Chapter 19
William McKinley, Optimal Reneging, and the Spanish-American War

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Abstract President William McKinley's decision to go to war with Spain in 1898 is not well understood. Since McKinley kept very few written records, little is known about his actual thought process. As a result, historians have struggled with the apparent inconsistency between McKinley's initial commitment to peace and subsequent decision to go to war and tend to focus on identifying outside forces that can explain the reversal. In this paper, I develop a model of optimal reneging. Contrary to conventional narratives among historians that McKinley's decision to go to war was inconsistent with his earlier position, my model suggests that McKinley's decision can be understood as an optimal timing problem. I start with the premise that a country would prefer to enter conflict only when its military capability is sufficient to make a victory likely. Thus, a country will commit to peace until its military capability reaches some threshold. Once military capability reaches this threshold, it is optimal to renege on a commitment to peace. I conduct simulations of the model to determine the likelihood that McKinley would renege during his first term. I find that if the ex ante estimate of the benefits of war was 2–2.6 times the ex ante estimate of cost, then the probability of reneging after one year is approximately 1–18%. If the perceived benefits were 2.7 times the ex ante estimate of cost (or greater), entry during McKinley's first term is certain.

Keywords War · Political economy · William McKinley · Spanish-American war

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19.1 Introduction

Among historians, there are three predominant explanations of President William McKinley's decision to go to war with Spain in 1898. One popular explanation is that McKinley gave in to the pressure by yellow journalists to go to war with Spain (Beard and Beard 1934; Wisan 1934). A second popular explanation is that McKinley was pushed into the conflict by business interests who sought expansion into foreign markets (Williams 1972). Finally, the third narrative is that McKinley was a political pragmatist who ultimately gave in to pressure from Congress (Gould 1982; Offner 1992, 2004). In each case, McKinley is depicted as an advocate of peace who was unable to withstand the public pressure to go to war with Spain. However, as Kapur (2011, p. 23) points out, these narratives fail to take into account "the fact that Congress moved so rapidly to make war on Spain, but only *after* it had secured McKinley's stamp of approval, and *after* acceding to all of his stated wishes." As Kapur argues, it is hard to reconcile how much power McKinley seemed to wield with Congress with the idea that McKinley was weak and prone to succumb to public pressure.

In this paper, I propose an alternative explanation of McKinley's decision to go to war. The Cuban rebellion against Spain that began in 1895 significantly reduced trade between the United States and Cuba. In addition, the strategies employed by both the Cubans and the Spanish threatened to destroy a significant number of investments made by US firms in Cuba. As a result, there were potential benefits to an intervention that restored trade and limited the destruction of wealth. However, war comes with significant costs. In determining whether or not to use military intervention, a leader must consider the expected net benefits of conflict, realizing that the benefits of intervention only occur with victory, but the costs are paid regardless of the outcome. Against this backdrop, it might be optimal to maintain a commitment to peace until some cost-benefit threshold is reached.

When President McKinley took office, he expressed a commitment to peace. However, he also threatened to use military action if necessary. A credible commitment to peace with the threat of military action creates an optimal timing problem. In other words, given a credible commitment to peace, McKinley's decision is to choose the optimal point in time (if any) to renege on his commitment to peace. The basic idea is that McKinley would ideally like to avoid war until the likelihood of victory is sufficiently high. I present a theory in which the decision about when to renege is equivalent to choosing an optimal threshold for the expected net benefit of military conflict. I assume that the probability of victory, and therefore the expected net benefit from war, is a function of the relative military capabilities of the United States and Spain. If there is uncertainty about relative military capabilities, then this timing problem cannot determine a precise point in time at which military action will occur; instead, there will be a distribution of optimal reneging times.

I conduct a Monte Carlo simulation of the model, which is calibrated using data on relative military expenditures of the United States in comparison to Spain. I show that the probability of reneging within McKinley's first term is dependent on (1) the

ex ante estimates of the benefits of a successful war, (2) the ex ante estimates of the cost of war, and (3) the expected future time path of the relative military capability of the United States. If the perceived benefits of a successful war are double the cost, then the probability of McKinley reneging after only a year in office is 1%. If the perceived benefits are 2.6 times the cost, this probability is 17%. If the perceived benefit is 2.7 times the cost, McKinley is certain to enter in 1898. This suggests that, given the time path of the relative military capabilities of the United States, the probability of reneging depends critically on the magnitude of ex ante beliefs about the benefits of a successful military engagement.

Overall, the model suggests that when judging McKinley's decision to go to war, one must take into account the perceived benefits and costs of the conflict. Some back-of-the-envelope calculations suggest that the perceived benefit-cost ratio might have been 2.5 or higher. This implies that McKinley's decision to go to war should not be considered a sign of weakness or ineptitude, but rather a response to incentives associated with the benefits and costs of war.

The contribution of this paper is two-fold. First, historians see McKinley's commitment to peace and his subsequent reversal as an inconsistency. In their attempt to identify some triggering factor that led to this inconsistency, they are forced to appeal to outside influences. In contrast, I present an argument and a corresponding model that is able to show that McKinley's decision to renege on his commitment to peace need not imply inconsistency in his decision-making. Second, my model allows me to consider the role of uncertainty and the relevant counterfactuals ex ante. By using a Monte Carlo experiment, I am able to predict how likely McKinley is to renege on his commitment, given the perceived benefits and costs, the relative military capability of the United States when McKinley took office, and the expected future time path of relative military capability.

19.2 McKinley and the Decision to Go to War

19.2.1 Background

The Cuban rebellion against Spain began in 1895. The Cubans had previously attempted to oust the Spanish in 1868. After a war that lasted until 1878, the conflict ended when the Spanish government offered reforms. These reforms never materialized.

The rebellion that began in 1895 was better organized. The Cubans had learned their lesson from the previous war. Knowing that they were unlikely to defeat the Spanish militarily, the Cubans resorted to the outright destruction of wealth. The idea was that by destroying capital and other forms of wealth, this would convince Spain that nothing was to be gained from the island and they would decide to leave. Rather than leave, the Spanish committed to a policy of "reconcentration." This entailed taking Cubans from the countryside and relocating them to towns controlled by the Spanish. Once the Cubans were removed from the countryside, their villages and crops were burned. The conditions that Cubans faced after this

relocation were harsh. Approximately 15 percent of the Cuban population died as a result of disease and starvation (Offner 2004, p. 51). The idea behind the reconcentration policy was to cut off resources and the food supply of those participating in the rebellion as well as fragment the Cuban population. The result was that "both the Cubans and the Spanish engaged in economic warfare that devastated the island. Agricultural production and foreign trade plummeted" (Offner 2004, p. 51). Nonetheless, this did not stop the rebellion.

