FINANCIAL SECTOR LIBERALIZATION

IN TURKEY AND CROATIA

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Abstract

This paper examines results of liberalization and adoption of outward market orientation on the financial sector development in Turkey and Croatia.

In view of the new development concept launched in Turkey in 80s-development based on liberalization and reintegration into international economy- previously negative interest rates were abandoned through deregulation of interest, capital flows were liberalized, while entry of foreign banks boosted competition, product quality and product diversification. Furthermore, financial infrastructure was completed by establishment of the fundamental financial markets: Istanbul Stock-Exchange (ISE), Turkish Lira and forex interbank money markets, and Istanbul Gold Exchange. Moreover, new financial institutions such as leasing and factoring companies, mutual funds and life insurance companies enriched the Turkish financial sector. However, Turkish financial sector is still bank dominated like in most developing countries Croatia included. The central bank's role in the financial sector is still large especially compared with developed economies. Besides reducing it in the near future central bank will have to ensure appropriate monitoring system.

Process of liberalization in Croatia started in 1992 and later on gained momentum. Namely, World Development Report consider it to be in the first group of Central and Eastern European countries (CEE) when liberalization of economy is taken in account. However, operations of banks are mainly based in the field of traditional functions such as collection of (mainly foreign exchange) deposits and short term lending which resemble Turkish experience prior to financial and overall economic liberalization. Brokerage activities, fund management, international and internet banking, leasing and factoring arrangements offered by leading Turkish banks unfortunately represent a thinly share of Croatian banks income. Croatia has attained investment grade rating in January 1997 which was followed by the successful Croatian government and corporate sector access to international capital markets. Zagreb Stock-Exchange (ZSE) has revealed good results in 1996, but recently it started to decline due to withdrawal of foreign institutional investor and weak financial strength of local retail and institutional investors (the later one being rare and underdeveloped) . Certain problems are stemming from incomplete legal and regulatory infrastructure of the main security market including delayed establishment of central depository agency and unsatisfactory transaction transparency resulting in anemic trade and few (around 15) company shares actively traded.

Istanbul stock exchange, on the contrary, is one of the major emerging markets in the world. More than 240 company shares are traded on the exchange while the market capitalization is around $40 billion. Effects of liberalization on the Istanbul stock exchange are particularly examined.

Both economies are faced with the task of accomplishment of privatization programs aimed at increased efficiency of state-owned enterprises and more sound public finance. Furthermore, restructuring of business sector aimed at increased competitiveness and consequently more balanced foreign sector (by increased export/foreign market penetration) needs to be undertaken. Besides, government role in the business and financial sector is highlighted including deepening of financial markets, financial institutions and instruments diversification, and improved financial standing of business entities, financial institutions and increased rate of saving in the national economy.

1.Liberalization and outward-oriented market development of Turkey and Croatia

On January 24 1980, the Turkish administration announced an economic package to liberalize the economy and the financial markets. This package and the next decisions madeby the government has promoted the exports, liberalized the exchange rate regime , and removed the interest rate resections on the banks. The exports grew at 22% annual rate between 1980-1985 and this rate has quadrupled in 1990s. At the same time percentage of exports in GNP has doubled during the period of 1980-1990.

During 1980s Turkish economy has revealed faster economic growth (although still not stable), increased international competitiveness and volume of foreign trade due to implementation of liberal policies and outward-oriented market economy. A considerable part of Turkish imports are from the EU countries with imports from Germany at leading position as in the case of Croatia. Furthermore, tourism is being considered as one of the major sectors in the economy. This stands for Croatia, as well as for leading Mediterranean tourist destinations such as France, Italy, Greece, and Spain.

In view of the new development concept-development based on liberalization and reintegration into international economy- previously negative interest rates were abandoned through deregulation of interest, capital flows were liberalized, while entry of foreign banks boosted competition, product quality and product diversification in Turkey. Furthermore, financial infrastructure was completed by establishment of the fundamental financial markets: Istanbul stock-exchange (ISE), Turkish lira and forex interbank money markets, and Istanbul gold exchange. Moreover, new financial institutions such as leasing and factoring companies, mutual funds and life insurance companies enriched the Turkish financial sector.

