

This handout is a continuation of Handout #3, so it would be good to read it as soon as possible.

A Positive Role for Risk Analysis

Thus far we have been applying risk analysis to illuminate and estimate the level of risk posed by our nuclear weapons strategy. Those findings, while gloomy, have a silver lining: By identifying the most likely failure mechanisms, risk analysis allows us to focus remedial efforts where they will be most effective.

While the in-depth risk analyses I have proposed will provide better guidelines, even my preliminary analysis illuminates areas that are susceptible to improvement. One approach is to revisit the modern day analogs of the six steps that led to the 1962 Cuban crisis and see what they might tell us. I repeat each of those six steps below, in a paragraph starting with the step number, and then comment on what lessons we can learn:

Step #1, conflict between America and Castro's Cuba: Cuba still is an emotional land mine for Americans. When word reached General Norton Schwartz, now Air Force Chief of Staff, that the Russians might deploy nuclear capable bombers in Cuba, he said that would cross “a red line.”

The risk would be greatly reduced if we reacted more rationally to events surrounding that island nation. Given that Cuba, in and of itself, poses little or no threat to our national security, we should reexamine why we have such an emotional response to events there.

This step also shows the danger of drawing “red lines” in Russian-American confrontations. What would General Schwartz would have done if the Russians had called his bluff? (At least that is how his “red line” appears to me since, if it were crossed, following through on his implied threat would have a high likelihood of creating a full-blown Cuban crisis. If anyone sees another possibility, please let me know.) In 1962, both Kennedy and Khrushchev became haunted by similar “red lines” they had drawn, but that were crossed. They then faced the dilemma of either admitting that they had been bluffing, or following through with actions that would have risked hundreds of millions of lives:

Under attack by the Republicans for his passivity over Cuba, the president [JFK] had issued a public statement on September 4 [1962] warning the Soviets that “the gravest issues would arise” if they developed “a significant offensive capability” in Cuba. He had planted a marker in the sand, and was now committed to defending it. “Last month I should have said we don’t care,” Kennedy said wistfully, as if to himself. ... Doing nothing was no longer an option.¹

¹ Michael Dobbs, *One Minute to Midnight*, Alfred A. Knopf, New York, 2008, page 16.

[On September 12, 1962 Moscow warned that] “one cannot now attack Cuba and expect the aggressor will be free from punishment. If this attack is made, this will be the beginning of the unleashing of war.”²

Step #2. Russia demanding to be treated as a military equal and being denied that status: The same is true today. Even though Russia has thousands of nuclear weapons (as does the U.S.), we see ourselves as the world’s sole remaining superpower, leading even Mikhail Gorbachev to say in a [2008 interview](#), “there is just one thing that Russia will not accept ... the position of a kid brother, the position of a person who does what someone tells it to do.” Repeated American statements that we defeated Russia in the Cold War add fuel to that fire since the Russians feel they were equal participants in ending that conflict. An additional irritant is the way D-Day ceremonies repeatedly give the impression that the West won World War II, overlooking the immense Soviet contribution in the victory over Nazism.

This risk would be reduced by reassessing the limits of American military power, the extent of Russian (and other nations’) military power, and whether our words and deeds need to change as a result. As demonstrated by the Russian reaction to President Obama’s [2009 D-Day speech](#), it would not take much to diminish tensions. His speech included the following [emphasis added]:

This is the story of the Allied victory. It's the legend of units like Easy Company and the All-American 82nd. It's the tale of the British people, whose courage during the Blitz forced Hitler to call off the invasion of England; the Canadians, who came even though they were never attacked; ***the Russians, who sustained some of the war's heaviest casualties on the Eastern front***; and all those French men and women who would rather have died resisting tyranny than lived within its grasp.

That one phrase was enough for a [Russian news article](#) to contrast America’s recognition of the Soviet losses with Britain’s and France’s more self-centered perspectives:

Russia Thursday protested that its role in defeating Nazi Germany in World War II had gone unrecognized at this month's D-Day ceremonies. Not a single word was said by Sarkozy, Brown or Harper about the decisive role in the victory of the Soviet Union, which took the hardest blows from Hitler's army and sustained the heaviest casualties ... Only U.S. President Barack Obama mentioned the Soviet Union's contribution to defeating fascism and its horrendous losses at the ceremony to mark the 65th anniversary of the landings ... Twenty-six million Soviet citizens paid the ultimate sacrifice in

² Richard K. Betts, *Nuclear Blackmail and Nuclear Balance*, The Brookings Institution, Washington, DC, 1987, page 112.

defeating Hitler's project of Armageddon on Earth. Nine out of every ten Wehrmacht personnel killed in battle were killed on the Eastern Front. ... Full marks to President Obama for bothering to mention the Soviet contribution towards defeating Hitler and his Nazis.

