Confluence INVESTMENT MANAGEMENT

Weekly Geopolitical Report

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Greek Games: An Update

On Sunday, July 5th, Greeks voted in a special referendum to decide whether to accept the troika's most recent proposal to end the current debt and financial crisis. Voters in Greece overwhelmingly rejected the EU's offer. Since the vote, EU and Greek officials have been meeting, trying to determine the path forward. As of this morning, Greek PM Tsipras agreed to rather harsh measures to begin the bailout process. However, nothing has been finalized yet.

In this report, we will update our views on the Greek situation, using game theory as a theoretical construct. We used a similar construct in an earlier report[1] on Greece but, in light of the referendum and subsequent negotiations, we believe that further clarification is necessary. And so, in this report, we will review the "game of chicken," which we believe best describes this situation. After this description, we will discuss in detail the particular aspects of this game and why it leads to rash and aggressive behaviors in participants. In the aftermath of the referendum, we will review the choices available to the troika and offer our expectations on the outcome, with the caveat that games of chicken do not necessarily lead to easily predictable outcomes. As always, we will conclude with market ramifications.

The Game of Chicken

To understand the game of chicken, it's important to first understand prisoner's dilemma.

	Silence	Talk
Silence	+5, +5	-10, +10
Talk	+10, -10	-5, -5

In the canonical game, two prisoners are held separately. Interrogators talk to both; if neither talk, they both get the outcome in quadrant #1. If one talks and the other remains silent, the former is much better off than the latter. Given the risks of remaining silent, the equilibrium position will be quadrant #4. This position is known as the "Nash equilibrium,"[2] which occurs when neither player in a non-cooperative game has an incentive to change positions. A Nash equilibrium is not necessarily the most optimal outcome but it is stable. Why does this outcome occur? Assume both start in quadrant #1, the most optimal outcome for both players combined. The incentive to defect and talk if one assumes the other party won't defect is quite high. Thus, worried that the other party will talk, each player talks.

Now, let's look at the game of chicken.[3]

[1] See WGR, 2/9/2015, Greek Games.

[2] First described by John Nash, who won a Nobel Prize in economics for his work in game theory.

[3] This analysis is derived from the research of Ben Hunt, an analyst with Salient Partners.

	Divert	Maintain
Divert	-1, -1	-10, +10
Maintain	+10, -10	-∞, -∞

In this standard game, two drivers head toward each other at high speeds approaching a one-way bridge. If they both turn off before entering the bridge, they both equally lose face, the outcome seen in quadrant #1. If one player maintains his path to the bridge and the other diverts, the player that holds his position gains face and the other player is "chicken." The worst outcome is quadrant #4, which is "death" for both players.

What makes the game of chicken unstable is that there is no single Nash equilibrium. Either quadrant #2 or #3 is a reasonable outcome for a non-cooperative game. ***However, there is no compelling reason why either player should divert***. In other words, even though it makes sense for one player to divert to avoid a catastrophic quadrant #4 outcome, there is nothing in the game itself that indicates which player should divert. This lack of a single Nash equilibrium leads to some interesting characteristics.

There is no structural or fundamental method to determine the probability of the decision of either player. Unlike prisoner's dilemma, which has a Nash equilibrium in quadrant #4, in chicken, there is no single Nash equilibrium and thus no way to determine an outcome based on the structure of the game. That means that all outcomes in a game of chicken exist under conditions of uncertainty, where probabilities cannot be determined.

Games of chicken are not determined by power and capacity; they are determined by will. Because there is no way to predetermine the outcome, both players have an incentive to signal their intentions and create narratives that argue that the other player should divert and solidify the notion that each driver will maintain the course.

There are three primary tactics in chicken.

1. Use small changes in behavior to signal intention. In the standard game, both cars are expected to go fast. However, if one player is accelerating going into the bridge, it shows the second player that he intends to maintain his position.

2. Employ self-binding behaviors that might appear irrational. Again, in the standard game, this may mean tying a belt to the steering wheel to prevent the driver from turning. This action shows the other driver that the first driver is willing to risk ruin to encourage the other driver to divert.

3. Engage in stall tactics. Because the game of chicken is high stakes and there is much to be gained by building a narrative to signal intentions, players should be in no hurry to resolve the outcome because none are attractive. Even winning, by getting the other player to divert, requires the unnerving uncertainty that the other player will maintain and lead to ruin.

Both the standard games of prisoner's dilemma and chicken can be played as one-episode games or iterative games. Studies have shown that in prisoner's dilemma, repeated play usually ends up with persistent defection. Iterative chicken games are always uncertain; even quadrant #4, which is in neither player's interest, can occur because both parties miscalculate the payoffs or misread the other player's

intentions. However, it should also be noted that in repeated chicken games, one should not expect consistency; just because one side has won several rounds doesn't mean that result will continue. That's because the outcomes are not structurally determined; they're determined by will and the perception of will, which is fluid.