Privatization in Turkey was launched in 1986. The government has an ambitious privatization plan for 1998 including selling of the stakes in a big oil company , a big quasi private bank and a telecommunication company. Hopefully, privatization revenues will ease budget deficit with consequent positive influence on Turkish inflation rate. Although still high, inflation rate is showing downturn trend and central bank and finance ministry are conducting programs aimed at increased government discipline.

However, Turkish financial sector is still bank dominated like in most developing countries Croatia included. Banking sector in Turkey comprises 72 banks revealing mainly poor asset base and relatively low efficiency ratios. Big banks have started to improve its base by foreign borrowing although this source of finance is sometimes costly due to Turkey's sub-investment grade risk rating. The central bank's role in the financial sector is still large especially compared with developed economies. Besides reducing it in the near future central bank will have to ensure appropriate monitoring system.

As far as Croatian financial sector is concerned, foreign banks have begun to operate in the country, although, as opposed to the Turkish ones, Croatian banks have not started to open their branches abroad. Process of liberalization in Croatia started in 1992 and later on gained momentum. Namely, World Development Report consider it to be in the first group of Central and Eastern European countries (CEE) when liberalization of economy is taken in account.

But. there are still a lot of things waiting to be accomplished and improved. In the field of finance, although the process of rehabilitation of banking sector is in its final phase, recapitalization of banks is yet to be dealt with. Operations of banks are mainly based in the field of traditional functions such as collection of (mainly foreign exchange)deposits and short term lending which resemble Turkish experience prior to financial and overall economic liberalization. Brokerage activities, fund management , international and internet banking, leasing and factoring arrangements offered by leading Turkish banks unfortunately represent a thinly share of Croatian banks income.

Croatian banking sector is coping with confidence building. Furthermore, it is faced with existence of at one hand two big banks- Zagrebaèka banka and Privredna banka Zagreb (being 7th and 15 th largest bank in Central Europe), which account for 59% of the market and at the other hand several dozens of small under-capitalized banks totaling around 60 commercial banks, and local saving banks. The final privatization phase, besides privatization of utilities and tourist facilities, includes privatization of banks. With foreign banks presence one

may expect that foreign ownership will increase, resulting in greater competition increased profitability, stronger asset base and more adequate concentration in Croatian banking sector.

Croatia has attained investment grade rating in January 1997 which was followed by the successful Croatian government and corporate sector access to international capital markets. Croatian financial markets (Zagreb Stock Exchange, Varazdin-Osijek O-T-C market, interbank money and foreign exchange markets) have been under great dominantly psichological constraints due to frozen old foreign exchange deposits, war and high political risk in the broader region. Zagreb Stock-Exchange (ZSE) has revealed good results in 1996, but recently it started to decline due to withdrawal of foreign institutional investor and weak financial strength of local retail and institutional investors (the later one being rare and underdeveloped) .

Certain problems are stemming from incomplete legal and regulatory infrastructure of the main security market including delayed establishment of central depository agency and unsatisfactory transaction transparency resulting in anemic trade and few (around 15) company shares actively traded. Istanbul stock exchange, on the contrary, is one of the major emerging markets in the world. More than 240 company shares are traded on the exchange while the market capitalization is around $40 billion.

However, both economies are facing certain constraints which are to be dealt by complex programs and set of consistent economic policy measures. Both economies are faced with the task of accomplishment of privatization programs aimed at increased efficiency of state-owned enterprises and more sound public finance. Furthermore, restructuring of business sector aimed at increased competitiveness and consequently more balanced foreign sector (by increased export/foreign market penetration) needs to be undertaken.

In the sphere of finance, Croatian government has to promote and regulate the process of recapitalization and privatization of banks, diversification of financial institutions and to demonstrate serious results in normalizing public budget relative size and structure -in the favor of private sector and infrastructure expenditures as suggested by Viducic (1998). In the case of Turkey, stabilization results, according to Aktan (1996) need to be revealed and better results should be obtained in the public sector efficiency .

