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# Connecting 9/11 to the Financial Crisis

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**Abstract:** This paper summarizes and analyzes research on the economic impact of United States fiscal and monetary policy in the wake of the 9/11-terrorist attacks. Therein, it attempts to connect this tragedy to the financial crisis of the late-2000s, which is still not fully understood. The large number of factors identified by numerous experts as the causes for the collapse of the financial system makes the crisis a difficult topic to study. This analysis provides a stepping-stone for any further research in that it helps explain how the factors that led to the crisis were created in the first place. Expert opinions, academic studies, as well as both a Cobb-Douglas production function and one of the newest specifications of the Taylor Rule are looked at throughout this paper. While the latter model shows how monetary policy should have been determined throughout the 2000s, the former helps to analyze the impact of fiscal policy after 9/11 on monetary policy. Based on the research and analysis presented in this paper, we can conclude that the factors that caused the collapse of the financial system were largely impacted by government spending in response to the terrorist attacks and monetary policy between 2001 and 2008. This conclusion implies that the crisis could have been minimized if not prevented altogether.

**Keywords:** Financial Crisis, Fiscal Policy, Monetary Policy, Liquidity Effect, Paradox of Monetary Economics, Money Supply, Interest Rates, Systemic Risk

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## 1. Introduction

It was just another Tuesday morning, not quite nine o'clock, the streets of New York City filled with cars and people heading to work. For about three thousand of them it would be the last thing they ever did. Between 8:46 and 10:28 AM nineteen terrorists committed a horrific crime against the United States, one that will remain unforgettable to the history of mankind. Four airplanes were hijacked and crashed into the World Trade Center and the Pentagon. Thankfully, the terrorists missed their third target, the White House, because the passengers of United Airlines Flight 93 forced them to wreck the plane on a field near Shanksville, Pennsylvania. It was September 11th, 2001.

As hard as it was to overcome the psychological damage of these attacks, the "legacy of the disaster has been the exposure of the vulnerability of the [American] financial system to both internal and external shocks"<sup>1</sup>. This paper examines how the terrorists not only altered the way people look at national security, but also helped set the stage for the largest economic crisis in the United States since the

Great Depression. Specifically, this paper analyzes how government spending on the War on Terror and other steps to ensure the safety of the American people caused the conditions that led to the financial crisis in the late 2000s. The approach the government took to finance these steps and the impact of fiscal on monetary policy between 2001 and 2008 is also looked at in detail. Lastly, this paper focuses on interest rates and changes in the money supply, which significantly "helped spark a historic collapse"<sup>2</sup> of the economy. A large amount of empirical data, macroeconomic and monetary theory, and several illustrations of the impact of relevant government policies are provided to illustrate how the financial crisis relates directly to the terrorist attacks of 9/11.

Overall, the importance of this work lays in the fact that the "financial [crisis] is not yet fully understood in its full complexity"<sup>3</sup> because of the sheer number of contributing factors. In order to ensure that this situation does not repeat

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1 Burton (2011). Page 1.

2 Comiskey and Madhogarhia (2009). Page 274.

3 Jickling (2009). Summary.

itself, it is essential to understand exactly what happened and why it happened. This paper discusses the underlying economic factors, which ought to be considered the root of the financial collapse. It answers several questions still surrounding the conditions that led to the financial crisis by connecting the latter to the government's response to 9/11 and the Federal Reserve's subsequent monetary policy. Therein, a much-needed analysis of the consequences of the attacks is provided and will hopefully lead to more informed decision-making by both public and private actors in the future. Bear in mind that this paper discusses the causes for the conditions leading up to the financial crisis, not the conditions themselves. At the end of the day, both fiscal policy after 9/11 and US monetary policy between 2001 and 2008 led directly to the factors that caused the financial crisis in the late 2000s.

## 2. Literature Review

As for previous literature on the topic of 9/11 and the financial crisis, Jickling (2009) lists and summarizes all causes of the collapse as identified by the United States government. In addition, he analyzes the complexity of the crisis in much detail by incorporating economic phenomena and government policies in his investigation. The report is meant to answer questions about the origin of the crisis, why it escalated to become one of the worst recessions in United States history, and who is to blame for the fiasco. Therein, Jickling's report helps explain the financial crisis in its full complexity. In his research, the financial economist found that "the roots of the crisis go back much further"<sup>4</sup> than 2008, which is when the Federal Reserve began to worry more about financial stability than inflation. Other economists including Marc Faber, Michael Comiskey, Pawan Madhogarhia, and Kimberly Amadeo have taken the same position in interviews, articles, and academic studies. The argument that the crisis was initiated long before the actual collapse relates these studies to this paper in that it connects the Great Recession to monetary policy and government borrowing and debt.

Monetary policy, in particular, is viewed as one of the most important factors in determining the well being of the United States economy. Nelson (2010), a former professor of economics at the University of Washington, explains the variables that make monetary policy work and how it has evolved over time. He goes back to the 1940s and 1950s when the Truman administration "emphasized that the Fed would be responsible for monetary policy"<sup>5</sup> and monetary policy only. This argument helps to explain the institution's actions post-9/11. After discussing the liquidity effect and the paradox of monetary economics, Nelson talks specifically about the Federal Reserve's response to the terrorist attacks. The liquidity effect receives further support from James D. Hamilton in his 1997 study of the

impact of capital reserve requirements for banks on interest rates. Hamilton's goal was to identify how monetary policy must be used to ensure economic stability in the United States. Both Hamilton's and Nelson's research shows that it is essential to adhere to a variation of the Taylor Rule to achieve the Federal Reserve's main goals of full employment and low inflation. Furthermore, Nelson establishes that bad monetary policy is hardly recognizable in the short run, but will eventually raise inflation and cause recurrent recessions in the long run. Because he uses the Federal Reserve's response to 9/11 to show the ramifications of improper monetary policy, his text plays a key role in proving the thesis presented in this paper. He also connects government spending and debt to interest rates, which links the economic phenomena referenced throughout this paper.

John B. Taylor (2009) explains the role interest rates played in the financial collapse in more detail. The famous economist draws from in-depth research about the actions of the Federal Reserve in the early- to mid-2000s. He discusses how the authorities deviated from sound principles in regard to monetary policy, which had worked for many decades prior to the 2000s. Both historical experience and the author's very own Taylor Rule suggested interest rates much better suited to the state of the economy at the time. According to Larry Elliot (2014), the International Monetary Fund publicly supports Taylor's stance. He found that the housing boom and subsequent bust would have never happened without loose-fitting monetary policy, suggesting that the collapse could have been avoided. Furthermore, Taylor looks at government saving and investment between 2001 and 2004 to prove that global factors did not cause the drop in interest rates. Therein he supports his main argument that government interventions led to the financial crisis. Taylor's book provides the last step in the connection between 9/11 and the financial crisis. He describes in detail how the boom in the early-2000s and the subsequent bust were created by factors that can be traced back to the government's response to 9/11. In addition, he convincingly explains that there was no global saving glut, which is the focal point of the critics' alternative explanation for the collapse. Joseph Stiglitz (2014) goes into further detail about excessive global saving and its negligibility in regard to the financial crisis.

Another issue addressed in this paper is government debt. Eric Engen and Glenn Hubbard (2005) draw a line between the increase in national debt and the increase in interest rates between June 2004 and the financial crisis. The authors look at several different ways to determine the impact of the growing government deficit on monetary policy including a Cobb-Douglas production function, a Keynesian IS-LM model, and an alternative production function framework based on the authors' crowding-out hypothesis. Therein, Engen and Hubbard supply valuable evidence for the dependence of interest rates on government debt. They conclude that an increase in government debt increases interest rates in the long run. While it may seem

4 Jickling (2009). Summary.

5 Timberlake (2008).

that their work counters John Taylor's argument, the fact that "factors other than government debt can influence the determination of interest rates"<sup>6</sup> shows how the two frameworks can work together with one dominating between 9/11 and 2004 and the other dominating between 2005 and the financial crisis. For example, the Federal Reserve's purchase of government securities in the early-2000s offset the impact of an increasing federal deficit. The extra money supply then depressed interest rates. By the middle of the decade the Federal Reserve stopped increasing the money supply, which then led to rising interest rates. Meanwhile, the government kept operating at a deficit in part due to tax cuts and, therein, spurred the crowding-out effect. These tax cuts were contentious decisions in the first place and are criticized by numerous experts. Reinhart and Tashiro (2013) provide a helpful and necessary description of how capital is crowded out. Their study focuses on the impact of deficits, finding that the crowding-out effect occurs when a government rolls over debt for an extended period of time. Engen and Hubbard theorize that the higher government deficit was a direct result from government spending on the War on Terror and national security post-9/11. Therein lays the connection between the findings of Engen and Hubbard, Reinhart and Tashiro's work, and the hypothesis of this paper.

Government spending after the terrorist attacks is more closely examined by Linda Bilmes (2011). The Harvard professor looks at the cost of improved homeland security and the War on Terror as she attempts to explain how these government actions have contributed to the financial crisis. Bilmes tries to establish a better understanding of the connection between the terrorist attacks and the financial crisis. She found that oil prices spiked substantially between the invasion of Iraq in 2003 and the first signs of a financial crisis in 2007. Fact is, the wars in Iraq and Afghanistan brought instability to the Gulf region, which contributed to higher oil prices. This, in turn, contributed to the Federal Reserve loosening its monetary policy especially in the two years following the initial spike in oil prices, according to Bilmes. Loose monetary policy, she says, resulted in the housing bubble and contributed to real GDP growth in the early-2000s, which is supported by figure 1<sup>7</sup>. Eventually, however, this led to the financial collapse. While John Taylor closely examines the connection between monetary policy and the crisis, Bilmes adds more details about the way the United States government financed its response to 9/11 and the implications of the accumulated debt for the future. Her work establishes the missing connection between the terrorist attacks and the financial crisis.

Martin Eichenbaum and Jonas Fisher (2004) provide another valuable examination of the government's response to the 9/11-shocks. Primarily the authors analyze how the increase in government spending in the early- and mid-

2000s can be attributed to the attacks. Their research covers empirical data on how the government responded to such shocks in the past and if the response to 9/11 was justifiable or rather an act of panic to keep the economy out of a recession. Eichenbaum and Fisher utilize highly technical analyses and complex functions to prove their argument that the increase in government spending is attributable to the terrorist attacks. From their research, the two economists conclude that national debt would have behaved very differently if the government had responded to 9/11 in the same fashion as it did to previous shocks of similar magnitude. They also found military expenditures post-9/11 were as significant as those associated with the Korean War, Vietnam War, and Carter-Reagan defense buildup. Eichenbaum and Fisher's research proves that government spending after the terrorist attacks was significant enough to influence monetary policy and contribute to the causal factors of the financial crisis.

As with all research, there are counterarguments. Maurice Obstfeld and Kenneth Rogoff (2009) suggest that three distinct global trends became ever less sustainable as time went on and caused the bust of the credit bubble at the end of 2007. They argue that real estate values in many countries rose much too fast, too many countries were operating under high and rising deficits, and leverage levels had become far too large in numerous economies across the globe. The authors emphasize how these factors occurred on a global scale and, therein, try to provide evidence that global imbalances were the primary determinant of the conditions that led to the financial crisis. They conclude that the willingness of other countries, primarily China, to lend money helped the United States finance its deficit. Allegedly the problem is that the authorities underestimated the implications of excessive borrowing. Obstfeld and Rogoff argue that the imbalances "both reflected and magnified the ultimate causal factors behind the... financial crisis"<sup>8</sup>. Their paper provides an alternative explanation for the causes of the financial crisis, but is invalidated throughout this paper.

Claudio Borio and Piti Disyatat (2011) further examine the argument that global imbalances, excessive saving in particular, contributed to the causes of the financial crisis. The monetary economists analyze previous research, which states that account surpluses in numerous market economies encouraged risk-taking and subprime mortgage investments. According to Borio and Disyatat, these hypotheses display significant weaknesses. Throughout their paper, the authors attempt to prove that capital flows between various countries were insignificant to the financing of the subprime mortgages. In addition, they argue that an increase in global saving did not contribute to interest rates hitting record lows between 2001 and 2004. In their research, Borio and Disyatat found that the excessive-savings argument puts far too much emphasis on the role of current account imbalances across the globe. Although

6 Engen and Hubbard (2005). Page 85.

7 Appendix A.

8 Obstfeld and Rogoff (2009). Page 4.

savings might have an impact on interest rates, the economists found evidence that this was not the case before the financial collapse in 2008. Joseph Stiglitz supports their argument and helps Borio and Disyatat support the notion that monetary economics played a more significant role than global imbalances to the financial crisis.

