

Overcoming the Collective Action Problem: A Case Study of The Holy League and the Battle of Lepanto

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Abstract

The Ottoman Empire was once the dominant naval power in the Mediterranean. This changed on October 7, 1571 when The Holy League, a coalition of Venice, Spain and the Papal States, destroyed two-thirds of the Ottoman's Mediterranean navy in a single day of combat. This paper examines the formation of the Holy League and their victory over a numerically superior foe.

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Introduction

On October 7, 1571 at Lepanto, the Ottoman Empire lost over two thirds of its Mediterranean fleet. The Ottomans would never fully recover from this defeat and it removed them as a dominant Mediterranean power. This paper explores how a coalition, The Holy League, was formed to challenge the Ottomans and how changes in technology and institutions affected the relative prices of war fighting.

The battle of Lepanto was significant because in forming The Holy League, the Europeans had managed to overcome the collective action problems that had previously prevented them from challenging the Ottomans. The subsequent destruction of the Ottoman armada marked the beginning Europe's naval dominance and brought an end to the age of galley warfare. To understand the magnitude of the European triumph, one must realize that at that time, Lepanto was the second largest naval battle in history and the third deadliest single day of warfare. It is only by looking more than a thousand years into the past that one can find a day that rivaled the sheer scale of destruction and death.

Location	Date	Approximate Casualties
Salamis	480 BC	40,000
Cannae	216 BC	50,000
Lepanto	1571 AD	40,000

I. Causes of the battle.

This battle was fought because the Ottomans had an institutional bias against trade. This is not to argue that no trade occurred, rather it is that the

incentives of the Sultan were such that piracy was always preferred to trade. This can be explained as a result of inept tax policy.

The Ottoman Sultan faced a problem of collecting taxes over a large geographically dispersed empire. There were problems with organizing and monitoring agent behavior. As a result of the inability to overcome these problems, taxation was infrequent but high. No one was exempt from expropriation and this lack of security in property rights highly distorted behavior. Rather than investing in resources that could be easily expropriated, wealth was often buried to avoid taxation. This had the predictable effects upon Ottoman capital accumulation, but it also forced the Sultan to look for more easily captured sources of wealth.

The problem with trade is that the benefits are dispersed. Countless individuals are profiting from trade with Europe and it is very difficult and costly for the tax collectors to capture a majority of this wealth. The solution to this problem was that rather than trying to collect dispersed wealth, the Sultan looked for easily taken concentrated wealth. This explains the rise of the Corsairs.

The Corsairs were Muslim pirates that attacked Christian merchant ships and coastal settlements. They attacked concentrated European wealth and transferred it to themselves and the Sultan. Piracy was a better method of transferring wealth than taxation. The Corsairs were successful for several reasons. The first of which was that at the time, the Ottomans had a dominant naval advantage in the Mediterranean. This was the age of galley warfare and until the battle of Lepanto the Ottomans had acquitted themselves as a

dangerous and determined foe. Complementing their numerical advantage, no single European state could contest their naval dominance. Constant raiding was incentive compatible for the Corsairs. They kept a portion of what they stole and successful commanders gained significant status and notoriety within Ottoman society. Even though cities like Venice grew wealthy trading with the Ottoman Empire, it was in the interest of the Sultans and his Corsairs to continue raiding and pillaging. Eventually this became intolerable and a European collation was formed to challenge Ottoman dominance.

II. The Logic of Collective Action

Ottoman piracy persisted for as long as it did because the Europeans were unable to overcome the problems of collective action. These problems were threefold. First, the Europeans constantly warred with one another. Secondly, victory would be less beneficial to those who fought than those who did not fight. Lastly, the Ottomans extracted tribute from states in exchange for promises of not attacking. Ridding the Mediterranean of Ottoman piracy would provide a large public good but would be very costly for those providing the good. One solution would have been to lower the individual cost by spreading the total cost across all the states in Europe; however, there was no single central power in Europe that could coerce other states into a coalition. One might presume that the Vatican would fulfill this role, but that would be incorrect for two reasons. The first of which is the destabilizing effects of the Protestant Reformation. Protestantism undermined the religious authority of the Pope and as

Protestantism spread, sectarian violence increased across Europe. The second is that an army of the Holy Roman Empire, commanded by Charles V of Spain, sacked the city of Rome in 1527. The Vatican lacks the political and military muscle to punish non-participants.

