How did deregulation and financial innovations impact housing, wealth, and output?

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ABSTRACT

The recent financial meltdown and economic recession has left many people wondering what role deregulation and financial innovations played in our current financial and economic crisis. There have been several deregulations in the financial and housing markets over the past 30 years. Some of these include The Depository Institutions Deregulation and Monetary Control Act, the Federal Home Loan Bank Board establishing adjustable mortgages, the 1982 Garn-St Germain Depository Institutions Act establishing a secondary mortgage market, the repeal of the Glass-Stegall Act allowing commercial and investment banks to merge, and the 2004 SECs deregulation of investment banks, allowing investment banks to increase their leverage ratio from 12:1 to 30:1.

This paper examines some of the deregulations and financial innovations that led up to our current economic and financial crises and their impacts on the housing market, stock market wealth and the overall economy. Using both Chow tests and Cusum Squares tests, this paper examines if there is a structural break in the behavior of the housing market, stock market, and GDP due to each of these events.

Key Words: Deregulation, Housing, Macroeconomics, Stock Market

INTRODUCTION

The recent financial meltdown and economic recession has left many people wondering what role deregulation and financial innovations played in our current financial and economic crisis. Prior to Bear Sterns and Lehman Brothers collapse the housing market represented by residential fixed investment (RFI), the stock market wealth measured as the Dow Jones Industrial Average (DJIA) and overall output measured as real GDP were doing quite well, which can be seen in Appendix A Figures 1-3, shows each overtime. These graphs show a tremendous change in all three overtime. The tremendous change in the mean and variation of these variables can also be seen if we examine the mean and standard deviation (S.D.) between different decades. Table 1 in Appendix B, shows that the mean of RFI and GDP overtime has increased greatly, as well as the standard deviation, which hints that there is little stability overtime for housing and the overall economy.

So what lead to the significant changes in the housing market, stock market and GDP? What role did deregulation and financial innovations have in the recent downturn in RFI, DJIA and GDP? To better answer these questions it is import to examine what these innovations and deregulations were over the past 30 years. It is important to note, that prior to the 1980s, most home loans were done by savings and loan institutions, with 95% of all home loans being conventional uninsured fixed rate mortgages. So what caused this to change?

Although home mortgage loans during the 1950s came from diverse lending institutions, by the 1960s, Savings and Loans (S&Ls) became the main providers of residential mortgage funds, providing almost all home mortgage loans.[1] Prior to the 1980s, ceiling regulations existed on deposit rates paid by S&Ls, so whenever market interest rates rose above the Regulation Q interest rate ceiling, depositors removed funds to find higher unregulated returns. During episodes of tight monetary policy, funds shifted away from savings and loans toward more attractive direct obligations, such as Treasury Bills. Reductions in S&L deposits reduced available funds for potential borrowers, regardless of the price they were willing to pay, creating a climate of "disintermediation." As S&Ls experienced a sharp outflow of deposits, they restricted mortgage lending and created credit rationing. Credit rationing as reflected in short-run reductions in the ease of borrowing, availability of mortgage funds, or the supply of mortgage credit led to reductions in housing investment. Supply rationing lowered the amount some borrowers received and eliminated potential borrowers who required loans with low down payments.[2]

In the early 1980s, federal legislative and regulatory actions were undertaken in an effort to eliminate possible supply side credit rationing. By 1983, three government actions combined to effectively eliminate Regulation Q as a significant constraint on the ability of S&Ls to raise funds.[3] In 1980, The Depository Institutions Deregulation and Monetary Control Act (DIDMCA) phased out the interest rate ceilings on time and saving deposits at banks and thrifts over a six-year period and provided nationwide authorization of interest-bearing transactions accounts. Thus, the DIDMCA eliminated Regulation Q that was imposed on Savings and Loan institutions (S&Ls), who were the main provider of home mortgage loans, which allowed S&Ls to take on riskier behavior and allowed more commercial banks to get into the home loan market.

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[1] See Martin (1978).
[2] See Jaffee and Rosen (1979).
[3] See Ryding (1990).

During this time period, the Federal Home Loan Bank Board in 1981 established adjustable federally-insured FHA mortgage loans. These FHA loans were more expensive, but since they were insured, they helped to relax credit constraints and allowed borrowers with higher loan-to-value ratios or lower down payments into the market. In essence, this allowed for more sub-prime mortgages. Once it was approved for FHA loans, the rest of the market for home loans started doing it as well.[4]

Finally in 1982, the Garn-St Germain Depository Institutions Act provided authorization of money market deposit accounts with unregulated deposit rates.[5] This helped to establish a secondary market (where mortgage loans were bought and sold) that allowed more borrowers and lenders into the housing market. It also allowed S&Ls as well as other banks to buy and sell their home loan mortgages so they were no longer tied to or owned their mortgages.

These reforms were thought to help "complete" the mortgage loan market by better matching the needs of lenders and borrowers. First, deregulation of deposit rates removed the primary cause of financial disintermediation. By allowing S&Ls to price their deposits more competitively with non-deposit securities, it removed the incentive for depositors to move funds from financial intermediaries into purchases in the primary securities markets. As depositors kept more funds in financial intermediaries such as S&Ls, it allowed S&Ls to make more home mortgage loans. Second, the development of secondary markets produced a more "complete" market by allowing more borrowers and lenders into the housing market. Third, the availability of the adjustable mortgage rates allowed payments below fixed rate mortgages, making any given payment-to-income test less binding. Borrowers preferred adjustable rates to fixed rates if they believed their income would fluctuate in the future, and this encouraged more borrowers to enter the housing market. However, a consequence of these deregulations is that after the early 1980s, S&Ls where no longer the main provider and holder of home loans and that they as well as other institutions were encouraged to take on risky behavior and to provide mortgages with a premium to lower income home buyers.