When McKinley took office in 1897, he sent his friend and former Illinois state representative William Calhoun to Cuba to get an idea of the state of the conflict. When Calhoun returned, he brought back stories of human suffering due to the reconcentration policy of the Spanish. McKinley followed by calling for the Spanish to put down the rebellion "within humane limits" (Gould 1982, p. 28). He sent a representative, Stewart Woodford, to Spain calling for this change in Spanish tactics within three months. If the Spanish did not comply, he threatened that the United States would take action. However, while his representative was traveling to Spain, the Spanish prime minister was assassinated. The new government initially seemed willing to acquiesce to McKinley's demands:

> On October 23, 1897, Woodford was told that the decrees granting autonomy to Cuba would soon be issued. During the next month the Spanish suspended the reconcentration policy, declared an amnesty for political prisoners, and released Americans who were in Cuban jails. (Gould 1982, p. 30)

Nonetheless, McKinley prepared the United States for the possibility of conflict. He sent the USS Maine to dock in Florida and "the Navy discussed contingency plans for sending a ship to Havana" (Gould 1982, p. 31).

The Spanish promise of autonomy meant that the Cubans would have more power over domestic decision-making, but the Spanish would still control foreign affairs. The policy was officially put in place at the beginning of 1898. However, just two weeks later, Spanish military officers led riots in Havana. In the United States, this created "fear that Spain was losing its grip on the island and that future riots might harm U.S. citizens" (Offner 2004, p. 56). As a result of these fears,

> McKinley sent the USS Maine to Havana harbor, and the Navy Department repositioned a portion of the North Atlantic fleet from Hampton Roads to Key West and the Gulf of Mexico. Some U.S. naval ships also dropped anchor in Lisbon and others gathered in Hong Kong near the Philippines. (Offner 2004, p. 56)

Shortly afterward, a private letter from the Spanish minister appeared in the US press that presented a dim view of McKinley and suggested that the Spanish government was merely buying time by offering token appeasements to the United States in the hopes of putting down the rebellion in the meantime. Less than a week after the letter surfaced, the USS Maine exploded off the coast of Cuba. McKinley called for an investigation into the explosion, but also asked Congress for a $50 million appropriation to prepare the military. While the investigation was underway, McKinley sought a diplomatic solution with Spain. However, his requests of Spain were at least partially rejected. On April 11, 1898, McKinley asked Congress for a declaration of war.

19.2.2 Explanations for McKinley's Decision to Go to War

The two earliest narratives constructed to explain McKinley's decision to go to war focused on outside influences. Historian Lewis Gould presents a summary and critique of these early views:

> At the center of the controversy stands William McKinley. His actions and policies toward Spain and Cuba from March 1897 to April 1898 have received close attention and since the First World War, almost uniform censure. That McKinley gave in to jingoist pressure from a hysterical press and an overheated public and therefore accepted war with a nation that had capitulated to American demands has become a staple of textbook accounts of his presidency.
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> During the 1960s an alternative hypothesis evolved. Departing from the usual picture of a feckless leader, some scholars have depicted a Machiavellian and cunning executive, bent on expansion and heedless of the interest of Cubans and Filipinos, whom Americans believed they were assisting. Sensitive to every wish of the business community, McKinley went to war when conditions were right for economic imperialism that relied on overseas markets.
>
> Neither of these portrayals does justice to the complexity of diplomatic problems that Spain and the United States encountered over Cuba between 1895 and 1898, and neither captures how McKinley sought, in the end unsuccessfully, to discover a way out of the impasse in which both nations found themselves. What is significant is not that war came. The divergent perceptions of Spanish and American national interests made conflict likely, once revolution began in Cuba in 1895. McKinley's ability to postpone war for as long as he did and to control the terms on which the United States commenced hostilities indicates that his presidential leadership during the coming of war was more courageous and principled than his critics have realized. (Gould 1982, p. 19–20)

Gould's dismissive attitude with respect to early criticisms is not unfounded. These earlier views tend to take a normative view of the Spanish-American War and then try to explain McKinley's decision to enter the war through backward induction from that initial premise. In other words, the basic premise of the early criticism of McKinley is that the war was unnecessary, either because the Spanish had made concessions to the United States or because the war was seen an attempt at US imperialism. Given the premise that the war was unnecessary, one must then determine how and why President McKinley would end up in an unnecessary war. The conclusion reached by early historians is that McKinley caved either to public pressure spurred on by yellow journalism or pressure from US business interests.

One problem with this line of thinking is that it fails to construct a proper counterfactual. For example, if yellow journalism was the cause of McKinley reneging on his commitment to peace, then in the absence of journalistic pressure, McKinley would not have gone to war. There is little evidence in favor of this counterfactual. Gould argues that it is hard to ascertain the direction of causation between the public support of the Cubans and yellow journalism. In fact, Gould (1982, p. 24) argues that prominent publishers of yellow journalism, such as William Randolph Hearst and Joseph Pulitzer, represented "only a small part of the journalistic community, and they reflected what the public wanted, rather than shaping it." The idea that public opinion might have been driving the coverage of the Cuban rebellion and not the reverse has some merit based on pre-existing opinions of Americans about

Spain. Offner (2004, p. 52) argues that "Americans had long disparaged Spain" and that many in the United States saw the Cuban rebellion as part of a "historical trend of the New World throwing off the tyrannical restraints of Old World political, economic, and religious domination."

Scholars like Williams (1972) argued that business interests wanted to expand into foreign markets to deal with problems of overproduction. Economists tend to take a dim view of overproduction theories. If firms produce more than individuals want to purchase at a given price, then the price will have to decline to clear the market. This certainly occurs. For such theories to be valid, however, would require that firms systematically and consistently overproduce, despite experience. Furthermore, an advocate of the view put forth by Williams would have to believe that not only do firms systematically make the same error, but that the only way to correct this error is to sell this excess production into foreign markets. Of course, the logical flaws in this argument do not preclude political adherence to such a theory. However, Williams "offered little, if any, supporting evidence for his assertions" (Kapur 2011, p. 21).[1] Furthermore, Offner (2004, p. 52) argues that firms with business interests in Cuba were divided on the war. Some wanted the United States to intervene to protect their interests. Others wanted cooperation with Spain to put down the Cuban rebellion. In addition, Gould (1982, p. 24) argues that business leaders without a direct stake in Cuba wanted to avoid war and the uncertainty that went along with it.