### 3. Government Spending Initiated the Downfall of the United States Financial System

As terrible as the terrorist attacks were, the economy did not give the authorities time to cope with the losses. We knew before that “an increase in terrorist activity redirects economic activity from investment to government spending,”<sup>9</sup> and this trend persisted after 9/11. A transition away from investing is always undesirable because of the significant impact investments have on the larger economy. This section examines how “the long-term damage [of the attacks was] inflicted not by the event itself but by the response to it,”<sup>10</sup> which led to outrageous levels of government debt and subsequently to low interest rates and the financial crisis.

Before we look at the impacts of the response, however, we must explore how exactly the government responded to the 9/11-attacks. First and foremost, the government feared other terrorist groups might launch similar attacks on the United States, which led to substantial capital flows towards national defense and improvements to homeland security. One of the most notable reactions by the government to 9/11 was a more expansionary fiscal policy. The repercussions of the new policy approach were “to destroy any semblance of fiscal discipline in Washington”<sup>11</sup>. Seemingly out of anger and grief, the government “rush[ed] headlong into two, essentially unaffordable wars”<sup>12</sup> in Afghanistan and Iraq. Both conflicts were justified by the argument that 9/11 forced our military into a War on Terror. About fourteen years later, the impact of the two wars on government debt still affects the economy today.

The way the government decided to finance the conflicts took an immense financial toll on the United States. Fact is that “war costs always linger well after the last shot has been fired”<sup>13</sup>. As shown in figure 2<sup>14</sup>, in the late-1990s the Clinton-administration made a conscious effort to reduce federal debt continuously and smart policy-making put the nation on the right path. However, when George W. Bush took office in 2001 the government ceased its debt-control mindset and went on a spending spree, in particular after 9/11. Specifically, decisions to create the Department of Homeland Security, attack Afghanistan and Iraq, and

improve national security systems strained the budget. When the new administration decided to combine these expenditures with tax cuts in 2001 and 2003, the trend of decreasing national debt inevitably reversed, as figure 2<sup>15</sup> indicates. Furthermore, figure 3<sup>16</sup> reveals how defense spending alone increased by about \$150 billion between 2001 and 2003 and had more than doubled by the end of 2007. Overall, the amount of money the government put into its Department of Defense increased from a little under \$300 billion in 2000 to over \$700 billion in nominal value terms by 2012. In 2008, when the financial system collapsed, war expenditures on the conflicts in Afghanistan and Iraq reached peak levels eating up one-fourth of the entire defense budget. In the first ten years after the terrorist-attacks, the wars in the Middle East cost the United States \$1.4 trillion overall, as shown in figure 4<sup>17</sup>, with ever more capital flowing in that direction still today. If we isolate the War on Terror, including benefit payments to veterans and expenditures on homeland security, we find that it had cost the government about \$800 billion by the end of George W. Bush’s term in office, as illustrated by figure 5<sup>18</sup>. President Barack Obama did not cut down on these costs either when he took office in January of 2009, but instead “increased spending for the War on Terror”<sup>19</sup>. Between 2009 and 2012, in just three years in office, President Obama had requested another \$477 billion to fight terror.

Historically, military activity has been a stimulant to the economy by creating jobs. However, in the 2000s it was “a primary contributor to ballooning United States government debt”<sup>20</sup>. The extra debt accumulated in order to finance the Afghanistan and Iraq wars, non-war related defense spending, and homeland security “accounts for well over one-quarter of the increase in national debt since 2001”<sup>21</sup>. The government’s expenditures “would not have been on anything like this scale had it not been for 9/11”<sup>22</sup>. Econometric studies about the relationship between the increased debt and terrorist attacks indeed found that the rise in federal debt can be attributed to the terrorist attacks<sup>23</sup>. That is because the way the government decided to finance the wars in Afghanistan and Iraq carried the economy into an unsustainable state. Unlike previous conflicts, such as the Korean War, Vietnam War, or even World War II, which were financed at least in part by high tax rates between 70 and 90 percent, as shown in figure 6<sup>24</sup>, tax rates during the wars in the Middle East were kept below 40 percent. The government actually cut taxes at the same time as our military invaded Iraq. The government put the economy on

9 Roberts (2009). Page 3.

10 Warner (2011). Page 1.

11 Yardeni, ed. Burton (2011). Page 1.

12 Warner (2011). Page 1f.

13 Bilmes (2011). Page 1.

14 Appendix B.

15 Appendix B.

16 Appendix B.

17 Appendix B.

18 Appendix B.

19 Amadeo (2014). Page 2.

20 Burger (2013). Page 2.

21 Bilmes (2011). Page 1.

22 Cox, ed. Burton (2011). Page 2.

23 Eichenbaum and Fisher (2004). Page 2.

24 Appendix B.

a downward spiral with its tax policies in the early-2000s. Not surprisingly, the costs of both the Afghanistan conflict and Iraq war exceeded the capacity of the federal budget and “have since pushed [it] into a deep and prolonged projected deficit”<sup>25</sup>. From the beginning, there was no other option but to pay for the entire costs of the wars through borrowing, primarily from Japan and China, as indicated in figure 7<sup>26</sup>. The problem with this approach is that some other country might pay for the expenses now, but eventually this money must be paid back plus interest. Although the authorities were able to sustain the illusion of growing prosperity for half a decade, they failed to recognize the true state of the economy between 2001 and 2008.

#### 4. The Impact of Government Debt

The most obvious impact of such large amounts of federal debt is that the government is less inclined to invest in the economy because the budget is strained. Although figure 8<sup>27</sup> does not show a large decrease in real net investment immediately after 9/11, it does show a significant drop immediately after the government forced the largest banks of the economy to accept an immense injection of federal capital in 2008<sup>28</sup>. When the financial system in the United States collapsed due to the losses banks incurred from the bust of the credit bubble, the government had to invest much more into the market than it was willing to. Fact is, many of the “resources that would have been spent on” investments to save the economy “went instead to prevent further attacks” and fight terrorism on the other side of the planet<sup>29</sup>. These expenditures simply “meant that less funds were available for stimulus programs to boost the country out of the... financial crisis”<sup>30</sup> before it became the largest recession in about seventy years. Neely (2004) and Amadeo (2014) suggest that the increasing debt caused the government to look for ways to save money, consciously or unconsciously. Therefore, although authorities introduced the Troubled Asset Relief Program late in 2008 and passed the American Recovery and Reinvestment Act in 2009, they waited too long to provide banks with the financial assistance they needed in part due to their unwillingness to invest further billions of dollars in the economy. In addition, Giancarlo Corsetti (2013) suggests a large amount of federal debt has the following impact:

“It hampers the exercise of sound monetary policy by making monetary authorities less inclined to use restrictive monetary policies because of the impact on the interest bill of the government.”<sup>31</sup>

This means that the Federal Reserve will theoretically keep interest rates low at times of increasing government debt. At the end of the day, however, high levels of government debt inevitably have a very specific long-term impact on interest rates. If we look at a Cobb-Douglas production function model as introduced by Eric Engen and Glenn Hubbard:

$$Y = A^*K^{\partial}L^{(1-\partial)}$$

where Y is output, A represents a coefficient for productivity, L depicts labor, and K is capital, we find that the interest rate depends on shocks to national debt. In order to make the model as simple as possible, let us assume that investments are equal to capital. The following equation models the relationship between the nominal interest rate and investments, which is subject to the federal deficit:

$$r = \partial^*(Y/K) = \partial^*A^*(L/I)^{(1-\partial)}$$

Notice how the interest rate (r) increases as investments (I) decrease<sup>32</sup>. In other words, the model proves that changes in government debt play a key role in determining the level of the interest rate. The two variables operate at a positive relationship, meaning that as debt increases the interest rate increases as well, as evident in figure 9<sup>33</sup>. Bear in mind, this phenomenon occurs because a large national deficit and an increase in federal borrowing crowds out capital and reduces investments. To clarify, the crowding-out effect occurs when the government’s “financing needs are large and when government has to roll over large debts on a continual basis”<sup>34</sup>. Emphasis is put on the word “continual” and it is certainly reasonable to argue that the United States operated on a significant and growing deficit between 2001 and 2004, as shown in figure 10<sup>35</sup>. Furthermore, figure 11<sup>36</sup> illustrates how United States borrowing increased substantially between 2001 and 2006. The interest rate did not increase until 2004 because the Federal Reserve artificially kept it at a low-level by consistently increasing the money supply throughout the early-2000s. When the growth of money supply was shut close to zero between 2004 and 2008, as illustrated in figure 13<sup>37</sup>, the boundaries that held the crowding-out effect in check were removed.

#### 5. Monetary Policy and the Financial Crisis – Money Supply and Interest Rates

Some economists feel that “mistakes by the [Federal

25 Santomero (2003). Page 4.

26 Appendix B.

27 Appendix B.

28 Kirk (2009).

29 Neely (2004). Page 30.

30 Amadeo (2014). Page 3.

31 Corsetti (1999). Page 1.

32 Engen and Hubbard (2004). Page 84.

33 Appendix C.

34 Reinhart and Tashiro (2013). Page 23.

35 Appendix C.

36 Appendix C.

37 Appendix C.

Reserve] set the stage for the financial crisis”<sup>38</sup> in the late-2000s. Before analyzing the institution’s actions between 9/11 and the financial crisis, an understanding of the way it creates interest rates on the open market is essential. This is where the money supply and the federal funds rate come into play. In order to implement its policy, the Federal Reserve relies heavily on open market operations. Specifically, the institution adjusts the value of capital reserves banks are required to have on hand. Lowering the requirement, for example, means that banks must withhold a smaller percentage of deposits from the market and can lend more money to customers or other banks instead. Therein, the Federal Reserve controls the money supply in the economy. Another, more complicated approach is directly related to financial securities. After the government increases its spending, such as during the years after 9/11, the Department of Treasury auctions off bonds and other government securities to private dealers authorized to trade them on the open market. If the Federal Reserve determines the money supply in the economy is insufficient, it “can buy [these] securities providing banks with greater reserves”<sup>39</sup> in that the money used to execute the transactions is credited to the bank accounts of the dealers. These extra deposits enable banks to lend out more money, which results in a greater flow of capital throughout the economy. A third way in which the Federal Reserve increases the money supply is by lending directly to banks.

After 9/11, the Federal Reserve substantially revised its expectations about future economic and financial variables. It made sure that the shock of the attacks would not have a significant impact on the economy and provided “an extraordinary degree of monetary stimulus”<sup>40</sup> in the form of ample liquidity. Specifically, the Federal Reserve directly “injected over \$100 billion per day into the financial system”<sup>41</sup> on the first three days after 9/11 before increasing the money supply by another \$200 billion between 2002 and the end of 2004, as shown in figure 12<sup>42</sup>. Figure 13<sup>43</sup> illustrates how this trend of money growth has persisted ever since. As the blue line indicates, the amount of liquidity provided by the Federal Reserve increased substantially in the early-2000s. In the short-run, this worked out fine. Between 2002 and 2004 the economy recovered from the shock of 9/11 as proven by the Gross Domestic Product (GDP) and unemployment rate, amongst other indicators. During this period, GDP recovered quickly from a growth rate of less than 1% to over 4%, as shown in figure 14<sup>44</sup>. Meanwhile, unemployment decreased slightly from 6% to about 5%, as illustrated in figure 14<sup>45</sup>. Other major indicators, however, including inflation, projected

that the long-term impact of the growing money supply would be problematic. Between 2002 and 2004 the inflation rate rose to a worrisome level of about 3.5%, as shown in figure 15<sup>46</sup>. Therefore, while some indicators made the economy look healthy in the aftermath of 9/11, other measures painted a different picture.