Following these deregulations, in 1987 Chairman Greenspan replaced Chairman Volker as the Federal Reserve chairman. In contrast to Chairman Volker, Chairman Greenspan encouraged deregulation of the Federal Reserve Bank and its role in overseeing banks, thus again expanding the culture of deregulation in the financial and housing markets.

During the mid to late 1990s, there were also tax changes and strong encouragement from the government to help expand the demand and access in the housing market. First, in 1997 President Clinton eliminated the capital gains tax on the primary residence. Prior to this change, a couple could only receive a one-time tax exemption on the capital gain from the sale of a home. However, after 1997, capital gains on the sale of a home that you lived in for 2 out of the past 5 years were tax exempt for up to $250,000 for an individual and $500,000 per couple, which encouraging people to buy a home for tax purposes. This tax change encouraged potential

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[4] Prior to 1981, conventional uninsured fixed rate loans comprised over 95% of all residential mortgages. Federally insured mortgages or mortgage-backed securities guarantee loan repayment to the lending institution, eliminating default risk. This enhanced the attractiveness of holding mortgages in an investment portfolio and potentially lowered the interest rate charged on mortgages. This allowed FHA mortgage loans to relax credit constraints and allow borrowers with higher loan-to-value ratios or lower down payments into the market. Although this made FHA loans more expensive than conventional mortgage loans, fully insuring lenders for the cost of default removed the lenders' incentive for nonprice credit rationing. If there was a class of borrowers who could not qualify for mortgages at the higher fixed-rate, the introduction of adjustable mortgage loans could potentially increase home purchases for a given level of interest rates.

[5] See Kahn (1989).

"flipping" the buying and immediate reselling of a house to make a profit. During this time, President Clinton also encouraged Fannie Mae and Freddie Mac to lend to lower income buyers.

In 1998 the Commodity Futures Trading Commission called for regulation of the futures market, which included credit default swaps, however, Chairman Greenspan, along with the Secretary of the Treasury Rubin and the Economic Advisor to the president, Summers were all against such actions, and thus it remained unregulated. A year later, Phil Graham proposed to repeal the Glass Steagall Act in 1999, which was originally passed after the Great Depression to separate commercial and investment banks. It passed with overwhelming support.

While during the late 1990s, the stock market was growing tremendously, especially in what is known as the dot.com technology industry, however, in 2000 and 2001, the so called "Dot.com bubble" burst, so money that flowed into the stock market was looking for a perceived better and safer return, increasing the demand for real estate investment. Soon after this fall in the stock market and to the September 11th, 2001 attack, the U.S. economy went into a recession. In response, the Federal Reserve Bank under Chairman Greenspan reduced interest rates to 1% to easy credit to help increase aggregate demand. This action combined with the fall in the stock market and the preferential tax treatment of housing made mortgages and homes very attractive, thus greatly increasing the demand for homes.

The increase in the demand for housing was potentially exacerbated by President Bush's 2001 and 2003 tax cuts for middle and upper incomes, which again increased the demand for housing. The increase in demand pushed up home prices at unforeseen rates, with the ratio of house prices to rents becoming 78% and house prices to income of 190%.

In response to such high demand and the payment structure of mortgage brokers, mortgage companies and their brokers (who are paid on commission) actively sold subprime mortgages to people with bad credit and lower incomes. According to Credit Suisse, Subprime mortgages grew from $173 billion in 2001 to a record level of $665 billion in 2005, which represented an increase of nearly 300%. One reason for this tremendous growth was that commissions on subprime mortgages were much greater than the commissions for prime mortgages. Thus, mortgage brokers often became creative and sometimes even accepted "liar loans" and did not verify the information for that was used to obtain the loan. In fact, mortgage brokers often encouraged adjustable rate mortgages to people who could not afford homes.

In 2004, the Securities and Exchange Commission (SEC) very quietly deregulated Investment Banks and allowed their debt to capital ratio to increase from 12:1 to 30:1. This encouraged investment banks to greatly increase their leverage. During the mid-2000s, in 2003, Bear Sterns fixed-income department set up a hedge fund called the High-Grade Structured Credit Fund and told investors the High-Grade Structured Credit Fund would invest in low-risk, high-grade debt securities, such as tranches of CDOs, which the ratings agencies had rated either AAA or AA. The fund would focus on using leverage to generate returns by borrowing money in the low-cost, short-term repo markets to buy higher yielding, long-term CDOs. In 2006, Bear Sterns opened a second fund, the High-Grade Structured Credit Enhanced Leveraged Fund with close to $600 million of investors' money, as well as $400 million borrowed from a credit facility from Barclays, the largest British Bank. This fund used substantially even more leverage and risk than the first fund. (Cohan, 2009).

Eventually, the expansionary monetary policy of low interest rates and expansionary fiscal policy of tax cuts and the war on Iraq started to put inflation pressures on the overall economy. Thus to reduce inflation, the Federal Reserve Bank increased interest rates very quickly from July 2004 to July 2006 from 1% to 5.25%. This made many of the adjustable rate

mortgages (ARMs) which were reaching their common 3 and 5 year introductory fixed rates to increase the interest rates on many home owners, which made mortgage payments unaffordable. To help put things in perspective, for the average home loan a 2% increase in the interest rate can increase the cost of mortgage interest payments by close to 40%. Since many of the ARMs were given to low income and subprime mortgages, this quick and significant increase in the mortgage payments, caused many homeowners to default on their loans. As people began defaulting on their loans, others wanted to cash out and the supply of housing increased significantly.