Step #3: The Berlin Crisis: Several hotspots (e.g., Chechnya, Georgia, [Estonia](#), Cuba and Venezuela) test Russian-American relations in ways that are similar to Berlin forty years ago.

Risk can be reduced by reexamining our perspective on each of those hotspots and rooting out any mistaken assumptions. While, ideally, the other nations involved would do the same, having one of the players behave more rationally is better than none. We will study the conflict in Georgia in more detail later. For now I will only repeat the summary provided in handout #3:

The August 2008 Russian invasion of Georgia would have produced a major crisis if President George W. Bush had followed through on his [earlier promises to Georgia](#): “The path of freedom you have chosen is not easy but you will not travel it alone. Americans respect your courageous choice for liberty. And as you build a free and democratic Georgia, the American people will stand with you.” The danger is compounded because most Americans are unaware that Georgia fired the first shots and Russia is [not solely to blame](#). Ongoing tensions could well produce a rematch, and Sarah Palin, reflecting the mood of many Americans, has said that the United States should be [ready to go to war](#) with Russia should that occur.

Step #4. The Bay of Pigs invasion: The 2008 Georgian war is almost a mirror image of the 1961 Bay of Pigs invasion. In 1961, Kennedy was humiliated and therefore looking for ways to regain his manhood, both with the Soviets and the American electorate. In 2008, Georgia’s President Mikheil Saakashvili was similarly humiliated by the Russians after his failed attempt to regain South Ossetia and Abkhazia by force. Probably pushed by some of the same motivations that drove Kennedy, Saakashvili [has taken actions](#) that could result in a rematch. The danger is increased because most Americans [mistakenly believe](#) that Russia’s invasion of Georgia was totally unprovoked. In consequence, possible presidential candidate Sarah Palin [has said](#) that we should be prepared to go to war with Russia should it invade Georgia again, and many Americans, [including President Obama](#), still support NATO membership for Georgia.

The best way to reduce the risk of this step is also to reexamine our perspective on Georgia to produce a more accurate picture. Reexamining NATO expansion also might help.

Step #5. The American deployment of ballistic missiles in Turkey: The missile defense system President George W. Bush planned for Eastern Europe, with American missiles in Poland, bears an ominous similarity to the Turkish missiles. While these new missiles are seen as defensive and

a non-issue in America, the Russians see them as offensive and part of an American military encirclement. In October 2007, [Putin warned](#), “Similar actions by the Soviet Union, when it put rockets in Cuba, precipitated the Cuban Missile Crisis.” Two months later Gorbachev questioned America’s stated goal of countering a possible Iranian missile threat, “What kind of Iran threat do you see? This is a system that is being created against Russia.” Russia’s fears are exacerbated by [Poland believing the system](#) will protect it against Russia.

This risk can be reduced by trying to put ourselves in the other guy’s shoes and see how our actions might make him respond. Surprisingly, some far-sighted individuals did that both before our Turkish deployment and while our Eastern European missile defense system was debated. Unfortunately, these individuals were not heeded – sometimes by themselves, as we will see in the first example. Prof. Barton Bernstein, one of the world’s leading experts on the Cuban Missile Crisis, wrote:

[Referring to plans to place American missiles in Italy, Turkey, and possibly Greece:] in summer 1959 ... President Eisenhower privately expressed his worries about placing these IRBMs so near the Soviet Union. “If Mexico or Cuba had been penetrated by the Communists,” he said in the paraphrased words of the minutes, “and then began getting arms and missiles from [the Soviets], we would be bound to look on such developments with the gravest concern and in fact... it would be imperative for us [even] to take ... offensive military action.” Such thinking, however, did not block his administration's movement toward an agreement with Turkey to take some Jupiters.³

Bernstein cites another, even earlier instance of this ability to see the danger of our Turkish deployment. An April 1961 letter written from Undersecretary of State Chester Bowles to President Kennedy warned: “I am particularly concerned that we may fail to understand the Soviet reaction to our own defense programs. A double standard which allows us to react angrily at the slightest rumor of a Soviet missile base in Cuba, while we introduce ... missile set ups in Turkey... is dangerously self-defeating.”⁴

