.72571	2.56200 2.58800
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008	2.18125 2.20250 2.21688 2.22000	2.34357 2.37143	2.21000 2.22600 2.24500	2.56750 2.59125 2.60625	2.73286 2.72571	2.56200 2.58800 2.61750
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008	2.18125 2.20250 2.21688 2.22000 2.21000	2.33214 2.34357 2.37143 2.37714	2.21000 2.22600 2.24500 2.23500	2.56750 2.59125 2.60625 2.56875	2.73286 2.72571 2.71143	2.56200 2.58800 2.61750 2.58500
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.20125	2.33214 2.34357 2.37143 2.37714 2.36571	2.21000 2.22600 2.24500 2.23500 2.21800	2.56750 2.59125 2.60625 2.56875 2.56875	2.73286 2.72571 2.71143 2.68857	2.56200 2.58800 2.61750 2.58500 2.58500 2.56600
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008 12/3/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.21000 2.20125	2.3214 2.34357 2.37143 2.37714 2.36571	2.21000 2.22600 2.24500 2.23500 2.21800 2.10200	2.56750 2.59125 2.60625 2.56875 2.55625	2.73286 2.72571 2.71143 2.68857 2.6157	2.56200 2.58800 2.61750 2.58500 2.56600
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008 12/4/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.20125 2.19250	2.3214 2.34357 2.37143 2.37714 2.36571 2.31857	2.21000 2.22600 2.24500 2.23500 2.21800 2.19200	2.56750 2.59125 2.60625 2.56875 2.55625 2.55625 2.52000	2.73286 2.72571 2.71143 2.68857 2.64857	2.56200 2.58800 2.61750 2.58500 2.56600 2.54200
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008 12/4/2008 12/5/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.20125 2.19250 2.18563	2.33214 2.34357 2.37143 2.37714 2.36571 2.31857 2.26000	2.21000 2.22600 2.24500 2.23500 2.21800 2.19200 2.18800	2.56750 2.59125 2.60625 2.56875 2.55625 2.52000 2.55125	2.73286 2.72571 2.71143 2.68857 2.64857 2.59000	2.56200 2.58800 2.61750 2.58500 2.56600 2.54200 2.55800
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008 12/4/2008 12/5/2008 12/5/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.20125 2.19250 2.18563 2.18938	2.33214 2.34357 2.37143 2.37714 2.36571 2.31857 2.26000	2.21000 2.22600 2.24500 2.23500 2.21800 2.19200 2.18800	2.56750 2.59125 2.60625 2.56875 2.55625 2.52000 2.55125 2.60063	2.73286 2.72571 2.71143 2.68857 2.64857 2.59000	2.56200 2.58800 2.61750 2.58500 2.56600 2.54200 2.55800
48th wk 49th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008 12/4/2008 12/4/2008 12/5/2008 12/8/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.20125 2.19250 2.18938 2.18938 2.18938	2.33214 2.34357 2.37143 2.37714 2.36571 2.31857 2.26000	2.21000 2.22600 2.24500 2.23500 2.21800 2.19200 2.18800	2.56750 2.59125 2.60625 2.56875 2.55625 2.52000 2.55125 2.60063 2.55125	2.73286 2.72571 2.71143 2.68857 2.64857 2.59000	2.56200 2.58800 2.61750 2.58500 2.56600 2.54200 2.55800
48th wk	11/26/2008 11/27/2008 11/28/2008 12/1/2008 12/2/2008 12/3/2008 12/4/2008 12/5/2008 12/8/2008 12/9/2008	2.18125 2.20250 2.21688 2.22000 2.21000 2.20125 2.19250 2.18563 2.18938 2.16375	2.33214 2.34357 2.37143 2.37714 2.36571 2.31857 2.26000 2.26462	2.21000 2.22600 2.24500 2.23500 2.21800 2.19200 2.18800 2.19000 2.19000	2.56750 2.59125 2.60625 2.56875 2.55625 2.52000 2.55125 2.60063 2.52500	2.73286 2.72571 2.71143 2.68857 2.64857 2.59000 2.66923	2.56200 2.58800 2.61750 2.58500 2.56600 2.54200 2.55800 2.57125