Subsequent scholars moved on from journalists and business interests to argue that it was Congressional pressure that ultimately caused McKinley to go to war. Historians such as Gould (1982) and Offner (1992, 2004) argue that McKinley was indeed committed to peace and tried to exhaust every opportunity for peace before going to war – even after the explosion of the USS Maine. Offner (2004) points out that as many as 100 Republicans had sought to align themselves with Congressional Democrats to declare war on Spain without the consent of the president. In fact, Offner depicts McKinley as trying to pursue peace until April 10, just one day before he asked Congress for a declaration of war.

The problem with explanations based on Congressional pressure is that they ignore key facts. The most important of these facts is that Congress failed to take any action before being explicitly asked by President McKinley. Also, it was McKinley who had requested $50 million in funding for the US Navy in the aftermath of the explosion of the USS Maine. And perhaps most importantly,

[1] Historians, such as Williams and even Gould, seem to suggest that McKinley gave some credence to this overproduction view. However, the support for this argument seems to be from one speech that McKinley gave in 1895. The speech, however, was clearly a call for reciprocity in trade, a view McKinley adopted in 1891 (Gould 1982, p. 10). The only indication that this relates to overproduction is McKinley's use of the word "surplus." However, his use of surplus hardly indicated he accepted this overproduction view. His use of the term "surplus" seems to imply that production in both countries would be higher than it would be with only domestic customers. When one considers that McKinley had long been a protectionist before he pivoted to the idea of reciprocity, the speech can just as easily be seen as an inarticulate attempt to explain the mutual benefits from reciprocity in trade.

McKinley "never showed any sign of regret for any 'failure' to secure peace" (Kapur 2011, p. 36).[2]

In short, each of the popular narratives denies McKinley agency. Perhaps McKinley wanted to avoid war, but circumstances beyond his control pushed him into war. One critical flaw in this analysis, as Kapur (2011, p. 23) argues, is that these historians traditionally focused on "what his actions were, and why they failed, rather than *why* his actions were, and whether he thought of them as failures." In this paper, I present a complementary idea. What I argue is that rather than starting with a premise that is based on information available ex post and then reasoning through backward induction, one should consider the incentives faced by McKinley ex ante.

19.2.3 An Alternative View

The view that I put forth is this paper is similar to that of Gould in the sense that I assume that conflict between the two countries is likely. However, I depart from Gould's argument that McKinley's decision to go to war represented a submission to Congressional pressure. The basic idea that I put forward begins with the assumption that conflict is likely. Given that conflict is likely, McKinley would prefer to wait to enter into such conflict until the United States is in a position of power and likely to emerge victorious from the conflict.

I present a model in which McKinley's decision is to choose a threshold for reneging on his commitment to peace. I assume that there are particular benefits from going to war. These benefits might include preventing the destruction of capital in Cuba that belonged to individuals and firms in the United States, a recovery of trade with Cuba that had declined significantly during the Cuban rebellion, greater US hegemony over the Western Hemisphere, and McKinley's own reelection prospects. There are also costs in terms of the direct cost of the government and the loss of human lives. The benefits of going to war are only realized in the event of victory, whereas the costs are paid regardless of the outcome. Furthermore, I assume that the probability of victory is a function of the relative military capability of the United States. As a result, McKinley's decision is to choose a threshold for relative military capability (or equivalently, a threshold for the expected net benefit) such that he would be willing to renege on his commitment to peace once the threshold is reached.

[2] McKinley probably produced fewer written records than most modern presidents. However, there is some indication that McKinley was savvy enough to use the written records for political purposes. He once sent a letter to his political ally and financier, Mark Hanna, indicating that it was improper to give public contracts for political reasons. Hanna was angry that McKinley had submitted this letter to the public White House file, thereby making it part of the public record (Kapur 2011, p. 31–32).

My model provides a way to think about the decision to renege on a commitment to peace that relies on only three factors: (1) the prospective benefits from conflict, (2) the prospective cost, and (3) the expected future path of the military capacity of the United States relative to that of Spain. Back-of-the-envelope calculations suggest that the prospective loss of wealth is sufficient to make war somewhat likely. Thus, one does not need to argue that journalists, Congressmen, or calls for economic expansionism pushed the United States into war. Furthermore, the focus is exclusively on the decision to go to war. Whether the war was necessary, worthwhile, or justified is beside the point.

19.3 The Model

Suppose that the United States has credibly committed to peace with the Spanish, such that Spain believes that the United States has no desire to enter a military conflict. However, the commander-in-chief of the US military, in this case William McKinley, has threatened to use military force, if necessary. Given the credible commitment, McKinley's decision to enter the conflict is a timing decision. He wants to choose the optimal point in time to renege on the US commitment to peace.

Let B and C denote the benefit of successful military aggression and the cost of conflict, respectively. The benefits from military aggression are the direct benefits that accrue to the state, government, and political leaders in the event of success. This could include the accumulation of land, prestige, and/or international power as well as any political benefits associated with success. The costs include political costs, the destruction of military infrastructure, as well as the human cost. I assume that the benefits of conflict are only received if the military action is successful. The costs are paid regardless of whether the action is successful.Suppose that the probability of victory, $p(M)$, is given as

$$p\left(M\right)=\frac{M}{1+M} \tag{19.1}$$

where M is the relative military capability of the United States in comparison to Spain. This implies that the probability of victory is a sigmoid function of relative military capability such that $\lim_{M\to 0} p\left(M\right)=0$, $\lim_{M\to\infty} p\left(M\right)=1$. Furthermore, suppose that M is random. In particular, assume that the relative military capability of the United States follows a jump diffusion:

$$\frac{dM}{M}=\mu dt+\sigma dz+\phi_1 dq_1-\phi_2 dq_2 \tag{19.2}$$

where μ is the expected rate of change, σ is the conditional standard deviation, dz is an increment of a Wiener process, and dq_1 and dq_2 are each increments of two

independent Poisson processes with arrival rates λ_1 and λ_2, respectively.[3] What this implies is that the relative military capability of the United States ordinarily follows a geometric Brownian motion. However, there are rare instances in which M experiences a "jump." In particular, given the assumptions above, $q_1 = 1$ and $dq_2 = 1$ with probabilities $\lambda_1 dt$ and $\lambda_2 dt$, respectively. When $dq_1 = 1$ or $dq_2 = 1$, these are referred to as "jumps." The magnitudes of the jumps in M are determined by ϕ_1 and ϕ_2. With probability $(1 - \lambda_i)dt$, $dq_i = 0$, $i = 1, 2$ (no jump occurs). Later, I show that jump processes are necessary to match the data.