³ Barton J. Bernstein, “Reconsidering the Missile Crisis: Dealing with the Problem of the American Jupiters in Turkey,” in James A. Nathan (Editor), *The Cuban Missile Crisis Revisited*, St. Martin’s Press, New York, 1992, page 58. While Castro’s revolution had taken control of Cuba the preceding winter, Castro was not yet a Communist. As noted in one of handout #3’s references to Burlatsky’s book on Khrushchev, “At that time Castro was neither a Communist nor a Marxist. It was the Americans themselves who pushed him in the direction of the Soviet Union. He needed economic and political support and help with weapons, and he found all three in Moscow.”

⁴ Barton J. Bernstein, “Reconsidering the Missile Crisis: Dealing with the Problem of the American Jupiters in Turkey,” in James A. Nathan (Editor), *The Cuban Missile Crisis Revisited*, St. Martin’s Press, New York, 1992 page 55.

President Reagan's March 23, 1983, "[Star Wars](#)" speech proposed missile defense as a solution to the nuclear dilemma. But recognizing that, "If paired with offensive systems, they can be viewed as fostering an aggressive policy," he promised that, "We seek neither military superiority nor political advantage. Our only purpose one all people share – is to search for ways to reduce the danger of nuclear war." In spite of that pledge, the work was done in secret, with the promise to share the technology with the Soviets to be fulfilled at some indefinite future time. Recognizing this dangerous inconsistency, noted defense expert [Dr. Richard Garwin stated](#):

I think we ought to work on these military technologies [missile defense] ONLY openly and jointly. [emphasis in original] And I go farther than Edward [Teller], I think, because I think we shouldn't work on them unless we are willing that the Soviet Union have them as well. Had we done that with MIRV we would not be in the present situation where we feel our land-based forces are vulnerable. That's really a test of whether the government regards this as truly stabilizing or just states that its stabilizing in order to sell the program. If it is truly stabilizing for both sides to have it then let's give it to the Soviet Union, let's get the advantage of getting something in return – some access to their programs if possible. But if it is truly stabilizing they ought to get it when we do.

Independently, I came to the same conclusion in a [1986 OpEd](#):

In spite of the president's assurances, the Soviets fear SDI as a misguided American attempt to gain military superiority. They refer to it as "space attack weapons." Their mistrust is fueled by testimony by some senior American officials that SDI would only be shared with the Soviets after they dismantled all of their nuclear weapons. ... There is a simple procedure, however, by which we can move out of fantasy, back into reality. If SDI is for global benefit, the work should not be Top Secret. If we really plan to share the technology with the Soviets, let us answer their mistrust by sharing the technology with them now, not at some indefinite point in the far future. Or, if we have no real intention of ever sharing with them, let us be honest and say so. We will not have fooled the Soviets, and the American public would then assess SDI in a very different light.

In October 2007, Senator Richard Lugar (R-IN) made a [similar proposal](#) with respect to the specific system that constituted step #5 in the failure process:

Henry Kissinger has suggested that President Putin's initiative to link NATO and Russian warning systems was one of those initiatives easy to disparage on technical grounds, but also one that allows us to, "imagine a genuinely global approach to the specter of nuclear proliferation which until now been treated largely through national policies." ... I agree with former Secretary Kissinger. ... President Putin's proposal is not a new concept. In fact, it is surprisingly similar to the strategic vision that President Ronald Reagan laid out

more than two decades ago. ... The United States and Russia should also consider the establishment of jointly manned radar facilities and exchanges of early warning data. They might also consider joint threat assessments, as well as undertake bilateral discussions on options for missile defense cooperation. Lastly, we might consider placing Russian liaison officers at U.S. missile defense tracking sites in exchange for U.S. officers in Russian strategic command centers. The transparency gained from such steps would be useful in offering reassurances that these radars are not meant for spying on Russia.

Step #6. Khrushchev's deployment of ballistic missiles in Cuba: While there is not yet a modern day analog of this complete step, serious warning tremors occurred in July 2008. That was when *Izvestia*, a Russian newspaper often used for strategic governmental leaks, reported that, if we proceeded with our Eastern European missile defense system, then nuclear-armed [Russian bombers would be deployed to Cuba](#). During Senate confirmation hearings as Air Force Chief of Staff, [General Norton Schwartz responded](#) that “we should stand strong and indicate that is something that crosses a threshold, crosses a red line.” While the Russian Foreign Ministry later [dismissed *Izvestia's* report](#) as unfounded, some elements within the Russian Defense Ministry seem to be in a similar state of mind to the one that prompted Khrushchev to deploy his Cuban missiles.