As the supply of housing increased, it put downward pressure on the price of housing, causing a quick and significant reduction in home prices. This fall in housing prices was exacerbated by the fact that building of new homes peaked in 2007. Homes were saturating the market with supply, just as demand was falling, causing housing prices to fall even faster. The quick fall in housing prices made defaults for banks even more risky and costly. Since many of these subprime mortgages were packaged together and sold over and over again as credit default swaps, it caused banks to have to write-off bad assets, reducing their balance sheet and hurting their stock value. Since most of these credit default swaps were not traded on an exchange they were unregulated, and thus no one had any idea how many or how large the credit default swap market had become. Similarly, it was also not very clear what was in any of the packaged deals.

During this time, Lehman acquired five mortgage lenders, including subprime lender BNC Mortgage and Aurora Loan Services, which specialized in Alt-A loans (made to borrowers without full documentation). By 2007, Lehman underwrote more mortgage-backed securities than any other firm, accumulating an $85-billion portfolio, or four times its shareholders' equity. By the middle of 2007, the Credit Default market was greater than 45 trillion dollars.

In August 2007, the credit crisis erupted with the failure of two of Bear Sterns hedge funds, the High-Grade Structured Credit Fund and the High-Grade Structured Credit Enhanced Leveraged Fund. By the end of 2007, Barclay's brought a lawsuit against Bear Sterns for not disclosing what was in the funds. Soon after Standard and Poor's downgraded the company's credit rating. By March 2008, Bear Sterns collapsed and was sold to J.P. Morgan.

By the summer of 2008, the stock market lost confidence in the mortgage finance giants Fannie Mae and Freddie Mac, with the stock prices plummeting by more than 90% after they reported accumulated losses of $14 billion for the year. By July 2008, the government gave Fannie $34.2 billion and Freddie $51.7 billion.

September 15, 2008, Lehman Brothers filed for bankruptcy. With $639 billion in assets and $619 billion in debt, Lehman's bankruptcy filing was the largest in history. Lehman was the fourth-largest U.S. investment bank at the time of its collapse, with 25,000 employees worldwide. Less than one week later, AIG's credit rating was downgraded, increasing their collateral obligations. In response, their stock price fell 95%. While they were on the brink of bankruptcy, the government stepped in on September 18th, 2008 and gave them a loan of $85 billion dollars.

ESTIMATION TECHNIQUE AND DATA

To examine the impacts of deregulation and financial innovations on the housing market, stock market and GDP, a chow test is employed. This test determines whether there is a significant structural change in RFI, DJIA, and GDP before and after the time periods before and after deregulation and financial innovations. To do this, I split the time period into two separate

periods before and after each event and compare results to determine if there is a change in the behavior of RFI, DJIA, and GDP.

A Chow test is employed to examine whether there is a significant structural difference in the housing market after the earlier 1980s and then again after the late 1990s. This Chow test is similar to that of Pozdena (1990) and outlined in Hamilton (1994), and tests for a structural change between the two sample time-periods. A significant difference indicates a structural change in the housing market. To estimate this, an F test is constructed as:

F = [(RSS1 –RSS2 –RSS3)/k]/[(RSS2+RSS3)/(N1+N2-2K)]

where the residual sum of squares *(RSS)* information from regressions spanning the entire data sample is *(RSS1)*, the first sub-period *is (RSS2),* and the second sub-period is *(RSS3).* This F test has degrees of freedom of: *{k,N1+N2-2k}* where *N1* is the sample size of the first sub-period, *N2* is the sample size of the second sub-period, and *k* is the number of estimated parameters.

To examine the robustness of the Chow test results, Cusum-of-Squares tests are estimated. Green (1997) argues that a cusum-of-squares test is appropriate if uncertainty exists regarding when a structural change might exist. According to Greene (2000), one advantage of this test is that is does not require a prior specification of when the structural change takes place as a Chow test does. However, the power of the cusum-of-squares test is limited compared with that of the Chow test.

In general, this test plots the variable over time and its 5 percent critical values. Any movement outside the critical lines suggests the parameter or its variance is no longer stable. This test, developed by Brown, Durbin, and Evans (1975), has a null hypothesis that the coefficient vector β is the same in every period, while the alternative is that β (or the disturbance variance) is not the same in every time period. Specifically, the CUSUM Squares test is based on the test statistic:

$$S_t = \frac{\sum_{r=t}^{r=K+1} w_r^2}{\sum_{r=k+1}^{r=T} w_r^2},$$

where w_r is represented by

$$w_r = \frac{e_r}{\sqrt{1 + x_r'(X_{r-1}'X_{r-1})^{-1}x_r}},$$

which goes from zero at $t = k$ to unity at $t = T$. Assuming that T equals all observations and t equals the ex post prediction error for y_t, the regression is estimated using only the first t-1 observations such as where x_t is the vector of regressors associated with observation y_t and b_{t-1} is the least squares coefficients computed using the first t-1 observations. The forecast variance of the residual is:

$$\sigma_{ft}^2 = \sigma^2\left[1 + s_t'(X_{t-1}'X_{t-1})^{-1}x_t\right]$$

where the expected value of S under the hypothesis of parameter constancy is:

Deregulation and Financial Innovations

$$E|S_t = \frac{(t-k)}{(T-k)}.$$

To determine the proper lag length, a likelihood ratio test is used. All log likelihood ratio test results suggest that four lags of RFI, DJIA, and GDP are the proper lag lengths, thus cusum square test results are based on four lags.