	12/11/2008	1.99625	2.12714	2.04200		2.32250	2.49500	2.39200
	12/12/2008	1.92125	2.03083	1.95400		2.22000	2.37917	2.28400
50.1 1	12/15/2000	1.02125	2.00000	1.00000		2.22000	2107717	2.26100
50th wk	12/15/2008	1.8/125		1.90000		2.21625		2.26000
	12/16/2008	1.84750	1.93357	1.85000		2.16750	2.29357	2.19000
	12/17/2008	1 57750	1 67143	1 63000		1 89125	2 04143	1 94600
	12/19/2000	1.57750	1.67145	1.54500		1.0/125	1.02571	1.97000
	12/18/2008	1.52500	1.61000	1.54500		1.803/5	1.92571	1.87000
	12/19/2008	1.49750	1.56071	1.50750		1.84500	1.89214	1.84750
51 at ml	12/22/2008	1 46625		1 48500	_	1 82625		1 82500
JISU WK	12/22/2008	1.40023		1.46500		1.62025		1.65500
	12/23/2008	1.46625	1.52071	1.47000		1.85000	1.85786	1.83250
	12/24/2008	1.46750	1.51500	1.45875		1.83000	1.88214	1.83000
	12/26/2008			1 47000				1 82000
	12/20/2008			1.47000	_			1.65000
52nd wk	12/29/2008	1.45875		1.46200		1.81125		1.81800
	12/30/2008	1.43500	1 48923	1.44250		1.77500	1.83769	1.80000
	12/21/2008	1 42500	1 47714	1 44250		1 75000	1 01706	1 70000
	12/31/2008	1.42300	1.4//14	1.44230		1.73000	1.01/00	1.79000
		2.92732	3.05456	2.93338		3.06199	3.13423	3.06124
		lowest	highest		=		highest	lowest
		lowesi	nignesi				nignesi	iowesi
	01/2/2009	1.41250	1.46286	1.41500		1.75250	1.80429	1.77250
1 of mile	01/5/2000	1 40105		1 42200	-	1 70275		1 75400
ISU WK	01/3/2009	1.42123		1.42200		1.79575		1.73400
	01/6/2009	1.41125	1.45214	1.40800		1.77000	1.79786	1.74800
	01/7/2009	1.39750	1.43846	1.40800		1.75000	1.79615	1.74000
	01/8/2000	1 25275	1 10796	1 27600		1 69635	1 77642	1 70200
	01/0/2009	1.55575	1.42780	1.37000		1.06025	1.77045	1.70200
_	01/9/2009	1.26000	1.36143	1.29600		1.60000	1.71286	1.64200
2nd wk	01/12/2009	1.16000		1.18400		1.50625		1.54600
2110 111	01/12/2000	1.00429	1 20142	1 12000		1 46500	1 54020	1 47400
	01/13/2009	1.09438	1.20145	1.12000		1.40500	1.54929	1.47400
	01/14/2009	1.08250	1.14500	1.08750		1.47125	1.49286	1.45000
	01/15/2009	1.08563	1.13714	1.08600		1.50125	1.49000	1.47400
	01/16/2000	1 14250	1 16642	1 14400		1 59975	1 54642	1 58600
	01/10/2009	1.14230	1.10045	1.14400	_	1.300/3	1.54045	1.58000
3rd wk	01/19/2009	1.13250		1.13200		1.55625		1.57800
	01/20/2009	1.12250	1.18571	1.14000		1.54500	1.58143	1.54750
	01/21/2000	1 12500	1 17020	1 12600		1 55075	1 56714	1 5 4 4 0 0
	01/21/2009	1.12300	1.1/929	1.15000		1.55875	1.30/14	1.54400
	01/22/2009	1.15938	1.20429	1.15000		1.61750	1.59143	1.61000
	01/23/2009	1.16938	1.21643	1.18000		1.62750	1.62929	1.62500
4.1 1	01/26/2000	1.10275	1121010	1110000	-	1.627250	1102/2/	1.02000
4th WK	01/26/2009	1.183/5				1.6/250		
	01/27/2009	1.18438				1.67750		
	01/28/2009	1 17438		1 17250		1 63063		1 61250
	01/20/2000	1.17000	1 22214	1.1/200		1.03005	1 (270)	1.61200
	01/29/2009	1.17000	1.23214	1.10000		1.033/5	1.03/80	1.01000
	01/30/2009	1.18438	1.24429	1.18000		1.66000	1.65000	1.64600
5th wk	02/2/2009	1 22500		1 23400		1 76000		1 73200
Jui wk	02/2/2009	1.22500	1 2020 6	1.23400		1.70000	1 75057	1.75200
	02/3/2009	1.23375	1.28286	1.23/50		1.77625	1./585/	1.76750
	02/4/2009		1 20500	1 24000		1	1 50051	1 7 6 5 0 0
		1.23563	1.26500	1.24000		1.77375	1.78071	1.76500
	02/5/2009	1.23563	1.28500	1 23400		1.77375	1.78071 1.78714	1.76500
	02/5/2009	1.23563 1.24125	1.28500	1.23400		1.77375	1.78071 1.78714	1.76500
	02/5/2009 02/6/2009	1.23563 1.24125 1.24125	1.28500 1.28643 1.28643	1.23400 1.24625	_	1.77375 1.77375 1.74750	1.78071 1.78714 1.77786	1.76500 1.76400 1.76500
6th wk	02/5/2009 02/6/2009 02/9/2009	1.23563 1.24125 1.24125 1.24125 1.22813	1.28500 1.28643 1.28643	1.24000 1.23400 1.24625 1.22000	_	1.77375 1.77375 <u>1.74750</u> 1.70438	1.78071 1.78714 1.77786	1.76500 1.76400 1.76500 1.70400
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009	1.23563 1.24125 1.24125 1.22813 1.22813	1.28500 1.28643 1.28643	1.24600 1.23400 1.24625 1.22000 1.21800	_	1.77375 1.77375 1.74750 1.70438 1.68625	1.78071 1.78714 1.77786	1.76500 1.76400 1.76500 1.70400 1.70200
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.22188	1.28500 1.28643 1.28643 1.28071	1.23400 1.24625 1.22000 1.21800	_	1.77375 1.77375 1.74750 1.70438 1.68625	1.78071 1.78714 1.77786	1.76500 1.76400 1.76500 1.70400 1.70200
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/11/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125	1.28500 1.28643 1.28643 1.28071 1.26714	1.24000 1.23400 1.24625 1.22000 1.21800 1.23000	_	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500	1.78071 1.78714 1.77786 1.73929 1.73286	1.76500 1.76400 1.76500 1.70400 1.70200 1.74000
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/11/2009 02/12/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500	1.23400 1.23400 1.24625 1.22000 1.21800 1.23000 1.23000	_	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571	$ \begin{array}{r} 1.76500\\ 1.76400\\ 1.76500\\ 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ \end{array} $
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000	$\begin{array}{r} 1.24000 \\ 1.23400 \\ 1.24625 \\ \hline 1.22000 \\ 1.21800 \\ 1.23000 \\ 1.23000 \\ 1.24000 \end{array}$	-	$ \begin{array}{r} 1.77375 \\ 1.77375 \\ 1.74750 \\ 1.70438 \\ 1.68625 \\ 1.72500 \\ 1.72375 \\ 1.73500 \\ \end{array} $	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500	1.76500 1.76400 1.76500 1.70400 1.70200 1.74000 1.72250 1.74750
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000	$\begin{array}{r} 1.2400 \\ 1.23400 \\ 1.24625 \\ \hline 1.22000 \\ 1.21800 \\ 1.23000 \\ 1.23000 \\ 1.24000 \\ \hline 1.240275 \end{array}$	-	$\begin{array}{r} 1.77375\\ 1.77375\\ 1.74750\\ \hline 1.70438\\ 1.68625\\ 1.72500\\ \hline 1.72375\\ 1.73500\\ \hline 1.73500\\ \hline 1.72428\end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500	$ \begin{array}{r} 1.76500\\ 1.76400\\ 1.76500\\ 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ 1.74750\\ 1.74750 \end{array} $
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/16/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563	1.28500 1.28643 1.28071 1.26714 1.28500 1.28000	$\begin{array}{c} 1.2400 \\ 1.24625 \\ 1.22000 \\ 1.21800 \\ 1.23000 \\ 1.23000 \\ 1.24000 \\ 1.24375 \end{array}$	-	$\begin{array}{r} 1.77375\\ 1.77375\\ 1.74750\\ \hline 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ \hline 1.73500\\ \hline 1.76438\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500	$\begin{array}{r} 1.76500\\ 1.76400\\ 1.76500\\ \hline 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ \hline 1.74750\\ \hline 1.76000\end{array}$
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/16/2009 02/17/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036	$\begin{array}{r} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ \hline 1.24375\\ 1.24200\\ \end{array}$	-	$\begin{array}{r} 1.77375\\ 1.77375\\ 1.77375\\ 1.74750\\ 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.73500\\ 1.76438\\ 1.76563\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464	$\begin{array}{r} 1.76500\\ 1.76400\\ 1.76500\\ 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ 1.74750\\ 1.76000\\ 1.75400\end{array}$
6th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/12/2009 02/12/2009 02/13/2009 02/16/2009 02/17/2009 02/17/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.25125	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214	$\begin{array}{c} 1.2400\\ 1.2400\\ 1.24625\\ \hline 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ \hline 1.24000\\ \hline 1.24375\\ 1.24200\\ 1.24500\\ \end{array}$	-	$\begin{array}{r} 1.77375\\ 1.77375\\ 1.74750\\ \hline 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.73500\\ \hline 1.76438\\ 1.76563\\ 1.78000\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857	1.76500 1.76400 1.76500 1.70400 1.70200 1.74000 1.72250 1.74750 1.76600 1.75400 1.75400
6th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/16/2009 02/17/2009 02/17/2009 02/18/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25025	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214 1.29042	1.23400 1.24625 1.22000 1.21800 1.23000 1.23000 1.24000 1.24375 1.24200 1.24500	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78000	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.90208	1.76500 1.76400 1.76500 1.70200 1.70200 1.74000 1.72250 1.74750 1.76600 1.75400 1.75875
6th wk	02/5/2009 02/6/2009 02/0/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/16/2009 02/17/2009 02/18/2009 02/19/2009	$\begin{array}{r} 1.23563\\ 1.24125\\ 1.24125\\ 1.22813\\ 1.22188\\ 1.23125\\ 1.23438\\ 1.23750\\ 1.24563\\ 1.24563\\ 1.24563\\ 1.25125\\ 1.25063\\ \end{array}$	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.28000 1.29036 1.29214 1.29962	$\begin{array}{c} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24800\\ \end{array}$	-	$\begin{array}{c} 1.77375\\ 1.77375\\ 1.77375\\ 1.74750\\ 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.73500\\ 1.76438\\ 1.76563\\ 1.78000\\ 1.78938\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308	$\begin{array}{c} 1.76500\\ 1.76400\\ 1.76500\\ 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ 1.74750\\ 1.76000\\ 1.75400\\ 1.75400\\ 1.76875\\ 1.76600\end{array}$
6th wk	02/5/2009 02/6/2009 02/9/2009 02/10/2009 02/12/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/17/2009 02/18/2009 02/19/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214 1.29962 1.30179	$\begin{array}{c} 1.2400\\ 1.2400\\ 1.24625\\ \hline 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ \hline 1.24375\\ 1.24200\\ 1.24500\\ 1.24800\\ 1.25400\\ \hline \end{array}$	-	$\begin{array}{c} 1.77375\\ 1.77375\\ 1.77375\\ 1.74750\\ \hline 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.72500\\ \hline 1.72375\\ 1.73500\\ \hline 1.76438\\ 1.76563\\ 1.76000\\ 1.78938\\ 1.76188\\ \end{array}$	1.78071 1.78714 1.77786 1.73286 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357	$\begin{array}{c} 1.76500\\ 1.76400\\ 1.76400\\ 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ 1.74750\\ 1.76600\\ 1.75400\\ 1.75400\\ 1.76875\\ 1.76600\\ 1.74400\\ \end{array}$
6th wk	02/5/2009 02/6/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/19/2009 02/20/2009 02/23/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214 1.29962 1.30179	$\begin{array}{c} 1.2400\\ 1.2400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24800\\ 1.25400\\ 1.25400\\ 1.24200\\ \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357	1.76500 1.76400 1.76500 1.70200 1.70200 1.74000 1.72250 1.74750 1.76600 1.75400 1.76875 1.76600 1.74400 1.74400
6th wk 7th wk 8th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29036 1.29962 1.30179 1.20386	$\begin{array}{c} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.25400\\ 1.24200\\ 1.24207\\ 1.24207\\ 1.24200\\ 1.24207\\ 1.24275\\ 1.24207\\ 1.24275\\ 1.2427$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.7222	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200
6th wk 7th wk 8th wk	02/5/2009 02/6/2009 02/0/2009 02/10/2009 02/12/2009 02/12/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/23/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.25000	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.28000 1.29036 1.29214 1.29962 1.30179 1.29286	$\begin{array}{c} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24800\\ 1.25400\\ 1.24200\\ 1.24375\\ \end{array}$	-	$\begin{array}{c} 1.77375\\ 1.77375\\ 1.77375\\ 1.74750\\ \hline 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.73500\\ \hline 1.76438\\ 1.76563\\ 1.78000\\ 1.78938\\ 1.76188\\ \hline 1.75125\\ 1.74750\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393	$\begin{array}{c} 1.76500\\ 1.76400\\ 1.76500\\ 1.70400\\ 1.70200\\ 1.74000\\ 1.72250\\ 1.74750\\ 1.76000\\ 1.75400\\ 1.75400\\ 1.76875\\ 1.76600\\ 1.74400\\ 1.73200\\ 1.72750\\ \end{array}$
6th wk 7th wk 8th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/20/2009 02/23/2009 02/23/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.25000 1.25625	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.29286	$\begin{array}{c} 1.2400\\ 1.2400\\ 1.24625\\ \hline 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ \hline 1.24000\\ \hline 1.24375\\ 1.24200\\ 1.24500\\ \hline 1.24800\\ \hline 1.24800\\ \hline 1.24200\\ \hline 1.24200\\ 1.24375\\ \hline 1.25125\\ \end{array}$	-	$\begin{array}{c} 1.77375\\ 1.77375\\ 1.77375\\ 1.74750\\ \hline 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.73500\\ \hline 1.76438\\ 1.76563\\ 1.78000\\ 1.78938\\ 1.76188\\ \hline 1.75125\\ 1.74750\\ 1.77250\\ \hline 1.77250\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714	1.76500 1.76400 1.76500 1.70400 1.70200 1.72250 1.74750 1.76600 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.72750 1.72750
6th wk 7th wk 8th wk	02/5/2009 02/6/2009 02/10/2009 02/11/2009 02/11/2009 02/13/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/25/2009 02/25/2009 02/25/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.24875 1.24875 1.25000 1.25625	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.29286 1.30000	$\begin{array}{r} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24200\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25125\\ 1.25800\\ \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.73200 1.75000 1.77400
6th wk 7th wk 8th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/12/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/19/2009 02/20/2009 02/23/2009 02/23/2009 02/25/2009 02/25/2009 02/25/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.25000 1.25625 1.26125 1.26125	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.29256	$\begin{array}{r} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24500\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25800\\ 1.26275\end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.89212	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81420	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.72750 1.75000 1.77400
6th wk 7th wk 8th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/16/2009 02/19/2009 02/19/2009 02/20/2009 02/23/2009 02/23/2009 02/25/2009 02/25/2009 02/27/2009	$\begin{array}{r} 1.23563\\ 1.24125\\ 1.24125\\ 1.22813\\ 1.22188\\ 1.23125\\ 1.23438\\ 1.23750\\ 1.24563\\ 1.24563\\ 1.24563\\ 1.25125\\ 1.25063\\ 1.24875\\ 1.25000\\ 1.25625\\ 1.26000\\ 1.25625\\ 1.26125\\ 1.26438\\ \end{array}$	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.29286 1.30000 1.30536	$\begin{array}{r} 1.2400\\ 1.2400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24800\\ 1.24200\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25800\\ 1.26375\\ \end{array}$	-	$\begin{array}{c} 1.77375\\ 1.77375\\ 1.77375\\ 1.74750\\ 1.70438\\ 1.68625\\ 1.72500\\ 1.72375\\ 1.73500\\ 1.76438\\ 1.76563\\ 1.78000\\ 1.78938\\ 1.76188\\ 1.76188\\ 1.75125\\ 1.74750\\ 1.77250\\ 1.79750\\ 1.80313\\ \end{array}$	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429	1.76500 1.76400 1.76500 1.70400 1.70200 1.72250 1.74750 1.76600 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.72750 1.72500 1.72750
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/11/2009 02/11/2009 02/13/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/23/2009 02/23/2009 02/25/2009 02/25/2009 02/25/2009 02/26/2009 03/2/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.24875 1.24875 1.24875 1.25625 1.26125 1.26438 1.26625	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.30536	$\begin{array}{r} 1.2400 \\ 1.24625 \\ 1.22000 \\ 1.21800 \\ 1.23000 \\ 1.23000 \\ 1.23000 \\ 1.24000 \\ 1.24375 \\ 1.24200 \\ 1.24500 \\ 1.24500 \\ 1.24800 \\ 1.25400 \\ 1.24375 \\ 1.25125 \\ 1.25125 \\ 1.25800 \\ 1.26375 \\ 1.25300 \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.80313 1.80375	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.72750 1.75000 1.77400 1.77400 1.77400 1.79500 1.79000
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/12/2009 02/12/2009 02/13/2009 02/13/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/25/2009 02/25/2009 02/25/2009 02/26/2009 03/2/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.25000 1.25625 1.26125 1.26438 1.26438	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.30536 1.30143	$\begin{array}{r} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24200\\ 1.24200\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25800\\ 1.26375\\ 1.25300\\ 1.25333\end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.77250 1.79750 1.80313 1.80375 1.81000	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81429 1.81964	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.72750 1.75000 1.77400 1.779000 1.799000 1.78000
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/25/2009 02/25/2009 02/25/2009 02/27/2009 03/2/2009 03/2/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.25000 1.25625 1.26125 1.26438 1.26625 1.27125 1.27125 1.27625	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.30536 1.30143 1.20002	$\begin{array}{r} 1.2400\\ 1.2400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24500\\ 1.24500\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25800\\ 1.26375\\ 1.25300\\ 1.25830\\ 1.2580\\ 1.2580\\ 1.25800\\ 1.2580\\ 1.25800\\ 1.25800\\ 1.25800\\ 1$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.80313 1.80375 1.81000 1.91020	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82957	1.76500 1.76400 1.76500 1.70200 1.70200 1.74000 1.72250 1.74750 1.76600 1.75400 1.75400 1.75400 1.74400 1.73200 1.72750 1.75000 1.72750 1.75000 1.77400 1.79500 1.79000 1.78000 1.78000 1.78000 1.79000 1.78000 1.78000 1.78000 1.79000 1.78000 1.78000 1.79000 1.79000 1.78000 1.79000 1.79000 1.79000 1.79000 1.78000 1.79000 1.79000 1.78000 1.790000 1.7900000 1.790000 1.790000 1.790000 1.790000 1.790000 1.7900000 1.79000000 1.7900000 1.790000000000 1.79000000000000000000000000000000000000
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/11/2009 02/11/2009 02/12/2009 02/13/2009 02/13/2009 02/16/2009 02/18/2009 02/18/2009 02/23/2009 02/23/2009 02/25/2009 02/25/2009 02/25/2009 02/26/2009 03/2/2009 03/2/2009 03/3/2009	$\begin{array}{r} 1.23563\\ 1.24125\\ 1.24125\\ 1.22813\\ 1.22188\\ 1.23125\\ 1.23438\\ 1.23750\\ 1.24563\\ 1.24563\\ 1.25125\\ 1.25063\\ 1.24875\\ 1.24875\\ 1.24875\\ 1.24875\\ 1.26000\\ 1.25625\\ 1.26125\\ 1.26125\\ 1.26438\\ 1.26625\\ 1.27125\\ 1.27163\\ \end{array}$	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.30000 1.30536 1.30143 1.30893	$\begin{array}{r} 1.2400\\ 1.2400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24800\\ 1.24800\\ 1.25400\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25125\\ 1.25800\\ 1.26375\\ 1.25300\\ 1.25833\\ 1.26500\\ \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.77250 1.79750 1.80313 1.80375 1.81000 1.81688	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82857	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76600 1.75400 1.75400 1.75400 1.76875 1.76600 1.74400 1.73200 1.72750 1.75500 1.775000 1.77400 1.79500 1.79000 1.78000 1.78400
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/23/2009 02/25/2009 02/27/2009 03/2/2009 03/3/2009 03/4/2009 03/5/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.24875 1.25000 1.25625 1.26125 1.26438 1.26438 1.26625 1.27125 1.27663 1.28375	1.28500 1.28643 1.28643 1.28643 1.28071 1.26714 1.28500 1.28000 1.29036 1.29214 1.29962 1.30179 1.29286 1.30286 1.30536 1.30143 1.30893 1.31500	$\begin{array}{c} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24800\\ 1.25400\\ 1.24375\\ 1.25125\\ 1.25125\\ 1.25800\\ 1.25800\\ 1.25300\\ 1.25300\\ 1.25833\\ 1.26500\\ 1.2500\\ 1.2500\\ 1$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.79750 1.80313 1.80375 1.81000 1.81688 1.83250	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82857 1.83643	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.75400 1.76875 1.76600 1.74400 1.72750 1.75000 1.72750 1.75000 1.77400 1.79500 1.78000 1.78000 1.78000
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/13/2009 02/18/2009 02/18/2009 02/19/2009 02/20/2009 02/22/2009 02/24/2009 02/25/2009 02/25/2009 03/2/2009 03/3/2009 03/3/2009 03/5/2009 03/5/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.25000 1.25625 1.26125 1.26438 1.26625 1.27125 1.27663 1.28375 1.29250	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.30536 1.30143 1.30893 1.31500 1.32179	$\begin{array}{r} 1.2400\\ 1.2400\\ 1.24625\\ \hline 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ \hline 1.23000\\ \hline 1.24000\\ \hline 1.24375\\ 1.24200\\ \hline 1.24500\\ \hline 1.24500\\ \hline 1.24500\\ \hline 1.24200\\ \hline 1.24375\\ \hline 1.25125\\ \hline 1.25800\\ \hline 1.26375\\ \hline 1.25300\\ \hline 1.25333\\ \hline 1.26500\\ \hline 1.25000\\ \hline 1.28375\\ \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.80313 1.80375 1.81000 1.81688 1.83250 1.85375	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82857 1.83643 1.84464	1.76500 1.76400 1.76400 1.70200 1.70200 1.72250 1.74750 1.76000 1.75400 1.75400 1.75400 1.75400 1.72750 1.76600 1.72750 1.72750 1.72750 1.72750 1.72750 1.72750 1.729000 1.729000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.8125
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/11/2009 02/11/2009 02/13/2009 02/13/2009 02/13/2009 02/18/2009 02/18/2009 02/20/2009 02/23/2009 02/23/2009 02/25/2009 02/25/2009 02/26/2009 03/3/2009 03/3/2009 03/3/2009 03/4/2009 03/5/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.24875 1.24875 1.26025 1.26125 1.26438 1.26625 1.27125 1.27663 1.28375 1.29250	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.30536 1.30143 1.30893 1.31500 1.32179	$\begin{array}{r} 1.2400\\ 1.2400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24800\\ 1.24800\\ 1.25400\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25800\\ 1.26375\\ 1.25300\\ 1.25333\\ 1.26500\\ 1.25833\\ 1.26500\\ 1.28375\\ 1.25000\\ 1.28375\\ 1.26100\\ 1.28375\\ 1.28100\\ 1.28375\\ 1.28100\\ 1.28375\\ 1.28100$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.80313 1.80375 1.81000 1.81688 1.83250 1.8525	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82857 1.83643 1.84464	1.76500 1.76400 1.76500 1.70200 1.70200 1.74000 1.72250 1.74750 1.76600 1.75400 1.75400 1.75600 1.74400 1.73200 1.72750 1.75500 1.77400 1.75500 1.77400 1.79500 1.79000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.74000 1.74000 1.725500 1.7255500 1.725500 1.725500 1.725500 1.725500 1.725500 1.75
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/16/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/23/2009 02/25/2009 02/27/2009 03/2/2009 03/3/2009 03/5/2009 03/6/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.24875 1.25000 1.25625 1.26125 1.26438 1.26438 1.26625 1.27125 1.27663 1.28375 1.29250 1.31250	1.28500 1.28643 1.28643 1.28643 1.28071 1.26714 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.30000 1.30536 1.30143 1.30893 1.31500 1.32179	$\begin{array}{r} 1.2400\\ 1.23400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24800\\ 1.25400\\ 1.24375\\ 1.25125\\ 1.25125\\ 1.25800\\ 1.26375\\ 1.25300\\ 1.25833\\ 1.26500\\ 1.25000\\ 1.28375\\ 1.29100\\ \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.79750 1.80313 1.80375 1.81000 1.81688 1.83250 1.85375 1.91625	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82857 1.83643 1.84464	1.76500 1.76400 1.76500 1.70200 1.74000 1.72250 1.74750 1.76000 1.75400 1.75400 1.75400 1.75400 1.76875 1.76600 1.74400 1.72750 1.75000 1.72750 1.75000 1.77400 1.79500 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.82125 1.84600
6th wk 7th wk 8th wk 9th wk	02/5/2009 02/6/2009 02/10/2009 02/10/2009 02/11/2009 02/12/2009 02/13/2009 02/13/2009 02/18/2009 02/19/2009 02/20/2009 02/23/2009 02/23/2009 02/25/2009 02/25/2009 03/2/2009 03/2/2009 03/2/2009 03/5/2009 03/6/2009 03/10/2009	1.23563 1.24125 1.24125 1.22813 1.22188 1.23125 1.23438 1.23750 1.24563 1.24563 1.24563 1.25125 1.25063 1.24875 1.25000 1.25625 1.26125 1.26438 1.26625 1.27125 1.27663 1.28375 1.29250 1.31250 1.31250 1.33125	1.28500 1.28643 1.28643 1.28071 1.26714 1.28500 1.29036 1.29036 1.29214 1.29962 1.30179 1.29286 1.29286 1.30000 1.30536 1.30143 1.30893 1.31500 1.32179 1.34179	$\begin{array}{r} 1.2400\\ 1.2400\\ 1.24625\\ 1.22000\\ 1.21800\\ 1.23000\\ 1.23000\\ 1.23000\\ 1.24000\\ 1.24375\\ 1.24200\\ 1.24500\\ 1.24500\\ 1.24500\\ 1.24500\\ 1.24200\\ 1.24375\\ 1.25125\\ 1.25800\\ 1.26375\\ 1.25300\\ 1.25833\\ 1.26500\\ 1.25000\\ 1.28375\\ 1.29100\\ 1.30800\\ \end{array}$	-	1.77375 1.77375 1.74750 1.70438 1.68625 1.72500 1.72375 1.73500 1.76438 1.76563 1.78000 1.78938 1.76188 1.75125 1.74750 1.77250 1.79750 1.80313 1.80375 1.81000 1.81688 1.83250 1.85375 1.91625 1.96188	1.78071 1.78714 1.77786 1.73929 1.73286 1.75571 1.75500 1.78464 1.78857 1.80308 1.81357 1.78393 1.78714 1.80107 1.81429 1.81964 1.82857 1.83643 1.84464 1.92714	1.76500 1.76400 1.76500 1.70200 1.70200 1.70200 1.72250 1.74750 1.76000 1.75400 1.75400 1.75400 1.75400 1.74400 1.73200 1.72750 1.75000 1.72750 1.75000 1.77400 1.79500 1.78000 1.78000 1.78000 1.78000 1.78000 1.78000 1.78400 1.78000 1.78400 1.78000 1.78400 1.78000 1.78400 1.82125 1.84600 1.908000 1.908000 1.9080000 1.9080000 1.9080000 1.90800000000000000000000000000