The probability of victory against the Ottomans was an increasing function of men and ships. Even if a coalition could amass enough force to tip the odds in their favor, victory would still entail substantial losses. This further undermined the formation of a coalition because the cost of losing those men and ships would be borne by those few contributing states and it would likely put them at a disadvantage relative to the nations that did not contribute. For example, France had allied itself with the Ottoman Empire to resist the advances of the Spanish and the English. If Charles V committed a large force to battling the Ottomans, resources would have been shifted away from fighting the French. Victory was uncertain, but history favored the Ottomans and they were fearful of a Pyrrhic victory.

The Ottomans took advantage of this disunity by systematically extracting tribute in exchange for promising not to attack. For some states this was a good deal. Rather than tying up their military fighting the Ottomans, they could merely pay them to go away. This option further undermined the formation of an coalition because any state that had already paid the tribute would in essence be paying twice: first in the lost wealth to the Ottomans and second in the ships and men that would be lost in the battle. Also, if they failed to achieve victory, the Ottomans would punitively seek revenge.

III. Implications of the Collective Action Problem

“My Children, we are here to conquer or to die as Heaven may determine.”

-Don Juan

Overcoming the collective action problem had strong implications for the way the battle would be fought. First, the incentives were aligned for a single decisive battle rather than a long campaign of attrition. This is because of increasing material costs and the increasing risk of defection. Long wars are simply more expensive than short wars and the costs of fielding the armada would rise over time. As these costs increased, the chance that any single member of the coalition would defect would also increase. As members withdrew their support, the remaining powers would have to either increase their commitment or face a lower probability of victory. As proof of this description, once the Holy League was formed, they immediately sought decisive battle.

The second implication of the collective action problem is that the battle would be exceptionally bloody. It was not enough to merely scatter the Ottoman fleet, because they would subsequently regroup and attack. This would transform a short war into a long war and the change in associated costs undermined the long term prospects of victory. In game theoretic terms, the Europeans wanted to punish the Ottomans with a trigger strategy. The Holy League saw the opportunity to make the Ottomans pay dearly for all those years of raiding. When the European armada was finally amassed, it sailed out to kill the Ottomans, not to raid their merchant ships or pillage coastal cities.

There is a historical caveat that bears relevance to Lepanto. While the Europeans had a strong incentive to destroy as many Ottoman ships as possible, it must be noted that in the months preceding the battle, the Ottomans committed a massacre at Cyprus. Two of the European commanders, Antonio and Ambrogio Bragadino, had just learned of the torture and murder of their brother at Cyprus. The Christians in the fleet were outraged at the atrocity. Before the battle, priests performed blessings and distributed Communion wafers. After their blessings, they put on armor and fought with the rest of the soldiers.

The European boarding parties showed no mercy. Men begging for mercy and the wounded were murdered without hesitation. They killed every Ottoman they could lay hands on. Those soldiers and sailors adrift in the water were either shot or speared to the laughing catcalls of the Europeans. Only 3,500 Ottoman soldiers and sailors were captured, this is in comparison to the nearly 30,000 total Ottoman casualties.

IV. A shift in relative prices.

The Holy League was able to overcome the problems of collective action because changing technology lowered the relative costs of arming and manning the coalition. It is because the Europeans switched from labor intensive to capital intensive methods of warfare that they were able to incur heavy losses and quickly return to full fighting strength. An illustrative example of this is the European harquebus and the Ottoman composite bow.

The harquebus was a precursor to the rifle and one of the earliest gunpowder weapons. It fired a lead ball and was deadly between ranges of 300 to 500 yards. It was not an accurate weapon. The composite bow was superior to the harquebus in both rate of fire and accuracy. Its weakness was that it required a skilled hand with months of training. It was also physically exhausting to use and the archer would tire after a few dozen shots.