Given these assumptions, for President McKinley, the decision about when to go to war is an optimal timing problem. The outcome of war is uncertain. Ideally, the president would like to wait until a point in time at which victory appears very likely. In the meantime, the president would like to communicate a commitment to peace. Since fluctuations in the relative strength of the US military are stochastic, it is not possible for any decision-maker to pinpoint an actual point in time in which to initiate conflict. For example, if the president sets a particular timetable, he might find that the US military doesn't have a sufficient advantage at that time. Or, the United States might have an advantage earlier than anticipated. In other words, this suggests that the timing problem is best understood in terms of a threshold for relative military capability. This description suggests that there is some threshold, M^*, at which the expected value of initiating conflict is sufficiently high to renege on a commitment to peace.

When presented in this context, the opportunity to renege on the United States's commitment to peace can be thought of in terms of its option value.[4] The objective of the president in determining when to renege is to choose a threshold, M^*, that maximizes the value of the option to initiate conflict. If $M \geq M^*$ when this threshold is determined, then the president should initiate conflict immediately. However, if $M < M^*$, then the president should continue to communicate a commitment to peace until $M \geq M^*$ and then renege on this commitment and initiate conflict.

Let $V(M)$ denote the value of the option for the United States to be the aggressor in conflict with Spain. Consider an interval of time of the size Δt. Let M be the relative military capability of the United States at the beginning of this interval and M' be the relative military capability at the end of this interval. It follows that the value of the option to initiate conflict at time t is the expected present discounted value of the option at the end of the time interval:

$$V\left(M,t\right) = \frac{1}{1+r\Delta t} EV\left(M',t+\Delta t\right)$$

[3] I assume that $E(dq_1 dz) = E(dq_2 dz) = E(dq_1 dq_2) = 0$.

[4] The logic of treating the decision to enter the conflict as similar to the decision of whether to exercise an option is that McKinley had the option, but not the obligation to go to war. This option has value. This is therefore similar to Hendrickson and Salter (2016), who treat the decision to participate in a revolution as akin to exercising an option, albeit strategically.

where r is the real interest rate used to discount the future and E is the expectations operator. Multiplying both sides of this expression by $(1 + r\Delta t)$ and re-arranging yields:

$$rV(M,t)\Delta t = EV(M',t+\Delta t) - V(M,t)$$

Dividing both sides of this expression by Δt and taking the limit as $\Delta t \to 0$, yields a continuous time representation of Bellman's equation:

$$rV(M) = \frac{1}{dt} EdV \tag{19.3}$$

where $dV = \lim_{\Delta t \to 0}\left[V(M',t+\Delta t) - V(M,t)\right]$. Using Eq. (19.2) in conjunction with Ito's Lemma, Eq. (19.3) can be written as

$$rV(M) = \mu MV'(M) + \frac{1}{2}\sigma^2 M^2 V''(M) + \lambda_1\left\{V\left[(1+\phi_1)M\right] - V(M)\right\}$$
$$+\lambda_2\left\{V\left[(1-\phi_2)M\right] - V(M)\right\}$$

Or, by re-arranging,

$$(r+\lambda_1+\lambda_2)V(M) = \mu MV'(M) + \frac{1}{2}\sigma^2 M^2 V''(M)$$
$$+\lambda_1 V\left[(1+\phi_1)M\right] + \lambda_2 V\left[(1-\phi_2)M\right] \tag{19.4}$$

Note here that $V(M)$ is some unknown function. In order to solve for the optimal threshold, M^*, I need a solution to $V(M)$. Guess that

$$V(M) = \alpha M^{\beta} \tag{19.5}$$

Note that this implies that

$$V'(M) = \alpha\beta M^{\beta-1}$$

$$V''(M) = \alpha\beta(\beta-1)M^{\beta-2}$$

Thus, Eq. (19.5) is a solution to Eq. (19.4), if β satisfies:

$$\frac{1}{2}\sigma^2\beta(\beta-1) + \mu\beta + \lambda_1(1+\phi)^{\beta} + \lambda_2(1-\phi_2)^{\beta} - (r+\lambda_1+\lambda_2) = 0 \tag{19.6}$$

The solution for β can be obtained using numerical methods. However, note that there is more than one solution for β in the equation above. In order to solve for the

threshold, M^*, I need to impose boundary conditions on $V(M)$. I impose two boundary conditions using economic reasoning.

The threshold, M^*, chosen by the government should meet two criteria. First, since the option value can be understood as the value of the option to wait, as long as the option value of initiating conflict is greater than the expected value of conflict, the government should not exercise the option. It is only when the option value is less than or equal to the expected value of the conflict that the option should be exercised. It follows that the president should choose to initiate conflict at the precise point at which the option value is equal to the expected value of conflict. Formally, this implies that

$$V\left(M^*\right) = p\left(M^*\right)B - C \tag{19.7}$$

Second, note that the value of the option to initiate conflict should be strictly increasing in M. In fact, as M gets arbitrarily small, the option to initiate conflict becomes worthless. Formally, this implies that

$$\lim_{M \to 0} V\left(M\right) = 0 \tag{19.8}$$

This latter condition implies that the solution to Eq. (19.6) must be positive. Further, from Eqs. (19.5) and (19.7),

$$V\left(M^*\right) = \alpha\left(M^*\right)^{\beta} = p\left(M^*\right)B - C$$

Solving this expression for α and substituting it into Eq. (19.5) yields

$$V\left(M\right) = \underbrace{\left(\frac{M}{M^*}\right)^{\beta}}_{\text{DiscountFactor}} \times \underbrace{\left[p\left(M^*\right)B - C\right]}_{\text{ExpectedNetBenefit}} \tag{19.9}$$

This equation illustrates the option value of reneging. The option value is the product of a stochastic discount factor and the expected net benefit of aggression. Note that M^* has been defined, but not determined. From Eq. (19.9), it is clear that there is a trade-off that the president faces when choosing the threshold for initiating conflict. If the president chooses a high threshold for relative strength, this increases the likelihood of victory. However, this also implies that the president will have to wait longer than if he chooses a lower threshold. As a result, the present discounted value of that future action is lower. The president's problem is to choose the threshold that optimally balances this trade-off. In short, the president wants to choose M^* to maximize the option value. The value of M^* that maximizes Eq. (19.9) satisfies:

$$(\beta B - C)(M^*)^2 + [(\beta - 1)B - 2C]M^* - C = 0 \tag{19.10}$$

Note that, as long as $(B/C) > (1/\beta)$, this equation has a positive and negative solution.[5] However, since M cannot be less than zero, then M^* cannot be less than zero. Thus, it follows that

$$M^* = \frac{-[(\beta - 1)B - 2C] + \sqrt{[(\beta - 1)B - 2C]^2 + 4(\beta B - C)C}}{2(\beta B - C)} \tag{19.11}$$

The threshold for reneging on the commitment to peace is a function of the benefits of successful conflict,

B, the costs of the conflict, C, and, from Eq. (19.6), the parameters that determine β.