We clearly have less control over this step than we do over earlier ones, which is consistent with a general rule: The earlier you stop the failure process, the better off you are. The best way to reduce the risk of this step is to pay adequate attention to remedial actions earlier in the process! But, should we ever find ourselves this close to the nuclear threshold, we still can reduce the risk by responding more rationally. For example, in the 1962 crisis, we saw that Kennedy and his advisors regarded the downing of Major Anderson's U-2 as a major provocation even though we had violated Cuban airspace. In contrast, when the commander of the North American Defense Command asked the Pentagon for advance permission “to use nuclear weapons ... in the event of an IL-28 [Soviet bomber] raid from Cuba which penetrates U.S. air space.” The Joint Chiefs agreed to his request, in the event that his air defense system indicated a general “Cuban and Sino-Soviet attack.”⁵ While such a plan made military sense if Soviet bombers were en route to destroy an American city, it also created the possibility for errors similar to the unauthorized firing of missiles that took out Major Anderson's U-2 and added tremendous pressure on Kennedy to take military action against Cuba.

Many of these recommendations are really just applying the Golden Rule It is interesting to note that handout #1's story about Hillel teaching the Torah to his inquisitor while the latter “stood on one foot” is applicable. Hillel replied, “What is hateful to you, do not do unto others,”

⁵ Michael Dobbs, *One Minute to Midnight*, Alfred A. Knopf, New York, 2008, page 248.

and, when asked why the Torah was so long, answered: “The rest is mere commentary.” Many, perhaps most, of the above recommendations for reducing the risk of a nuclear disaster, fit with that Golden Rule, with the rest being mere commentary. Here are some of the recommendations for reducing the risk along with brief commentaries that link them to that often spoken, but frequently ignored injunction:

The risk would be greatly reduced if we reacted more rationally to events surrounding that island nation. We react strongly to any Russian interest in Cuba, yet object when they react to our similar interest in their “near abroad.” During the Georgian war of 2008, [an essay in Newsweek](#) compared the Russian invasion of Georgia to Hitler’s takeover of Czechoslovakia in 1938. Implicitly calling Russia a modern-day Nazi Germany demonstrates deep anger and hurt on our part. Our reaction is also questionable given that it [has been determined](#) that Georgia fired the first shots and bears some of the blame for that war.

The danger of drawing “red lines.” General Schwartz drew a red line around Cuba and warned that Soviet air power should not cross it. Yet we have reacted angrily whenever Russia attempts to set limits on our actions, no matter how close to her borders, even when phrased in less humiliating terms than a “red line.” NATO’s expansion into Eastern Europe has been protested by Russia as dangerous, but is [dismissed as unwarranted meddling](#) by us – in spite of [an assurance](#) we gave in 1991 that, if Gorbachev did not resist the reunification of Germany within NATO, then “NATO’s jurisdiction would not shift one inch eastward from its present position.”

There are other examples where recommendations for reducing the risk fit with the Golden Rule, but I’ll stop here until I get some feedback from the class on whether this is helpful. I would appreciate receiving email comments indicating whether you found this section helpful and, if so, whether it should be expanded with a few additional examples.

If something as simple as following the Golden Rule would reduce the nuclear threat, why hasn’t that already been done? Because following the Golden Rule is not simple! I treated this [in a drash](#) (i.e., a Jewish sermon) that I was invited to give to my congregation in 2009:⁶

⁶ My drash was set in a Jewish context only because it was for a Jewish congregation. The same ideas work just as well in a Christian context, with quotes from the Gospels. For example, Matthew 5:44, “love your enemies and pray for those who persecute you,” fits perfectly with my theme, as does the parable of the mote and the beam (now often phrased as “the speck and the plank”), Matthew 7:1-5. While I do not know them well enough to give specific quotes, I am sure that similar teachings can be found in Islam, Buddhism, and other religions. For those of no religious persuasion, I will note that even the atheists in my congregation liked the drash. (We are a diverse group.) To see why they liked it even though it talks of God, you would have to read the earlier part of the *drash* that talks about how I conceive of God.

the Golden Rule has been quoted so often that there is an understandable tendency to dismiss it and say, “Of course. But don't I already do that?” My answer is that, no matter how well one follows the Golden Rule, there is always room for improvement. It is an ideal that no human being can achieve. At best, with constant effort, we can approach it as an asymptote.