Chicken and Greece

Since winning the election in late January, Syriza has been playing chicken with the EU. As we detailed in our earlier report, we believe that both sides overestimated the cost to the other player and underestimated their own. Over the past few months, we have seen stalling from both sides. Both parties made proposals and counterproposals but little progress was made.

The primary sticking point between the troika and Greece is over debt relief. Although Syriza initially opposed many of the structural changes demanded from Greece, Tsipras backed down and accepted not only the previous measures but new ones as well. Furthermore, it doesn't appear Greece will receive significant debt relief.

One key twist to the "game" was that the Tsipras government began to realize that time wasn't on its side, removing the third tactic from its arsenal of responses. Its economy was likely in recession and deposits were being steadily withdrawn from the banking system. When the ECB capped the amount of emergency funds the Bank of Greece could borrow, an example of the first tactic, Tsipras responded by calling a referendum, a self-binding ploy, or the second tactic. This was a risky decision for two reasons. First, the Greek public could have rejected the outcome. Second, since the troika didn't "blink" as Tsipras likely assumed it would, by giving Greece debt relief, the potential for a quadrant #4 outcome increased unless Greece capitulated.

So, now we will be watching to see how the Greek political system reacts to these developments. On the one hand, the deal reached essentially requires Tsipras to "walk back" from demanding debt relief that the Greek people thought they had won with the referendum. On the other hand, Greeks do not want to leave the Eurozone and face the chaos of a legacy currency.

It is clear that the EU and the troika have decided to risk a quadrant #4 outcome and push Greece out of the Eurozone. The German proposal over the weekend was essentially a five-year "time out" for Greece, where it would leave the single currency and reapply in five years for membership. That probably means Greece never returns to the Eurozone. By getting Greece to capitulate, the EU sends signals to other nations with debt concerns, Spain, Portugal, Ireland and Italy, that there is no alternative to austerity. All these nations have significant populist movements and it is clear the northern Europeans want to quash populist sentiment. At the same time, there is little domestic support to give Greece and other periphery nations additional help without strict conditions. Simply put, Chancellor Merkel and other leaders may not be able to offer much help because the citizens of northern Europe won't support it.

However, deciding to "maintain" and force Greek capitulation is also a dangerous stance. If Greece rejects the deal, defaults and leaves the Eurozone, it will raise all sorts of questions about the viability of the euro. When created, the Eurozone did not have any process for a nation to leave the single currency. It is unclear how a nation will leave the currency zone, how it will re-issue a legacy currency, what currency the

exiting nation will use to service debt and if a Eurozone nation leaving can even stay in the European Union. Moreover, if the cost of staying in the Eurozone is economic depression, it begs the question as to the benefits of single-currency membership.

The bigger problem, which we will address next week, is the potential long-term impact on the EU project. Although it is difficult to imagine it now, in an era of peace in Europe, this continent has been the source of two world wars. The particular geography of Europe generally prevents any power from dominating the region, which led to nearly constant conflict. The period since WWII has been unusual. Yes, there have been some conflicts in Europe and it was "ground zero" for the Cold War, but compared to the period from 1870 to 1945, Europe has been at peace. To offset the threat of nationalism to Europe, the European Coal and Steel Community was introduced in 1951 and, over the years, has evolved into the European Union and the Eurozone. The goal of European leaders was to use peace and prosperity as a substitute for political unity. That program is being threatened by the potential exit of Greece from the Eurozone.

Ramifications

Conditions remain fluid but we believe the structure of game theory works well in explaining the situation in Greece. The common market rhetoric that a "deal" is inevitable because Greece is a small nation and "agreements are always made" was always too simple. The issue in Greece is political. This is why looking at the economics alone is a mistake; in general, the Greek debt problem is really about the future structure of Europe. The tactics deployed by Greece fit into game theory; unfortunately, the game is chicken, which can have truly catastrophic outcomes. We expect financial markets to remain volatile in the coming weeks as the Greek situation is resolved.

In addition, it is worthwhile to note that chicken is a common structure in other circumstances. The debt ceiling issue in the U.S. can be analyzed as a chicken game. The decision U.S. policymakers faced in 2008 with Bear Stearns and Lehman Brothers also fits this model. The mistake made by investors in 2008 was to assume that policymakers always capitulate and would do so again. Essentially, Treasury Secretary Paulson opted to risk a quadrant #4 outcome to signal to other players that relying on bailouts from the government was wrong. It was simply a case of moral hazard; of course, had policymakers known a quadrant #4 outcome would be so costly, they probably would have bailed out Lehman Brothers, too. The classic situation of chicken was the onset of WWI, when all parties tried to use self-binding behavior, in the form of troop mobilizations, which led to a catastrophic war.

Investors would be well served by understanding that many policy problems lead to market outcomes resulting from games of chicken. Although pundits will offer their learned opinions, all should understand that chicken games cannot be reliably forecast. They are unstable by nature and can generate undesirable outcomes. Such circumstances tend to be underestimated sources of volatility; situations of chicken should be treated with great caution.

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