An important conclusion from this model is that the threshold is expressed in terms of the relative military capability of the United States and not an explicit period of time. In fact, let T^* denote the time at which the president will renege on his commitment to peace. The time at which it is optimal to renege is the earliest point in time at which relative military capability crosses the optimal threshold. Formally, this can be written as

$$T^* = \inf\{t > 0 \mid M \geq M^*\} \tag{19.12}$$

Since M is stochastic, this point in time cannot be known with certainty. Rather, given some initial value of $M(0) = M_0$, there is a probability distribution for T^*. In the next section, I use a Monte Carlo experiment to simulate a distribution for T^*.

19.4 Implications and Discussion

In the model I presented above, the decision about when to renege on the commitment to peace is determined by a threshold for the relative military capabilities of the United States in comparison to Spain. The underlying idea is one that is prevalent in international relations research. For example, Most and Starr (1989) point out that military capability affects both a country's ability and its willingness to enter conflict. Using data for the United States, Fordham (2004) finds that greater military capability leads to a more frequent use of force.

In the model, I made the assumption that the relative military capability of the United States generally follows a geometric Brownian motion, but that there are also

[5] Notice that this implies that there is no meaningful threshold for reneging on a commitment to peace unless the benefit is at least some mark-up above the cost. In other words, this implies that in some scenarios, one should not even consider reneging.

rare, discrete "jumps" in relative military capabilities between the two countries. As such, the purpose of this section is two-fold. First, I present three different measures of relative military capabilities and I examine the time series properties and the distributions of each of these measures to determine whether the characteristics of the data are consistent with the assumptions in my model. Second, given the characteristics of the data that I identify, I conduct a Monte Carlo experiment of the model to determine the probability of reneging for specific, perceived benefit-cost ratios.

19.4.1 Relative Military Capability: Measurement, Time Series Properties, and Fat Tails

Consider Eq. (19.2) without the possibility of jumps and define $m \coloneqq \ln(M)$. Using Ito's Lemma, it follows that without jumps, the evolution of m can be expressed using the following stochastic differential equation:

$$dm = \left(\mu - \frac{1}{2}\sigma^2\right)dt + \sigma\, dz$$

This equation can be written in discrete time using a random walk approximation:

$$m_t = \left(\mu - \frac{1}{2}\sigma^2\right) + m_{t-1} + \sigma\varepsilon_t \tag{19.13}$$

where E_t is drawn from a standard normal distribution. It is useful to use this random walk approximation because it highlights two important empirical properties. First, it implies that the logarithm of the relative military capability of the United States follows a random walk (with drift if $\mu - (1/2)\sigma^2 \neq 0$). Second, it follows that the expected change in the logarithm of the relative military capability of the United States has a normal distribution. Thus, to determine whether the data on the relative military capability of the United States is consistent with the assumptions of the model, I conduct unit root tests on the logarithm of each measure. I then use quantile-quantile plots of the log difference of these measures to examine whether the measures are drawn from a normal distribution.

I measure military capability using three distinct variables: (1) real military expenditures, (2) the stock of military capability, and (3) military personnel.

The use of real military expenditures is straightforward in the sense that military expenditures will tend to be positively correlated with military capability. As such, it might be a useful proxy. Nonetheless, the use of military expenditures is not without flaws. For example, military expenditures are a flow. In contrast, military capability is perhaps best thought of as a stock. Kugler et al. (1980) suggest the following method to measure the stock of military capabilities. Let M denote the stock of military capability and assume that military capability depreciates at a constant rate, (1

$-\delta$). It follows that the law of motion of the stock of military capability can be written as

$$M_t = E_t + \delta M_{t-1}$$

where E_t is military expenditures. Since the stock of military capabilities cannot be directly measured, this equation has the following equivalent representation:

$$M_t = E_t + \delta E_{t-1} + \delta^2 E_{t-2} + \ldots$$

I use this weighted lag approach to calculate the stock of military capabilities for both the United States and Spain. Finally, I measure military capability using military personnel. Again, this might not be a perfect indicator of military capability because changes in technology can affect military capability without having any effect on military personnel. However, these concerns should be lessened (somewhat) given the time period of the nineteenth century.

Figure 19.1 plots the natural logarithm of the ratio of US military expenditures to Spanish military expenditures over the course of the nineteenth century. The data are obtained from the Correlates of War Project.[6] As shown, there is a slight upward trend over the sample with a sizable temporary increase during the US Civil War. I test for a unit root using the augmented Dickey-Fuller test. The first row of Table 19.1 shows the test statistic and the corresponding 5% critical value. As shown, the null hypothesis of a unit root cannot be rejected.

In the model, I assumed that military capabilities follow a jump diffusion. In the absence of jumps, it follows from Eq. (19.13) that the log-difference of relative military capability follows a normal distribution with a mean of $\mu - (1/2)\sigma^2$ and a variance of σ^2. If, however, there are discrete jumps in M, then the distribution of M will have "fat tails" in the sense that extreme values are more likely than the normal distribution would predict. To examine this property, I present a quantile-quantile plot in Fig. 19.2. This figure plots the quantile of the log-difference of relative military expenditures against the corresponding quantile of a normal distribution. If the variable of interest follows a normal distribution, then each of the plotted points will lie on the 45-degree line. When points lie below the 45-degree line in the bottom left corner of the figure, this is evidence of a fat left tail. When points lie above the 45-degree line in the upper right corner of the figure, this is evidence of a fat right tail. As shown in Fig. 19.2, there is some evidence of fat tails since there is a point that lies significantly above the 45-degree line in the upper-right corner of the figure

[6] The data are from the Correlates of War project: http://www.correlatesofwar.org/data-sets. In particular, I use data from the project used to construct the material capabilities of the state. The project itself constructs an index of material capability, which includes data on military expenditures and military personnel, among other factors. I do not use the index because the way that the index is constructed implies that each component of the index as a perfect substitute for all other components. For more on this material capabilities project and corresponding data, see Singer et al. (1972) and Singer (1987).