To obtain the necessary data, the Bureau of Economic Analysis reports real RFI and GDP in quarterly 1996 dollars from 1959.Q1-2009.Q4 at http://www.bea.doc.gov/. Data regarding the stock market is from the quarterly average of the closing of the DJIA.

RESULTS

Chow test results seen in Appendix C suggest that there is a structural break in the housing market before and after each of the deregulations and financial innovations mentioned. In fact, with the exception of the late 1980's, it appears that there is a continuous structural break in RFI or housing behavior. While this is a surprising result, it suggests that the housing market may never have returned to "normal". This may be driven by the tremendous and unprecedented rise and fall in RFI data over the past ten years creating a distortion in the data.

Similarly, Cusum Square results in Appendix D also show that there appears to be a structural break in housing market during the early 1980s. However, these results suggest that the housing market returns to normal soon after this break, which contradicts that found in the Chow Test Results. Again, this may be due to the extremes that we have seen in the housing market over the past decade driving the findings.

Chow test results for GDP also appear to have a continuous structural break since 1996. This is a very surprising result, considering that until 2007, GDP was growing at a three percent growth rate for close to twenty years. However, as previously mentioned this may be due to the tremendous and quick downturn from 2007 to 2009 driving the findings. Cusum square results for GDP also show that GDP was significantly different through the 1990s. During this time period we did see tremendous growth in the overall economy.

Chow test results for the DJIA show that there is a structural break in the stock market for every year after 1985. Similarly, Cusum square test results show very little stability in the stock market.