In both countries, in the view of EU enlargement preparation, market oriented economic policy measures in financial sector are expected to result in much higher standards of transparency of operation and financial strength of financial institutions. Central banks have to provide prudent regulation and supervision. Moreover, banks will have to increase efficiency in mobilizing and allocating domestic savings resulting in stronger deposit base, and easier/ cheaper access of small and ,medium sized enterprises to banks credit.

2.The impact of liberalization on the emerging markets with regard to the main national stock-exchanges

Over the last two decades, the flow of capital across national borders has become much less restricted. Investors have begun including assets of foreign countries into their portfolios in an effort to further reduce risk and diversify effectively. At the same time, developing countries that borrowed heavily from commercial banks during the 1970s, have realized that the external capital markets are not the only, nor necessarily the best source of funds for development. The claims of international creditors during times of recession create financial burdens on developing countries. In an effort to obtain capital from different sources, some developing countries have established their own stock markets while others that already had stock markets have decreased restrictions on foreign investment.

Until recently, very little was known about the statistical properties and diversification possibilities of emerging markets. Traditionally investors avoided these markets because of the political risks involved and also because of restrictions against foreign investors in these markets. However, in recent years the political risk of emerging markets has reduced tremendously. Additionally, there exists a trend within developing countries to ease the restrictions that discourage foreign investment.

Beginning in the mid 1970s, both developed and developing countries removed foreign investment barriers in order to encourage foreign investors to invest in their country. The Istanbul Stock Exchange removed all the barriers to foreign investment with Decree No 32 (August 11, 1989), giving (1) foreign investors the right to

invest in Turkish stocks and mutual funds without getting the permission of the government and (2) domestic investors the right to invest in foreign markets.

Booth, Chowdhury and Martikainen (1993) explore the dynamic properties of the price differential paid for Finnish unrestricted shares during the 1984-1989 period. The authors first compare the distributional characteristics of the unrestricted and restricted series. The mean unrestricted return is not significantly different from the mean restricted return. However unrestricted stock returns are more volatile than restricted ones. The two return series are cointegrated and the restricted returns Granger cause the unrestricted returns.

The liberalization process in the Turkish economy started with the announcement of January 24, 1980 decree and continued with additional measures during 1980s. The revitalization of the capital markets and the opening of the Istanbul Stock Exchange were parts of these measures. Based on the previous studies, it is hypothesized that this event caused a structural shift in stock price changes. We hypothesize that means of the stocks will not be different in two periods but variances will be different in two periods. Booth, Chowdhury and Martikainen (1993) find that the mean return on the restricted Finnish Stock Index is not significantly different from that of the unrestricted one. However, unrestricted share prices are significantly more volatile than that of restricted shares. As is documented by the previous authors the policy changes by government causes structural changes and especially volatility changes. Next the statistical properties of the 56 stocks that were listed on the exchange before August 11, 1989 are examined and the distribution of the series before and after this date are compared to determine whether the opening of the stock exchange to foreign investors affected the stocks significantly.

The Istanbul Stock Exchange began its operations on January 2, 1986. Although the Istanbul Stock Exchange was established on January 1, 1986, data on individual stocks are available only for the period after 1988. The data used in the paper contain the price changes of the stocks that were listed on the Istanbul Exchange before August 1989 and continued to be traded until July 31 1992. Those stocks that were delisted before July 31, 1992 were eliminated. Our data consist of 56 stocks listed on the Istanbul Stock Exchange.

The price changes are computed as the first differences of the closing prices.

$$D_t = \ln P_{t+1} - \ln P_t \qquad (1.1.)$$

where P_t = price of the security at the end of day t

The decision of opening the stock exchange to foreign investors leads two different types of actions that can affect the stock prices. 1- Foreign investors start investing heavily in the Istanbul Stock Exchange. 2- Domestic investors start investing in other stock exchanges. Both of these actions are expected to increase the efficiency of the companies in order to satisfy foreign investors and domestic investors who can invest in other markets if they are not satisfied with the companies. Foreign investors' entry and exit decisions will increase volatility.