That's certainly been my personal experience. No matter how hard I try, when I am frustrated or tired or pushed to the limits, I will sometimes fail to live up to that ideal. Worse, I am often blind to my failure. If I fall into a conflict with someone else, I naturally try to contain my anger. What I often miss is how some of my anger leaks out anyway, or is telegraphed to the other person in spite of my attempts to be as reasonable as possible. Also, in the weakened spiritual state that a conflict engenders, I am prone to take the other person's words and actions more negatively than they were intended, respond inappropriately, and add more fuel to the fire. ...

The need to look beyond self-congratulatory views of ourselves, in which someone else is to blame for every conflict, extends to the international level, and with far graver consequences if we fail to do so. Our relations with many nations are in urgent need of *tikkun*⁷, and in all instances that I have examined, the other side is not solely to blame for the tension. Rather, I have always found something for which we as a nation could atone and thereby possibly start the healing process.

The difficulty of living up to the Golden Rule is another way of saying that critical thinking is needed. We need to carefully reexamine our thoughts and deeds to ensure that we are seeing ourselves and the world as clearly as possible, so that we can be as consistent as possible with our stated ideals.

Risk Analysis Provides Early Warning Signs

Risk analysis provides early warning signs for faulty system designs that are headed for catastrophic failure – but only if we pay attention to those signs. Unfortunately, history shows that society usually makes the mistake of distorting early warning signs into evidence that all is well. “After all,” the reasoning goes, “we had a scare [the near miss], but our backup systems clicked in and nothing bad happened. Clearly all is well.” Examples of that dangerous thinking follow:

⁷ *Tikkun Olam* is a Jewish concept that means “repair the world.” While it also can have a mystical meaning, most Jews interpret it to mean working for peace and justice in the world.

The Gulf Oil Spill As noted in handout #3, just five months before British Petroleum's Deepwater Horizon rig created an environmental disaster, its vice president for exploration in the Gulf of Mexico told [Congressional Hearings](#) that Outer Continental Shelf drilling "has been going on for the last 50 years, and it has been going on in a way that is both safe and protective of the environment." The reality was very different, as shown by a December 2010 [The Wall Street Journal article](#):

The oil industry has said the Deepwater Horizon rig catastrophe was a unique event, the result of an unprecedented series of missteps that are unlikely to be repeated. The recent history of offshore drilling suggests otherwise. In the months before and after the rig exploded and sank, killing 11 and spilling millions of barrels of oil into the Gulf of Mexico, the industry was hit with several serious spills and alarming near-misses, some of them strikingly similar to what happened aboard the Deepwater Horizon. ... The industry's faith in its ability to safely develop oil and gas from facilities at sea is largely unshaken. The Deepwater Horizon "was an isolated incident," says Erik Milito, a senior official at the American Petroleum Institute. "We do not believe there is a systemic failure across the industry."

In contrast to the industry's complacent attitude, an [interim National Academies report](#) on the Gulf oil spill found a glaring systemic failure:

The failures and missed indications of hazard were not isolated events during the preparation of the [British Petroleum] Macondo well for temporary abandonment. Numerous decisions to proceed toward abandonment despite indications of hazard ... suggest an insufficient consideration of risk and a lack of operating discipline. ... The various failures mentioned in this report indicate ... a failure to learn from previous near misses. ... Of particular concern is an apparent lack of a systems approach that would integrate the multiplicity of factors potentially affecting the safety of the well ... the testimony failed to discern any standard practice employed to guide the tradeoffs between cost and schedule and the safety implications of the many decisions (that is, a risk management approach). ... The experience of the committee members suggests that in an effective risk management approach reflecting a safety culture, "near misses" provide opportunities to improve, and the reporting of errors, omissions, and questionable results is highly encouraged.

As we now know, all those early warning signs were ignored and the near misses mistakenly seen as proof that all was well. The result was a catastrophic failure.

The Challenger Space Shuttle Disaster Ignoring early warning signs and mistakenly viewing near misses as proof that all was well also led to the loss of the Challenger space shuttle. The O-rings on the shuttle's booster rocket were designed to prevent hot gases from escaping from the combustion chamber. Partial O-ring failures on flights prior to the Challenger disaster showed that the system was not working as designed and should have been cause for alarm. Instead, these early warning signs were turned into evidence of a significant (and illusory) safety margin: It was decided that, because the O-rings had only burned $\frac{1}{3}$ of the way through, there still was "a safety factor of three." In his [personal observations](#) on the Rogers Commission report, Nobel Laureate in Physics and commission member Prof. Richard Feynman criticized that approach:

This is a strange use of the engineer's term, *safety factor*. ... The O-rings of the Solid Rocket Boosters were not designed to erode. Erosion was a clue that something was wrong. Erosion was not something from which safety can be inferred.