Fact is, the “additional liquidity contributed to the housing bubble and the financial collapse”<sup>47</sup> in that it helped drive interest rates down from about 3.8% right before 9/11 to 1% by the end of 2003. Figures 16 and 17<sup>48</sup> prove how an increase in the previously discussed money supply impacts interest rates. The more money the Federal Reserve made available to banks, the more loans, mortgages, and other securities banks were able to sell. Figure 18<sup>49</sup> indicates a sharp increase in the amount of loans and leases in 2002, which persisted until the bankruptcy of Lehman Brothers in 2008. Therein, banks earned a higher total income from more interest payments. The relationship between aggregate demand and interest rates is illustrated in figure 16<sup>50</sup>, where output (Y) increases and the interest rate (i) decreases in response to a greater money supply. In figure 19<sup>51</sup> we see how an increase in the supply of money drives interest rates down and how the impact of federal debt offsets this trend when money growth decreases.

## 6. The Liquidity Effect and the Paradox of Monetary Economics

As we discuss the impact of money growth on interest rates we must keep in mind that the two variables “are negatively related over short periods”<sup>52</sup>. This means that interest rates decrease as the money supply increases in the short-run, which is what happened after 9/11. It might be important to note that the Federal Reserve was already aiming for lower “interest rates in January 2001, but because of 9/11, [it] cut [them] further”<sup>53</sup>. In fact, the attacks led the authorities to target an interest rate reduction much larger “than would be expected from levels of output and inflation”<sup>54</sup> at the time. Figure 20<sup>55</sup> shows that interest rates decreased from 3.75% to 1.75% at the end of 2001, and again from 1.75% to 1% flat between 2002 and 2004. The decision to lower rates was based on the idea that it is “useful to maintain lower interest rates than [usual] to keep banks and other financial institutions healthy”<sup>56</sup> when uncertainty regarding the future grew within the population.

38 Nelson (2010). Page 10.

39 Neely (2004). Page 30.

40 Santomero (2003). Page 4.

41 Makinen (2002). Page 10.

42 Appendix C.

43 Appendix C.

44 Appendix A.

45 Appendix C.

46 Appendix C.

47 Bilmes (2011). Page 2.

48 Appendix C.

49 Appendix C.

50 Appendix C.

51 Appendix C.

52 Nelson (2010). Page 5.

53 Faber, ed. Burton (2011). Page 2.

54 Neely (2004). Page 27.

55 Appendix D.

56 Neely (2004). Page 29.

Not less important in the decision-making process was the state of the financial industry and private as well as public debt. Low interest rates were supposed to help the financial system restructure after the stock market was shut down for five whole days after the attacks, the longest shutdown since 1933. The rate was kept down until the end of 2004 in order to reduce the cost of financing government debt, which has increased every year since 9/11. Moreover, the aforementioned unemployment rate played a role in the determination of the interest rate target between 2001 and 2004. Last but not least, the rise in the debt-to-GDP ratio, illustrated in figure 21<sup>57</sup>, was more tolerable at low interest rates. This argument is supported by the fact that rates were cut close to zero when the debt-to-GDP ratio rose to over 80 % between 2008 and 2009.

In addition, the Federal Reserve's decision to increase the money supply substantially after 9/11 caused the so-called liquidity effect to reach unsustainable levels in the United States. To clarify, this effect implies that a greater supply of money makes credit more easily available, which results in greater economic activity as businesses and individuals borrow more. As the demand for loans increases the price of borrowing decreases. In other words, an increase in the money supply puts downward pressure on interest rates short term<sup>58</sup>. In the years after 9/11 the Federal Reserve excessively increased money growth and then technically shut it down to almost zero, as seen in figure 15<sup>59</sup>. Notice how the slope of the blue line for the money supply changes from \$666.67 billion per year between 2001 and 2004 to \$66.67 billion per year between 2004 and 2008. To the economy, a change of this size over a period this short was devastating. In turn, the magnitude of the liquidity effect increased the magnitude of the paradox of monetary economics, which states that "excessively low interest rates now will only lead to much higher interest rates later"<sup>60</sup>. Evidence for the paradox is given in figure 20<sup>61</sup>, which indicates how interest rates fell substantially in the early-2000s before they increased just as significantly between 2004 and 2006. In the graph the interest rate is substituted with the federal funds rate target, which is acceptable because the two rates have empirically behaved the same way.

## 7. Changes in the Interest Rate Helped Cause the Conditions Which Led to the Financial Crisis

This leads us to the federal funds rate, which is the rate banks charge each other for overnight loans needed to meet the capital reserve requirement. In turn, the federal funds rate impacts the interest rates banks charge their customers

for all kinds of loans. As the reserve requirement decreases, so does the federal funds rate because banks will not have to borrow as much money from each other. Based on a very basic price-demand-relationship, as shown in figure 22<sup>62</sup>, lower demand for funds results in cheaper loans. When it becomes less expensive to borrow money, banks pass this change on to their customers in terms of lower interest rates because they do not have to pay as much interest on their own loans. Making such credit more readily available has led to excessive risk-taking in the banking sector and on the open market, in particular in regards to default swaps and real estate<sup>63</sup>. Such risk-taking due to ultra-low interest rates significantly increases the likelihood of a financial crisis.

At the end of 2001, the Federal Reserve adjusted its federal funds rate target "to a near-record low of one percent and kept it under two percent until"<sup>64</sup> June 2004. Per usual, the Federal Reserve accomplished their target and sparked a drop in the interest rate, which made all kinds of loans much more attractive to private borrowers. The lower reserve requirement and decrease in interest rates "spurred a frenzy in mortgage lending"<sup>65</sup> above anything else. In turn, this increasing demand for mortgages led to the rapidly increasing values of homes in the United States between 2001 and 2005<sup>66</sup>, which is known as the housing bubble. As people sought assistance to pay for the high housing prices, the policies executed by the Federal Reserve after 9/11 enabled banks "to entice homebuyers with adjustable-rate mortgages,"<sup>67</sup> although economic theory suggested that interest rates were going to increase eventually. Sure enough, the valuation of real property increased to a level unsustainable "in relation to incomes and other indicators of affordability"<sup>68</sup>. It is reasonable to assume that the Federal Reserve decided to raise its federal funds rate target to slow down the evident boom in the economy. In addition to rising property values, the aforementioned behavior of the GDP growth and unemployment rates between 2002 and 2004 likely impacted this decision, which caused the housing bubble to burst. Both rates made the Federal Reserve feel comfortable that the economy could sustain an increase in interest rates. However, this increase led to the values of houses decreasing so much that mortgage debt exceeded the worth of these homes. Therefore, foreclosure rates increased substantially between 2007 and 2009, as illustrated in figure 24<sup>69</sup>, leading to struggles within the banking sector. Former Federal Reserve-chairman Alan Greenspan admitted that the housing bubble and excessive mortgage lending were "fundamentally engendered by the decline in... interest

57 Appendix D.

58 Hamilton (1997). Page 81.

59 Appendix C.

60 Nelson (2010). Page 4.

61 Appendix D.

62 Appendix D.

63 Kuttner (2012). Page 6.

64 Comiskey and Madhogarhia (2009). Page 273.

65 Comiskey and Madhogarhia (2009). Page 273.

66 Figure 23. Appendix D.

67 Levy (2011). Page 1.

68 Bianco (2008). Page 3.

69 Appendix D.

rates”<sup>70</sup>.

The large number of foreclosures was influenced by the behavior of interest rates. After keeping the rate between 1% and 2% for much of the first half of the 2000s, the Federal Reserve more than tripled it by the end of 2006 to almost 6%. This decision was not only meant to slow down the economic boom, but also to contain inflation, which had increased from about 1% in 2002 to over 4% in 2006, as shown in figure 15<sup>71</sup>. However, while the increase in interest rates did drive inflation back down, it also increased loan rates, including the three-month treasury bill market rate, discount rate, and the rate for adjustable-rate mortgages, as shown in figures 25, 26, and 27<sup>72</sup>, respectively. Note how these interest rates behave very similar to the federal funds rate target proving a significant correlation between monetary policy and actual interest rates. Mortgage rates, in particular, rose by more than 2% between 2004 and 2007. A “hike of this magnitude can double the payments on”<sup>73</sup> adjustable-rate mortgages and push borrowers into a financial hole. In the years following the 9/11-attacks, “the number of adjustable-rate mortgages rose to about one-third of total mortgages,”<sup>74</sup> which engendered the housing bubble. The implosion of these mortgages, which initiated the financial crisis, is proven in figure 28<sup>75</sup>, where resets equal the losses accumulated by banks as borrowers became unable to pay off their debts. Therein, banks incurred too much bad debt, which could not be covered by the existing capital reserves.

When economists refer to the bursting of the housing or credit bubble, the amount of bad debt in the financial system reached critical levels and left financial institutions insolvent. Monetary policy is supposed to prevent this situation before it ever reaches a critical point. However, in the 2000s the Federal Reserve’s loose-fitting approach played a key role in causing excessive risk-taking<sup>76</sup>. Claudio Borio and Haibin Zhu (2012) studied this relationship between monetary policy and risk-taking in more detail:

“Lower interest rates, for instance, boost asset and collateral values as well as income and profits, which in turn can reduce risk perceptions and increase risk tolerance. [T]his can encourage risk-taking.”<sup>77</sup>

In addition, not only interest rates, but also liquidity shocks impact risk-taking in the economy. If monetary policy is kept too loose for too long its weak constraints can lead to excessive risk-taking<sup>78</sup>. Other potential causes for excessive risk-taking mainly relate to the philosophy of corporate governance. A recent study on this topic by

Hamid Mehran, Alan Morrison, and Joel Shapiro (2011) examines how the banking sector had been infested by shadowy decision-making. Overall, the study proposes that strategic decisions were based on a desire to increase individual bonuses, short-term stock price movements, or the selfish short-term interests of major shareholders<sup>79</sup>. Regardless, between 9/11 and the collapse of the financial system, the willingness of banks and all other economic agents to take ever greater risks led to a phenomenon called systemic risk. The authorities, in cooperation with our nation’s banks, injected a dangerous virus into the economy. After the bankruptcy of Lehman Brothers it unleashed its power.

Utilizing a variation of the original Taylor Rule in order to determine the federal funds rate target could have incapacitated the virus before it ever became a threat and prevented the Great Recession. To clarify, according to this particular specification of the rule the Federal Reserve should base its target interest rate on the following formula:

$$i = r + \pi + \delta^*(\pi - \pi') + \mu^*(y - y')$$

where  $i$  is the federal funds rate,  $r$  is the natural federal funds rate oftentimes taken to be 2%,  $\pi$  is the rate of inflation,  $\pi'$  is the desired inflation rate,  $\delta$  is a fixed inflation gap coefficient,  $\mu$  is a fixed GDP gap coefficient,  $y$  is the logarithm of real output in the economy, and  $y'$  is the logarithm of potential output<sup>80</sup>. As proven by figure 29<sup>81</sup>, the fact that the Federal Reserve kept interest rates “too low for too long... [and] then raised them too far too fast”<sup>82</sup> triggered the collapse of the financial system. If policy makers had adhered to the Taylor Rule introduced above instead of trying to aggressively safeguard the market, the boom would not have occurred to such a high degree. Instead, borrowers would have acted more conservatively. In addition, banks would not have written as many adjustable-rate mortgages because the likelihood of interest rates decreasing would have been larger. To clarify, lower interest rates mean that banks receive a lower return on adjustable-rate mortgages, making these less attractive to the institutions. In turn, the lower current interest rates are, the more of these adjustable-rate mortgages are sold. Without the boom, there would not have been a bust and no financial crisis. If monetary policy is executed carefully it can help the economy approach full employment and prosperity, but if not it “will ensure high inflation and recurrent recessions”<sup>83</sup>.

## 8. Regression Analysis

In order to strengthen the arguments made in this paper up to this point, two ordinary least squares regression

70 quoted in Bianco (2008). Page 4.