It is hypothesized that the means of stocks will not change as a result of this event. However, this event will increase volatility.Theoretical literature show that government actions regarding liberalization affect stock returns significantly. However, all the cited countries are developed and politically stable countries. This paper examines effects of liberalization movements in an emerging stock market.

Our first null hypothesis is that the means of stock returns are not different from each other after liberalization of stock markets in politically unstable countries. The second hypothesis states that the variances of the stock price changes will be significantly different after liberalization.

We can write our first null hypothesis as follows:

H_{1o} : $m_a = m_b$ the means of stock returns before and after the liberalization of the stock market are not different from each other. Our second hypothesis is that actions of foreign investors will cause a statistical change in volatility. We test the null hypotheses of equal variances in both periods. If we reject the null hypothesis we may conclude that the liberalization program has significantly changed the stock variances and caused a structural change in price distributions.

H_{2o} : $s^2_a = s^2_b$

First we describe the series by using various statistics. The location of each series is reported with mean, and median. The dispersion of the series is reported with standard deviation, and interquartile range . Finally skewness and kurtosis of the series are reported.

Table I and Table II present the descriptive statistics of the price changes before and after August 11, 1989. Forty-seven stocks have negative means before August 11, 1989. This number decreases to twenty seven stocks after that date. After August 11, 1989 twenty nine stocks have positive means. Prior to August 11, 1989 fifty one stocks exhibit negative skewness. After August 11, 1989 fifty five stocks show negative skewness Almost all stocks are extremely leptokurtic both before and after that date. All stocks have zero median price changes in both periods. The data do not indicate any trend in various statistics when we compare them.

The tables also report the t statistics for the null hypothesis of population means are equal to zero. Before August 11, 1989 one stock has mean that is statistically different from zero. We fail to reject the hypothesis for all stocks after August 11, 1989.

Next the equality of the population variances is tested with F statistic. Table III shows the results. The hypothesis is rejected for thirty eight stocks and the hypothesis of equal population variances is not rejected for eighteen stocks.

To test the hypothesis of equality of population means if the population variances are equal the t statistics is used, and the approximate t statistics is used if they are not equal. Table III presents the results. In every case, the null hypothesis of equal population means is not rejected at 5% significance level. The results of the Wald statistics also fail to reject the equality of means for all stocks.

The null hypothesis that the means of stock price changes are not different before and after the opening of the stock exchange to foreigners is not rejected. This is an expected result. However, the variances of majority of the stocks are significantly different between two periods.

The hypothesis of population means of the distributions equal to zero is tested with usual t statistic. The averages of the t statistics and the standard errors of skewness and kurtosis are presented. The results indicate that the means of the two stocks are significantly different from zero. All the other means are not significantly different from zero.

The null hypothesis of normality is tested by using Shapiro-Wilk and Kiefer Salmon test statistics. Table IV and Table V exhibit the normality test statistics' values. Both the Shapiro-Wilk statistic and the Kiefer-Salmon statistics reject normality for all stocks in both periods. Normality tests indicate that all stocks are nonnormal in both periods.

Spectral analysis is an alternative to studying autocorrelations. It is particularly appropriate when cycles occur in the process, instead of random distribution. Based on spectral analysis and periodogram we use the Fisher's Kappa and Bartlett's Kolmogorov Smirnov statistics to test the strict white noise hypothesis.

The Fisher's Kappa statistic rejects the hypothesis for one stock before August 11, 1989 and fails to reject the hypothesis after August 11, 1989 for all stocks. The Bartlett's test, on the other hand, rejects the white noise hypothesis for thirty six stocks in both periods.

The existence of ARCH effect in the data is investigated. The Ljung Box statistics need to be modified if ARCH effects exist in the data.

The null hypothesis of no heteroskedasticity in the data is tested with three tests: 1- ARCH test, 2- Breusch, Pagan and Godfrey test (B.P.G), 3- Harvey's test. Tables IV-V represents the results of ARCH and other heteroskedasticity tests for the data. The null hypothesis is the following: H_o: the time series is homoskedastic.