Ignoring the early warning signs and misinterpreting near misses as successes⁸ because an accident had not yet occurred proved fatal to the Challenger's crew.

Hurricane Katrina Prior to being destroyed by Katrina, New Orleans was known to be vulnerable to a slow moving category 3 hurricane. A year earlier, an emergency preparedness exercise had simulated the effects of such a fictional "Hurricane Pam" and predicted a catastrophe. A [Louisiana State University report](#) notes that "experts involved in the Hurricane Pam exercise were struck by the similarity of the simulation to the actual destructive conditions wrought by Katrina." I do not know for sure why this early warning sign was overlooked, but suspect that successfully escaping a real near miss the year before played an important role. When Hurricane Ivan (a real one, not a simulation) [had a 23% chance](#) of hitting New Orleans with disastrous results, an evacuation was ordered. Given the catastrophic consequences of failing to evacuate when needed, even a 23% chance of a disaster warrants evacuating. As it happened, the 77% chance won out and Ivan did not hit New Orleans. Many people therefore ignored the evacuation order for Katrina. As noted in the above link, Katrina had a slightly smaller 21% chance of hitting the city.

Even after Katrina's devastation, this dangerous mentality persisted. In 2008, Hurricane Gustav triggered the largest evacuation in U.S. history. Gustav weakened before making landfall, [leading](#)

⁸ In testimony to the Rogers Commission, the manager of NASA's booster rocket program, Lawrence Mulloy, stated that his frame of mind in overriding the Thiokol engineers' objections to launching in such cold weather included, "What you are proposing to do is to generate a new Launch Commit Criteria on the eve of launch, after we have **successfully** flown with the existing Launch Commit Criteria 24 previous times." [emphasis added]

[one evacuee to complain](#), “Next time, it’s going to be bad because people who evacuated like us aren't going to evacuate. They jumped the gun.” It takes time to evacuate a city, so the decision must be made well before the hurricane hits, when its ultimate strength and path are only roughly known. An objective analysis is needed that balances the costs of the two types of error – needlessly evacuating versus not evacuating when we should – and then factors in the probability of a particular storm hitting the area in question. In the case of Ivan, Katrina and Gustav, I suspect such analyses would vindicate the evacuations that were ordered. The problem is getting society to recognize that we live in a world with imperfect information, so seemingly “needless evacuations” (errors of the first kind) are needed to reduce the risk of disaster (errors of the second kind) to an acceptable level.⁹

The Economic Crisis The financial meltdown, from which we are still trying to extricate ourselves provides another good example of how hard it is to get society to start paying attention to early warning signs and to stop seeing near misses as proof that the systems in place are functioning properly. The meltdown first came to public consciousness in the summer and fall of 2008, when the nation was told that, if it didn’t provide \$700 billion to Secretary of the Treasury Henry Paulson to buy mortgage-related securities, we faced a crisis that could rival the Great Depression. The situation was so dire that Section 8 of [Paulson’s original proposal](#) stated that all of his actions in using those funds “may not be reviewed by any court of law or any administrative agency.” While Congress added some oversight provisions before appropriating the funds, that section of the original proposal gives some idea of how serious matters had become. Figure 3.5 charts the Dow Jones Industrial Average for a five year period from 11 JAN 2006 to 11 JAN 2011. It shows that, until the meltdown started, its potential magnitude was not appreciated even by sophisticated investors. (While not all investors are sophisticated, mutual funds control a large portion of investments and are supposed to be run by financial experts.)

⁹ One of the first things I learned in decision theory is that, without perfect information, the only way to have zero errors of one kind is to have 100% errors of the other kind. While a proof is clearly beyond the scope of this seminar, you may be able to see that: If you cannot be 100% certain of your decision (that’s what imperfect information means), then the only way to never “needlessly” evacuate is to never evacuate. That guarantees that every time you should have evacuated, you won’t, giving an error rate of 100% in that direction.