CONCLUSIONS

In conclusion, results suggest that financial innovations and deregulations have greatly altered the housing market, stock market and overall economy. In fact, it appears that all three are exhibiting a continuous structural break over the past few decades and have not returned to their "normal" behavior. While it is unclear what the catalyst is that caused this structural break, it is clear that it has been a strong and continued break, with an increase in the volatility of the housing market, stock market and the overall economy.
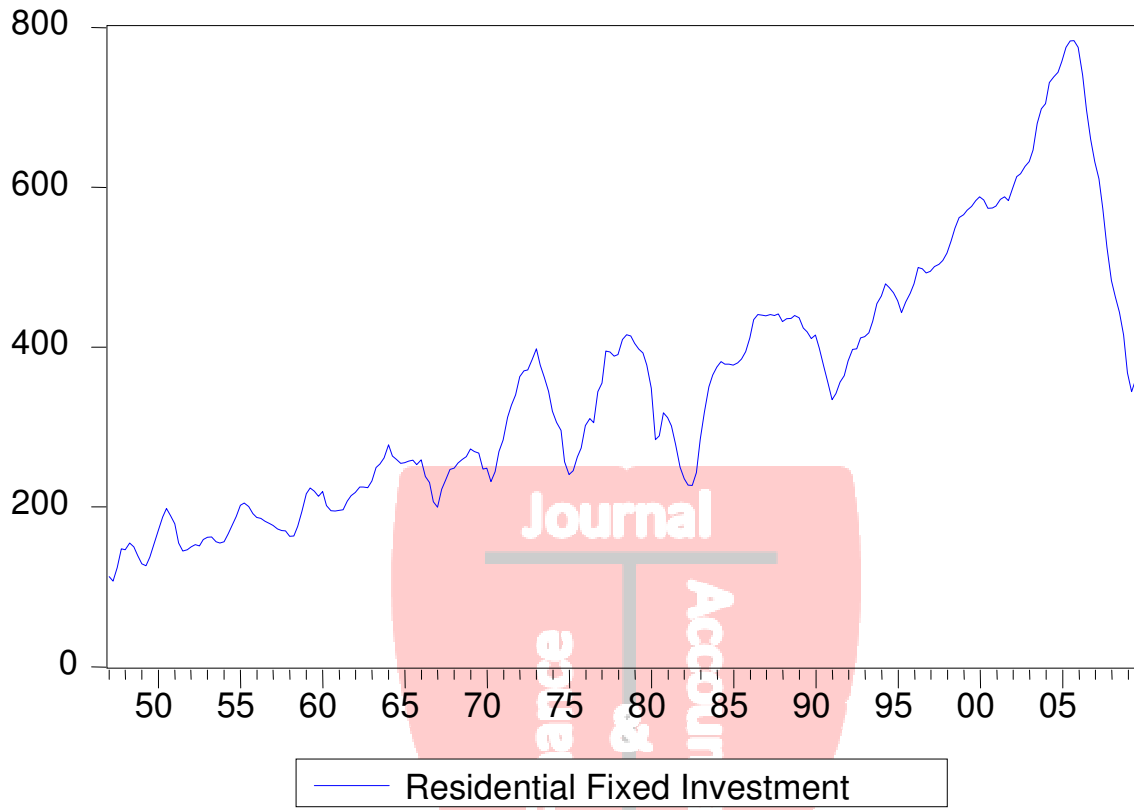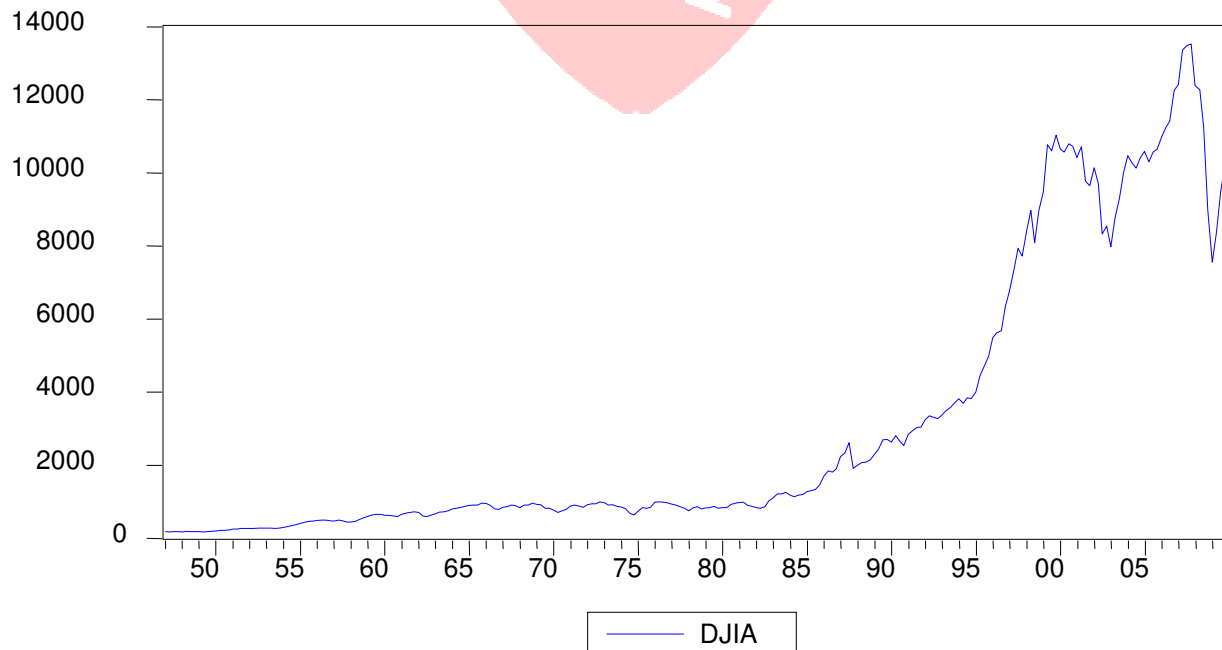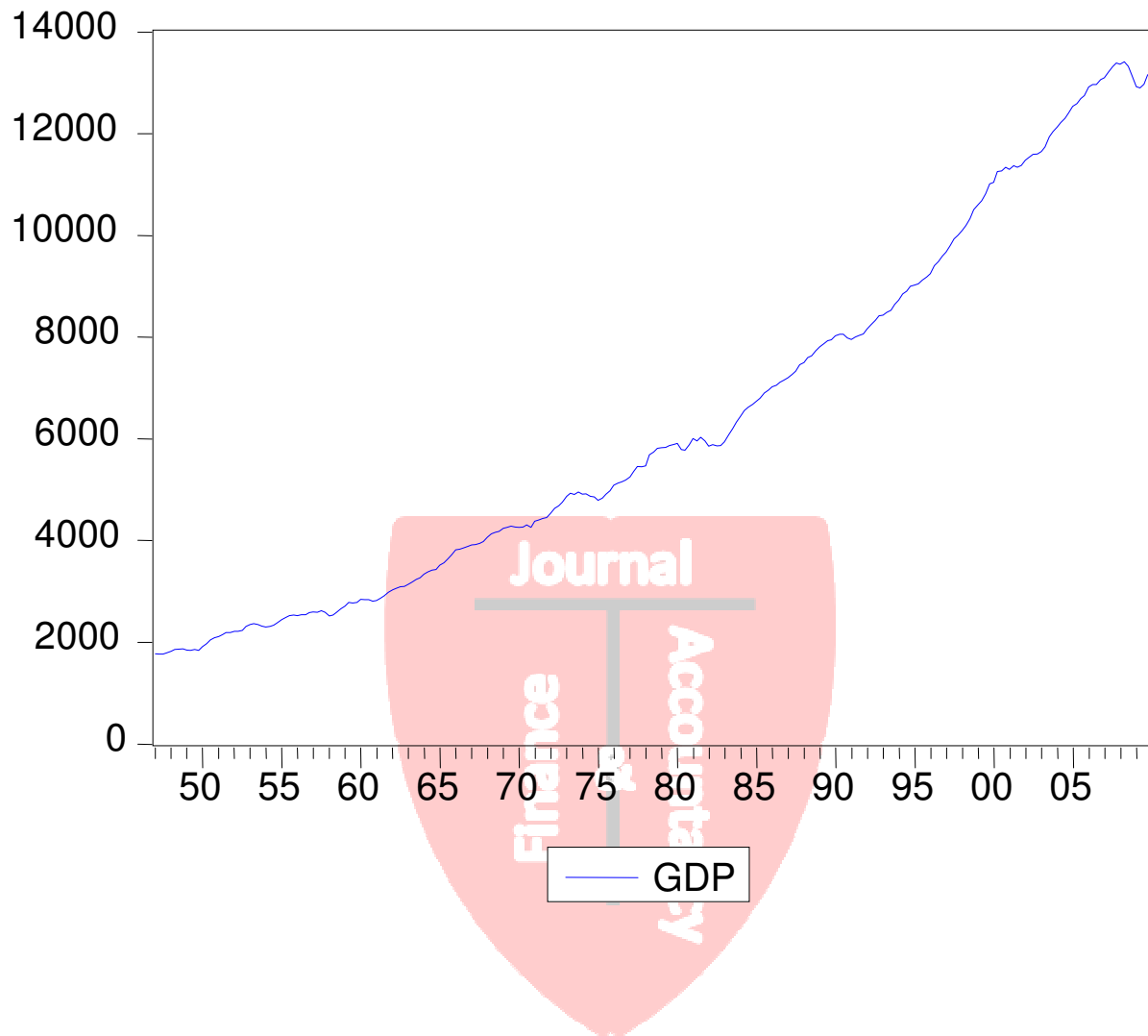
Appendix A: Figures 1-3