ARCH statistic rejects homoskedasticity for 9 stocks before and 8 stocks after August 11, 1989. The BPG test rejects the hypothesis for 9 and 3 stocks and the Harvey test rejects the hypothesis for 15 and 16 stocks in the two periods respectively. The next hypothesis that is tested is the hypothesis of strict white noise. The question of whether there is nonlinear dependence in the series or dependence in squared and absolute return series is investigated. First the Box-Pierce portmanteau test is used to test whether the return series follow white noise and to check the presence of nonlinear dependence in the squared return series and in the absolute value series.

Next, the degrees of autocorrelation in the mean and the variance are examined. Since the hypothesis that the population means are equal to zero is not rejected, squared returns can be used for variance in autocorrelation tests. If a time series is strict white noise, then all of its moments are independent and uncorrelated. To verify the null hypothesis that the series is white noise autocorrelation in the original data, squared data and in the absolute value data are investigated. The Ljung-Box statistics on the original price changes D, the squared changes and the absolute changes of D are exploited.

Since significant ARCH effects do not exist in the original series, the original Ljung Box statistics are used. Tables VI-VII show the results of these tests.

Tests for linear and nonlinear dependencies are presented
in Tables VI through VII. The Ljung Box statistic indicates linear dependencies in nine stocks before and in eight stocks after August 11, 1989. The same statistic find dependencies in squared price changes for ten stocks before and seven stocks after August 11, 1989. The Ljung Box statistic finds dependencies in absolute price changes of the majority of the stocks (thirty three out of fifty six before, and thirty eight out of fifty six stocks after August 11, 1989). Twenty three stocks exhibit significant lag one dependence before August 11, 1989 and twenty two stocks exhibit significant lag one dependence after August 11, 1989. The strict white noise hypothesis is not rejected for 22 stocks before and 13 stocks after the opening of the stock market to foreigners.

The tests indicate that there is no statistical difference between the population means for all stocks. The price changes are not normally distributed in both periods. For the majority of the stocks, the hypothesis of no linear dependence and no nonlinear dependence in squared series are not rejected. On the other hand, majority of the stocks exhibit dependencies in the absolute price changes in both periods.

The previous findings indicate that opening of the stock market cause a structural change (not in the mean, but in the variance). In summary the hypothesis that liberalization in the stock market did not cause a change in means of stock prices is not rejected. However, this process cause a structural change in the variance of the stock prices. The evidence indicates that the Decree No 32 did not affect the mean of the series. However, the variances of the majority of the stocks changed significantly after the opening of the market. It is concluded that the opening of the market to international investors caused a structural change in price distributions.

Results of Croatian external and internal liberalization are considered to be good according to World Bank Report. Croatian index of liberalization is just behind those in most advanced countries in transition (Poland, Hungary, Czech, Slovenia) but it should be taken in account that Croatia is one of the countries severely affected by war. However, Croatia may not be satisfied with degree of privatization and further development is needed in the field of financial sector liberalization.

Positive effects of liberalization may be observed in the field of foreign capital entry and business entities establishment (national treatment). There is no dividend and capital gain tax. Foreigners may freely exchange and repatriate their earnings abroad. There are no restrictions on foreign direct investments except that reciprocity is required. Foreign banks have started to operate in Croatia. However in the field of banking and security trading reciprocity is required. Foreign residents are not allowed to invest in central bank (HNB) short -term instruments on the primary market. Furthermore, capital restrictions for resident transactions are imposed (depositing money abroad, investing in foreign securities etc.)

As far as future development is regarded, as appropriate course of action gradual liberalization is recommended by Radoševic (1998). Restrictions for foreigners to establish, operate and expand trading activities should be removed, followed, in the second phase of liberalization, by enabling residents to purchase financial services abroad and, latter on, by allowing nonresident traders to sell its financial services in Croatia. These measures would enable Croatia to join WTO and consequently CEFTA, and hopefully to accomplish liberalization and sign association agreement with EU.