Fig. 19.1 Relative Military Expenditures, U.S. (Natural Logarithm). This figure plots the ratio of US military expenditures to Spanish military expenditures. (*Source*: Correlates of War Project)

Table 19.1 Unit root tests

Variable	Test statistic	5% Critical value
Military expenditures	−3.22	−3.48
Stock of military capability	−2.27	−2.93
Military personnel	−2.91	−3.47

and a point that lies significantly below the 45-degree line in the lower-left corner of the figure.

It is possible to argue that the two extreme values in the far ends of the tail of the distribution are due to the Civil War and that the large increase (and subsequently large decrease) in relative military expenditures do not reflect changes in military capability, but rather reflect the temporary cost of war. To examine this, I remove the years 1860-1866 from the sample and present a quantile-quantile plot of the modified sample in Fig. 19.3. As shown, the existence of fat tails is evident in this plot as well. In fact, the evidence of a fat right tail is more pronounced in the subsample than it was in the entire sample.

In order to calculate the stock of military capabilities as outlined above, I set $\delta = 0.75$, as in Kugler et al. (1980). This implies a depreciation rate of 25%. I then construct the stock measure using the data on military expenditures for each country. The natural logarithm of the relative stock of military capability of the United States is plotted in Fig. 19.4. I first test for a unit root using an augmented Dickey-Fuller

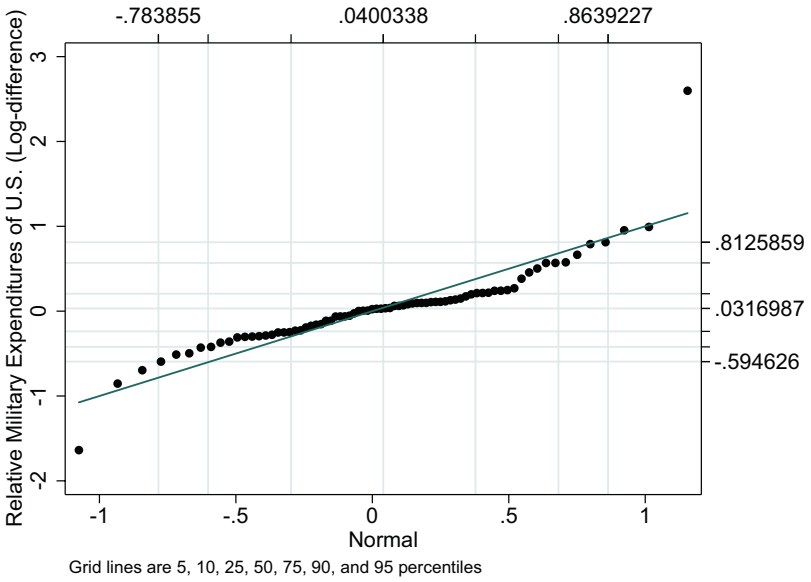

Fig. 19.2 Q-Q plot: relative military expenditures

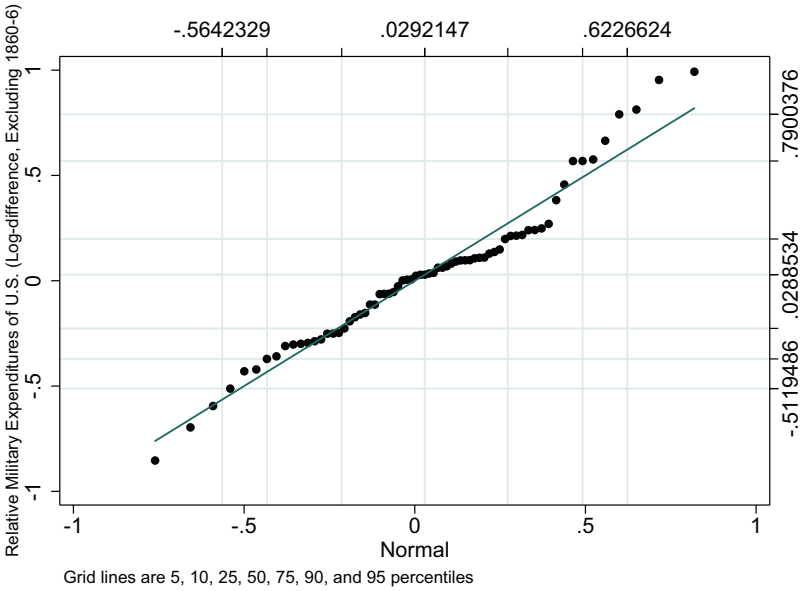

Fig. 19.3 Q-Q Plot: relative military expenditures (excluding 1860–1866)

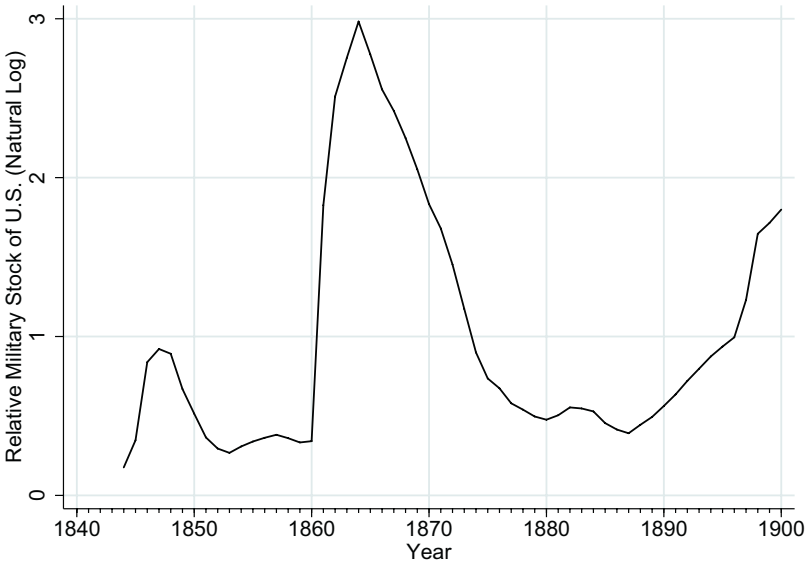

Fig. 19.4 Relative Stock of Military Capability, U.S. (Natural Logarithm). The figure plots the ratio of the stock of US military capability to the stock of Spanish military capability. (*Source*: Correlates of War Project, author's calculations)

test. The results are shown in the second row of Table 19.1. As shown, one cannot reject the null hypothesis of a unit root.