71 Appendix C.

72 Appendix D.

73 Comiskey and Madhogarhia (2009). Page 273.

74 Taylor (2009). Page 11

75 Appendix D.

76 Challe (2012). Page 51.

77 Borio and Zhu (2011). Page 243.

78 Borio and Zhu (2011). Page 245.

79 Mehran et al. (2011). Page 1.

80 Fernandez et al. (2008). Page 5.

81 Appendix D.

82 Comiskey and Madhogarhia (2009). Page 273.

83 Nelson (2010). Page 13.

analyses add tangible economic proof to the claim that fiscal and monetary policy post-9/11 caused the financial crisis. Figures 30 and 31<sup>84</sup> show the complete results of the regression analyses in the following basic format:

$$y_1 = \partial_0 + \partial_1x_i + \partial_2x_i + \dots + \partial_nx_i + u_i.$$

Both models are calculated with time-series quarterly data covering the period of September 2001, immediately after the terrorist attacks, through December 2010, when the financial crisis had officially subsided in the United States. Both models are presented in simplified tables below.

The results of the first model show that the inflation and unemployment rate significantly impact GDP, which was chosen as the dependent variable because it is commonly accepted as a representation of the state of the economy. Most importantly, this model indicates that the cost of the infamous War on Terror, the interest rate, and the US money supply impact GDP significantly as well. Therein, this analysis proves that both fiscal and monetary policy between 9/11 and the financial crisis directly caused the economy to struggle and eventually fall off a cliff. Thanks to an R-squared value of .977 and a White's test finding that no heteroskedasticity is present we can argue that this model is not just a matter of chance but a truthful representation of what factors impacted GDP between 2001 and 2010 (see table 1).

*Table 1. Regression Results for Model 1.*

<b>Dependent Variable: Gross Domestic Product</b>	
<b>Method: Ordinary Least Squares</b>	<b>Data: Time-Series</b>
<b>Independent Variables</b>	<b>Coefficient Estimates</b>
	<b>(Standard Errors)</b>
Constant	1.02710e+13 *** (3.47403e+11)
Inflation Rate	5.66269e+10 *** (1.82742e+10)
Unemployment Rate	-1.55761e+11 *** (3.12923e+10)
War-on-Terror Cost	3.57786 *** (0.835636)
Interest Rate	6.39812e+10 *** (2.28582e+10)
US Money Supply	0.328473 *** (0.113864)
Observations	38
R-Squared	0.977103
Adjusted R-Squared	0.973525

\*\*\* indicates significance on 99% level

\*\* indicates significance on 95% level

\* indicates significance on 90% level

The second model is a little bit different considering that the dependent variable is a dummy variable indicating when the financial crisis officially started and ended. Therefore, this model may not be as accurate as the first model, but we can still refer to it in order to prove what factors seem to have caused the financial crisis. The results show that primarily US government debt caused the collapse. The cost of the War on Terror, US defense spending, and the US money supply also played significant roles in causing the financial sector's struggles. These results are further proof that the government's fiscal and monetary policy after 9/11 directly led to the financial crisis (see table 2).

*Table 2. Regression Results for Model 2.*

<b>Dependent Variable: Financial Crisis (1=yes, 0=no)</b>	
<b>Method: Ordinary Least Squares</b>	<b>Data: Time-Series</b>
<b>Independent Variables</b>	<b>Coefficient Estimates</b>
	<b>(Standard Errors)</b>
Constant	-2.86066 *** (0.838237)
War-on-Terror Cost	-4.81263e-12 ** (1.94306e-12)
US Defense Spending	5.00557e-12 ** (1.97639e-12)
US Government Debt	-2.71719e-13 *** (0.00000)
US Money Supply	8.39642e-13 ** (3.20916e-13)
Observations	38
R-Squared	0.583640
Adjusted R-Squared	0.533173

\*\*\* indicates significance on 99% level

\*\* indicates significance on 95% level

\* indicates significance on 90% level

## 9. Systemic Risk and the Bankruptcy of Lehman Brothers

Although the Federal Reserve's loose monetary policy approach after 9/11 helped cause the financial crisis, the collapse would not have been nearly as severe without the phenomenon of systemic risk in the US banking sector. As mentioned earlier, increasing government debt and monetary policy, which encouraged excessive risk-taking within the banking sector, drove down interest rates. While subprime lending and adjustable-rate mortgages increased the amount of debt on the portfolios of the largest banks in the United States, the biggest issue was how the institutions decided to deal with their debt. To ensure good-looking

balance sheets, banks engaged in default swaps worth hundreds of billions of dollars<sup>85</sup>. Because all of Wall Street's financial institutions traded their debt in such a manner, systemic risk grew larger by the minute. To clarify, systemic risk is a result of financial institutions being interconnected through debt trading. If one institution fails, many others will follow because the system will have to cover the indebtedness of the insolvent company. When the authorities realized the degree to which the largest banks of our nation depended on each other it was already too late.

While the Federal Reserve still made an effort to save Bear Stearns from bankruptcy when it became evident the bank was running low on cash, the central bank's officials decided to make an example of Lehman Brothers to prove that improper decision-making has consequences. However, the Federal Reserve was oblivious to the level of systemic risk in the system. Allowing Lehman to fail caused a fallout that put the financial system in legitimate danger<sup>86</sup>. Due to the size of Lehman, a large number of banks, institutions, and organizations thought swapping defaults with and investing in the bank would be safe. After all, how could a bank of Lehman's size with all its assets and connections ever fail? Once it did fail uncountable companies inherited unaffordable debt resulting in unbearable losses. At this point in time, uncertainty within the financial system rose to historic levels, resulting in a panic that led to stocks crashing. Meanwhile, banks stopped lending altogether simply to ensure their own survival. To accentuate the relationship between 9/11 and systemic risk, the response to the terrorist attacks led to loose monetary policy and, therein, to excessive risk-taking. This excessive risk-taking resulted in the entire American financial system being interconnected, which eventually led to an economic crisis as complex as any in history.

## 10. Counterarguments

It should not come as a surprise that there has been plenty of debate amongst economists regarding the causes of the financial crisis and what led to them in the first place. One counterargument to this paper's thesis is that excessive global saving had a significant impact on creating the conditions that led to the financial crisis. There are two main hypotheses put forth by proponents of this view: "(i) net capital flows from... account surplus countries to deficit ones helped to finance the credit booms in the latter" and "(ii) a rise in... global saving relative to... investment in surplus countries depressed... interest rates"<sup>87</sup>. Maurice Obstfeld and Kenneth Rogoff, argue that the "global imbalances... were a critically important co-determinant"<sup>88</sup> of the conditions that led to the financial crisis. The authors argue that countries with large account surpluses such as China and Japan took advantage of the extra capital and

offered cheap loans to the United States. These capital flows presumably enabled American decision-makers to keep interest rates low.

Claudio Borio and Piti Disyatat (2011), however, tell a different story about the reality:

"The state of these accounts tells us little about the [actual] role a country plays in international borrowing, lending, financial intermediation... and about the impact of cross-border capital flows on domestic financial conditions."<sup>89</sup>

This means that we cannot refer to net capital flows or account imbalances to explain the drop in interest rates without also taking a look at other variables such as the domestic money supply. The problem is that "a focus on... accounts in the analysis of cross-border capital flows diverts attention away from the global financing patterns that are at the core of financial fragility"<sup>90</sup>. Fact is that current account imbalances are negligible because current account balances only reflect the net resource flows between two trading partners. "Stocks, including all the transactions involving only trade in financial assets, which make up the bulk of cross-border financial activity"<sup>91</sup> are excluded, invalidating the argument that global imbalances could have affected the financial system in the United States significantly. While differences in current account balances are irrelevant, low capital account balances can indeed impact monetary policy. However, as shown in figure 32<sup>92</sup>, the American account balance was all but low throughout the 2000s.

The second counterhypothesis states that an increase in global saving relative to investment caused a saving glut that led to low interest rates. However, this argument is highly disputed. In fact, suggesting that an increasing level of savings caused interest rates to be kept low is simply a way of shifting blame to countries such as China or Germany and away from the leadership of the Federal Reserve<sup>93</sup>. The saving-glut argument fails to take into account the underlying issue within the financial system. Over the past decades the system has become "more fixated on speculation than on fulfilling its societal role of intermediation"<sup>94</sup> in the United States. By the 2000s increasingly excessive risk-taking within the financial sector was not questioned anymore because it had become the norm. Everyone accepted risky business and speculative practices because it increased profits and helped the US economy become the strongest and most flexible in the world. Consequently, excess in savings did not lead to bad monetary policy, but the nature of the financial sector did.

Lastly, while many economists counter the argument that the terrorist attacks of 9/11 had a significant impact

85 Kirk (2009).

86 Kirk (2009).

87 Borio and Disyatat (2011). Page 1.

88 Obstfeld and Rogoff (2009). Page 1.

89 Borio and Disyatat (2011). Page 1.

90 Borio and Disyatat (2011). Page 1.

91 Borio and Disyatat (2011). Page 1.

92 Appendix E.

93 Stiglitz (2014). Page 1.

94 Stiglitz (2014). Page 1.

on the economy, all of these critics look at the short-run instead of the long-run effects. It might be true that the uncertainty and drop in economic activity immediately after the attacks “was followed by a strong rebound,”<sup>95</sup> but the long-term impact was certainly not positive. While it cannot be denied that the economy was doing well about a year after 9/11, the research presented in this paper proves that the United States government was oblivious to its true state. Especially external borrowing, loose monetary policy, and fiscal-policy changes impacted by the attacks, directly or indirectly, masked the issues within the financial system. Therein, the authorities allowed these problems to grow to unsustainable levels. Although the economy might have seemed healthy between 2001 and 2007, it grew more ill each and every day and the shock of the terrorist attacks magnified the decisions of the Federal Reserve during that time. Specifically, the national debt began to increase because of post-9/11 fiscal policy, encouraging the decision to cut interest rates. Yes, interest rates were already falling, but they probably would not have been cut as much<sup>96</sup>. Liquidity, on the other hand, was injected in the market to alleviate the fear of a market crash in response to the one-week shutdown of the stock market caused by the attacks.

## 11. Conclusion

In summary, the terrorist attacks of 9/11 led the United States government to increase spending significantly, nullifying the successes made at the end of the 1990s in regards to national debt. The event was the catalyst for debt rising to almost twenty trillion dollars today. Initially, spending funds on homeland security and the War on Terror did not seem to be a terrible decision although it was expected to strain the government’s budget. After all, fighting the people who bring fear to our doorstep has always been the American way. There had been wars in the past that had to be financed, but never had the expenditures led to economic crises. Instead they had helped domestic markets perform better. However, this time around the government made a major mistake in that it cut taxes at the same time it increased spending, which goes against every kind of common sense. As a result, monetary policy suffered from the increasing debt in that authorities tried to keep policies loose to minimize the impact on the interest bill of the government. Other evaluations, such as a Cobb-Douglas production function or a Keynesian IS-LM model illustrate how increases in the national debt and federal borrowing led to higher interest rates in the mid- to late-2000s. In addition, the outrageous amount of debt incurred between 2001 and 2007 made authorities hesitant to provide the necessary stimulus to boost the economy out of the Great Recession. The government’s fiscal policy was not the only factor in

causing the financial crisis, however. The Federal Reserve had at least as much of an impact. Decisions regarding the money supply and interest rates incentivized banks to lend ever more money and customers to engage in ever more risky borrowing. As adjustable-rate mortgages and subprime lending became popular practices, the market was already moving towards an inevitable bust. In fact, when the Federal Reserve made more money available to banks, the latter began to lend more money to each other and customers, which helped keep interest rates low. At that time, not many experts, if any, saw the paradox of monetary economics hiding in the market. Had it been noticed in time, the economy would have been better prepared for the spike in interest rates. This could have helped our banks elude the crisis. On the other hand, if the government and the Federal Reserve had adhered to a variation of the original Taylor Rule, the paradox and other conditions that led to the collapse could have been avoided altogether. Fact is, bad fiscal and monetary policies lead to recessions and, if one bad decision follows another, the ramifications will increase exponentially in magnitude. The best example is the bankruptcy of Lehman Brothers. After the government and Federal Reserve allowed systemic risk to invade the financial system with low interest rates and an ever increasing money supply, they shut down their bail-out programs and cut almost all investments in struggling banks. As a result, Lehman Brothers failed and dragged down with it the entire financial system.