Furthermore, privatization of banks, restructuring and accomplishing of final -mass privatization phase are expected to boost establishing and operating of domestic institutional investors. In such way, not only supply of qualitative and various securities will be secured at the official stock exchange (Zagreb Stock Exchange-ZSE), but strong and competitive demand from local institutional investors will emerge providing satisfactory market capitalization, liquidity and transparency on the ZSE.

Security markets in Croatia include Zagreb Stock Exchange (ZSE), the principal official security market, and VTV-over-the-counter market situated in Varaždin where less active and more riskier shares are traded.There are two quotations at the ZSE - 1st with full disclosure comprising 6 shares and TN quotation with 14 shares, few of them being active. There are no classical initial public offerings and share issued were sold of the majority stake of the shares already issued in privatization process on the base of debt/equity swaps.

ZSE turnover and importance started to increase in 1996. However, as a consequence of macroeconomic and microeconomic factors, as well as emerging market crisis, ZSE recorded an adverse trend at the end of 1997. Foreign institutional investors continued to withdraw from the market in 1998 leading to the severe shrink of local security markets. ZSE experienced both drastic share price and turnover fall and severe illiquidity. Turnover dropped from 2 percent to 1 percent of GDP while blue-chip trading transferred substantially to international markets which they were listed in parallel form.

The main features of Croatian security markets include insufficient transparency of transactions and financial reports of company listed, high reliance on foreign investors, undeveloped institutional environment, and high macroeconomics risk. In addition, it demonstrates low liquidity, turnover and activity, small number of company listed and strong price volatility.

As for ZSE prospect is concerned, one can expect that transformation of privatization investment funds into traditional investment funds, accomplishment of pension reform and competition of privatization of utilities, banks and tourism industry will probably increase profitability of financial and business sector, share listing and market capitalization, turnover and market liquidity.

However, Croatia, as other small and open economies in the region, should be aware of fact that its economy will hardly be able to sustain autonomous local security market (see table 5.). Better solution may be to open for regional association of security markets which is more in line with the global trend in security trading, too.

Unfortunately, ZSE is still in its embryonic phase of development. Being a small and illiquid market, it is under great influence of foreign institutional investor transactions. As far as share volatility is concerned, GARCH model (Generalised Autoregresive Conditional Heteroskedasticity) test undertaken by Šestoviæ and Latkoviæ (1998) for the most liquid shares at ZSE (PLIVA and Zagrebaèka banka) and ZSE index (CROBEX) has revealed that volatility is very dependent upon innovation in the previous time pad, while CROBEX reveals long memory effect in time series.

Concluding remarks

Liberalization and market oriented economy development have brought diversification and sophistication in Turkish and to a lesser extent in Croatian financial sector. There is still a great necessity to undertake a set of interrelated and complex programs aimed at business restructuring and privatization aimed at increased competition, increase of portfolio and foreign direct investment, restoring external balance and, in case of Turkey, curbing of inflation rate.

In the sphere of finance, Croatian government has to promote and regulate the process of recapitalization and privatization of banks, diversification of financial institutions and to demonstrate serious results in normalizing public budget relative size and structure (in favor of private sector and infrastructure expenditures). In the case of Turkey, stabilization results need to be revealed as well as better results should be obtained in the public sector efficiency and improvements in public finances.

The previous findings indicate that opening of the stock market has caused a structural change (not in the mean, but in the variance). However, this process causes a structural change in the variance of the stock prices. The evidence indicates that the Istanbul stock market's removal of restrictions on foreign investors from 1989 did not affect the mean of the stock prices series. However, the variances of the majority of the stocks changed significantly after the opening of the market. It is concluded that the opening of the market to international investors caused a structural change in price distributions.

One of the key tasks of respective governments is to secure prospective economic environment and to bring confidence to the financial markets. On the base of improved financial strength and competitiveness more intensive presence on the international market accompanied by the more intensive product and capital flows may be expected between Croatia and Turkey as well as between the Mediterranean basin and European countries

TABLE 1.