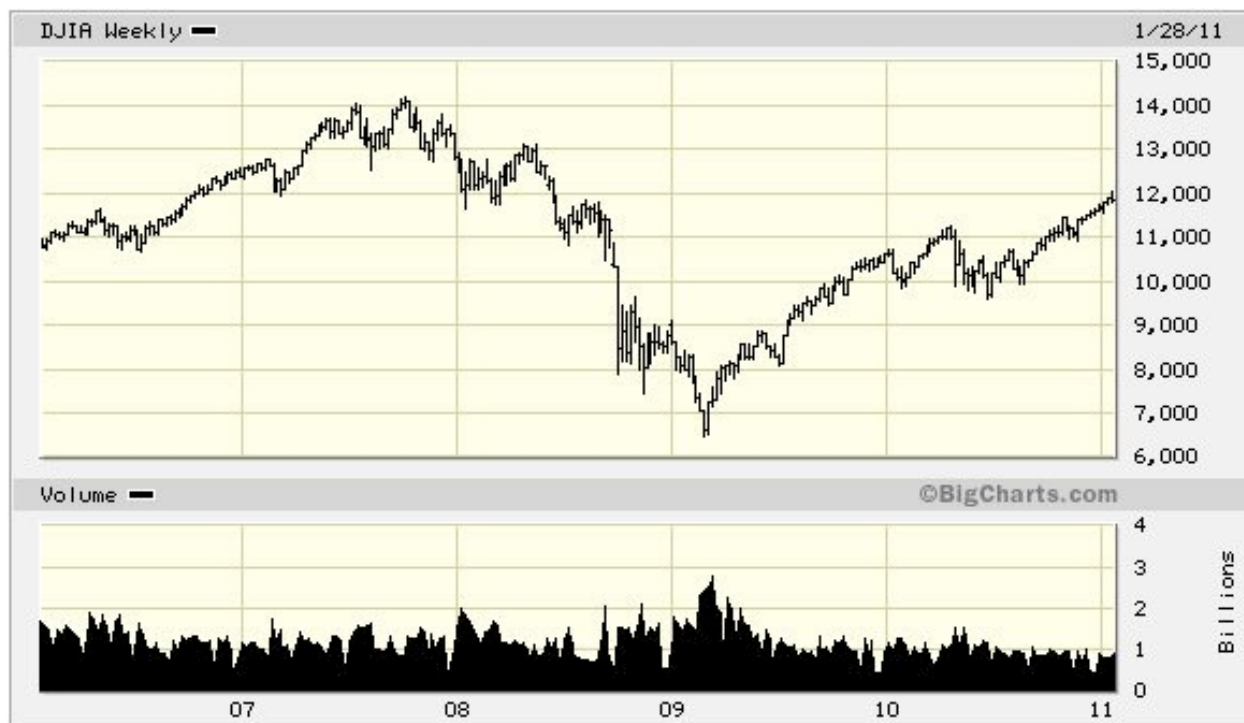


Figure 3.5: The Dow Jones Industrial Average from 2006 to 2010

Yet there were numerous, overlooked early warning signs:

- In the *Washington Monthly's* October 1994 [cover story](#), Senator Byron Dorgan wrote extensively about the danger of financial derivatives: “here’s the real kicker: Because the key players are federally insured banks, every taxpayer in the country is on the line. ... What is surprising is that the Office of the Comptroller of the Currency (OCC) and the Federal Reserve agree, too, that legislative reform is unnecessary. ‘As far as the Federal Reserve Board is concerned,’ Chairman Alan Greenspan testified in May, ‘we believe that we are ahead of the curve on this issue as best one can get.’” Dorgan further noted that “derivatives were now a \$35 trillion – that’s right, trillion – worldwide market.” By 2008, they had mushroomed to a \$600 trillion market. While derivatives were not the sole cause of the meltdown, their use of leverage greatly amplified the damage.
- Several years later, the head of the Commodity Futures Trading Commission (CFTC), Brooksley Born, recognized the danger posed by derivatives, but was blocked from regulating them by Congress. As reported in the [March/April 2009 issue](#) of Stanford’s alumni magazine. “Ultimately, Greenspan and the other regulators foiled Born’s efforts, and Congress took the extraordinary step of enacting legislation that prohibited her agency from taking any action.”