In Fig. 19.5, I present a quantile-quantile plot of the log-difference of the stock of military capacity. As shown, there is no evidence of a fat left tail, but there is some evidence of fat right tail. However, this series does not appear to be consistent with a normal distribution, even in the absence of fat tails.

Finally, Fig. 19.6 plots the natural logarithm of relative military personnel of the United States. The data are again from the Correlates of War project. The measure shows a slight upward trend with a large increase during the US Civil War. The results of an augmented Dickey-Fuller test are shown in the third row of Table 19.1. As shown, one cannot reject the null hypothesis of a unit root.

In Fig. 19.7, I present a quantile-quantile plot using the log-difference of the relative military personnel of the United States. As shown, there is again evidence of fat tails in the distribution.The implications of the model presented in this paper are predicated on the assumption that Eq. (19.2) is an accurate representation of the time path of relative military capability. For each measure of military capability used in this paper, there is evidence of a unit root and evidence of jumps that are larger than would be predicted by a normal distribution. It therefore seems reasonable to argue that a president weighing the expected net benefit of war and also aware of the historical evolution of relative military capability, would behave in a manner that is consistent with the model I have outlined above. In the next section, I conduct Monte Carlo experiments to determine the probability of reneging for various perceived benefit-cost ratios.

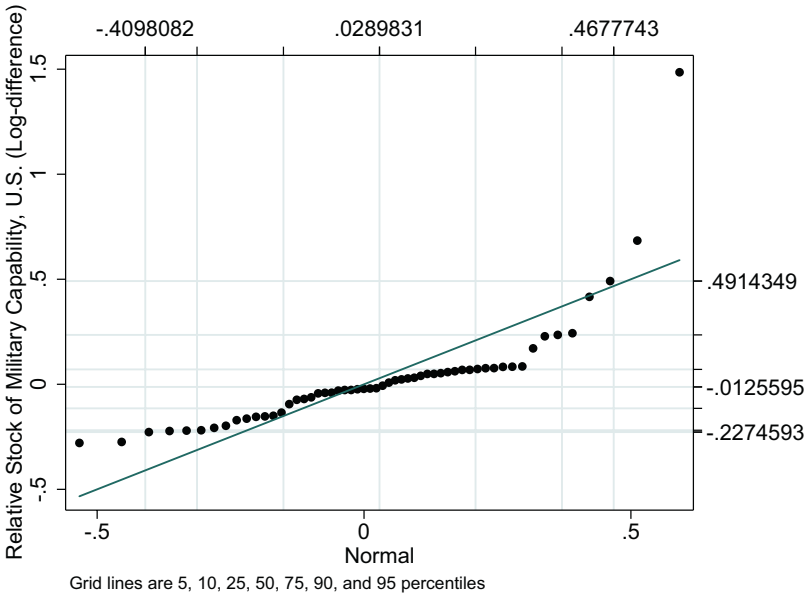

Fig. 19.5 Q-Q plot: relative stock of military capability

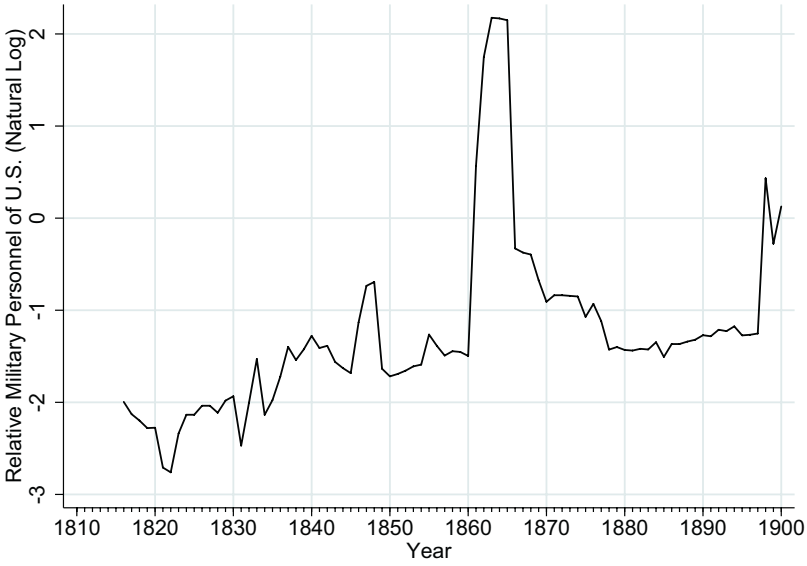

Fig. 19.6 Relative military personnel, U.S. (natural logarithm). This figure plots the ratio of US military personnel to Spanish military personnel. (*Source*: Correlates of War Project)

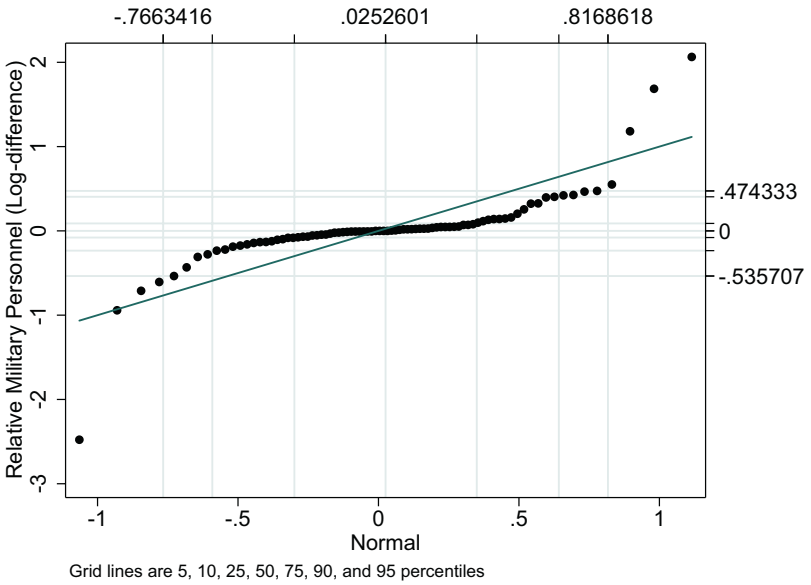

Fig. 19.7 Q-Q plot: relative military personnel

19.4.2 A Monte Carlo Experiment

In this section, I conduct Monte Carlo experiments to determine the probability of reneging on a commitment to peace, given that relative military capability behaves according to eq. (2). The idea behind the Monte Carlo experiment is to construct relevant counterfactuals. Using data on military capabilities and Eq. (19.2), I can simulate hypothetical paths for relative military capabilities during McKinley's first term in office. I can then estimate the probability that relative military capabilities hit the threshold for reneging and initiating conflict. What this does is allow me to get a sense of the probability that McKinley would have reneged on his commitment to peace based solely on my model and the historical data. The experiment thus gives a sense in which reneging is likely. To do this, I simulate 100,000 different paths for M, given this initial value and given the assumption that it behaves according to Eq. (19.2). For a given perceived benefit, B, and cost, C, I calculate a cumulative distribution function for the probability that $t \leq T^*$, for $t = 1, 2, ..., T$. I then plot the CDF for the first term of the McKinley administration.