	03/11/2009	1.32594	1.35393	1.32400	1.929	38 1.95536	1.91000
	03/12/2009	1.32000	1.35500	1.32000	1.903	75 1.94500	1.89333
	03/13/2009	1.31563	1.36571	1.31300	1.901	88 1.94036	1.88800
11th wk	03/16/2009	1.30875		1.31625	1.887	50	1.90250
	03/17/2009	1.29938	1.35000	1.31500	1.883	75 1.92714	1.89500
	03/18/2009	1.28750	1 32929	1.30700	1.863	75 1.90893	1.86800
	03/19/2009	1 22688	1 29429	1 23200	1 741	25 1 85964	1 76800
	03/20/2009	1 22281	1 26143	1.25200	1.741	25 1.05704	1 74000
12th ml	03/20/2009	1 22210	1.20145	1.21300	1.751	25 1.77700	1.74000
12th wk	03/23/2009	1.22219	1 25029	1.22300	1.730	23 75 1 77021	1.75200
	03/24/2009	1.22023	1.23038	1.22575	1.//3	1.77251	1.70300
	03/25/2009	1.22/50	1.24929	1.21/50	1.//5	1.78607	1.76750
	03/26/2009	1.23188	1.25000	1.22400	1.794	58 1.78007	1.77000
	03/27/2009	1.22000	1.25179	1.22700	1.762	50 1.79321	1.//800
13th wk	03/30/2009	1.20750		1.21400	1.745	00	1.74400
	03/31/2009	1.19188	1.23571	1.20200	1.735	63 1.76536	1.74400
	04/1/2009	1.17688	1.22821	1.18600	1.716	25 1.75536	1.72400
	04/2/2009	1.16594	1.21571	1.17400	1.715	63 1.74286	1.71800
	04/3/2009	1.16094	1.20857	1.16400	1.712	50 1.74643	1.71800
14th wk	04/6/2009	1.15688		1.15750	1.715	63	1.70625
	04/7/2009	1.14938	1.20000	1.15875	1.703	13 1.74286	1.70625
	04/8/2009	1.13875	1.19429	1.14400	1.687	19 1.73679	1.70500
	04/9/2009	1.13125	1.18929	1.13600	1.676	25 1.72929	1.69100
15th wk	04/13/2009			1.13400			1.68400
	04/14/2009	1.12188	1.17893	1.13200	1.660	00 1.72143	1.67800
	04/15/2009	1 11250	1 16179	1 12500	1.600	88 1 70214	1.67050
	04/16/2009	1 10688	1 15464	1 12500	1.640	63 1 69071	1.63750
	04/17/2009	1 10188	1 14714	1 10700	1.636	25 1.68107	1.63400
16th ml	04/20/2000	1.10160	1.14/14	1.10700	1.650	00	1.63400
TOUT WK	04/20/2009	1.10003	1 1 2 9 2 1	1.11123	1.050	62 1 67142	1.03730
	04/21/2009	1.10000	1.13621	1.10025	1.030	05 1.0/145 50 1.67170	1.03230
	04/22/2009	1.09958	1.12929	1.10123	1.037	30 1.0/1/9 20 1.07071	1.07000
	04/23/2009	1.09188	1.12214	1.08800	1.039	38 1.0/0/1 25 1.65957	1.05000
	04/24/2009	1.07250	1.11607	1.08375	1.621	25 1.65857	1.63/50
17th wk	04/27/2009	1.05375		1.07300	1.590	00	1.61400
	04/28/2009	1.03938	1.07464	1.04800	1.575	00 1.61571	1.57400
	04/29/2009	1.02750	1.06286	1.03625	1.578	75 1.60250	1.57750
	04/30/2009	1.01625	1.04929	1.02625	1.565	00 1.59571	1.56500
	05/1/2009	1.00688			1.549	38	
18th wk	05/4/2009			1.01667			1.55667
					1 5 40		
	05/5/2009	0.98625	1.03929	1.00750	1.540	00 1.57071	1.54750
	05/5/2009 05/6/2009	0.98625 0.97375	1.03929 1.02357	1.00750 0.99433	1.540	00 1.57071 25 1.56071	1.54750 1.53833
	05/5/2009 05/6/2009 05/7/2009	0.98625 0.97375 0.95625	1.03929 1.02357 1.00393	1.00750 0.99433 0.97200	1.540 1.506 1.493	00 1.57071 25 1.56071 75 1.53071	1.54750 1.53833 1.49700
	05/5/2009 05/6/2009 05/7/2009 05/8/2009	0.98625 0.97375 0.95625 0.93750	1.03929 1.02357 1.00393 0.99143	1.00750 0.99433 0.97200 0.95600	1.540 1.506 1.493 1.462	00 1.57071 25 1.56071 75 1.53071 50 1.50321	1.54750 1.53833 1.49700 1.47800
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/11/2009	0.98625 0.97375 0.95625 0.93750 0.92000	1.03929 1.02357 1.00393 0.99143	1.00750 0.99433 0.97200 0.95600 0.92500		00 1.57071 25 1.56071 75 1.53071 50 1.50321 75	1.54750 1.53833 1.49700 1.47800 1.45200
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/11/2009 05/12/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563	1.03929 1.02357 1.00393 0.99143	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700	1.540 1.506 1.493 1.462 1.438 1.430	00 1.57071 25 1.56071 75 1.53071 50 1.50321 75 00 1.44786	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/11/2009 05/12/2009 05/13/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600	$ \begin{array}{r} 1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ \hline 1.438 \\ 1.430 \\ 1.412 \\ \end{array} $	00 1.57071 25 1.56071 75 1.53071 50 1.50321 75 00 1.44786 50 1.43357	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42400
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ \hline 1.438\\ 1.430\\ 1.412\\ 1.378\\ \end{array} $	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42800 1.42400 1.39800
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009 05/15/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.85438	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ \hline 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ \end{array} $	00 1.57071 25 1.56071 75 1.53071 50 1.50321 75 1.44786 50 1.43357 75 1.41500 25 1.39571	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42400 1.39800 1.38000
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/15/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.885438 0.82563 0.78500	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ 1.312 \end{array} $	00 1.57071 25 1.56071 75 1.53071 50 1.50321 75 00 1.44786 1.43357 75 1.41500 25 1.39571 50 1.39571	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42800 1.39800 1.38000 1.38000
19th wk 20th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009 05/15/2009 05/18/2009 05/18/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800 0.77600	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ \hline 1.312\\ 1.280 \end{array} $	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42800 1.34000 1.38000 1.34600 1.34000
19th wk 20th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/15/2009 05/18/2009 05/19/2009 05/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800 0.77600 0.75400	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ \hline 1.312\\ 1.280\\ 1.241 \end{array} $	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42800 1.42400 1.39800 1.38000 1.34600 1.30400 1.27400
19th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009 05/15/2009 05/18/2009 05/19/2009 05/20/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800 0.77600 0.75400 0.70500	$1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ 1.438 \\ 1.430 \\ 1.412 \\ 1.378 \\ 1.356 \\ 1.312 \\ 1.280 \\ 1.241 \\ 1.170 \\ 1.70 \\ 1$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42400 1.39800 1.38000 1.34600 1.34600 1.27400 1.27400
19th wk 20th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009 05/15/2009 05/18/2009 05/19/2009 05/20/2009 05/21/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66020	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800 0.77600 0.75400 0.70500 0.67500	1.540 1.506 1.493 1.462 1.438 1.430 1.412 1.378 1.356 1.312 1.280 1.241 1.170 1.201	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42400 1.39800 1.38000 1.34600 1.30400 1.27400 1.23250 1.22000
19th wk 20th wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/15/2009 05/15/2009 05/19/2009 05/20/2009 05/21/2009 05/22/2009	$\begin{array}{c} 0.98625\\ 0.97375\\ 0.95625\\ 0.93750\\ \hline 0.92000\\ 0.90563\\ 0.88313\\ 0.85438\\ 0.82563\\ \hline 0.78500\\ 0.75250\\ 0.71625\\ 0.66125\\ 0.66000\\ \hline \end{array}$	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800 0.77600 0.75400 0.75500 0.67500	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ 1.312\\ 1.280\\ 1.241\\ 1.170\\ 1.201\\ \end{array} $	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42400 1.39800 1.38000 1.34600 1.30400 1.27400 1.222000 1.222000
19th wk 20th wk 21st wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009 05/15/2009 05/18/2009 05/20/2009 05/22/2009 05/22/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66000	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.87964 0.82250 0.78321 0.74500 0.68964	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85000 0.85000 0.81800 0.77600 0.75400 0.75400 0.67500 0.66667	1.540 1.506 1.493 1.462 1.438 1.430 1.412 1.378 1.356 1.312 1.280 1.241 1.170 1.201	00 1.57071 25 1.56071 75 1.53071 50 1.50321 75 00 1.44786 50 50 1.43357 75 1.41500 25 1.39571 50 1.32750 25 1.28714 00 1.24679 25 1.20286	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.39800 1.38000 1.34600 1.30400 1.27400 1.23250 1.22000 1.20333 1.20333
19th wk 20th wk 21st wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/19/2009 05/19/2009 05/20/2009 05/22/2009 05/22/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.88438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66000 0.66375 0.66375	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85000 0.81800 0.77600 0.75400 0.75400 0.70500 0.66667 0.66667 0.67600	$ \begin{array}{r} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ 1.312\\ 1.280\\ 1.241\\ 1.170\\ 1.201\\ \end{array} $	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.42800 1.42800 1.39800 1.38000 1.34600 1.34600 1.27400 1.23250 1.22000 1.20333 1.21400 1.24500
19th wk 20th wk 21st wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/18/2009 05/20/2009 05/22/2009 05/22/2009 05/25/2009 05/26/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66000 0.66375 0.67375 0.67375	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67538	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.81800 0.77600 0.75400 0.75400 0.70500 0.66667 0.67600 0.69000	$1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ 1.438 \\ 1.430 \\ 1.412 \\ 1.378 \\ 1.356 \\ 1.312 \\ 1.280 \\ 1.241 \\ 1.170 \\ 1.201 \\ 1.217 \\ 1.270 \\ 1.27$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.42800 1.42800 1.39800 1.39800 1.34600 1.34600 1.2400 1.2250 1.22000 1.20333 1.21400 1.24500 1.24500
19th wk 20th wk 21st wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/18/2009 05/18/2009 05/20/2009 05/22/2009 05/22/2009 05/25/2009 05/25/2009 05/26/2009 05/28/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66000 0.66375 0.66375 0.67375 0.66750	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67538	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.75400 0.75400 0.75400 0.75500 0.66667 0.66667 0.67600 0.69000 0.69207	$1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ 1.438 \\ 1.430 \\ 1.412 \\ 1.378 \\ 1.356 \\ 1.312 \\ 1.280 \\ 1.241 \\ 1.170 \\ 1.201 \\ 1.217 \\ 1.270 \\ 1.26$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.54750 1.53833 1.49700 1.47800 1.42800 1.42800 1.42800 1.38000 1.38000 1.34600 1.27400 1.23250 1.22000 1.20333 1.21400 1.24500 1.27800 1.2
19th wk 20th wk 21st wk	05/5/2009 05/6/2009 05/7/2009 05/1/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/15/2009 05/18/2009 05/20/2009 05/21/2009 05/22/2009 05/22/2009 05/25/2009 05/26/2009 05/27/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66000 0.66375 0.66375 0.66750 0.66750 0.66750	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85000 0.77600 0.75400 0.75400 0.75400 0.66667 0.67600 0.69000 0.69200	$1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ 1.438 \\ 1.430 \\ 1.412 \\ 1.378 \\ 1.356 \\ 1.312 \\ 1.280 \\ 1.241 \\ 1.170 \\ 1.201 \\ 1.217 \\ 1.270 \\ 1.260 \\ 1.240 \\ 1.240 \\ 1.240 \\ 1.240 \\ 1.240 \\ 1.240 \\ 1.50$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42800 1.39800 1.38000 1.30400 1.27400 1.2250 1.22000 1.22000 1.22333 1.21400 1.24500 1.27800 1.27800 1.27333 1.21400
19th wk 20th wk 21st wk 22nd wk	05/5/2009 05/6/2009 05/7/2009 05/1/2009 05/12/2009 05/13/2009 05/13/2009 05/13/2009 05/14/2009 05/18/2009 05/20/2009 05/22/2009 05/22/2009 05/25/2009 05/25/2009 05/27/2009 05/28/2009 05/29/2009 06/1/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66125 0.66000 0.66375 0.67375 0.66750 0.65625 0.65000	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85000 0.81800 0.77600 0.75400 0.70500 0.67500 0.66667 0.67600 0.69000 0.69200 0.67667 0.66600	1.540 1.506 1.493 1.462 1.438 1.430 1.412 1.378 1.356 1.312 1.280 1.241 1.170 1.201 1.217 1.270 1.260 1.240 1.233	00 1.57071 25 1.56071 75 1.53071 50 1.50321 75 00 75 1.44786 50 1.43357 75 1.41500 25 1.39571 50 00 025 1.28714 00 1.24679 25 1.20286 50 1.20231 00 1.21714 00 1.24769 <td>1.54750 1.53833 1.49700 1.47800 1.45200 1.42400 1.39800 1.38000 1.34600 1.27400 1.22000 1.22033 1.21400 1.27800 1.27333 1.24000</td>	1.54750 1.53833 1.49700 1.47800 1.45200 1.42400 1.39800 1.38000 1.34600 1.27400 1.22000 1.22033 1.21400 1.27800 1.27333 1.24000
19th wk 20th wk 21st wk 22nd wk	05/5/2009 05/6/2009 05/7/2009 05/1/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/18/2009 05/18/2009 05/20/2009 05/22/2009 05/22/2009 05/26/2009 05/28/2009 05/29/2009 06/1/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66125 0.66000 0.66375 0.67375 0.66750 0.65625 0.65000 0.64625	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538 0.67462	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.77600 0.75400 0.75400 0.67500 0.67600 0.67600 0.69200 0.69200 0.67667 0.66600 0.66200	$1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ 1.438 \\ 1.430 \\ 1.412 \\ 1.378 \\ 1.356 \\ 1.312 \\ 1.280 \\ 1.241 \\ 1.170 \\ 1.201 \\ 1.217 \\ 1.270 \\ 1.260 \\ 1.240 \\ 1.233 \\ 1.233 \\ 1.233 \\ 1.233 \\ 1.506 \\ 1.50$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.45200 1.42800 1.42400 1.39800 1.38000 1.34600 1.27400 1.22000 1.20333 1.21400 1.27800 1.27333 1.24000 1.27333
19th wk 20th wk 21st wk 22nd wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/12/2009 05/13/2009 05/18/2009 05/19/2009 05/20/2009 05/22/2009 05/22/2009 05/22/2009 05/22/2009 05/22/2009 05/22/2009 05/22/2009 05/22/2009 06/1/2009 06/2/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66125 0.66000 0.66375 0.667375 0.66750 0.65625 0.65000 0.64625 0.63688	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538 0.67462 0.66857	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.87700 0.87700 0.87700 0.75400 0.75400 0.75400 0.67500 0.66667 0.67600 0.69000 0.69200 0.67667 0.66600 0.66200 0.66200	$1.540 \\ 1.506 \\ 1.493 \\ 1.462 \\ 1.438 \\ 1.430 \\ 1.412 \\ 1.378 \\ 1.356 \\ 1.312 \\ 1.280 \\ 1.241 \\ 1.170 \\ 1.201 \\ 1.217 \\ 1.270 \\ 1.260 \\ 1.240 \\ 1.233 \\ 1.233 \\ 1.207 \\ 1.207 \\ 1.207 \\ 1.207 \\ 1.207 \\ 1.201 \\ 1.217 \\ 1.21$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.42800 1.42800 1.42800 1.39800 1.38000 1.34600 1.34600 1.27400 1.23250 1.22000 1.20333 1.21400 1.27733 1.24000 1.23800 1.24500 1.27833
19th wk 20th wk 21st wk 22nd wk	05/5/2009 05/6/2009 05/7/2009 05/8/2009 05/12/2009 05/12/2009 05/13/2009 05/14/2009 05/15/2009 05/19/2009 05/20/2009 05/22/2009 05/22/2009 05/26/2009 05/26/2009 05/28/2009 05/29/2009 06/1/2009 06/2/2009 06/3/2009	$\begin{array}{c} 0.98625\\ 0.97375\\ 0.95625\\ 0.93750\\ \hline 0.92000\\ 0.90563\\ 0.88313\\ 0.85438\\ 0.82563\\ \hline 0.78500\\ 0.75250\\ 0.71625\\ 0.66125\\ 0.66125\\ 0.66000\\ \hline 0.66375\\ 0.66755\\ 0.66755\\ 0.66755\\ 0.65625\\ \hline 0.65000\\ 0.64625\\ 0.63688\\ 0.62938\\ \hline \end{array}$	1.03929 1.02357 1.00393 0.99143 0.95143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538 0.67462 0.66857 0.66571	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85700 0.85000 0.75400 0.75400 0.75400 0.67500 0.66667 0.67600 0.69200 0.67667 0.66600 0.66200 0.66200	1.540 1.506 1.493 1.462 1.438 1.430 1.412 1.378 1.356 1.312 1.280 1.241 1.170 1.201 1.217 1.270 1.260 1.240 1.233 1.233 1.207 1.180	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.47800 1.42800 1.42800 1.39800 1.38000 1.34600 1.27400 1.23250 1.22000 1.20333 1.21400 1.27800 1.27800 1.27333 1.24000 1.22750 1.20000
19th wk 20th wk 21st wk 22nd wk	05/5/2009 05/6/2009 05/7/2009 05/1/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/14/2009 05/20/2009 05/22/2009 05/22/2009 05/25/2009 05/22/2009 05/29/2009 05/29/2009 06/1/2009 06/2/2009 06/2/2009 06/2/2009	$\begin{array}{c} 0.98625\\ 0.97375\\ 0.95625\\ 0.93750\\ 0.92000\\ 0.90563\\ 0.88313\\ 0.85438\\ 0.82563\\ 0.78500\\ 0.75250\\ 0.71625\\ 0.66125\\ 0.66125\\ 0.66000\\ \hline\end{array}$	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67538 0.67521 0.68538 0.67462 0.66857 0.66571 0.66571	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85000 0.85000 0.75400 0.75400 0.75400 0.75500 0.66667 0.67600 0.69200 0.67667 0.66600 0.66200 0.66200 0.65000 0.65000	1.540 1.506 1.493 1.462 1.438 1.430 1.412 1.378 1.356 1.312 1.280 1.241 1.170 1.201 1.217 1.270 1.260 1.240 1.233 1.233 1.233 1.207 1.180 1.203	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.42800 1.42800 1.42400 1.39800 1.38000 1.34600 1.27400 1.2250 1.22000 1.20333 1.21400 1.24500 1.27800 1.27333 1.24000 1.27333 1.24000 1.2750 1.20000 1.22750 1.20000 1.19250
19th wk 20th wk 21st wk 22nd wk 23rd wk	05/5/2009 05/6/2009 05/7/2009 05/1/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/18/2009 05/20/2009 05/22/2009 05/22/2009 05/25/2009 05/25/2009 05/28/2009 06/1/2009 06/2/2009 06/2/2009 06/2/2009 06/2/2009 06/2/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66000 0.66375 0.66730 0.65625 0.65000 0.64625 0.63688 0.62938 0.63250 0.65000	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67538 0.67921 0.68538 0.67462 0.66857 0.66571 0.66214	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.75400 0.75400 0.75400 0.75500 0.66667 0.67600 0.69200 0.66600 0.66200 0.66200 0.65000 0.65000 0.65000	1.540 1.506 1.493 1.462 1.438 1.430 1.412 1.378 1.356 1.312 1.280 1.241 1.170 1.201 1.217 1.270 1.260 1.240 1.233 1.233 1.207 1.180 1.203 1.282	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.42800 1.42800 1.39800 1.39800 1.34600 1.34600 1.27400 1.2250 1.22000 1.20333 1.21400 1.27800 1.27800 1.27800 1.22750 1.22000 1.22750 1.20000 1.27800
19th wk 20th wk 21st wk 22nd wk 23rd wk	05/5/2009 05/6/2009 05/7/2009 05/12/2009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/13/2009 05/18/2009 05/20/2009 05/21/2009 05/22/2009 05/25/2009 05/25/2009 05/25/2009 05/28/2009 06/2/2009 06/2/2009 06/3/2009 06/5/2009 06/5/2009 06/8/2009	0.98625 0.97375 0.95625 0.93750 0.92000 0.90563 0.88313 0.85438 0.82563 0.78500 0.75250 0.71625 0.66125 0.66125 0.66000 0.66375 0.67375 0.66750 0.655625 0.65502 0.656000 0.64625 0.63688 0.62938 0.62938	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538 0.67462 0.66857 0.66571 0.66214 0.68643	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.90600 0.87700 0.85000 0.75400 0.75400 0.75400 0.75400 0.66667 0.66667 0.66600 0.66200 0.66200 0.665000 0.65000 0.65000 0.666000	$\begin{array}{c} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ 1.312\\ 1.280\\ 1.241\\ 1.170\\ 1.201\\ 1.217\\ 1.270\\ 1.260\\ 1.240\\ 1.233\\ 1.233\\ 1.203\\ 1.203\\ 1.203\\ 1.203\\ 1.203\\ 1.282\\ 1.266\\ 1.246\\ 1.282\\ 1.266\\ 1.240\\ 1.233\\ 1.203\\ 1.282\\ 1.266\\ 1.282\\ 1.266\\ 1.240\\ 1.233\\ 1.203\\ 1.282\\ 1.266\\ 1.282\\ 1.266\\ 1.282\\ 1.266\\ 1.282\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.298\\ 1.282\\ 1.266\\ 1.298\\ 1.$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.47800 1.42800 1.42800 1.38000 1.38000 1.34600 1.27400 1.23250 1.22000 1.20333 1.21400 1.27800 1.27800 1.27303 1.24000 1.22750 1.22000 1.22750 1.20000 1.22750 1.20000 1.227800 1.227800 1.22800
19th wk 20th wk 21st wk 22nd wk 23rd wk	05/5/2009 05/6/2009 05/7/2009 05/1/2/009 05/12/2009 05/12/2009 05/13/2009 05/13/2009 05/14/2009 05/18/2009 05/21/2009 05/22/2009 05/22/2009 05/25/2009 05/25/2009 05/26/2009 05/28/2009 06/1/2009 06/3/2009 06/3/2009 06/3/2009 06/8/2009 06/8/2009 06/9/2009	$\begin{array}{c} 0.98625\\ 0.97375\\ 0.95625\\ 0.93750\\ 0.92000\\ 0.90563\\ 0.92000\\ 0.90563\\ 0.88313\\ 0.85438\\ 0.82563\\ 0.78500\\ 0.75250\\ 0.71625\\ 0.66125\\ 0.66125\\ 0.66000\\ \hline 0.66375\\ 0.66375\\ 0.66750\\ 0.65625\\ \hline 0.65000\\ 0.64625\\ 0.63250\\ 0.63250\\ \hline 0.65000\\ 0.64750\\ 0.63875\\ \hline 0.63875\\$	1.03929 1.02357 1.00393 0.99143 0.92857 0.90964 0.87964 0.82250 0.78321 0.74500 0.68964 0.67538 0.67921 0.68538 0.67462 0.66557 0.66571 0.66214 0.68643 0.68071	1.00750 0.99433 0.97200 0.95600 0.92500 0.91700 0.87700 0.85000 0.8700 0.75400 0.75400 0.75400 0.75400 0.66667 0.67600 0.69200 0.67667 0.66600 0.66200 0.665000 0.65000 0.65000 0.66600	$\begin{array}{c} 1.540\\ 1.506\\ 1.493\\ 1.462\\ 1.438\\ 1.430\\ 1.412\\ 1.378\\ 1.356\\ 1.312\\ 1.280\\ 1.241\\ 1.170\\ 1.201\\ 1.217\\ 1.270\\ 1.260\\ 1.240\\ 1.233\\ 1.203\\ 1.233\\ 1.203\\ 1.203\\ 1.282\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.266\\ 1.228\\ 1.268\\ 1.288\\ 1.$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	1.54750 1.53833 1.49700 1.47800 1.47800 1.42800 1.42800 1.38000 1.38000 1.34600 1.27400 1.2250 1.22000 1.22333 1.21400 1.27800 1.27800 1.27800 1.22750 1.20000 1.19250 1.27800 1.27800 1.2800 1.2800 1.24800