- In March 1998, *DowJones Financial News* had an article, “[Buffett turns Cassandra over catastrophe bonds](#).” He had warned in his annual letter to Berkshire Hathaway shareholders that disaster awaited those who invested in those related financial instruments. Even “the Oracle of Omaha,” as Buffet is often called, can be seen as a Cassandra when his warnings contradict a widespread belief that all is well.
- Four years later, in his [2002 annual letter](#), Buffet zeroed in on financial derivatives and warned, “Charlie [Munger, Buffett’s partner in managing Berkshire Hathaway] and I are of one mind in how we feel about derivatives and the trading activities that go with them: We view them as time bombs, both for the parties that deal in them and the economic system. ... In our view, however, derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal.”
- In January 2008, just months before the financial meltdown began in earnest, *Business Week Chicago*’s headline called Janet Tavakoli “[The Cassandra of Credit Derivatives](#).” Buffett has a different take and said, “Janet Tavakoli should have been listened to much more carefully in the past ... and will be in the future.”

In spite of these repeated, specific warnings (“financial weapons of mass destruction” is about as graphic as you can get) and in spite of the credibility of their sources (Buffet is widely regarded as a financial genius) society overlooked the danger, an error for which we all now are paying a heavy price.

Conclusion The above evidence shows that society often overlooks catastrophic risks until it is too late. In the case of nuclear weapons, that approach clearly is unacceptable. Here are some of the early warning signs of a nuclear disaster (some repeated from earlier handouts) that are being overlooked:

- South Africa stores the highly enriched uranium (HEU) fuel from about a dozen dismantled bombs in their Pelindaba facility. It was successfully [attacked and entered](#) by armed men in November 2007. Fortunately, they were scared off without any loss of HEU.
- Even the U.S. nuclear arsenal is less secure than it should be as demonstrated by the US Air Force [losing six nuclear warheads](#) in August 2007 for a day and a half. While they were lost, these six weapons were inadequately protected from theft.

- During the 9/11 terrorist attack, jet fighters were scrambled to protect Washington, but in the confusion, the lead pilot thought Russians had attacked us. That same day, Russia was flying strategic bombers toward the United States in an exercise. If the Russian military had not learned of the terrorist attack and grounded the bombers before an accident could occur, in the confusion, they might have been shot down even while outside U.S. airspace.
- Due to circumstances not understood in the West at the time, the 1983 Able Archer military exercise caused the Soviet leadership to fear an American nuclear first strike was in progress. Secretary of Defense Robert Gates has called Able Archer “one of the potentially most dangerous episodes of the Cold War.”¹⁰
- Both the 1991 and 1993 Russian coup attempts created dangerous conditions that also were not generally understood in the West. During the latter, a number of American intelligence officers at the North American Aerospace Defense Command (NORAD) headquarters who did understand the danger called their families and told them to leave Washington out of fear that the Russians might launch a nuclear attack.¹¹
- In 1995, Russian air defense mistook a meteorological rocket launched from Norway for an American submarine-launched ballistic missile, causing the Russian “nuclear football” – a device that contains the codes for authorizing a nuclear attack – to be opened in front of President Boris Yeltsin.
- The August 2008 Georgian war, coupled with dangerous misperceptions, created conditions that could have led to more general war. Ongoing tensions could produce a rematch, and Sarah Palin, reflecting the misunderstanding that plagues many Americans, has said that the United States should be [ready to go to war](#) with Russia should that occur.
- NATO’s expansion has caused Russia to feel increasingly encircled. In the [words of Admiral Ulrich Weisser](#), a former high ranking German defense official: “Moscow also feels provoked by the behavior of a number of newer NATO member states in central and Eastern Europe. Poland and the Baltic states use every opportunity to make provocative digs at Russia; they feel themselves protected by NATO and backed by the U.S.”

Unlike with the Gulf oil spill, the space shuttle disaster, the destruction of New Orleans by Hurricane Katrina and the economic meltdown, the consequences of a failure of nuclear

¹⁰ Gates Robert M (1996) *From the Shadows*. New York: Simon & Schuster, pages 270-273.

¹¹ Peter Vincent Pry, *War Scare*, Praeger, Westport, CT, 1999, pages x, 53-86 and 129-169.

deterrence would be so catastrophic that overlooking these early warning signs is not an acceptable option. It is time for society to wake up. As will be explained in a later handout, your involvement, coupled with in-depth risk analyses of nuclear deterrence, has the potential to play a key role in bringing the danger into clear focus before disaster strikes. If we do that, we can avert Einstein's "unparalleled disaster." And, in the process of combatting the ignorance and misperceptions that produce much of the nuclear risk, we will create a better world that we can be proud to pass on to future generations.