When our children learn about September 11, 2001, the legacy of this disastrous event will not only include the loss of thousands of American lives, but also encompass two wars, examples of bad fiscal and monetary policy, and a historic collapse of the US economy. Considering the apparent vulnerability of the American financial system, we can only hope that we are dealing with an occurrence of the Black Swan Theory, which states that “this crisis [was] a once-in-a-century event, caused by a confluence of factors so rare that it is impractical to think of erecting regulatory barriers”<sup>97</sup>. In order to avoid future market failures of such magnitude it is imperative that the regulatory institutions of the United States act as one unit in regards to fiscal and monetary policy and trust in proven rules, analyses of past recessions, and justify decisions rationally before proposing any authoritative action. On a last note, to understand the financial crisis in its entirety, further research must be done especially on systemic risk and the interconnectivity of banks on Wall Street before the collapse. This paper provides an important stepping-stone for anybody who attempts to comprehend what happened to the American financial system in the late-2000s and why. In the future, this paper may be expanded to include an analysis of the conditions that led to the financial crisis. Any expansionary research should start with a viewing of the documentaries *Inside*

95 Bloom (2007). Page 2.

96 Faber, ed. Burton (2011). Page 2.

97 Jickling (2009). Page 7.

*the Meltdown* by Michael Kirk and *Inside Job* by Charles Ferguson.

## Appendix A

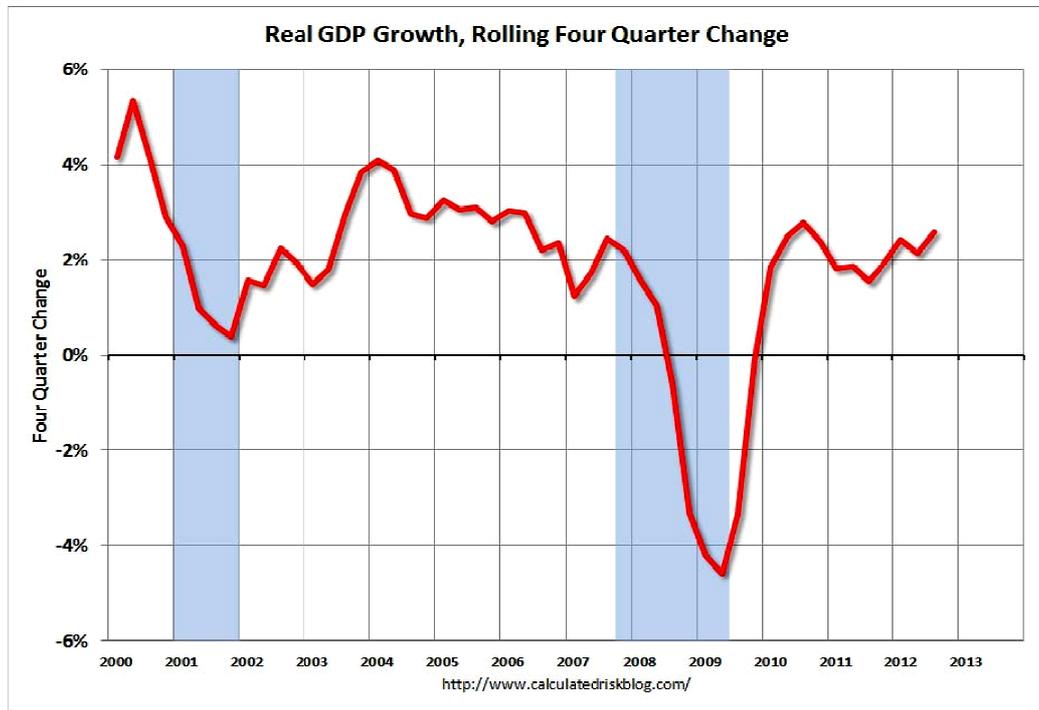


Figure 1. Quarterly change in GDP (%) in the US between 2000 and 2013. The shaded areas indicate times when the economy was officially in a recession.

McBride, Bill. "Will the U.S. Economy Grow in 2013?". Calculated Risk Finance & Economics. 10 January 2013. Web. 2 December 2014.

## Appendix B

### U.S. government debt, in trillions

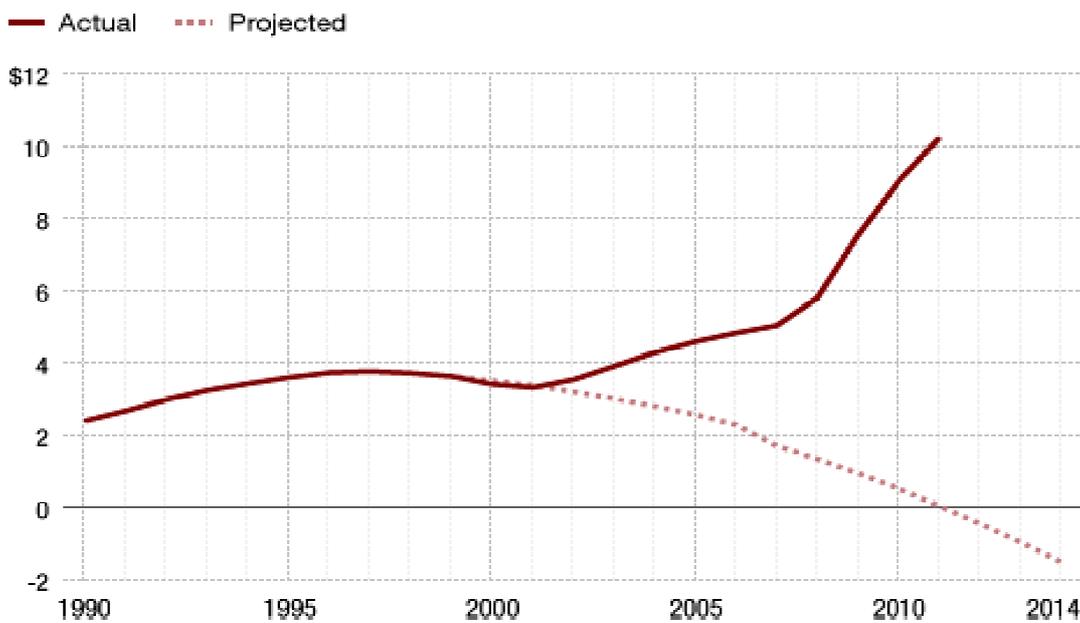
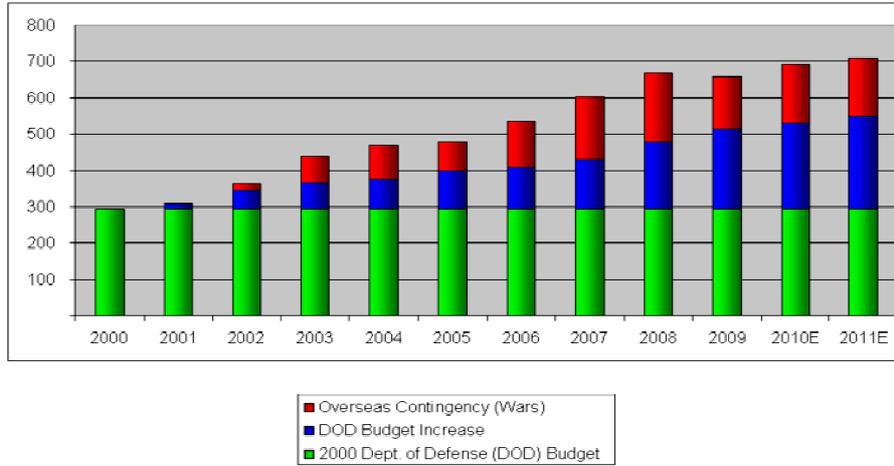


Figure 2. Actual (bold) versus projected (dotted) US government debt in trillions of US dollars between 1990 and 2014. George W. Bush entered into office as president in January of 2001 and the financial crisis began in 2007.

Kestenbaum, David. "What if We Paid Off The Debt: The Secret Government Report". NPR Planet Money. 20 October 2011. Web. 1 December 2014.

U.S. Defense Spending Trends 2000-2011 (\$ Billion)



Source Data: OMB – Annual Budget Documents  
Data excludes Homeland Security and Veteran's Affairs

Figure 3. US government spending on the Iraq and Afghanistan wars (red), the US department of defense budget (green), and the annual increase of this budget (blue) between 2000 and 2011. The department of defense uses its budget to pay for all military related expenses, including the salaries, training, and health care of uniformed and civilian personnel, the maintenance of arms, equipment, and facilities, the funding of operations, and the development and purchase of new equipment.

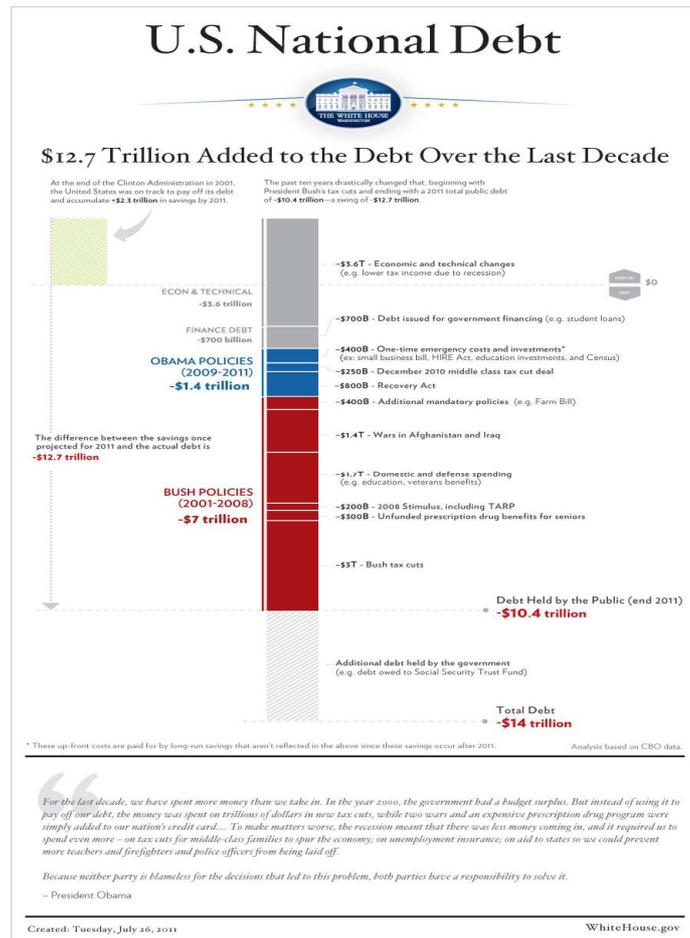


Figure 4. US national debt in trillions of US dollars between 2001 and 2011, where it originated, and which transactions were made during this time period.