	06/12/2009	0.62438	0.66786	0.64750	1.18375	1.22929	1.21375
24th wk	06/15/2009	0.61438		0.64300	1.16875		1,19500
2.00.000	06/16/2009	0.61313	0.65107	0.62800	1 16375	1 19000	1 17600
	06/17/2009	0.61000	0.64607	0.62660	1 15750	1 18750	1 18500
	06/18/2009	0.60875	0.64429	0.63060	1 16125	1 18214	1 17400
	06/19/2009	0.61188	0.64643	0.63700	1 18250	1 19107	1 20200
25th ml	06/22/2000	0.61000	0.04045	0.63600	1.16230	1.17107	1.20200
23th WK	06/22/2009	0.01000	0 (129)	0.03000	1.10123	1 10170	1.20200
	06/23/2009	0.60750	0.04280	0.62800	1.148/5	1.18179	1.17600
	06/24/2009	0.60438	0.04145	0.62600	1.13125	1.10429	1.15400
	06/25/2009	0.60125	0.63821	0.62600	1.113/5	1.15/50	1.15200
	06/26/2009	0.59/50	0.63/50	0.60/50	1.09500	1.13464	1.11500
26th wk	06/29/2009	0.59688		0.61500	1.11750		1.12600
	06/30/2009	0.59500	0.64000	0.61400	1.11125	1.13071	1.12200
	07/1/2009	0.58750		0.61200	1.09125		1.12000
	07/2/2009	0.57750	0.62769	0.59800	1.07875	1.12115	1.11000
	07/3/2009	0.55875	0.61500	0.58600	1.05125	1.09786	1.07700
27th wk	07/6/2009	0.54813		0.57063	1.03125		1.05500
	07/7/2009	0.53750	0.59571	0.56100	1.02250	1.06179	1.04000
	07/8/2009	0.52500	0.58786	0.55800	1.00500	1.04964	1.02200
	07/9/2009	0.51000	0.57923	0.54250	0.98563	1.03231	1.00750
	07/10/2009	0.50500	0.56357	0.52600	0.96750	1.01429	0.98800
28th wk	07/13/2009	0.50938		0.50500	0.96500		0.97200
	07/14/2009	0.51313	0.55154	0.51400	0.98375	0.99423	0.98000
	07/15/2009	0.51375	0.54893	0.51400	0.98750	0.99821	0.98700
	07/16/2009	0.51000	0.54893	0.51875	0.98500	1.00214	0.99250
	07/17/2009	0.50375	0.54786	0.51400	0.97125	0.99893	0.98100
29th wk	07/20/2009	0.50500		0.51600	0.96750		0.97800
2)tii wk	07/21/2009	0.50313	0 55179	0.52000	0.96125	0 99143	0.96750
	07/22/2009	0.50188	0.54393	0.52000	0.95063	0.98000	0.96250
	07/23/2009	0.50375	0.54321	0.52000	0.94563	0.97214	0.96000
	07/24/2009	0.50188	0.54179	0.51500	0.94903	0.97000	0.95500
20th mlr	07/24/2009	0.30188	0.34179	0.51500	0.93003	0.97000	0.95300
50th wk	07/27/2009	0.49023	0 52420	0.51000	0.94730	0.06257	0.93500
	07/28/2009	0.49125	0.53429	0.51200	0.93625	0.96557	0.94600
	07/29/2009	0.48750	0.53107	0.51400	0.93250	0.96000	0.94700
	07/30/2009	0.48313	0.53077	0.50600	0.93000	0.95962	0.94400
	07/31/2009	0.47938	0.52250	0.50250	0.92500	0.95571	0.93500
31st wk	08/3/2009	0.47188	0 51100	0.50250	0.90375	0.0000	0.92250
	08/4/2009	0.47063	0.51192	0.49400	0.90875	0.93808	0.92400
	08/5/2009	0.46813	0.50893	0.49200	0.90938	0.93571	0.91600
	08/6/2009	0.46438	0.50714	0.49200	0.90875	0.93357	0.91600
	08/7/2009	0.46125	0.50679	0.49625	0.90750	0.93286	0.91750
32nd wk	08/10/2009	0.45875			0.90813		
	08/11/2009	0.45438	0.49857	0.48400	0.89125	0.92571	0.91600
	08/12/2009	0.44969	0.49464	0.47600	0.86875	0.91464	0.90000
	08/13/2009	0.44000	0.49154	0.46300	0.85125	0.89308	0.87400
	08/14/2009	0.42938	0.48357	0.45800	0.83188	0.87464	0.86200
33rd wk	08/17/2009	0.43125		0.45400	0.83125		0.84400
	08/18/2009	0.42500	0.46321	0.45200	0.82500	0.84429	0.84000
	08/19/2009	0.41875	0.45536	0.44400	0.81375	0.83786	0.83400
	08/20/2009	0.40688	0.45000	0.43500	0.80875	0.83071	0.82100
	08/21/2009	0.39313	0.44357	0.42750	0.79625	0.82214	0.81500
34th wk	08/24/2009	0.38688		0.40500	0.79625		0.80600
	08/25/2009	0.38000	0.43692	0.39400	0.78500	0.81538	0.79000
	08/26/2009	0.37188	0.43214	0.39000	0.78250	0.80464	0.78400
	08/27/2009	0.36063	0.42885	0.37875	0.77313	0.80038	0.78250
	08/28/2009	0.34750	0.42036	0.36800	0.75500	0.79607	0.77200
35th wk	08/31/2009			0.35700			0.76100
John wK	09/1/2009	0 33/38	0 40214	0 34700	0 72875	0 77464	0 75300
	09/2/2009	0.33438	0 38679	0 34400	0 72625	0 75214	0.75000
	09/3/2009	0.33000	0.38071	0 33750	0.71039	0 7/6/3	0.73000
	09/4/2009	0.32100	0.37670	0.33230	0.71250	0 73857	0.74230
264h1	00/7/2009	0.21430	0.37077	0.21/00	0.71230	0.15051	0.75000
som wk	09/1/2009	0.308/5	0.27000	0.31600	0.70438	0 72500	0.71600
	09/0/2009	0.30188	0.3/000	0.30600	0./0000	0.72500	0.70000
	09/9/2009	0.29869	0.3010/	0.30500	0.088/5	0.72429	0./1250
	09/10/2009	0.29969	0.35/14	0.30500	0.08250	0.71500	0.09/50
	07/11/2009	0.29900	0.33383	0.50500	0.07750	0.70054	0.09730