Figure 1

Residential Fixed Investment

Figure 2

DJIA

Deregulation and Financial Innovations

Figure 3

Deregulation and Financial Innovations

APPENDIX B: Table 1: Mean and Standard Deviation of RFI, GDP, and DJIA

Table 1: Mean and Standard Deviation

	Mean	Standard Deviation		Mean	Standard Deviation
Variable	1959-1979			1980-1989	
RFI	283.3881	66.186		365.0539	71.31433
GDP	4191.613	932.7594		6715.927	724.5147
DJIA	817.3667	112.9319		1513.849	599.1189
	1990-99			2000-2009	
RFI	459.8541	69.16426		605.9144	124.822
GDP	9117.556	926.6318		12340.17	777.4275
DJIA	5309.042	2599.579		10466.4	1437.649

Deregulation and Financial Innovations

Appendix C: Chow Test Results

RFI Chow Breakpoint Test				
Date	F-stat	Prob.	LLR	Prob.
1980	3.177424	0.008831	16.0572	0.006683
1981	3.152122	0.009272	15.9342	0.007034
1982	3.488897	0.00483	17.5653	0.003544
1983	3.394887	0.005797	17.11129	0.004294
1984	2.630704	0.025081	13.38282	0.020044
1985	2.806402	0.017981	14.24611	0.014119
1986	2.557129	0.028806	13.02023	0.02319
1987	2.196776	0.056218	11.23494	0.046916
1988	2.117317	0.064985	10.83917	0.054664
1989	2.263012	0.049783	11.56427	0.041272
1990	2.531827	0.030207	12.89538	0.024379
1991	2.982531	0.012845	15.10786	0.009911
1992	2.89741	0.015117	14.69184	0.011763
1993	2.661805	0.023652	13.5359	0.018842
1994	2.455462	0.034846	12.51812	0.028338
1995	3.184255	0.008715	16.0904	0.006591
1996	3.460138	0.005107	17.42652	0.003758
1997	3.812077	0.002571	19.11837	0.001827
1998	3.713569	0.003117	18.64624	0.002237
1999	3.230505	0.00797	16.315	0.006
2000	3.398439	0.005758	17.12846	0.004263
2001	3.521602	0.004532	17.723	0.003314
2002	3.641066	0.003591	18.29803	0.002595
2003	3.307079	0.006873	16.68632	0.005135
2004	3.089913	0.010452	15.63147	0.007979
2005	4.285404	0.001016	21.37188	0.000689
2006	5.009234	0.000244	24.77059	0.000154
2007	3.345197	0.006384	16.87091	0.004751

Deregulation and Financial Innovations

GDP Chow Breakpoint Test				
Date	F-stat	Prob.	LLR	Prob.
1980	0.744311	0.591181	3.876337	0.567354
1981	1.101168	0.361146	5.709023	0.33557
1982	1.895255	0.096849	9.729031	0.083287
1983	2.962008	0.01336	15.00764	0.01033
1984	1.724216	0.130757	8.869828	0.11437
1985	1.503356	0.190477	7.75497	0.170267
1986	1.450647	0.207901	7.488005	0.186802
1987	1.450743	0.207868	7.48849	0.18677
1988	1.327779	0.253962	6.864328	0.230928
1989	1.292785	0.268565	6.686346	0.245032
1990	1.39267	0.228653	7.193948	0.206611
1991	1.611549	0.158702	8.301869	0.140365
1992	2.110039	0.06585	10.80288	0.055431
1993	1.920815	0.092547	9.857117	0.079386
1994	2.047567	0.073736	10.49112	0.062457
1995	1.998089	0.080605	10.24387	0.068613
1996	2.642189	0.024544	13.43937	0.019592
1997	2.82082	0.017494	14.31679	0.013718
1998	2.844548	0.016721	14.43306	0.01308
1999	2.375378	0.040447	12.12174	0.033157
2000	2.695317	0.0222	13.70072	0.017627
2001	3.563578	0.004176	17.92524	0.003042
2002	3.684518	0.003299	18.50679	0.002374
2003	4.545451	0.000609	22.59944	0.000403
2004	4.465247	0.000713	22.22162	0.000475
2005	4.89338	0.000307	24.23039	0.000196
2006	6.026232	0.000033	29.45216	0.000019
2007	7.25674	0.000003	34.9766	0.000002