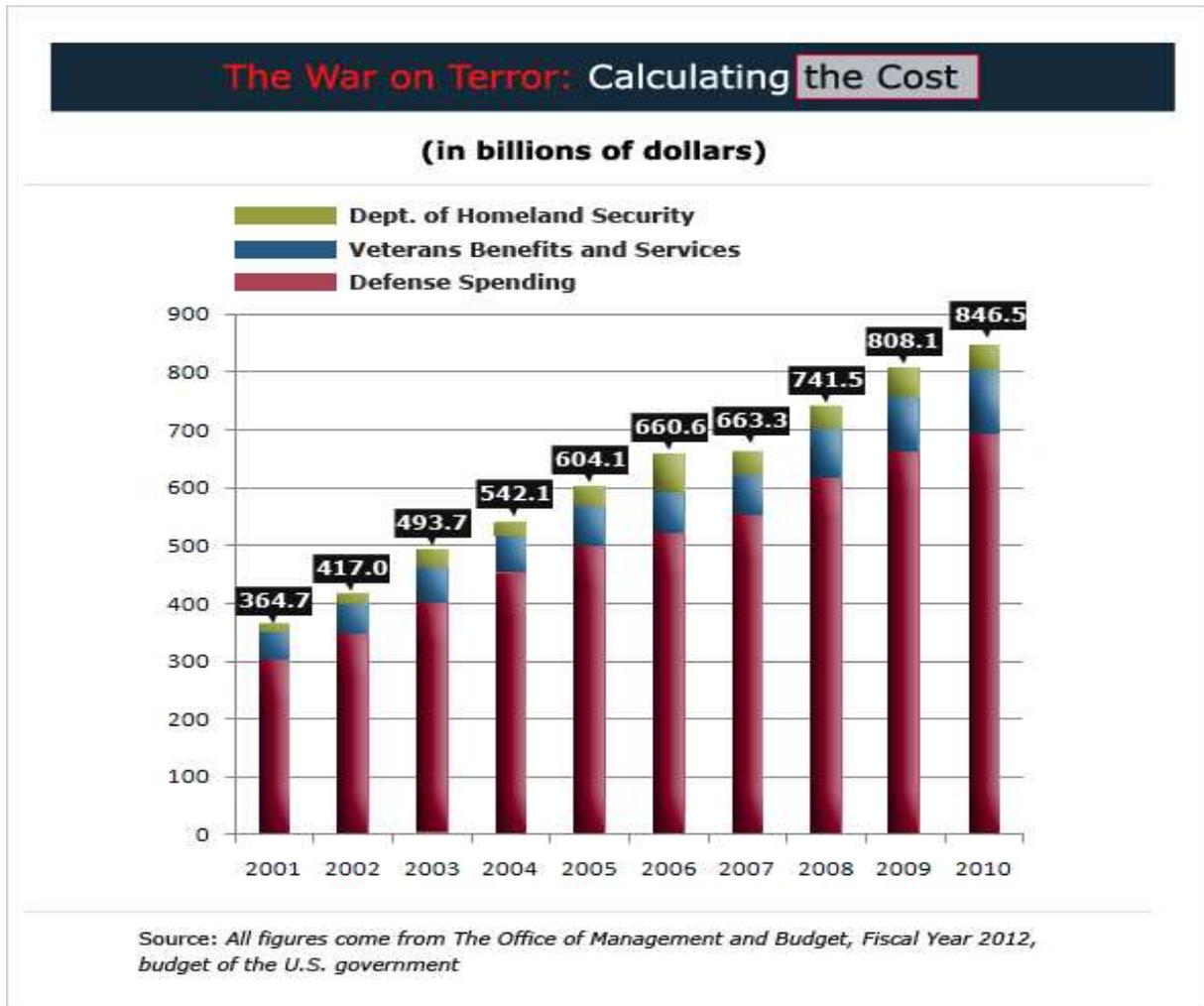


Figure 5. The cost of the War on Terror in billions of US dollars between 2001 and 2010. The War on Terror officially began in 2001 after the 9/11-terrorist attacks and is still going on today.

### Top Federal Tax Rates

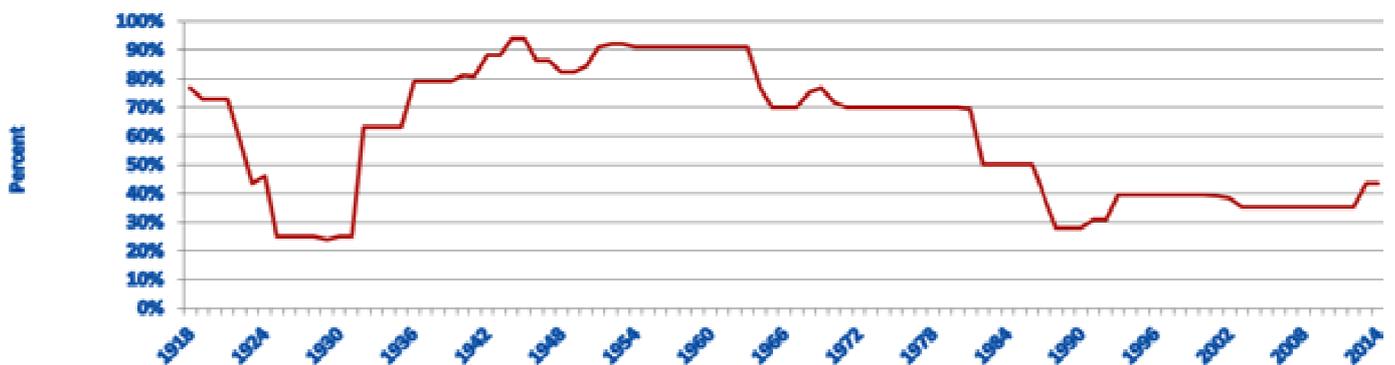


Figure 6. Federal tax rates (%) in the US between 1918 and 2014. Pay special attention to the tax-rate reduction in 2003, which is during a time when US government spending increased significantly due to the wars in Iraq and Afghanistan.

Source: Bradford Tax Institute, History of Federal Income Tax Rates: 1913 - 2014

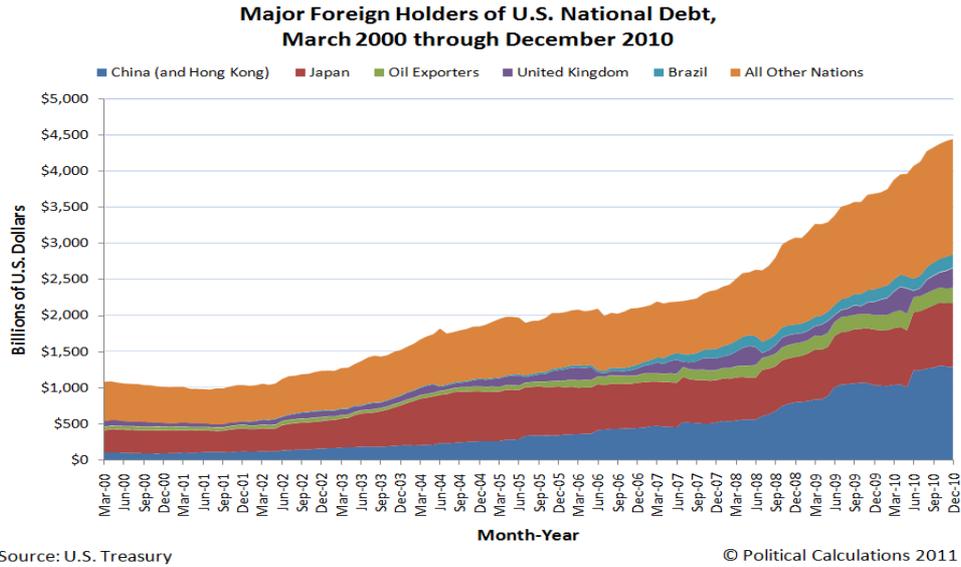


Figure 7. Major foreign holders of US federal debt. Between 2000 and 2010 China was the primary lender of the United States.

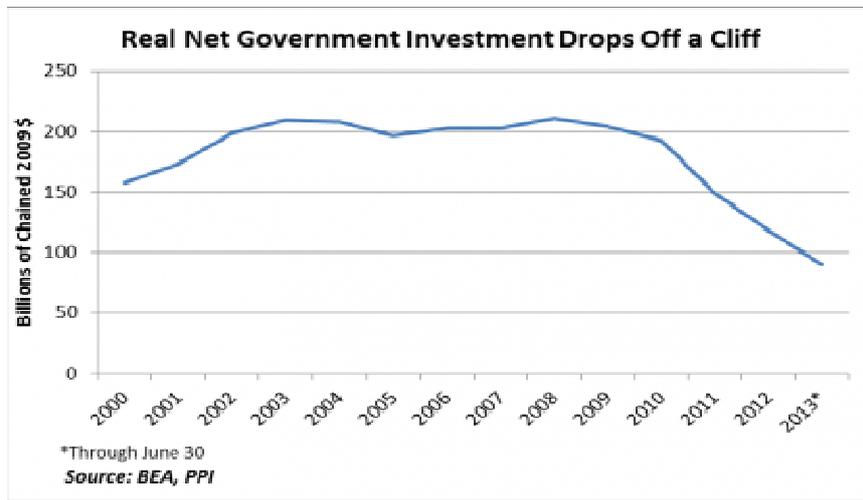


Figure 8. US government net investment in the economy between 2000 and 2013 in billions of US dollars. This kind of investment is a significant part of the GDP formula ( $GDP = C + I + G + X - M$ ).

### Appendix C

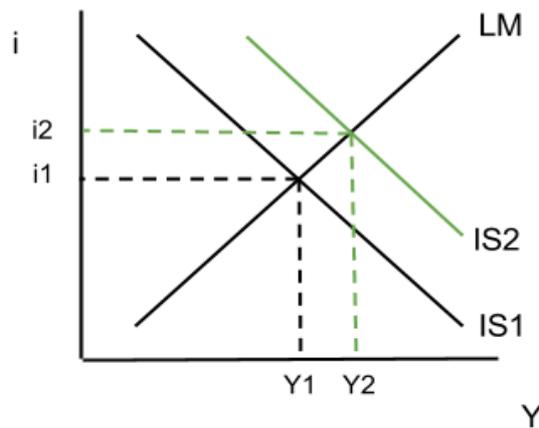


Figure 9. An IS-LM model indicating what should happen to market interest rates ( $i$ ) and level of output ( $Y$ ) in the economy when the IS curve shifts to the right (change in investment and/or saving in the economy). Between 2004 and 2006 the market interest rate rose.

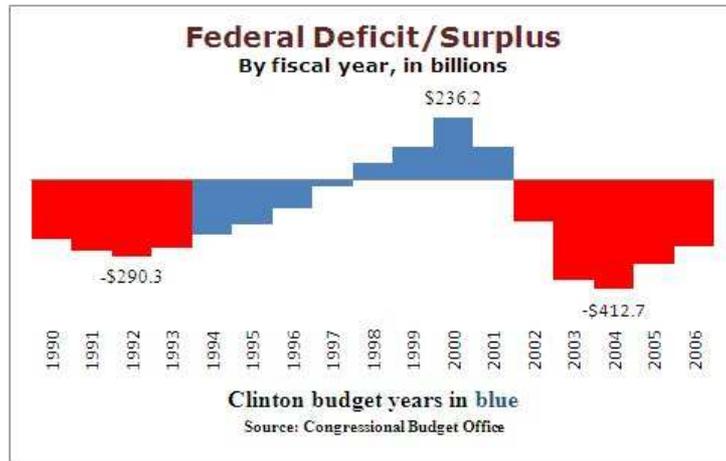


Figure 10. The US current account balances between 1990 and 2006. The blue bars indicate when President Bill Clinton was in office. George W. Bush entered into office in January of 2001.

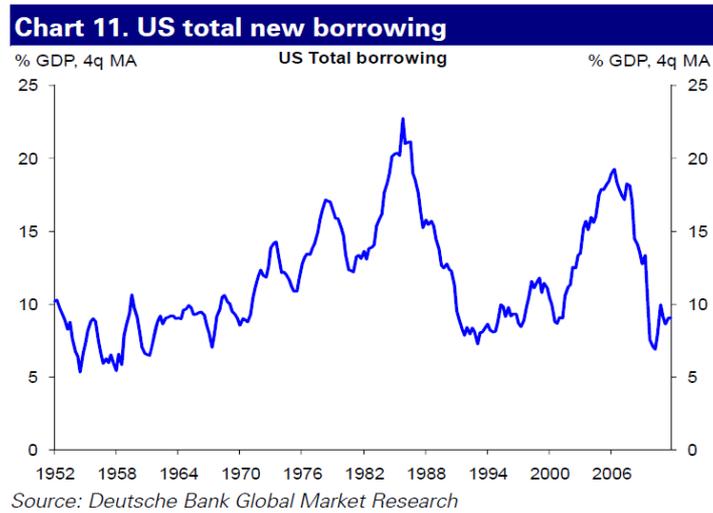


Figure 11. US government borrowing in percent of GDP between 1952 and 2010. Pay close attention to the years 2000 to 2010 and notice how borrowing increased significantly between 2001 and 2007.