37th wk	09/14/2009	0.29500		0.30400		0.67625		0.69000
	09/15/2009	0.29338	0.34731	0.30400		0.67500	0.70077	0.68800
	09/16/2009	0.29188	0.34885	0.30100		0.67625	0.69885	0.69000
	09/17/2009	0.29188	0.34464	0.29900		0.67938	0.69786	0.68600
	09/18/2009	0.28938	0.34393	0.29700	_	0.67563	0.69643	0.68600
38th wk	09/21/2009	0.28938		0.29700		0.67625		0.68600
	09/22/2009	0.28563	0.34143	0.29800		0.66813	0.69714	0.68400
	09/23/2009	0.28500	0.33786	0.30000		0.66063	0.69143	0.67800
	09/24/2009	0.28313	0.33750	0.29800		0.63938	0.67893	0.66800
-	09/25/2009	0.28250	0.33250	0.29800	_	0.63625	0.66357	0.66400
39th wk	09/28/2009	0.28250		0.29400		0.63875		0.65800
	09/29/2009	0.28969	0.33893	0.30400		0.63125	0.65571	0.65900
	09/30/2009	0.28688	0.34154	0.30000		0.62875	0.65346	0.65900
	10/1/2009	0.28438		0.29500		0.62000		0.64750
-	10/2/2009	0.28406	0.33464	0.29200	_	0.60313	0.63929	0.62800
40th wk	10/5/2009	0.28406		0.28800		0.60188		0.62300
	10/6/2009	0.28406	0.33321	0.28600		0.60000	0.62536	0.61700
	10/7/2009	0.28438	0.33179	0.28800		0.60000	0.62286	0.61700
	10/8/2009	0.28438	0.33393	0.30800		0.59750	0.62143	0.61900
	10/9/2009	0.28438	0.33321	0.29000	_	0.59688	0.62071	0.61600
41st wk	10/12/2009	0.28438		0.29000		0.60125		0.62750
	10/13/2009	0.28438	0.33679	0.29000		0.59563	0.62464	0.61500
	10/14/2009	0.28406	0.33962	0.28667		0.59313	0.62154	0.60500
	10/15/2009	0.28406	0.33607	0.28900		0.59000	0.61750	0.59800
	10/16/2009	0.28406	0.33393	0.29000	_	0.59125	0.61500	0.60500
42nd wk	10/19/2009	0.28338		0.29000		0.59250		0.60500
	10/20/2009	0.28313	0.33179	0.29250		0.58563	0.61250	0.60125
	10/21/2009	0.28344	0.32821	0.29050		0.58500	0.60643	0.59600
	10/22/2009	0.28219	0.33115	0.29000		0.58188	0.59769	0.59400
	10/23/2009	0.28188	0.33107	0.29000	_	0.58063	0.59786	0.59200
43rd wk	10/26/2009	0.28063		0.28333		0.58063		0.59000
	10/27/2009	0.28063	0.32577	0.28800		0.57688	0.59615	0.59000
	10/28/2009	0.28063	0.32964	0.28500		0.57000	0.59214	0.57750
	10/29/2009	0.28063	0.32464	0.28800		0.56438	0.58/14	0.57400
	10/30/2009	0.28063	0.32464	0.29000	-	0.56438	0.58536	0.58250
44th wk	11/2/2009	0.27938	0.0000	0.29000		0.56688	0.5050.6	0.57300
	11/3/2009	0.27813	0.32286	0.29000		0.56219	0.58/86	0.57100
	11/4/2009	0.27750	0.32214	0.29000		0.56344	0.58607	0.57200
	11/5/2009	0.27531	0.32462	0.28800		0.55400	0.58423	0.57200
	11/6/2009	0.27406	0.32385	0.28750	-	0.55000	0.57808	0.56250
45th wk	11/9/2009	0.27250	0.01701	0.28500		0.54063	0.5.521	0.55750
	11/10/2009	0.27250	0.31731	0.28750		0.53625	0.56/31	0.54500
	11/11/2009	0.27250	0.31536	0.28/50		0.53125	0.56357	0.55000
	11/12/2009	0.27250	0.31321	0.28600		0.52438	0.55964	0.54200
	11/13/2009	0.27250	0.31321	0.28500	_	0.52063	0.54964	0.53500
46th wk	11/16/2009	0.27125	0.01170	0.27825		0.51/81	0.54420	0.52875
	11/1//2009	0.2/031	0.31179	0.27860		0.50625	0.54429	0.52200
	11/18/2009	0.26906	0.316/9	0.27660		0.50188	0.53857	0.51600
	11/19/2009	0.26656	0.31286	0.27575		0.49250	0.53179	0.50625
	11/20/2009	0.26219	0.31231	0.27260	-	0.48938	0.51/31	0.50100
4/th wk	11/23/2009	0.26188	0.20/07	0.27325		0.48563	0.51420	0.49625
	11/24/2009	0.26063	0.30607	0.27325		0.48250	0.51429	0.49375
	11/25/2009	0.25563	0.30179	0.26825		0.47813	0.50464	0.48625
	11/20/2009	0.23438	0.29013	0.20000		0.47023	0.49709	0.48040
40/1 1	11/27/2009	0.23363	0.29209	0.26575	-	0.46436	0.49338	0 40500
48th WK	11/30/2009	0.25656	0.20206	0.26575		0.48813	0.50020	0.48500
	12/1/2009	0.25531	0.30286	0.26660		0.48188	0.50929	0.48500
	12/2/2009	0.25500	0.30214	0.20000		0.4/813	0.50/50	0.48400
	12/3/2009	0.20001	0.301/9	0.203/3		0.48300	0.30929	0.49123
4041 1	12/4/2009	0.25050	0.30280	0.20373	-	0.48373	0.311/9	0.493/3
4911 WK	12/1/2009	0.25050	0 20571	0.26460		0.48438	0 51250	0.49600
	12/8/2009	0.25594	0.305/1	0.205/5		0.40813	0.51250	0.49000
	12/9/2009	0.25519	0.30/80	0.20400		0.40188	0.30280	0.47900
	12/10/2009	0.23423	0.303/1	0.20373		0.4575	0.49393	0.47125
50th1	12/11/2009	0.23303	0.30209	0.20373	-	0.45212	0.+0530	0.47000
JUIN WK	12/14/2009	0.23375		0.2000/		0.45515		0.47000

	12/15/2009	0.25344	0.30269	0.26575	0.45250	0.47654	0.47125
	12/16/2009	0.25375	0.29964	0.26575	0.45125	0.47750	0.47125
	12/17/2009	0.25338	0 29964	0.26575	0 44388	0.47679	0.47125
	12/18/2009	0.25356	0.29579	0.26360	0.43538	0.46893	0.45900
F1 . 1	12/18/2009	0.23123	0.29079	0.20300	0.43538	0.40095	0.45500
51st wk	12/21/2009	0.24875		0.26060	0.43063		0.45600
	12/22/2009	0.24875	0.29571	0.26325	0.43125	0.45464	0.46125
	12/23/2009	0.25063	0.29769	0.26433	0.43063	0.45731	0.45333
	12/24/2009	0.25063	0.29750	0.26325	0.43125	0.45250	0.45625
52nd wk	12/28/2009			0.26000			0 44875
52nd wit	12/20/2000	0.25062	0 20802	0.25060	0 12120	0 45170	0.45200
	12/29/2009	0.23003	0.29895	0.23960	0.43438	0.43179	0.45500
	12/30/2009	0.25063	0.30250	0.26075	0.43000	0.45393	0.45625
	12/31/2009	0.25063	0.30536	0.26100	0.42969	0.44929	0.45833
		0.68571	0.72719	0.69385	1.11390	1.13400	1.12048
		lowest	highest		lowest	highest	
		1011051	mgnesi		1011051	mgnesi	
1 et wk	01/4/2010	0 25/38		0 25660	0 /3/38		0.45100
15t WK	01/4/2010	0.25450	0 20221	0.25000	0.43438	0.44064	0.45100
	01/5/2010	0.25250	0.30321	0.25860	0.42750	0.44964	0.44400
	01/6/2010	0.25000	0.30179	0.25860	0.42563	0.44357	0.43700
	01/7/2010	0.24938	0.30077	0.26100	0.41750	0.44615	0.43500
	01/8/2010	0.25125	0.29929	0.26075	0.42000	0.44143	0.43375
2nd wk	01/11/2010	0.25125		0.25860	0.40375		0.42500
2110 111	01/12/2010	0.25125	0 29821	0.25860	0.40000	0.43321	0.41800
	01/12/2010	0.25125	0.20821	0.25000	0.40000	0.42000	0.41500
	01/13/2010	0.25125	0.29621	0.20000	0.40000	0.43000	0.41500
	01/14/2010	0.25125	0.29750	0.26325	0.39875	0.42857	0.418/5
	01/15/2010	0.25125	0.29750	0.25860	0.39250	0.42857	0.41400
3rd wk	01/18/2010	0.24875		0.26075	0.39000		0.41125
	01/19/2010	0.24900	0.29643	0.25860	0.39063	0.42214	0.40800
	01/20/2010	0.24888	0.29500	0.25860	0.39000	0.41964	0 40600
	01/21/2010	0.24888	0 29571	0.26075	0.39031	0.41571	0.40625
	01/22/2010	0.24006	0.20571	0.26075	0.39051	0.41202	0.40025
	01/22/2010	0.24900	0.29371	0.20073	0.38409	0.41393	0.40373
4th wk	01/25/2010	0.24875		0.26100	0.38563		0.40833
	01/26/2010	0.24875	0.29154	0.26325	0.38250	0.40846	0.40375
	01/27/2010	0.24875	0.29846	0.26325	0.38344	0.41192	0.40125
	01/28/2010	0.24875	0.29571	0.26060	0.38563	0.41036	0.39900
	01/29/2010	0.24906	0.29571	0.26325	0.38438	0.40929	0.40125
5th wk	02/1/2010	0.24906		0.26000	0 38375		0 30625
Jul wk	02/1/2010	0.24900	0.00257	0.20000	0.36373	0 40001	0.39023
	02/2/2010	0.25031	0.29357	0.25860	0.38375	0.40821	0.39800
	02/3/2010	0.24906	0.28808	0.25860	0.38375	0.40346	0.40000
	02/4/2010	0.24875	0.28429	0.25660	0.38500	0.40179	0.39300
	02/5/2010	0.24969	0.28462	0.25660	0.38500	0.40423	0.39100
6th wk	02/8/2010	0.25000		0.25660	0.38625		0.38800
000 000	02/9/2010	0.25000	0 28385	0.25660	0.38875	0.40692	0.38900
	02/10/2010	0.25000	0.20505	0.25660	0.30075	0.40022	0.30100
	02/10/2010	0.25000	0.26336	0.25000	0.36673	0.40923	0.39100
	02/11/2010	0.25000	0.28429	0.25660	0.39000	0.41000	0.39300
	02/12/2010	0.25000	0.27643	0.25660	0.38813	0.40500	0.39100
7th wk	02/15/2010	0.25000			0.38813		
	02/16/2010	0.25000			0.38813		
	02/17/2010	0.25063	0.28286	0.25460	0.38500	0.40714	0.39100
	02/18/2010	0 25125	0 28393	0 25460	0 38438	0.40750	0 39100
	02/10/2010	0.25125	0.20373	0.25460	0.20521	0.40730	0.30500
0.1 1	02/19/2010	0.25194	0.28902	0.25000	0.39331	0.41751	0.39500
8th wk	02/22/2010	0.25219		0.25660	0.39313		0.39600
	02/23/2010	0.25194	0.28893	0.25760	0.39375	0.41607	0.39600
	02/24/2010	0.25194	0.29464	0.25660	0.39125	0.41750	0.39300
	02/25/2010	0.25194	0.29464	0.25660	0.38688	0.41536	0.38900
	02/26/2010	0.25169	0.29464	0.25660	0.38688	0.41429	0.38900
9th w	03/1/2010	0.25169		0.25500	0 38375		0 38375
Jul WK	03/2/2010	0.25109	0 20161	0.25500	0.20210	0 41221	0.20700
	03/2/2010	0.25194	0.29404	0.23000	0.30319	0.41321	0.58/00
	03/3/2010	0.25194	0.29577	0.25660	0.38319	0.41346	0.38600
	03/4/2010	0.25219	0.29321	0.25660	0.38319	0.41179	0.38600
	03/5/2010	0.25363	0.29321	0.25760	0.39000	0.41250	0.39100
10th wk	03/8/2010	0.25425		0.25700	0.39531		0.39500
	03/9/2010	0 25550	0.29679	0.25800	0.39438	0 41786	0.39500
	03/10/2010	0.25550	0.20714	0.25800	0 30/38	0 / 1750	0.30500
	03/11/2010	0.23303	0.27/14	0.25000	0.32430	0.41607	0.39300
	03/11/2010	0.25703	0.29/80	0.25800	0.59544	0.4100/	0.59500
	03/12/2010	0.25719	0.29846	0.25860	0.39781	0.42038	0.39500