Deregulation and Financial Innovations

DJIA Chow Breakpoint Test				
Date	F-stat	Prob.	LLR	Prob.
1980	0.533382	0.750834	2.785294	0.733045
1981	0.561153	0.729693	2.929275	0.710889
1982	0.674349	0.64337	3.515103	0.621104
1983	0.708457	0.617743	3.691294	0.59466
1984	0.746551	0.589536	3.887892	0.565667
1985	0.895993	0.484836	4.657333	0.459113
1986	0.93507	0.459359	4.858053	0.433448
1987	0.960256	0.443402	4.987317	0.41743
1988	1.37719	0.234487	7.115366	0.212201
1989	1.413385	0.221042	7.299062	0.199332
1990	1.438956	0.211949	7.42874	0.190656
1991	1.864069	0.102349	9.57264	0.08829
1992	2.06378	0.071608	10.57208	0.060556
1993	2.519502	0.030913	12.83454	0.02498
1994	3.022915	0.011888	15.30494	0.009136
1995	4.445225	0.000741	22.1272	0.000495
1996	5.175291	0.000176	25.54238	0.000109
1997	6.263187	0.000021	30.52768	0.000012
1998	7.642615	0.000001	36.67865	0.000001
1999	10.83862	0	50.25518	0
2000	10.28046	0	47.94833	0
2001	7.80616	0.000001	37.39576	0
2002	7.206169	0.000003	34.75248	0.000002
2003	0.000002	0.000001	38.38099	0
2004	7.697401	0.000001	36.91915	0.000001
2005	9.051082	0	42.7734	0
2006	10.58698	0	49.2184	0
2007	10.34074	0	48.19874	0