SUMMARY OF DESCRIPTIVE STATISTICS BEFORE AUGUST 11, 1989

	mean	T H_0:m = 0	std dev.	skew.	St.error of skew.	kurt.	St error of kurt.	range
Mean	-0.0024	-0.5480	0.0572	-3.9334	0.1579	46.7328	0.3165	0.6575
Negative obs.	47	N.A.	N.A.	51	N.A.	0	N.A.	N.A.
Securities with values greater than 50.00	N.A.	N.A.	N.A.	N.A.	N.A.	21	N.A.	N.A.
Securities with values less than -10.00	N.A.	N.A.	N.A.	2	N.A.	N.A.	N.A.	N.A.
Significant obs for mean test	N.A.	1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

TABLE 2.

SUMMARY OF DESCRIPTIVE STATISTICS AFTER AUGUST 11, 1989

	mean	T H_0:m = 0	std dev.	skew.	St.error of skew.	kurt.	St error of kurt.	range
Mean	0.0001	0.0744	0.0638	-4.5482	0.0926	69.4220	0.1847	0.9966
Negative obs.	27	N.A.	N.A.	55	N.A.	1	N.A.	N.A.
Securities with values greater than 50.00	N.A.	N.A.	N.A.	N.A.	N.A.	24	N.A.	N.A.
Securities with values less than -10.00	N.A.	N.A.	N.A.	4	N.A.	N.A.	N.A.	N.A.
Significant obs	N.A.	0	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.

for mean test

TABLE 3.

SUMMARY TABLE FOR EQUALITY OF TWO POPULATION VARIANCES AND MEANS

	F	T
Number of significant observations leading to rejection of equality of variances	38	N.A.
Number of significant observations leading to rejection of equality of means	N.A.	0

TABLE 4.

SUMMARY OF TESTS FOR NORMALITY, WHITE NOISE PROCESSES AND HETEROSKEDASTICITY BEFORE AUGUST 11, 1989

	Shapiro Wilk	Kiefer Salmon	Fisher	Bartlett	ARCH	B.P.G	HARVEY
Mean	0.7999	80,499	5.209	0.1016	N.A.	N.A.	N.A.
Percentage of significant observations rejecting normality	100.00	100.00	N.A.	N.A.	N.A.	N.A.	N.A.
Number of significant observations rejecting white noise	N.A.	N.A.	1	36	N.A.	N.A.	N.A.
Number of daily observations that rejects homosked.	N.A.	N.A.	N.A.	N.A.	9	9	15

TABLE 5.

SUMMARY OF TESTS FOR NORMALITY, WHITE NOISE PROCESSES AND HETEROSKEDASTICITY AFTER AUGUST 11, 1989

	Shapiro Wilk	Kiefer Salmon	Fisher	Bartlett	ARCH	B.P.G	HARVEY
Mean	0.8099	352,049	5.6778	0.0590	N.A.	N.A.	N.A.
Percentage of significant observations rejecting normality	100.00	100.00	N.A.	N.A.	N.A.	N.A.	N.A.
Number of significant observations rejecting white noise	N.A.	N.A.	0	36	N.A.	N.A.	N.A.
Number of daily observations that rejects homosked.	N.A.	N.A.	N.A.	N.A.	8	3	16

TABLE 6.

SUMMARY STATISTICS FOR TESTS OF LINEAR AND NONLINEAR DEPENDENCE BEFORE AUGUST 11, 1989

	LB(6) D	LB(6) D^2	LB(6) $\|D\|$	AUTOCORRELATION FOR LAG -1 D	D^2	$\|D\|$
Mean	8.22	8.38	25.09	0.068	0.055	0.140

Number of significant observations leading to accept dependence	9	10	33	23	10	41

TABLE 7.

SUMMARY STATISTICS FOR TESTS OF LINEAR AND NONLINEAR DEPENDENCE

AFTER AUGUST 11, 1989

	LB(6)	LB(6)	LB(6)	AUTOCORRELATION FOR LAG -1		
	D	D^2	|D|	D	D^2	|D|
Mean	8.93	6.59	36.21	0.059	0.025	0.120
Number of significant observations leading to accept dependence	8	7	38	22	7	44

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