11th wk	03/15/2010	0.25763		0.25860	0.40063		0.39600
	03/16/2010	0.26088	0.29643	0.25900	0.40125	0.42250	0.39600
	03/17/2010	0.26638	0.29964	0.26060	0.40188	0.42321	0.39500
	03/18/2010	0.27100	0.30500	0.26500	0.40766	0 42607	0.39460
	03/19/2010	0.27750	0.30607	0.26900	0.42325	0.43000	0.40700
12th wk	03/22/2010	0.27190	0.50007	0.27250	0.43656	0.15000	0.41400
12th wk	03/22/2010	0.20100	0.21/07	0.27250	0.43050	0 45214	0.41400
	03/23/2010	0.28555	0.31007	0.28060	0.43375	0.45214	0.41760
	03/24/2010	0.28491	0.31893	0.28080	0.43531	0.45536	0.41900
	03/25/2010	0.28/81	0.32107	0.28760	0.43688	0.45/86	0.43200
	03/26/2010	0.28875	0.32214	0.28760	0.43938	0.45929	0.42700
13th wk	03/29/2010	0.29013		0.28960	0.44250		0.42960
	03/30/2010	0.29088	0.32607	0.29050	0.44188	0.46321	0.43260
	03/31/2010	0.29150	0.32750	0.29160	0.44438	0.46321	0.43860
	04/1/2010	0.29150	0.32423	0.29320	0.44156	0.45885	0.44300
	04/5/2010			0.29290			0.44200
14th wk	04/6/2010	0.29488		0.29530	0.45438		0.44600
1	04/7/2010	0.29525	0 32654	0.29900	0.45250	0 46808	0.44880
	04/8/2010	0.29323	0.32034	0.29900	0.45250	0.40000	0.44500
	04/9/2010	0.29400	0.33250	0.29900	0.45375	0.47179	0.44800
154 1	04/12/2010	0.20701	0.33230	0.20050	0.45562	0.4/1/)	0.45100
15th WK	04/12/2010	0.30041	0.22526	0.29950	0.45563	0 47571	0.45100
	04/13/2010	0.30281	0.33536	0.29950	0.45563	0.47571	0.45060
	04/14/2010	0.30375	0.33679	0.30000	0.46250	0.47643	0.45060
	04/15/2010	0.30438	0.33607	0.30000	0.46500	0.47750	0.45460
	04/16/2010	0.30531	0.34286	0.30500	0.46438	0.48536	0.45500
16th wk	04/19/2010	0.30531		0.30700	0.46063		0.45400
	04/20/2010	0.30719	0.34214	0.30850	0.46500	0.48321	0.45500
	04/21/2010	0.31281	0.34643	0.30850	0.47250	0.48893	0.45800
	04/22/2010	0.31578	0.34750	0.31420	0.48219	0.49250	0.46860
	04/23/2010	0.32063	0.34929	0.31660	0.49281	0.50036	0.47900
17th wk	04/26/2010	0 32375		0.32250	0.50031		0.48600
17th WR	04/27/2010	0.32781	0 35857	0.32310	0.50563	0.52107	0.49250
	04/28/2010	0.32781	0.35057	0.32510	0.50505	0.52786	0.50800
	04/20/2010	0.33781	0.36214	0.33700	0.52250	0.52780	0.50800
	04/29/2010	0.34436	0.30657	0.33800	0.52/19	0.53007	0.50700
	04/30/2010	0.34030	0.37321	0.34830	0.33063	0.34000	0.31760
18th wk	05/3/2010			0.35570			0.53000
	05/4/2010	0.35313	0.37679	0.35520	0.54578	0.54893	0.52990
	05/5/2010	0.36016	0.38143	0.36160	0.55531	0.56071	0.54200
	05/6/2010	0.37359	0.39714	0.36780	0.56563	0.57500	0.55400
	05/7/2010	0.42813	0.42036	0.42400	0.63688	0.59857	0.61900
19th wk	05/10/2010	0.42125		0.43800	0.62250		0.63200
	05/11/2010	0.42281	0.45731	0.43600	0.61850	0.64115	0.62600
	05/12/2010	0.43019	0.46464	0.43500	0.62231	0.64786	0.62600
	05/13/2010	0.43588	0.47393	0.44100	0.62263	0.65464	0.62900
	05/14/2010	0.44506	0.47385	0.44900	0.63500	0.65423	0.63600
20th wk	05/17/2010	0.46000		0.46100	0.65475		0.64300
2011 WK	05/18/2010	0.46469	0 40231	0.46850	0.65500	0.68038	0.65200
	05/10/2010	0.40409	0.49231	0.40600	0.05500	0.08038	0.05200
	05/19/2010	0.47750	0.49043	0.48000	0.07338	0.06071	0.07500
	05/20/2010	0.46400	0.30904	0.48900	0.07873	0.09007	0.67600
	05/21/2010	0.49088		0.49900	0.09303		0.69200
21st wk	05/24/2010	0.50969		0.51860	0.71625		0.71500
	05/25/2010	0.53625	0.54036	0.53300	0.75913	0.73929	0.73000
	05/26/2010	0.53781	0.57923	0.55100	0.75788	0.78615	0.75600
	05/27/2010	0.53844	0.57643	0.55500	0.75850	0.78214	0.76300
	05/28/2010	0.53625	0.58464		0.75188	0.78714	
22nd wk	05/31/2010			0.55300			0.75600
	06/1/2010	0.53625	0.58250	0.54600	0.76113	0.77964	0.75600
	06/2/2010	0.53750	0.58750	0.54420	0.75363	0.78964	0.76000
	06/3/2010	0.53781	0.58821	0.54350	0.75300	0.78964	0.76050
	06/4/2010	0.53656	0.59500	0.54370	0.74919	0.79346	0.75850
23rd wl	06/7/2010	0 53710		0.54510	0.75731		0.76010
2310 WK	06/8/2010	0.53717	0 50571	0.54510	0.75362	0 70286	0.76010
	06/0/2010	0.55000	0.595/1	0.54500	0.7500	0.79200	0.70210
	00/9/2010	0.53050	0.39043	0.34380	0.75081	0.78904	0.76210
	06/10/2010			11 5/1/1101	0 /4938	0/910/	0/5/10
	06/10/2010	0.53044	0.39371	0.54400	0.74612	0.70520	0.75710
	06/10/2010 06/11/2010	0.53644	0.60308	0.54340	0.74613	0.79538	0.75510
24th wk	06/10/2010 06/11/2010 06/14/2010	0.53706	0.60308	0.54340 0.54340 0.54460	0.74613 0.75031	0.79538	0.75510

	06/16/2010	0.53894	0.60000	0.54660	0.75456	0.79321	0.75910
	06/17/2010	0.53925	0.59929	0.54790	0.75475	0.79464	0.76270
	06/18/2010	0.53819		0.54790	0.75063		0.76170
25th wk	06/21/2010	0.53838		0.54830	0.74956		0.76000
	06/22/2010	0.53825	0.60462	0.54750	0.74700	0.79308	0.75900
	06/23/2010	0.53825	0.60000	0.54750	0.74869	0.78929	0.75760
	06/24/2010	0.53719	0.60000	0.54656	0.75194	0.78929	0.76200
	06/25/2010	0.53469	0.60500	0.54556	0.75319	0.79179	0.75800
26th wk	06/28/2010	0.53344		0.54556	0.74719		0.75600
	06/29/2010	0.53300	0.60179	0.54150	0.75069	0.79071	0.75600
	06/30/2010	0.53394	0.60107	0.54270	0.75250	0.79036	0.75660
		0.34631	0.38636	0.35224	0.51427	0.53704	0.51737
		lowest	highest		lowest	highest	

Appendix 2: Result of Statistics

Tenor		1-Month		-	3-Month			6-Month		12-Month		
Rate	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR
Ν	743	743	743	743	743	743	743	743	743	743	743	743
Minimum	0.2281	0.2542	0.2360	0.2488	0.2764	0.2546	0.2425	0.4018	0.3860	0.8341	0.8369	0.8390
Maximum	5.8238	5.8257	5.8400	5.7250	5.7571	5.7550	5.5950	5.5971	5.6000	5.5066	5.4941	5.5030
Range	5.5956	5.5715	5.6040	5.4762	5.4807	5.5004	5.3525	5.1954	5.2140	4.6725	4.6572	4.6640
Mean	2.5748	2.6346	2.5904	2.7577	2.8108	2.7683	2.6095	2.9453	2.9189	3.0572	3.1017	3.0653
StdDev	2.1319	2.1285	2.1353	2.0395	2.0312	2.0387	2.0829	1.8765	1.8796	1.6306	1.6329	1.6333
Skewness	0.1798	0.1500	0.1735	0.1185	0.0881	0.1149	0.2088	0.0600	0.0835	0.1904	0.1331	0.1866
Kurtosis	-1.6348	-1.6570	-1.6381	-1.5816	-1.5984	-1.5830	-1.5070	-1.6206	-0.2583	-1.4429	-1.4680	-1.4474

Table 1	Summary Statistics for LIBOR	, HIBOR & SIBOR (Overall : 02 Jan 07 – 30 Jun 10)
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Table 2Correlation between LIBOR, HIBOR & SIBOR (**Overall**: 02 Jan 07 – 30 Jun 10)

Tenor	1-Month		3-Month		6-M	onth	12-Month		
Rate	LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR	
HIBOR	0.9980	0.9987	0.9990	0.9990	0.9788	0.9994	0.9991	0.9991	
LIBOR		0.9997		0.9999		0.9800		0.9999	

Tenor		1-Month		3-Month				6-Month			12-Month	
Rate	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR
Ν	238	238	238	238	238	238	238	238	238	238	238	238
Minimum	0.2281	0.2542	0.2360	0.2488	0.2764	0.2546	0.2425	0.4018	0.3860	0.8341	0.8369	0.8390
Maximum	5.8238	5.8257	5.8400	5.7250	5.7571	5.7550	5.5950	5.5971	5.6000	5.5066	5.4941	5.5030
Range	5.5956	5.5715	5.6040	5.4762	5.4807	5.5004	5.3525	5.1954	5.2140	4.6725	4.6572	4.6640
Mean	5.2497	5.2594	5.2641	5.2986	5.3043	5.3065	5.2524	5.2546	5.2576	5.1233	5.1342	5.1334
StdDev	0.2460	0.2383	0.2450	0.1908	0.1839	0.1884	0.2239	0.2177	0.2224	0.3368	0.3225	0.3322
Skewness	-0.6856	-0.6845	-0.6837	-0.7448	-0.5628	-0.6704	-1.2206	-1.1830	-1.1998	-1.1176	-1.1066	-1.1109
Kurtosis	1.0072	1.2086	1.0290	0.9715	1.1095	1.0924	0.1549	0.0462	0.1054	0.0884	0.1496	0.1245

Table 3Summary Statistics for LIBOR, HIBOR & SIBOR (Sub-period 1: 02 Jan – 31 Dec 07)

Table 4	Correlation between LIBOR, HIBOR & SIBOR ((Sub-period 1 : 02 Jan – 31 Dec 07)
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Tenor	1-Month		3-Month		6-M	onth	12-Month	
Rate	ate LIBOR SIBOR		LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR
HIBOR	0.9953	0.9967	0.9959	0.9974	0.9972	0.9987	0.9981	0.9994
LIBOR		0.9981		0.9981		0.9981		0.9986

Tenor		1-Month		3-Month			6-Month				12-Month		
Rate	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	
Ν	211	211	211	211	211	211	211	211	211	211	211	211	
Minimum	0.4363	0.5314	0.4475	1.4250	1.4771	1.4425	0.4363	1.8179	1.7900	2.0038	2.1000	2.0175	
Maximum	4.5875	5.2543	4.6050	4.8187	5.2964	4.7600	4.5875	4.8414	4.5938	4.2337	4.6050	4.2525	
Range	4.1513	4.7229	4.1575	3.3937	3.8193	3.3175	4.1513	3.0236	2.8038	2.2300	2.5050	2.2350	
Mean	2.7088	2.8484	2.7372	2.9371	3.0553	2.9531	2.6713	3.1348	3.0653	3.0727	3.1915	3.0845	
StdDev	0.8307	0.8999	0.8339	0.6526	0.7082	0.6488	0.8059	0.5716	0.5214	0.4638	0.5081	0.4710	
Skewness	-0.1724	0.3165	-0.1758	0.8084	1.0214	0.7347	-0.1639	0.9636	0.6189	0.2416	0.5349	0.1945	
Kurtosis	0.9862	1.0220	0.9237	1.4049	1.5749	1.2437	1.2185	1.4659	1.1649	-0.0223	0.3697	-0.0904	

Table 5Summary Statistics for LIBOR, HIBOR & SIBOR (Sub-period 2: 02 Jan – 31 Dec 08)

Table 6	Correlation between LIBOR, HIB	OR & SIBOR (Sub	-period 2: 02 Jan -	- 31 Dec 08)
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Tenor	1-Month		3-Month		6-M	onth	12-Month		
Rate	ate LIBOR SIBOR		LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR	
HIBOR	0.9676	0.9795	0.9790	0.9797	0.8715	0.9830	0.9877	0.9864	
LIBOR		0.9940		0.9975		0.8951		0.9963	

Tenor	1-Month			3-Month			6-Month			12-Month		
Rate	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR
Ν	198	198	198	198	198	198	198	198	198	198	198	198
Minimum	0.2309	0.2542	0.2376	0.2488	0.2957	0.2596	0.2425	0.4493	0.4530	0.9684	0.9861	0.9900
Maximum	0.5644	0.6179	0.5720	1.4125	1.4629	1.4150	0.5819	1.9554	1.9100	2.2975	2.2864	2.2500
Range	0.3334	0.3636	0.3344	1.1638	1.1671	1.1554	0.3394	1.5061	1.4570	1.3291	1.3004	1.2600
Mean	0.3328	0.3769	0.3390	0.6826	0.7296	0.6937	0.3839	1.1366	1.1185	1.5645	1.5861	1.5711
StdDev	0.0998	0.1073	0.1005	0.4021	0.4004	0.3977	0.1062	0.4955	0.4875	0.3737	0.3929	0.3677
Skewness	0.7980	0.7404	0.8104	0.4200	0.4252	0.3946	0.1801	0.1552	0.1363	0.0666	0.1097	0.0496
Kurtosis	-0.7242	-0.8368	-0.7457	-1.4797	-1.4808	-1.4892	-1.3711	-1.5060	-1.5181	-1.2489	-1.3337	-1.2712

Table 7	Summary Statistics for LIBOI	R, HIBOR & SIBOR (Sub-	period 3 : 02 Jan – 31 Dec 09)
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Table 8	Correlation between	LIBOR, HIBOR	& SIBOR (Sub-	period 3: 02 Jan -	- 31 Dec 09)
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Tenor	1-Month		3-Month		6-Month		12-Month						
Rate	LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR					
HIBOR	0.9968	0.9956	0.9995	0.9995	0.3028	0.9995	0.9970	0.9977					
LIBOR		0.9973		0.9997		0.2964		0.9991					
Tenor		1-Month			3-Month		6-Month				12-Month		
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Rate	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	
N	96	96	96	96	96	96	96	96	96	96	96	96	
Minimum	0.2281	0.2543	0.2360	0.2488	0.2764	0.2546	0.3825	0.4018	0.3860	0.8341	0.8369	0.8390	
Maximum	0.3541	0.4308	0.3710	0.5393	0.6050	0.5550	0.7611	0.7958	0.7630	1.2241	1.2392	1.2220	
Range	0.1259	0.1765	0.1350	0.2905	0.3286	0.3004	0.3786	0.3940	0.3770	0.3901	0.4023	0.3830	
Mean	0.2726	0.3142	0.2827	0.3439	0.3843	0.3486	0.5113	0.5344	0.5127	0.9800	0.9910	0.9777	
Std. Dev	0.0501	0.0655	0.0524	0.1141	0.1190	0.1153	0.1442	0.1478	0.1439	0.1340	0.1403	0.1317	
Skewness	0.7108	0.8686	0.7928	0.8653	0.9934	0.9092	0.8124	0.8991	0.8818	0.6202	0.7075	0.7215	
Kurtosis	-1.2992	-1.0212	-1.2053	-0.9671	-0.7177	-0.9206	-1.0261	-0.8791	-0.9428	-1.2033	-1.0823	-1.0879	

Table 9	Summary Statistics for LIBOR	, HIBOR & SIBOR (Sub-period 4 : 02 Jan – 30 Jun 10)
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Table 10	Correlation between L	IBOR, HIBOR & SIBOR	(Sub-period 4: 02 Jan	- 30 Jun 10)
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Tenor	1-M	onth	3-M	onth	6-M	onth	12-Month		
Rate	LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR	LIBOR	SIBOR	
HIBOR	0.9867	0.9928	0.9944	0.9962	0.9966	0.9981	0.9957	0.9975	
LIBOR		0.9941		0.9989		0.9970		0.9939	

able 11 Summary Statistics for LIBOR, HIBOR & SIBOR before, during, & after Financial Crisis:												
Tenor		1-Month		3-Month			6-Month			12-Month		
Rate	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR	LIBOR	HIBOR	SIBOR
02 Jan 07 – 31 Mar 08												
N	298	298	298	298	298	298	298	298	298	298	298	298
Minimum	2.5356	2.3977	2.5725	2.5419	2.5614	2.5250	2.3663	2.5562	2.3150	2.1781	2.2769	2.1125
Maximum	5.8238	5.5971	5.8400	5.7250	5.8257	5.7550	5.5950	5.7571	5.6000	5.5066	5.4941	5.5030
Range	3.2881	3.1995	3.2675	3.1831	3.2643	3.2300	3.2288	3.2010	3.2850	3.3284	3.2172	3.3905
Mean	4.8601	4.8417	4.8750	4.8952	4.8737	4.9046	4.8364	4.9045	4.8430	4.6852	4.7073	4.6971
StdDev	0.8466	0.8851	0.8466	0.8645	0.8378	0.8633	0.8907	0.8572	0.8898	0.9495	0.9250	0.9470
	01 A	pr – 30 Se	ep 08									
N	102	102	102	102	102	102	102	102	102	102	102	102
Minimum	2.3788	2.4209	2.3870	2.6381	2.7200	2.6413	2.3788	2.6562	2.6000	2.4700	2.5762	2.4675
Maximum	3.9262	5.1231	4.1875	4.0525	4.5986	3.9020	3.9262	4.3886	3.9900	3.9825	4.2871	3.9875
Range	1.5475	2.7022	1.8005	1.4144	1.8786	1.2607	1.5475	1.7324	1.3900	1.5125	1.7110	1.5200

Table 11 ~ . .