Figure 12. US M1 money supply in billions of US dollars between 1995 and 2014. The shaded areas indicate times during which the US economy was officially in a recession. M1 only includes liquid assets (cash and assets that can quickly be turned into cash).



source: www.financeandconomics.org

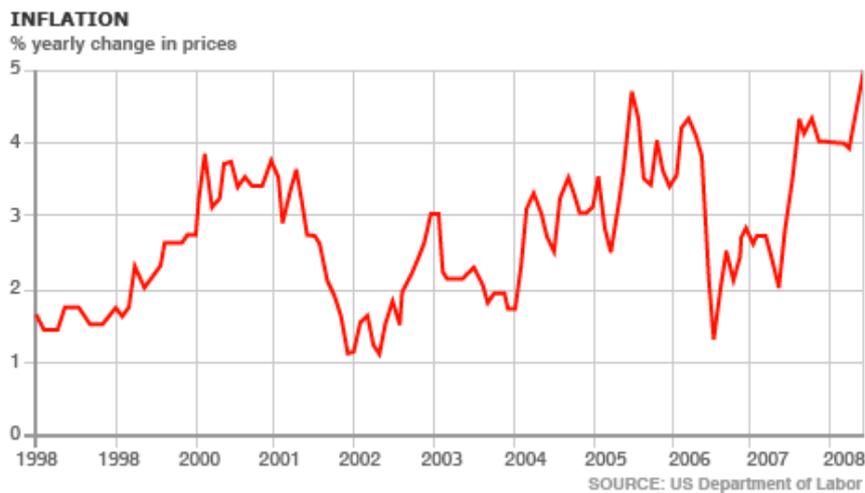
Figure 13. US true money supply in billions of US dollars between 1959 and 2014. “True money supply” includes all money from liquid to illiquid assets, from cash to securities and real estate. The dotted line indicates the average increase in the money supply and the two straight lines are trends.

Figure 2: The US Unemployment Rate since 2000



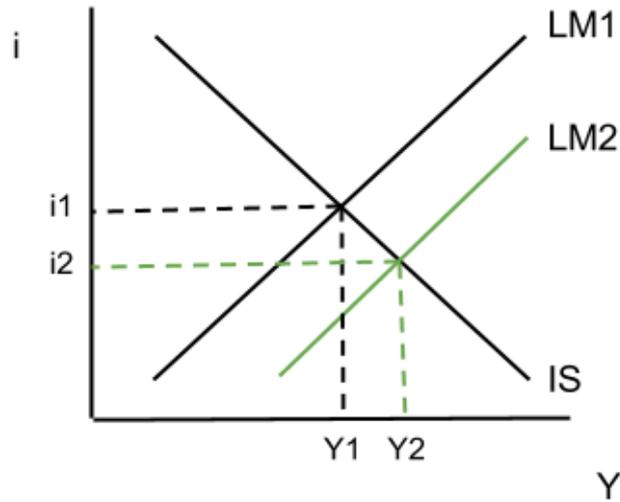
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Figure 14. US unemployment rate (%) between 2000 and 2012. Notice how the rate spikes between 2008 and 2010, which is the time period during and immediately after the financial crisis.

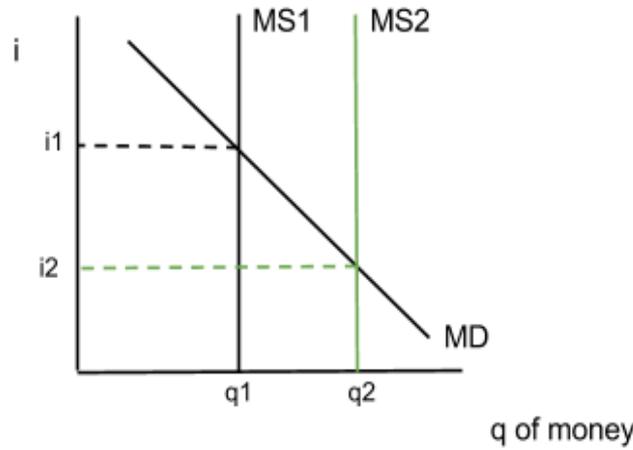


SOURCE: US Department of Labor

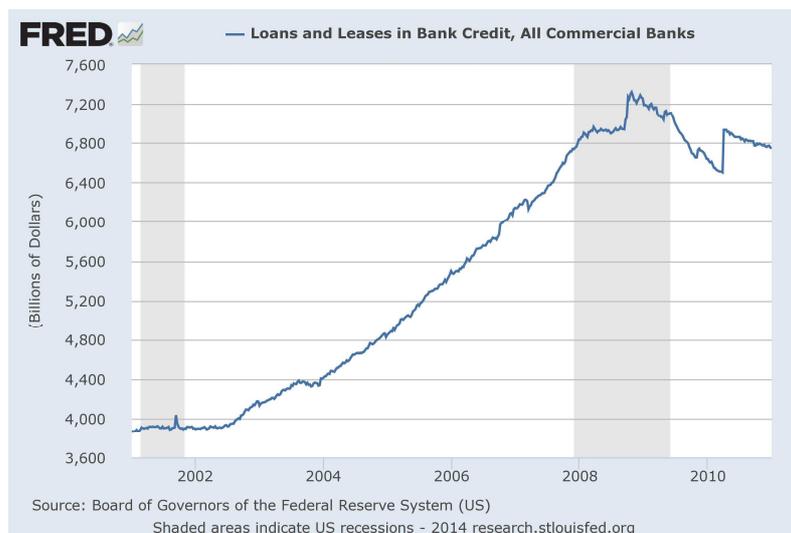
Figure 15. Inflation rate (%) in the United States between 1998 and 2008. The inflation rate shows how much prices change at any given point in time.



**Figure 16.** Another IS-LM model indicating what should happen to market interest rates ( $i$ ) and level of output ( $Y$ ) in the economy when the LM curve shifts to the right (change in liquidity and/or money supply). Between 2001 and 2007 the Federal Reserve increased both liquidity and the money supply.



**Figure 17.** An Money Market diagram indicating what should happen to the market interest rate ( $i$ ) and the quantity of money in the economy ( $q$ ) when the money supply ( $MS$ ) changes. The demand of money is indicated by the MD curve.



**Figure 18.** Loans and leases given out by all commercial banks in the United States in billions of US dollars between 2001 and 2011. The shaded areas indicate times when the US economy was officially in recession.

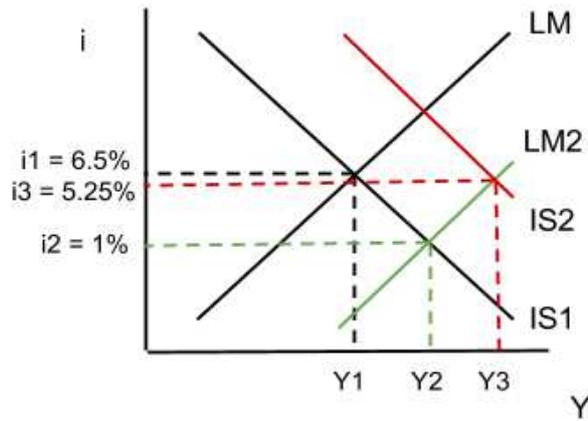


Figure 19. An IS-LM model that indicates what happened to the market interest rate (*i*) and the level of output (*Y*) in the US economy between 2001 and 2008. Between 2001 and 2004 liquidity and the money supply increased (LM curve to the right) and between 2005 and 2008 public investment increased (IS curve to the right).

### Appendix D

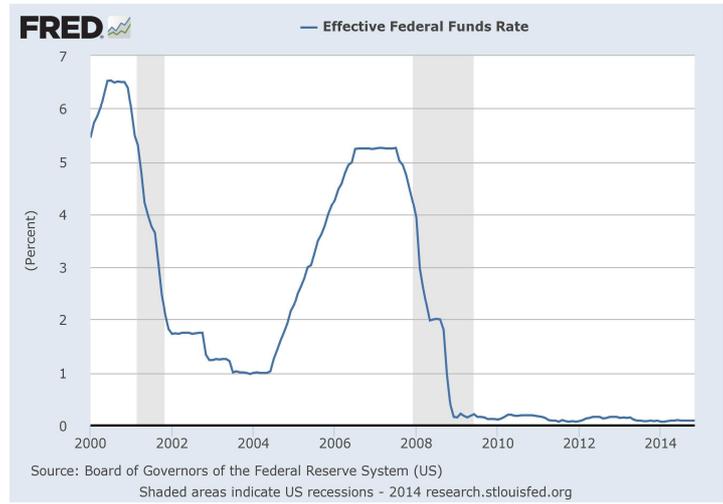


Figure 20. The effective federal funds rate in the US financial sector between 2000 and 2014 as established by the Federal Reserve. It behaves almost identical to the interest/discount rate in the US.

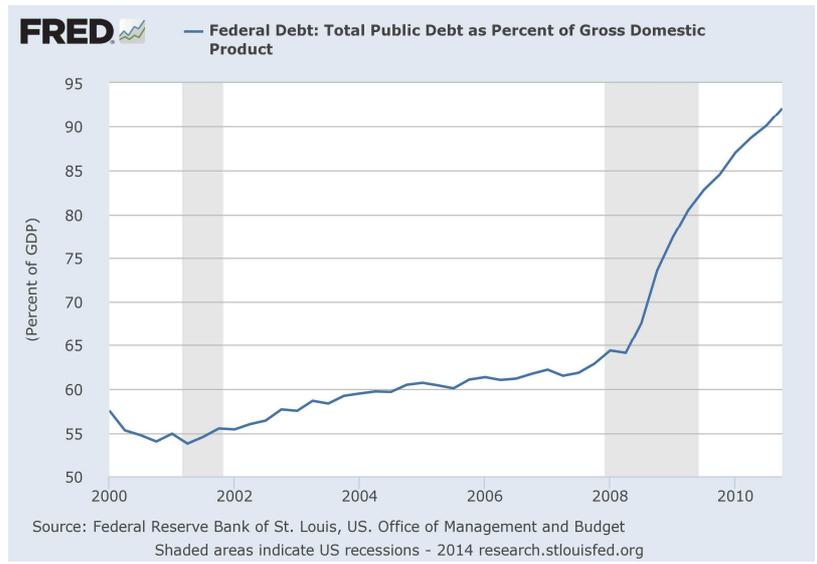


Figure 21. Total federal debt as percentage of GDP between 2000 and 2010. The shaded areas indicate times when the US economy was in a recession.

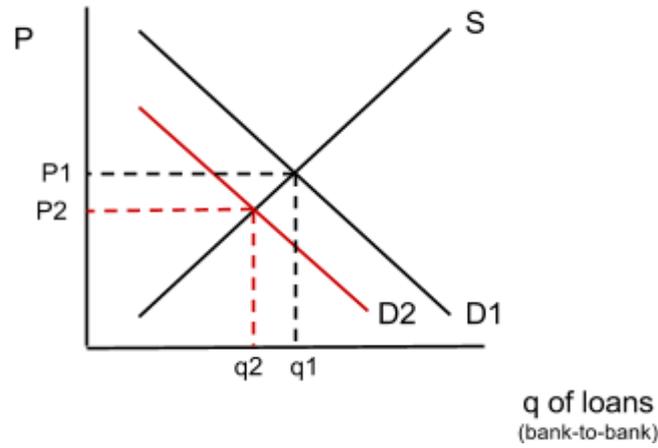


Figure 22. A simple supply-demand (S-D) diagram indicating what should happen to the price (P) and quantity of bank-to-bank loans (P) in the US if the demand for loans (D) decreases.

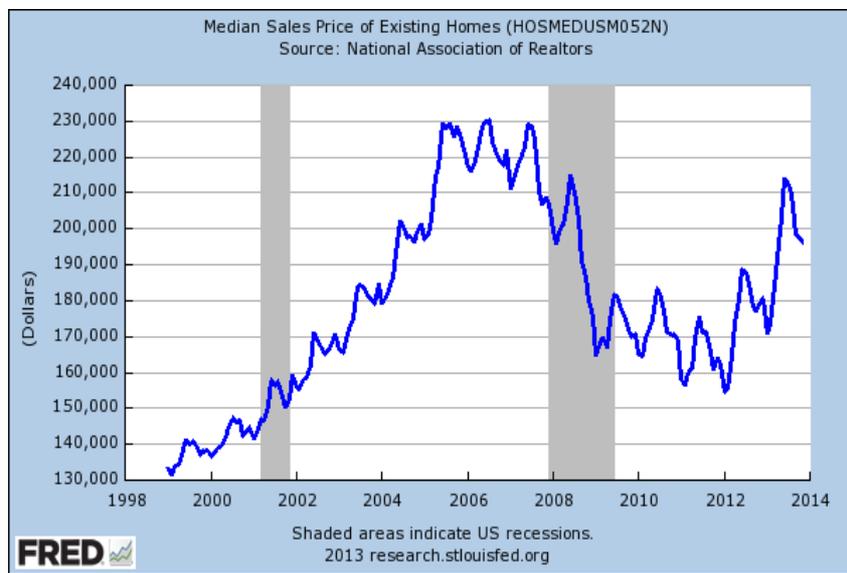


Figure 23. This graph shows the median sales price of existing homes in the United States in US dollars between 1999 and 2014. The shaded areas indicate times when the economy was officially in recession. The housing boom occurred between 2002 and 2007 and reached peak levels between 2005 and 2006.