These weapons were primarily used in ship to ship fighting when two or more galleys had pulled alongside one another and sent across boarding parties. These ranged weapons supported the advance of heavy infantry as they tried to force their way onto an enemy ship. The advantage of the harquebus was that the gunner was firing into a large mass of enemy soldiers at close range. Accuracy did not matter and the only relevant skill was reloading the weapon. In the hands of a peasant the harquebus was a deadly weapon. Ali Pasha, the dreaded Ottoman Corsair, died with a bullet in his brain. The skill and human capital it took to fire that gun was insignificant next to the naval and tactical knowledge that it succeeded in destroying.

The change in relative costs was the Europeans only needed to make small investments in their soldiers; the Ottomans in contrast had made heavy investments in the human capital of their soldiers. When their archers were killed, that investment was lost and it was a time intensive process to replace the fallen. It is easier and cheaper to stockpile guns than soldiers and the Europeans were able to sustain heavy battlefield casualties and almost immediately return to full fighting strength. Gunpowder decreased the

opportunity cost of casualties. With this decrease in cost, the states comprising The Holy League were more willing to commit troops to fighting the Ottomans.

Gunpowder also increased the destructive capabilities of the European forces. This does not imply that the Ottomans were without cannon, but the purpose of the Ottoman fleet was piracy and pillage. The Corsairs were naturally wary of sinking their targets and between their opening salvo and the time it took to reload, they had closed the distance between themselves and their opponents. At this time they had two choices, they could either ram the enemy vessel with the bronze tipped beak of their galley, or they could pull alongside and attempt to seize the vessel with a boarding party.

The tactical achievement of The Holy League was to realize that cannons rendered traditional galley warfare obsolete. While the Ottomans sought to capture opposing ships, The Holy League sought decisive combat. While the Ottomans sought to ram and board their opponents, The Holy League sawed off their beaks so as to fit more cannon upon their decks. The Holy League sought to destroy ships, not steal them.

The deadly power of the cannon is best exemplified by describing the first thirty minutes of Lepanto. As the armada of The Holy League approached that of the Ottomans, six ships lead the European lines. The ships were called galleasses, but they can be thought of as large floating gun platforms. Each ship was outfitted with nearly fifty guns. In terms of firepower these six ships had almost half the number of cannons as the entire Ottoman armada. The ships were nimble and could fire in all directions. In the first thirty minutes of combat,

four galleasses, two drifted out of position, fired with such frequency and accuracy that nearly 10,000 Ottoman sailors were left clinging to the flotsam of their wrecked galleys. The galleasses' were outfitted with the largest cannon that the Venetian foundries could fabricate. Sixty pound balls impacting at the waterline obliterated entire sections of Ottoman galleys. The use of capital and its superior fire power delivered victory to the outnumbered Holy League.

V. Industry & The Arsenal

Venice produced the finest cannons in Europe. Finest being a function of three qualities: size, accuracy, and dependability. The Holy League had some of the largest cannons in the world; 5,000 pound bronze monstrosities that necessitated the use of extra rowers. These cannons fired iron balls weighing in excess of fifty pounds that would punch through both sides of a galley, annihilating all intervening material. Accuracy can be thought of as a variance low enough so that the gunners could dependably hit their targets. The Holy League's strategy was to blast apart the Ottoman armada and accurate cannons increased the damage that could be dealt before the enemy closed the distance and cannons became useless. Dependability is absence of misfiring. Misfiring can be broken into two broad types, simple and catastrophic. Simple misfiring is when the powder fails to ignite and the cannon must be unloaded and cleaned before its next shot. This takes valuable time and could remove that cannon from battle. Catastrophic misfiring occurred when the barrel became jammed and the cannon exploded. Even if the explosion did not ignite the powder stores,

it is highly likely that crew members for nearby cannons would be injured and removed from the fight. The most telling endorsement of The Holy Leagues cannons was that after the battle, when they were looting the captured Ottoman ships, the majority of the seized cannons were either sold for scrap or kept as trophies. The Ottoman cannons were judged insufficient for military service.