Ν	102	102	102	102	102	102	102	102	102	102	102	102
Minimum	2.3788	2.4209	2.3870	2.6381	2.7200	2.6413	2.3788	2.6562	2.6000	2.4700	2.5762	2.4675
Maximum	3.9262	5.1231	4.1875	4.0525	4.5986	3.9020	3.9262	4.3886	3.9900	3.9825	4.2871	3.9875
Range	1.5475	2.7022	1.8005	1.4144	1.8786	1.2607	1.5475	1.7324	1.3900	1.5125	1.7110	1.5200
Mean	2.6086	2.7560	2.6473	2.8281	2.9575	2.8518	2.6065	3.1180	3.0607	3.1845	3.3044	3.1967
StdDev	0.2848	0.5157	0.3335	0.2191	0.3539	0.2202	0.2846	0.3062	0.2474	0.2908	0.3262	0.2994

01 Oct - 30 Dec 09

N	247	247	247	247	247	247	247	247	247	247	247	247
Minimum	0.2309	0.2542	0.2376	0.2488	0.2957	0.2596	0.2425	0.4493	0.4530	0.9684	0.9861	0.9900
Maximum	4.5875	5.2543	4.5400	4.8187	5.2964	4.7600	4.5875	4.8414	4.3880	4.2337	4.6050	4.2280
Range	4.3566	5.0001	4.3024	4.5700	5.0007	4.5004	4.3450	4.3921	3.9350	3.2654	3.6189	3.2380
Mean	0.6984	0.7849	0.7074	1.0879	1.1673	1.0970	0.7394	1.5231	1.4743	1.8479	1.9012	1.8537
Std. Dev	0.9371	1.0445	0.9373	1.0046	1.0827	0.9954	0.9217	0.9798	0.9053	0.7208	0.7957	0.7164

Tenor		1-Month		3-Month		6-Month			12-Month			
Rate	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L
N	743	743	743	743	743	743	743	743	743	743	743	743
Mean	0.0598	0.0442	0.0156	0.0531	0.0425	0.0106	0.3359*	0.0264	0.3095	0.0444	0.0363	0.0081
Std. Dev	0.1344	0.1105	0.0503	0.0922	0.0898	0.0267	0.4564	0.0675	0.4451	0.0705	0.0685	0.0265
Skewness	7.8859	5.6434	13.0766	5.6470	5.2273	1.9330	1.0793	5.2069	1.1174	2.6617	3.1819	-0.1046
Kurtosis	82.8492	35.9170	237.721	42.7399	32.9995	61.3469	-0.2583	31.9391	-0.1803	10.3676	14.6279	6.8100
t-Stat	0.54149	0.39992	0.14102	0.50297	0.40230	0.10056	*3.26561	0.27090	*3.00672	0.52459	0.42899	0.09523
F-Stat	0.99843	1.00163	0.99681	0.99595	0.99635	0.9996	0.90091	0.99834	0.90241	1.00146	0.99976	1.00171

Table 12	Summary	V Statistics for Ave	erage Spreads	of LIBOR,	HIBOR &	SIBOR	(Overall:	02 Jan 0	7 to 30 J	Jun 10)
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Table 13Correlation between Average Spreads of LIBOR, HIBOR & SIBOR (**Overall**: 02 Jan 07 to 30 Jun 10)

Tenor	1-M	onth	3-M	onth	6-M	onth	12-Month		
Rate	H - S	S - L	H - S	S - L	H - S	S - L	H - S	S - L	
H – L	0.9341	0.6200	0.9573	0.2319	0.2382	0.9891	0.9278	0.2647	
H - S		0.2989		-0.0591		0.0927		-0.1142	

Tenor		1-Month			3-Month		6-Month			12-Month		
Rate	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L
Ν	238	238	238	238	238	238	238	238	238	238	238	238
Mean	0.0097	-0.0047	0.0144	0.0057	-0.0022	0.0079	0.0021	-0.0030	0.0052	0.0109	0.0008	0.0101
Std. Dev	0.0248	0.0207	0.0153	0.0183	0.0143	0.0120	0.0177	0.0122	0.0140	0.0250	0.0151	0.0182
Skewness	2.4386	2.7640	1.6855	2.1514	0.4277	1.4254	1.5292	1.9172	0.3221	1.3182	1.6974	1.1120
Kurtosis	7.7859	9.4604	10.4928	6.3294	10.7798	5.7301	4.5572	9.2606	3.7546	2.2889	3.0497	5.6339
t-Stat	0.43536	(0.21199)	0.63809	0.33068	(0.12856)	0.45304	0.10582	(0.14945)	0.25207	0.35940	0.02535	0.32944
F-Stat	0.9896	0.73977	0.98961	0.99151	0.99291	0.99859	0.99377	0.9947	0.99907	0.97417	0.97676	0.99734

Table 14Summary Statistics for Average Spreads of LIBOR, HIBOR & SIBOR (Sub-period 1: 02 Jan to 31 Dec 07)

Table 15Correlation between Average Spreads of LIBOR, HIBOR & SIBOR (Sub-period 1: 02 Jan to 31 Dec 07)

Tenor	1-M	onth	3-M	onth	6-M	onth	12-Month		
Rate	H - S	S - L	H – S	S - L	H - S	S - L	H - S	S - L	
H – L	0.7868	0.5513	0.7560	0.6249	0.6153	0.7284	0.6946	0.8007	
H - S		-0.0811		-0.3489		-0.0920		0.1252	

Tenor		1-Month			3-Month			6-Month			12-Month	
Rate	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L
Ν	211	211	211	211	211	211	211	211	211	211	211	211
Mean	0.1395	0.1112	0.0283	0.1181	0.1021	0.0160	0.4634	0.0695	0.3940	0.1189	0.1070	0.0118
Std. Dev	0.2309	0.1874	0.0914	0.1500	0.1488	0.0466	0.4163	0.1125	0.4113	0.0881	0.0887	0.0409
Skewness	4.4729	3.0188	7.3384	3.3133	2.8492	0.9325	0.6006	2.8077	0.6214	1.9301	2.4531	-0.4274
Kurtosis	25.5300	8.7369	72.4599	13.3976	8.4910	21.3375	-0.4966	7.9254	-0.4938	4.9714	7.0435	2.7278
t-Stat	1.65476	1.31666	0.34939	1.78208	1.54475	0.25266	*6.81307	1.30424	*5.96198	*2.50990	*2.24443	0.25989
F-Stat	*1.81107	*1.54667	1.17094	*1.61536	*1.60679	1.00534	1.07578	1.23743	0.86937	1.218	1.08946	1.02968

Table 16	Summary Statistics for	or Average Spreads	of LIBOR, HIBOR &	& SIBOR (Sub-p	period 2: 02 Jan to	31 Dec 08)
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Table 17Correlation between Average Spreads of LIBOR, HIBOR & SIBOR (Sub-period 2: 02 Jan to 31 Dec 08)

Tenor	1-Month		3-M	onth	6-M	onth	12-Month		
Rate	H – S	S - L	H - S	S - L	H - S	S - L	H - S	S - L	
H – L	0.9253	0.6286	0.9514	0.1808	0.1792	0.9631	0.8929	0.2156	
H – S		0.2867		-0.1309		-0.0921		-0.2471	

Tenor		1-Month			3-Month			6-Month			12-Month	
Rate	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L
Ν	198	198	198	198	198	198	198	198	198	198	198	198
Mean	0.0441	0.0379	0.0062	0.0470	0.0359	0.0112	0.7527	0.0181	0.7346	0.0216	0.0149	0.0066
Std. Dev	0.0112	0.0120	0.0074	0.0125	0.0134	0.0110	0.4743	0.0176	0.4672	0.0355	0.0362	0.0167
Skewness	0.4075	1.0173	-1.7825	0.6938	-0.0823	-0.2787	-0.2575	0.8864	-0.2856	1.1784	1.0645	-0.3376
Kurtosis	-0.3572	2.0558	13.2978	4.7669	0.7983	1.2968	-1.2958	2.8113	-1.2890	3.0523	1.1413	0.6373
t-Stat	*4.23495	*3.62443	0.61974	1.16596	0.89406	0.27772	*20.902	0.36671	*20.718	0.56006	0.39083	0.17811
F-Stat	1.11462	1.11436	1.00023	1.07766	1.08763	0.99084	1.06307	1.08238	0.98217	1.10389	1.11077	0.99381

Table 10 Summary Statistics for Average Spreads of Libor, findor, of Sidor (Sub-period 5, 02 Jun - 51 Dec	Table 18	Summary Statistics for Avera	ge Spreads of LIBOR	, HIBOR & SIBOR (Sub	-period 3: 02 Jan –	- 31 Dec 09)
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Table 19Correlation between Average Spreads of LIBOR, HIBOR & SIBOR (Sub-period 3: 02 Jan – 31 Dec 09)

Tenor	1-Month		3-M	onth	6-M	onth	12-Month		
Rate	H-S S-L		H – S	S - L	H – S	S - L	H – S	S - L	
H – L	0.7954	0.2286	0.6384	0.3549	0.4177	0.9994	0.8910	0.1934	
H - S		-0.4082		-0.4931		0.3863		-0.2731	

Tenor		1-Month			3-Month			6-Month			12-Month	
Rate	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L
N	96	96	96	96	96	96	96	96	96	96	96	96
Mean	0.0416	0.0315	0.0101	0.0403	0.0357	0.0046	0.0231	0.0217	0.0014	0.0110	0.0133	-0.0023
Std. Dev	0.0180	0.0149	0.0060	0.0133	0.0109	0.0056	0.0125	0.0097	0.0111	0.0142	0.0128	0.0149
Skewness	1.1843	1.3533	-0.6845	-0.1189	-0.1983	-0.3030	-1.3790	-0.9296	-0.2503	-0.2055	0.2456	-0.2215
Kurtosis	0.1136	0.5113	1.7156	1.4233	1.7178	-0.5885	6.1172	2.3886	-0.5665	1.4532	-0.8134	-0.2080
t-Stat	*4.94102	*3.67633	1.36765	*2.39782	*2.11209	0.27871	1.09658	1.03168	0.06671	0.55643	0.67938	(0.12125)
F-Stat	1.3069	1.25023	1.04533	1.04366	1.03197	1.01133	1.02503	1.0269	0.99819	1.04671	1.06489	0.98293

Table 20Summary Statistics for Average Spreads of LIBOR, HIBOR & SIBOR (Sub-period 4: 02 Jan – 30 Jun 10)

Table 21Correlation between Average Spreads of LIBOR, HIBOR & SIBOR (Sub-period 4: 02 Jan – 30 Jun 10)

Tenor	1-Month		3-M	onth	6-M	onth	12-Month		
Rate	H-S S-L		H – S	S - L	H – S	S - L	H – S	S - L	
H - L	0.9506	0.6403	0.9105	0.5978	0.5267	0.6686	0.3987	0.6135	
H - S	0.3703			0.2127		-0.2801		-0.4796	

Table 22	Summary Statistics for	Average Spreads of	LIBOR, HIBOR & SIBOR	before, during, and a	after Financial Crisis
	2		,	, 0,	

Tenor	1-Month			3-Month			6-Month			12-Month		
Rate	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L	H–L	H–S	S–L

	02 Jan	n – 31 Mai	r 08									
Ν	298	298	298	298	298	298	298	298	298	298	298	298
Mean	0.0136	-0.0013	0.0149	0.0093	0.0000	0.0093	0.0053	-0.0013	0.0065	0.0220	0.0102	0.0119
Std. Dev	0.0264	0.0238	0.0175	0.0215	0.0180	0.0163	0.0228	0.0160	0.0204	0.0367	0.0282	0.0256
t-Stat	0.19756	(0.01875)	0.21518	0.13181	(0.00063)	0.13198	0.07279	(0.01725)	0.08979	0.28682	0.13257	0.15265
F-Stat	1.11124	0.73550	*1.51087	1.19576	0.90396	*1.32280	*1.42702	*1.27671	1.11774	*1.29989	0.90821	*1.43127

01 Apr – 30 Sep 08

Ν	102	102	102	102	102	102	102	102	102	102	102	102
Mean	0.1474	0.1087	0.0387	0.1294	0.1056	0.0238	0.5114	0.0573	0.4541	0.1198	0.1076	0.0122
Std. Dev	0.2820	0.1953	0.1222	0.1639	0.1452	0.0491	0.2390	0.0882	0.2534	0.0703	0.0643	0.0350
t-Stat	*2.52691	1.78745	0.89153	*3.14044	*2.55976	0.77292	*12.356	1.47019	*12.1615	*2.76999	*2.45549	0.29522
F-Stat	*1.81107	1.17094	*1.54667	*1.61536	1.00534	*1.60679	*2.70989	*2.87301	0.94323	1.09327	0.54515	*2.00546

01 Oct - 30 Dec 09

	247	247	247	247	247	247	247	247	247	247	247	247
Mean	0.0865	0.0775	0.0090	0.0794	0.0703	0.0091	0.7838	0.0488	0.7349	0.0533	0.0474	0.0058
Std. Dev	0.1195	0.1226	0.0290	0.0920	0.1029	0.0271	0.4683	0.0914	0.4818	0.0883	0.0903	0.0257
t-Stat	0.96915	0.86790	0.10710	0.84520	0.75131	0.10136	*9.15657	0.57501	*8.94065	0.77946	0.69631	0.08990
F-Stat	0.97527	0.23624	*4.12838	1.07766	1.08763	0.99084	1.06307	1.08238	0.98217	1.10389	1.11077	0.99381

Appendix 3: Announcement of ABS (27 Jul 1999) - ABS to Administer Interest Rate Fixings

The Association of Banks in Singapore (ABS) announced today that it will administer the fixing of the Singapore Dollar short-term interest rates, beginning on 2 August 1999. ⁽⁸⁵⁾ The ABS will select the panel of contributor banks, and determine the fixing procedures, on the basis of full transparency and accepted market convention.

The initiative arose from market consensus that a reliable, credible and independent benchmark for regional interest rates, including the Singapore Dollar, is essential. It was felt that, if an independent, verifiable and robust mechanism for the fixing of the regional interest rates, including the Singapore Dollar, could be established and administered by a professional body consisting of market practitioners, it would benefit market participants, and advance the development of the capital markets in the region. An example of desirable benchmark administration would be that of the British Bankers' Association (BBA) in London, which has successfully established the London Interbank Offered Rate (LIBOR) as the benchmark interest rate for European and other major currencies. The ABS will base the administration of its fixing rates on the well-established procedures of the BBA LIBOR.