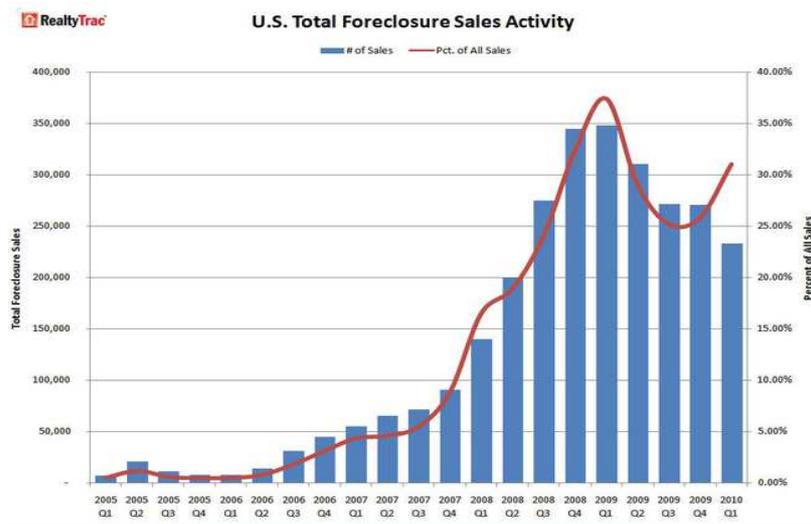
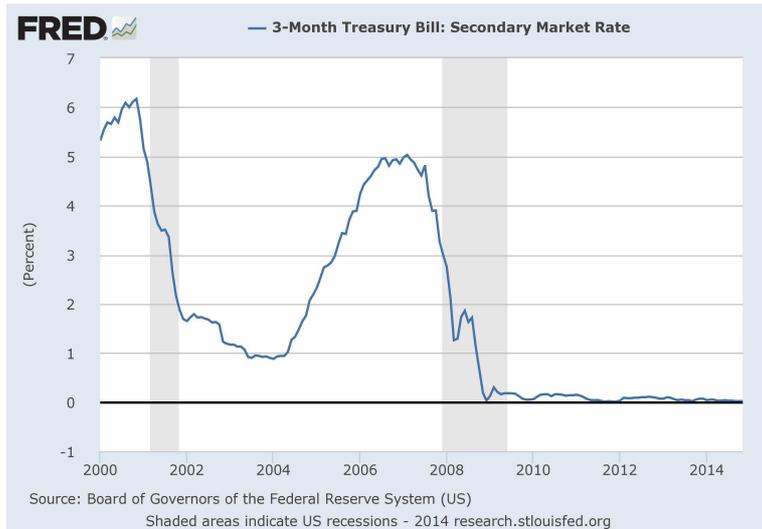
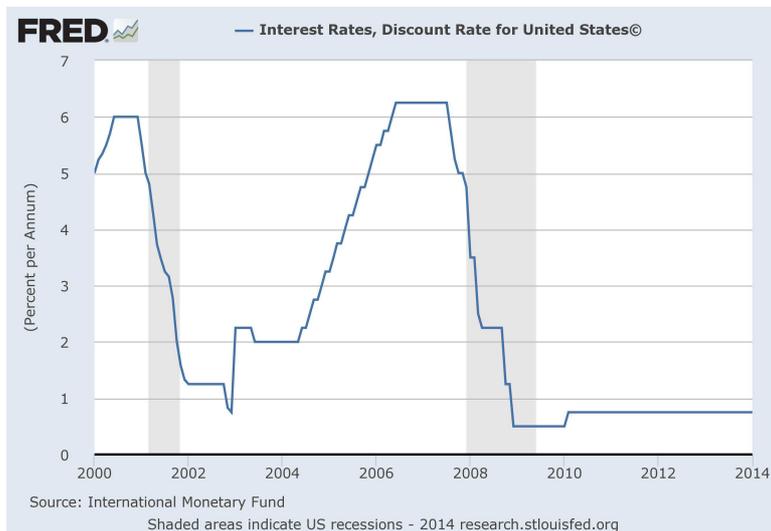


Figure 24. The number of forced home foreclosures (blue columns) in the United States between 2005 and 2010 and as a percentage of all sales (red line).



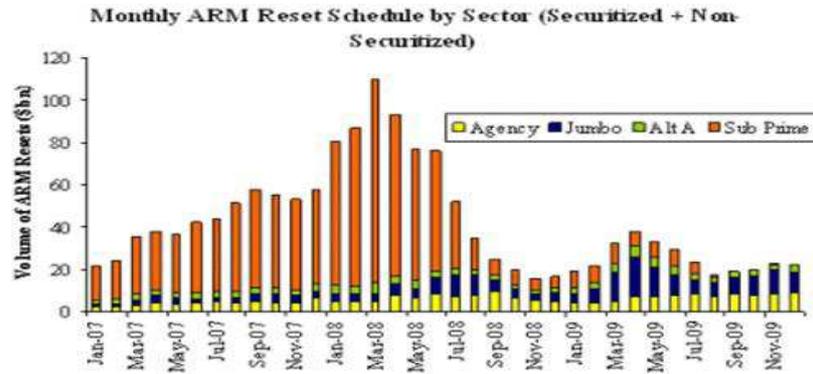
**Figure 25.** The 3-month Treasury Bill secondary market rate (%) in the US between 2000 and 2014. The shaded areas indicate times when the economy was officially in a recession.



**Figure 26.** The interest/discount rate (%) in the United States between 2000 and 2014. The shaded areas indicate times when the economy was officially in a recession.

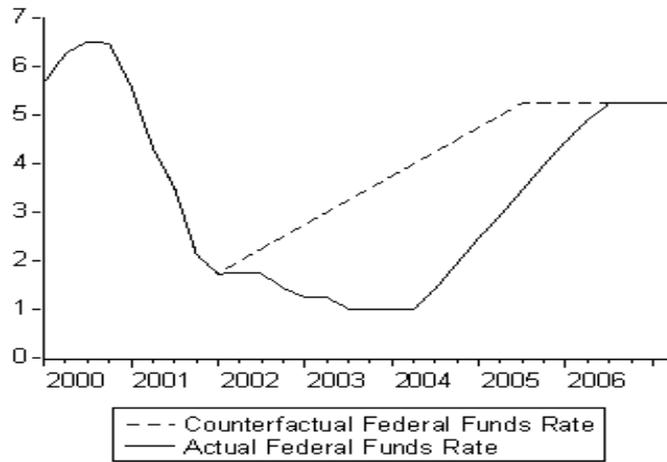


**Figure 27.** The 1-year adjustable rate mortgage rates (%) in the United States between 2000 and 2010. The shaded areas indicate times when the economy was officially in a recession. Notice how the rates increase between 2004 and 2006, which coincides with the housing boom.



source: www.doctorhousingbubble.com

Figure 28. Monthly adjustable-rate mortgage (ARM) reset schedule. When a mortgage resets it basically means that it went bad and cannot be repaid. Whenever a mortgage resets, banks incur bad debt. Notice how resets increase significantly between 2007 and 2008, which coincides with the financial crisis.



source: John B. Taylor’s Getting Off Track

Figure 29. Actual federal funds rate (% , normal line) versus the appropriate federal funds rate calculated with the Taylor Rule (% , dotted rule) between 2000 and 2007. Arguably, if the Federal Reserve had adhered to the Taylor Rule the financial crisis could have been avoided or at least mediated.

## Appendix E

Figure 30. Model 2: OLS, using observations 2001:3-2010:4 (T = 38) Dependent variable: GDP.

	coefficient	std. error	t-ratio	p-value
const	1.02710e+13	3.47403e+11	29.57	8.34e-25 ***
Inflation_Rate	5.66269e+10	1.82742e+10	3.099	0.0040 ***
Unemployment_Rate	-1.55761e+11	3.12923e+10	-4.978	2.12e-05 ***
War_on_Terror_Co~	3.57786	0.835636	4.282	0.0002 ***
Interest_Rate	6.39812e+10	2.28582e+10	2.799	0.0086 ***
US_Money_Supply	0.328473	0.113864	2.885	0.0070 ***
Mean dependent var	1.41e+13	S.D. dependent var		7.59e+11
Sum squared resid	4.87e+23	S.E. of regression		1.23e+11
R-squared	0.977103	Adjusted R-squared		0.973525
F(5, 32)	273.1121	P-value(F)		2.98e-25
Log-likelihood	-1021.131	Akaike criterion		2054.262
Schwarz criterion	2064.088	Hannan-Quinn		2057.758
rho	0.479220	Durbin-Watson		0.893879

White's test for heteroskedasticity:

Null hypothesis: heteroskedasticity not present

Test statistic: LM = 25.314

with p-value = P(Chi-square(20) > 25.314) = 0.18968

Figure 31. Model 6: OLS, using observations 2001:3-2010:4 ( $T = 38$ ) Dependent variable: *Financial\_Crisis*.

	coefficient	std. error	t-ratio	p-value
const	-2.86066	0.838237	-3.413	0.0017 ***
War_on_Terror_Co~	-4.81263e-12	1.94306e-12	-2.477	0.0186 **
US_Defense_Spend~	5.00557e-12	1.97639e-12	2.533	0.0163 **
US_Government_De~	-2.71719e-13	0.00000	-2.857	0.0074 ***
US_Money_Supply	8.39642e-13	3.20916e-13	2.616	0.0133 **
Mean dependent var	0.210526	S.D. dependent var		0.413155
Sum squared resid	2.629639	S.E. of regression		0.282287
R-squared	0.583640	Adjusted R-squared		0.533173
F(4, 33)	11.56460	P-value(F)		5.59e-06
Log-likelihood	-3.175614	Akaike criterion		16.35123
Schwarz criterion	24.53916	Hannan-Quinn		19.26443
rho	0.398879	Durbin-Watson		1.183206

White's test for heteroskedasticity:

Null hypothesis: heteroskedasticity not present

Test statistic: LM = 27.5792

with p-value =  $P(\text{Chi-square}(14) > 27.5792) = 0.0161718$

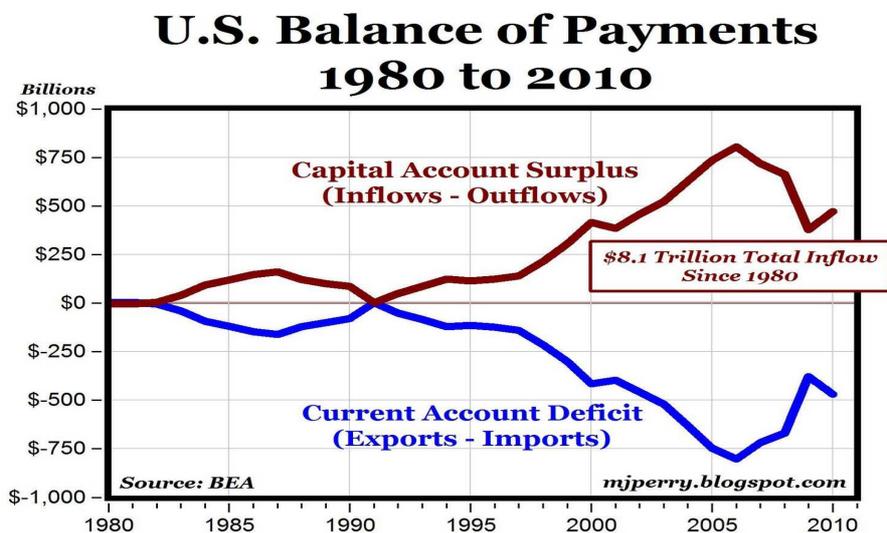


Figure 32. US Current and capital account balances (balance of payments) between 1980 and 2010 in billions of US dollars. Notice how the capital account balance decreased immensely over a very short period of time between 2006 and 2009. Also, notice how the current account balance increased just as quickly over the same period of time.

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