Deregulation and Financial Innovations

Appendix D: Cusum Squares Graphs
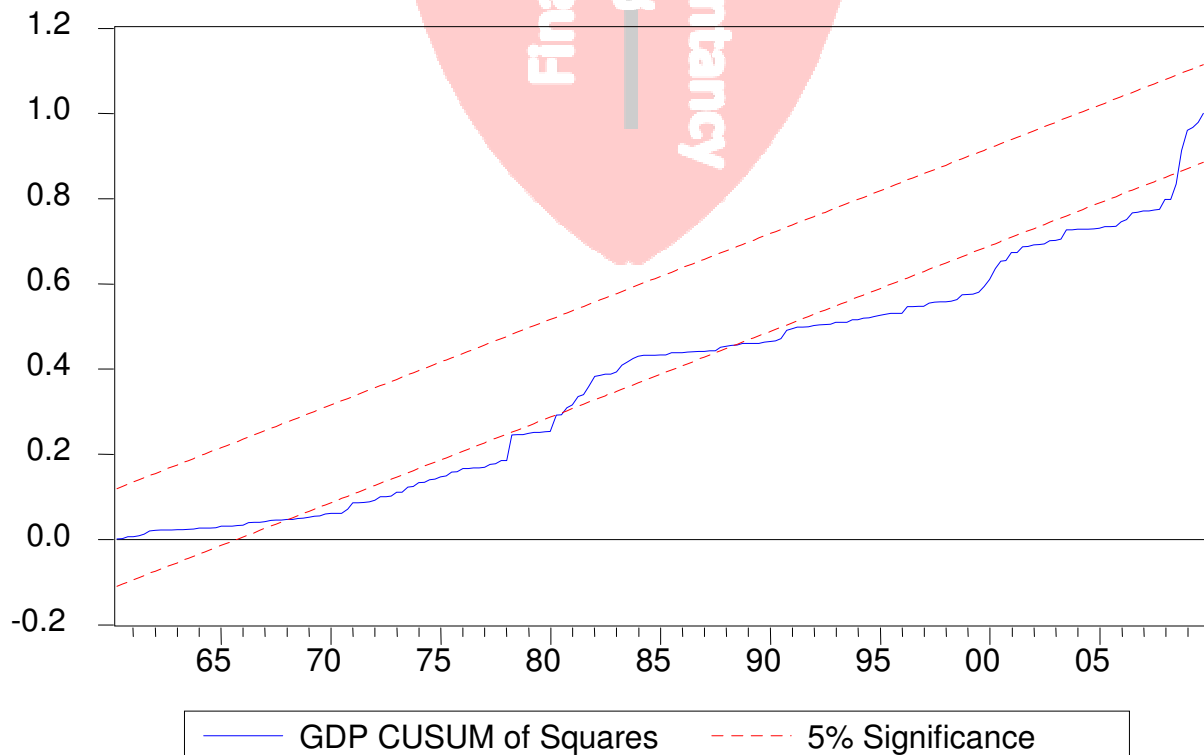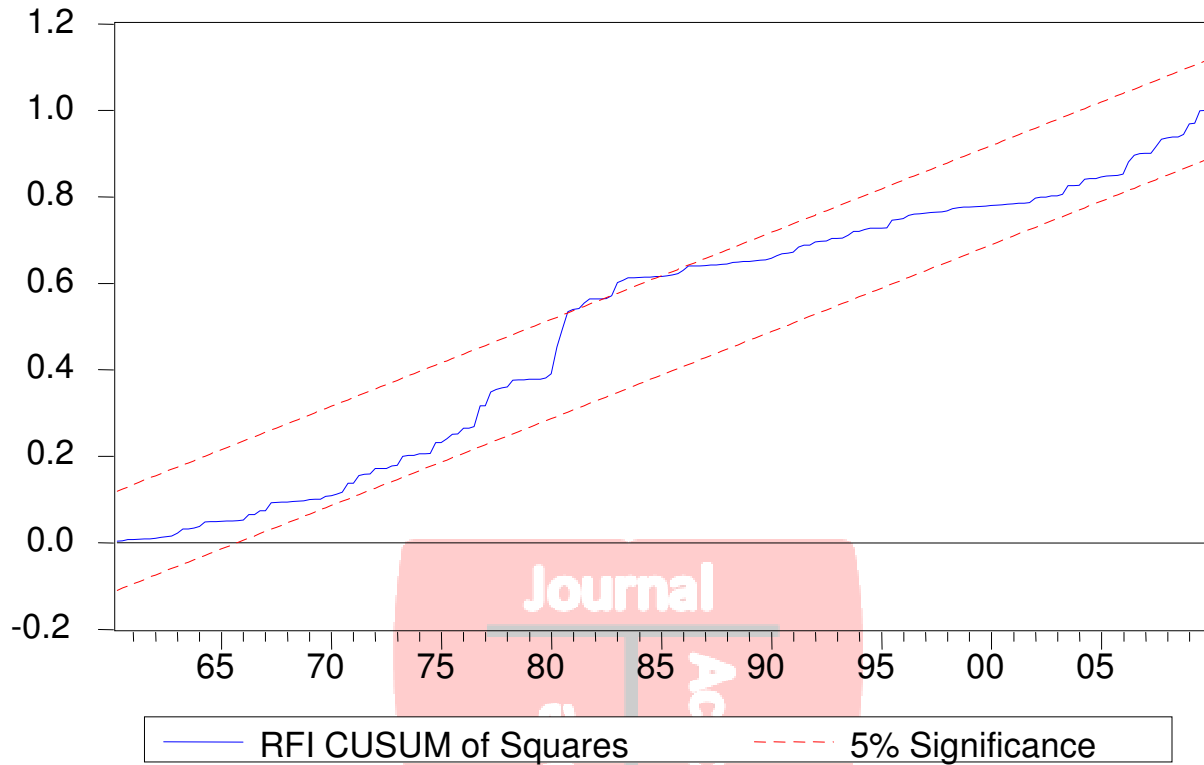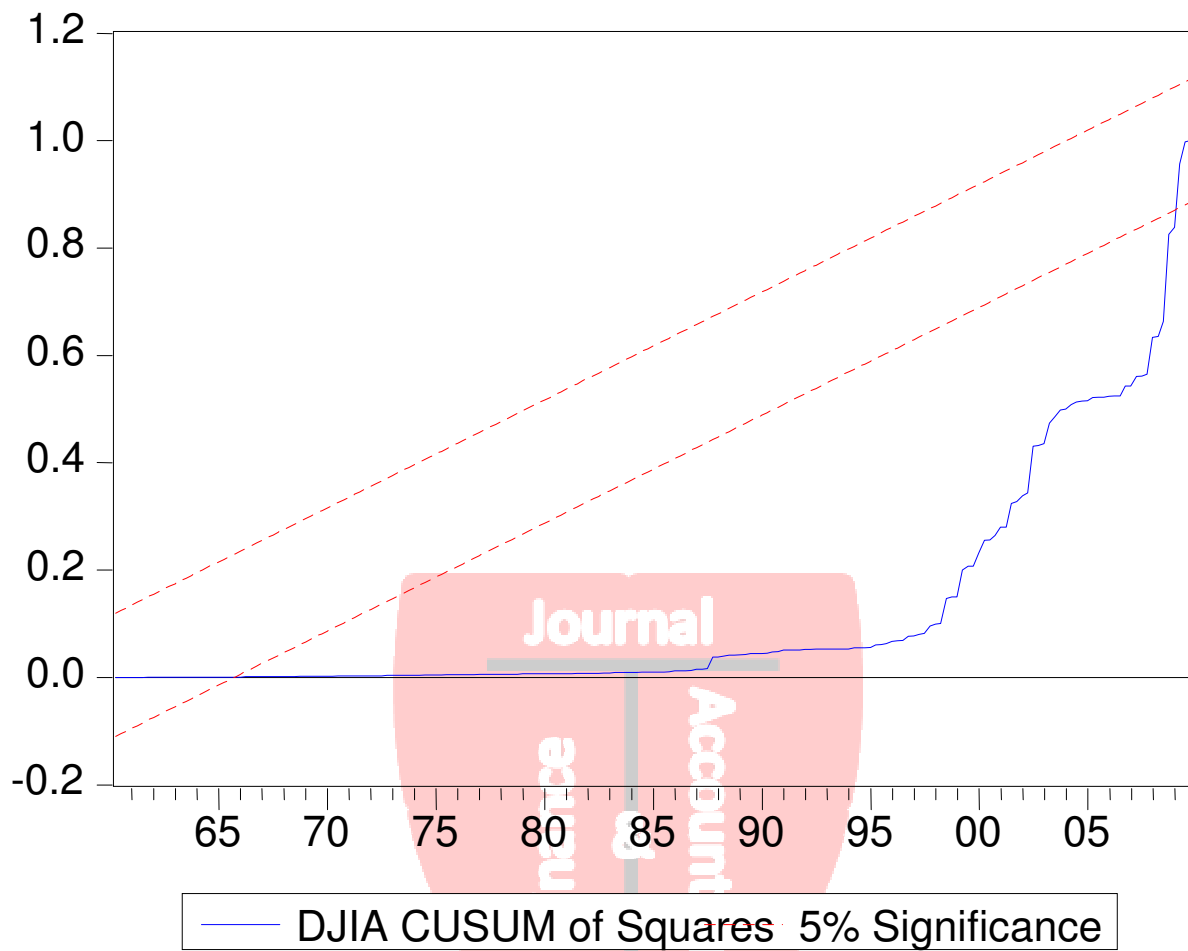
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