While there are a number of *interest rate fixings* for the Singapore Dollar available, their acceptability as the ultimate benchmark was not indisputable. Hence, it was felt that the Association representing the banking institutions in Singapore is the logical body to establish and administer the interest rate fixing mechanism. The Singapore Dollar was the natural choice for the first rate fixing. The ABS will

⁸⁵ Source: http://www.abs.org.sg/newsroomarchive/270799.htm

establish the Singapore Interbank Offered Rates for Singapore Dollar deposits (SGD SIBOR) for maturities of up to one year. In addition, it will also establish the Singapore Interbank Offered Rates for US Dollar deposits (USD SIBOR) and the US Dollar-Sing Dollar Swap Offered Rates (USD/SGD SOR). The USD/SGD SOR represents the cost of borrowing SGD synthetically by borrowing USD for the same tenor and swapping out the USD in return for the SGD. The SGD SIBOR, USD SIBOR and USD/SGD SOR will be fixed daily at 11.00 a.m. Singapore time. Interest calculation for SGD SIBOR and USD/SGD SOR will be on a 365-day basis while that for USD SIBOR will be on a 360-day basis. The value date for the *interest rate fixings* is two business days after the fixing date. The ABS will start managing the fixing procedures for these rates and make them available on major news vendors from 2 August 1999. Subsequent regional interest rate fixings will be decided according to market needs. In view of the Industry's current arrangement with Telerate, a division of Bridge, Telerate will be appointed the Calculating Agent and Distributor, and the daily Fixing Rates will be concurrently available to all other information services vendors.

The panel of banks will be selected based on criteria such as the banks' scale of activity in the interbank market and reputation. The quoted rates of individual contributor banks will be available publicly.

The fixing procedures will be similar to that of most polled *interest rate fixings*, where banks' quoted rates will be arithmetically averaged after excluding the extreme rates. The ABS will also review the panel of contributor banks and fixing procedures from time to time.

Appendix 4: Description of ABS Procedures for Interest Rate Fixings

1 Authority ⁽⁸⁶⁾

The Association of Banks in Singapore (ABS) Interest Rate Fixings are determined by the ABS and its decision shall be final.

2 Calculating Agent

A Calculating Agent will fix the ABS Interest Rate Fixings on behalf of the ABS and the rates will be made available simultaneously via a number of different information providers.

3 Contributor Panels

3.1 Selection of Contributor Panels

The Contributor Panel of banks will comprise at least 8 Contributor Banks. Contributor Panels will broadly reflect the balance of activity in the interbank money market and/or swap market. Individual Contributor Banks are selected by the ABS on the basis of reputation, scale of activity in the Singapore market, perceived expertise in the currency concerned and credit standing.

3.2 Review of Contributor Panels

The Contributor Panel will be reviewed annually by the ABS Treasury Committee in consultation with Singapore Foreign Exchange Market Committee (SFEMC), or as and when necessary.

3.3 Non-Compliance of Contributor Bank

⁸⁶ Source: http://www.abs.org.sg/newsroomarchive/270799_2.htm

If an individual Contributor Bank ceases to comply with the spirit of the ABS procedures for Interest Rate Fixings and/or Instructions to ABS Contributor Banks, the ABS may issue a warning requiring the Contributor Bank to remedy the situation. The ABS may, at its sole discretion, exclude the Bank from the Contributor Panel, and select a replacement as soon as possible and make public the substitution.

4 Instructions To ABS Contributor Banks

4.1 Quoted Rates

An individual Contributor Bank will contribute, as the case may be for the currency concerned, the relevant rates and for such maturities, fixing dates, value dates and other quotation convention as may be determined by the ABS. Contributor Banks shall input their rate without reference to rates contributed by other Contributor Banks.

4.2 **Posting of Quotes**

Contributors Banks will input their rates as at 11:00 a.m. Singapore time, to the Calculating Agent between 11:00 a.m. and 11:10 a.m. Singapore time.

4.3 Correction of Errors

The Calculating Agent will identify and arrange for the correction of manifest errors in rates input by individual Contributor Banks prior to such time as may be determined by the ABS.

4.4 Right to Modify these Procedures

The ABS has the right, in consultation with the ABS Treasury Committee and the SFEMC, to make amendments to the foregoing procedures, from time to time, as may be necessary to clarify and enhance such procedures.

5 Fixing Rate

5.1 Fixing Process

The contributed rates will be ranked in order, and the middle two quartiles averaged arithmetically. Such averaged rate will be used for the ABS Interest Rate Fixing, for such maturity, fixing date, value date and quotation convention as specified by the ABS.

5.2 Review of Fixing Process

ABS will review the ABS *interest rate fixing* process from time to time, with adequate notification of planned changes, if any.

5.3 Publication of ABS Interest Rate Fixing

Calculating Agent will publish and concurrently disseminate the ABS Interest Rate Fixings and individual Contributor Banks' rates at or around 11:30 a.m. Singapore time.

Manifest errors may be corrected over the 30 minutes following the publication of the ABS *interest rate fixing*. The Calculating Agent then will make any necessary adjustments and publish the corrected ABS Interest Rate Fixing at around 12:00 noon Singapore time.

5.4 Contingencies

In the event that it is not possible to conduct the ABS Interest Rate Fixing in the usual way, ABS, in consultation with Contributor Banks and other market practitioners, will use its best efforts to set a substitute rate. Such substitute fixing will be communicated to the market in a timely fashion.

Appendix 5: Announcement of HKMA (14 Dec 2006) - Launch of Renminbi Swap Offered Rate Fixing

The Treasury Markets Association (TMA) announced today that it would launch the Renminbi Swap Offer Rate (CNY SOR) Fixing in Hong Kong on 18 December 2006.

The CNY SOR Fixing has been developed by the TMA to serve as a market-based floating rate reference for Renminbi Non-deliverable Interest Rate Swaps (CNY NDIRS). The CNY NDIRS involve counterparties swapping fixed-interest payments for floating-rate payments based on the same underlying notional principal, on fixed dates over the life of the contract, with the net cashflows settled in US dollars.

The CNY SOR Fixing is calculated from (a) Spot US dollar/renminbi exchange rates published by the China Foreign Exchange Trade System; (b) renminbi non-deliverable forwards rates; and (c) US dollar interbank rates in Hong Kong (USD HIBOR).

In conjunction with the launch of CNY SOR Fixing, the TMA will also launch the USD HIBOR Fixing. This additional fixing will be used in the calculation of the CNY SOR Fixing and facilitate the development of products based on the rates.

Ms Anita Fung, Chairman of the TMA Market Development Committee, which developed the CNY SOR Fixing, said, "The launch of the CNY SOR Fixing is consistent with the TMA's mandate to help develop treasury products and services in Hong Kong to meet new market demands."

"We believe that the Fixing will provide a much-needed market-based benchmark to facilitate the growth of the CNY NDIRS for corporations and financial institutions outside of the Mainland to better manage their renminbi interest rate exposure," added Ms Fung. At present, CNY NDIRS are traded using existing Mainland interest rate benchmarks, including the seven-day repo rate or the one-year deposit rate, as the floating reference rates. The launch of the CNY SOR will provide an alternative benchmark, covering a full spectrum of tenors from one month to 12 months. Corporations and financial institutions which currently do not have access to the Mainland financial market can use the CNY NDIRS to manage their interest rate exposures. With the introduction of the CNY SOR as an alternative benchmark, users of the CNY NDIRS can choose the benchmark that best matches their specific risk profiles.

Reuters Limited has been appointed by the TMA as the Calculating Agent for the computation and dissemination of the CNY SOR Fixing. Two panels of banks, one each for the CNY NDF and the USD HIBOR, have been designated by the TMA as the contributing banks. The composition of the contributing banks will be reviewed by the TMA regularly.

The CNY SOR and USD HIBOR fixings will be published on both Reuters RICs <CNYSORFIX=>, <USDHIBOR=> and Reuters pages <CNYSORFIX>, <USDHIBOR> at 11:30 a.m. Hong Kong time from Monday to Friday, except public holidays or if Typhoon Signal No. 8 and above or the Black Rainstorm warning is hoisted.

For enquiries, please contact the Treasury Markets Association at 2878 8046 or 2878 1577.

Treasury Markets Association 14 December 2006

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Appendix 6: Features of Selected Money Market Fixings (by Gyntelberg and Wooldridge)

	1000005	Onshore/	Panel con	nposition	10 40	Type of	Bench-	IRS
Currency	Fixing	offshore rate?	Size ¹	Foreign banks ²	Average	quote	mark tenor ³	reference rate? ⁴
e	Libor	Offshore	8	6	Trimmed	Non-binding	3-month	No
AUD	Bank bills	Onshore	14	8	Trimmed	Non-binding	3-month	Yes
CAD	Libor	Offshore	12	9	Trimmed	Non-binding	3-month	Yes
G	Bank bills	Onshore	9	3	Trimmed	Non-binding	3-month	No
V	Chibor	Onshore	10.2.27	· · ·		Transacted	7-day	No
CNY	Shibor	Onshore	16	3	Untrimmed	Non-binding	7-day	No
t	Repo	Onshore	10.2.2		Untrimmed	Non-binding	7-day	Yes
PDIZIZ	Libor	Offshore	8	8	Trimmed	Non-binding	3-month	No
1	Cibor	Onshore	12	5	Trimmed	Non-binding	6-month	Yes
t heun	Libor	Offshore	16	11	Trimmed	Non-binding	3-month	No
UEUR	Euribor	Onshore	45		Trimmed	Non-binding	6-month	Yes
HKD	Hibor	Onshore	20	14	Trimmed	Non-binding	3-month	Yes
IDR	Jibor	Onshore	18	7	Untrimmed	Non-binding	3-month	No
INR	Mibor	Onshore	33	7	Trimmed	Non-binding	Overnight	Yes
101/	Libor	Offshore	16	12	Trimmed	Non-binding	6-month	Yes
aler	Tibor	Onshore	16	1	Trimmed	Non-binding	3-month	No
n MDM	Koribor	Onshore	14	4	Trimmed	Non-binding	3-month	No
Q (KAAA	CD rate	Onshore	10	1925	Trimmed	Transacted	3-month	No
MYR	Klibor	Onshore	11	6	Untrimmed	Non-binding	3-month	Yes
W	Libor	Offshore	8	8	Trimmed	Non-binding	3-month	No
NZD	Bank bills	Onshore	7	7	Trimmed	Non-binding	3-month	Yes
0	PHIREF	Offshore	10.2-21		Untrimmed	Transacted	3-month	Yes
ILHH	Phibor	Onshore	17	8	Untrimmed	Non-binding	3-month	No
d	Sibor	Onshore	13	10	Trimmed	Non-binding	6-month	No
rSGD	SOR	Onshore			Trimmed	Non-binding	6-month	Yes
i Tup	THBFIX	Offshore	13	14	Trimmed	Non-binding	6-month	Yes
dHB	Bibor	Onshore	16	7	Trimmed	Non-binding	3-month	No
g	Libor	Offshore	16	13	Trimmed	Non-binding	3-month	Yes
dJSD	Sibor	Offshore	15	12	Trimmed	Non-binding	3-month	No
	H 15	Offshore	Broker p	prices		Binding	3-month	No

¹ Total number of contributor banks. ² Number of contributor banks headquartered outside the currency's home country. Most widely referenced maturity. ⁴ Floating rate leg typically referenced in interest rate swap contracts.

Sources: BBA; Bloomberg; Reuters.

Quarterly Review, March 2008, Interbank Rate Fixings during the Recent Turmoil. Table 1, Page 62.

Appendix 7: Contributor Banks for LIBOR, HIBOR & SIBOR in August 2010

The sixteen contributor banks in London:

- JP Morgan Chase (JPM)⁽⁸⁷⁾
- Citibank, Credit Suisse
- Bank of America (BOA)⁽⁸⁸⁾
- Hongkong and Shanghai Banking Corporation (HSBC)
- Royal Bank of Scotland (RBS)⁽⁸⁹⁾
- Lloyds
- Barclays
- West LB
- Rabobank
- Royal Bank of Canada (RBC)
- Deutsche Bank ⁽⁹⁰⁾

⁸⁸ In 1998, Bank of America was established when BankAmerica Corporation was acquired by NationsBank, following by its recent acquisitions of Countrywide Financial in July 2008 and Merrill Lynch in January 2009. It is an American bank with headquarter in North Carolina of the US.

⁸⁹ In 2000, Royal Bank of Scotland Group bought National Westminster Bank Plc. Its headquarter is in Edinburgh, Scotland.

⁹⁰ Deutsche Bank AG is a German Bank with headquarter in Frankfurt. Its intentional offices cover the cities of London, Hong Kong, Singapore, New York, Tokyo, etc.

⁸⁷ In 2000, JPMorgan Chase was formed when Chase Manhattan Corporation merged with J.P. Morgan & Co (which was acquired by Chemical Bank in 1996 retaining the name of Chase) following by its recent acquisitions of Bank One Corp in 2004, Bear Stearns in June 2008 and Washington Mutual in September 2008. It is an American bank with headquarter in New York

- Société Générale (SG)
- Union Bank of Switzerland (UBS) ⁽⁹¹⁾
- Bank of Tokyo-Mitsubishi UFJ (BTM UFJ)⁽⁹²⁾
- Norinchukin Bank in August 2010

The twenty contributor banks in Hong Kong:

- JPM
- Citibank
- HSBC
- RBS
- SCB
- Société Générale (SG)
- BNP Paribas $^{(93)}$
- Deutsche Bank
- Sumitomo Mitsui Banking Corporation (SMBC) ⁽⁹⁴⁾
- Mizuho Bank (Mizuho)⁽⁹⁵⁾
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In 1998, Union Bank of Switzerland was continuously used when it merged with Swiss Bank Corporation, after the acquisitions of S.G. Warburg Dillon Read in 1997 and Schroder, Munchmeyer, Hengst & Co. in 1997. It is a Swiss bank with headquarters in Zurich and Basel, Switzerland.

- ⁹² In April 1996, Bank of Tokyo-Mitsubishi UFJ (三菱東京 UFJ 銀行) was created through the merger of Mitsubishi Bank (三菱銀行) and Bank of Tokyo (東京銀行), with headquarter is in Tokyo.
- ⁹³ In 2000, BNP Paribas was created through the merger of Banque Nationale de Paris (BNP) and Paribas, a French bank with headquarter in Paris and a second global headquarter in London.
- ⁹⁴ In April 2001, Sumitomo Mitsui Banking Corporation (三并住友銀行) was formed through the merger of Sakura Bank (which was established by the merger of Mitsui Bank and Taiyo Kobe Bank in 1990) and Sumitomo Bank, following by further with Wakashio Bank in 2003, with headquarter in Tokyo.
- ⁹⁵ In April 2002, Mizuho Bank was established by the merger of Dai-Ichi Kangyo Bank with the retail operations of Fuji Bank and Industrial Bank of Japan, with headquarter in Tokyo.

- BTM UFJ
- DBS
- Bank of China (BOC)
- Agricultural Bank of China (ABC)
- Bank of Communication
- Industrial and Commercial Bank of China (ICBC)
- China Construction Bank (CCB)
- Hang Seng Bank
- Bank of East Asia (BEA)
- Shanghai Commercial Bank (SCB)
- National Australia Bank (NAB)

In Singapore, the seven contributor banks for USD SIBOR:

- BOA
- BTM UFJ
- Citibank,
- DBS
- RBS
- UBS
- Deutsche Bank

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