Venice produced the finest cannons because of a free market in the sale of armaments. Venice was more than willing to trade with rest of Europe and they had no qualms about arming the warring factions. By not restricting their trade, Venice had access to the full extent of the market. The large demand for cannons led to specialization and because Venice had relatively secure property rights, entrepreneurs were more than willing to invest in the capital intensive ironworks and foundries. As a result, there was a booming cannon market in Venice and the competition between the foundries led to continuous improvements in quality. Cannon ended the era of galley warfare because one could sink more ships by shooting than by ramming. New and larger ships were designed to hold more cannon. The cost implications for The Holy League were two fold. The first is that quality is a substitute for quantity. More effective cannon meant that fewer ships and fewer men needed to be risked in facing the Ottomans; this lowered their cost in joining The Holy League. The second effect was that it shifted the destructive power of Europe from the frontlines to the foundries. As long as the foundries remained in operation, Venice could continue to fabricate new cannon, regardless of their battlefield losses. This is a powerful robustness argument as defeat no longer crippled their ability to fight. As long as

they could fabricate relatively cheap and plentiful weapons, they could fight and thus they could sustain losses.

In addition to the industry that fueled the engines of war, Venice had modified their shipyards to contain a facility known as the Arsenal. The purpose of the Arsenal was to fabricate a fleet of galleys in the shortest amount of time possible. The Arsenal contained hulls of galleys in various stages of construction. In addition to these hulls, it also contained an immense stockpile of parts. All of these parts were numbered and all were needed to construct a galley. One merely had to go to the appropriate lot, say lot 6, and all the pieces were numbered 6 and awaiting construction. It was the Ikea of shipyards. When the Arsenal was fully activated, it operated similar to an assembly line and by staggering the stages of production the Arsenal could produce a new, fully armed, provisioned, and manned galley every hour. In the event of national emergency or military disaster, the Venetians could produce a new and fully armed fleet to meet whatever crisis had occurred. The Arsenal was a concentration of shipbuilding talent and their galleys were of the highest quality. This quality differential is essential in understanding why they were able to defeat the numerically superior Ottomans. The Arsenal was a robust institution and by minimizing the chance of catastrophe it encouraged the Venetians to join The Holy League.

VI. Outcomes of Lepanto

The Holy League was able to overcome the collective action problem because of advances in technology. They switched to capital intensive methods of fighting with devastating effect. Bellow is the force composition of The Holy League and the Ottoman Empire.

	The Holy League	The Ottoman Empire
Ships	316	373
Soldiers	30,000	47,000
Rowers	50,000	53,000
Cannon	1,815	750

Although the Ottomans enjoyed the advantage in ships and soldiers, they were lacking in cannon and quality. The difference between Lepanto and prior European encounters with the Ottomans was that they sailed directly into the heart of the Ottoman armada and systematically blasted apart all opposition. The Holy League understood the tactical advantages of cannons over rams and Lepanto ended the era of galley warfare. Afterwards, it was possible for even an ad hoc coalition to resist the Ottomans. The Ottoman losses were devastating:

Losses	The Holy League	The Ottoman Empire
Ships	10	300
Soldiers	10,000	30,000

In addition to the losses of ships and men, the Ottomans lost a total of 34 Admirals and 120 galley commanders. Years of naval experience were destroyed in a single day. The Ottomans could rebuild their fleet but they could not so easily replace those years of naval experience.

VII. Conclusion

Technology changed the relative prices in armaments and war fighting. As a result, the Europeans were more willing to engage in wars on multiple fronts. When the Ottoman Empire had gathered its Armada in the late summer of 1571, several European states feared the raiding of the next year. As a result, the Holy League was formed and they set out to engage and destroy the Ottoman Armada. The marginal effects of technological improvements allowed The Holy League to overcome the problems of collective action and in doing so it led to the crushing defeat of the Ottoman Empire, a defeat which ended their power in the Mediterranean.

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