To perform the Monte Carlo experiments, I need to calibrate the parameters of Eq. (19.2). In the Monte Carlo experiment, and consistent with the assumption of the model, I assume constant jump sizes, ϕ_1 and ϕ_2. In reality, the magnitude of the jump should also likely be considered a random variable. However, by treating the jump size as exogenous, this allows me to calibrate the jump sizes to be consistent with the data that I presented in the previous section.

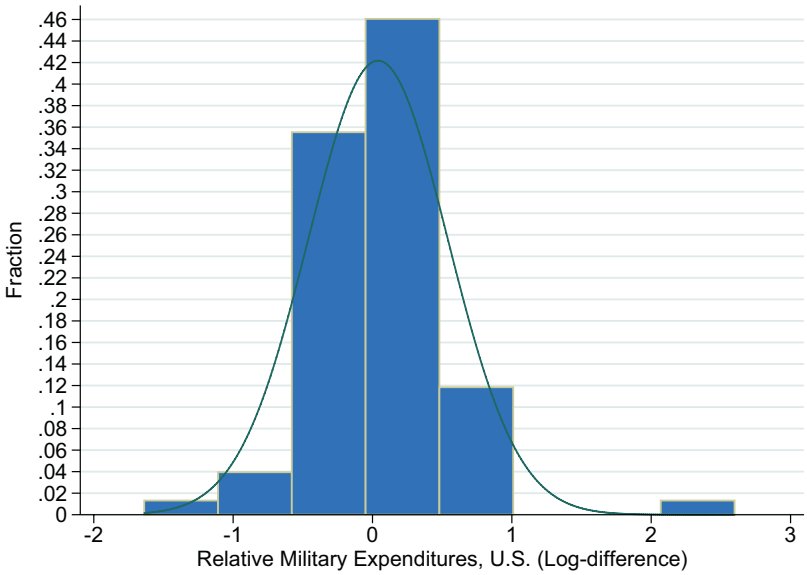

Fig. 19.8 Histogram of log-difference of relative US military expenditures

Figure 19.8 presents a histogram of the log-difference of relative military expenditures. A normal distribution overlays the histogram. Based on this histogram, I set $\lambda_1 = \lambda_2 = 0.01$, $\phi_1 = 8.49$, and $\phi_2 = 0.78$.[7] To calibrate μ and σ, I estimate the mean and variance of the log-difference of military expenditures. The average change in the logarithm of the ratio of US military expenditures to Spanish military expenditures is 0.04 with a standard deviation of 0.5. Thus, I set $\sigma = 0.5$. To calibrate μ, recall that $dm = [\mu - (1/2)\sigma^2]dt + \sigma dz + \phi_1 dq_1 - \phi_2 dq_2$. Thus, the expected value of the log-difference of M satisfies

$$\mu - (1/2)\sigma^2 + \lambda_1\phi_1 - \lambda_2\phi_2 = 0.04$$

It follows that $\mu = 0.0879$. Finally, I set the initial value of relative military expenditures to $M_0 = 4.4$, which is the average ratio of military expenditures between 1896 and 1897.

I consider three perceived benefit-cost ratios. I assume that the perceived benefits are 2, 2.5, or 2.6 times the cost of the conflict.[8] It is important to note that, in terms of the model, these are ex ante estimates of the benefits and costs associated with

[7] All else equal, the jumps imply that $M_t = (1 + \phi_1)M_{t-1}$ and $M_t = (1 - \phi_2)M_{t-1}$. It follows that the log-difference is $\ln(M_t/M_{t-1}) = \ln(1 + \phi_1)$ and $\ln(M_t/M_{t-1}) = \ln(1 - \phi_2)$. The value in the left-tail of the distribution is approximately -1.5. The value in the right tail is approximately 2.25. Using these formulas, this implies that $1.5 = \ln(1 - \phi_2)$, or $\phi_2 = 0.78$, and $2.25 = \ln(1 + \phi_1)$, or $\phi_1 = 8.49$.

[8] Here, I am defining the benefit-cost ratio in terms of the model as *B/C*. In the Monte Carlo experiments, I normalize $C = 1$ and then set B equal to the corresponding values.

war. Unfortunately, it is hard to know (or quantify) these ex ante estimates. Ex post, the budgetary cost of the Spanish-American War was approximately $270 million (Rockoff 2012; Edwards 2014).[9] Thus, assuming that the true cost of war was known, these ratios assume that the perceived benefit of going to war was between $540 million and $702 million.

To get an idea of how accurate these perceived benefits are, consider that prior to the Spanish- American War, firms had invested approximately $50 million in Cuba (Gould 1982, p. 24). Assuming this was all invested in tangible capital, a real interest rate of 5% and a depreciation rate of 10% would imply the present discounted value of that capital is approximately $333 million. Thus, the destruction or confiscation of wealth alone would amount to a benefit-cost ratio of 1.3. Prior to Cuba's war with Spain, trade between the United States and Cuba amounted to approximately $100 million annually. However, during the Cuban rebellion, this declined by two-thirds (Offner 2004). If the United States expected this decline in trade to continue indefinitely, this would imply a present discounted value of $1.32 billion of lost trade. Even if one imagines that the United States could only recover one-quarter of the trade that had been lost, it would still seem reasonable to assume a perceived benefit-cost ratio between 2 and 2.6 based on economic factors alone. Furthermore, it is important to note that this justification for benefit-cost ratios is basely solely on the direct economic benefits associated with war. There are additional benefits to politicians, such as McKinley and others, that they would accrue if victorious. In addition, the United States would stand to benefit in terms of military prestige and greater power in the Western Hemisphere. These benefits are hard to quantify, but certainly bolster the case for the assumption I've made about the benefit-cost ratios used in the Monte Carlo experiments.

In Figs. 19.9, 19.10, and 19.11, I plot the cumulative distribution functions for the Monte Carlo experiments associated with the benefit-cost ratios of 2, 2.5, and 2.6, respectively, for McKinley's first term as president. Each figure plots the probability that the United States will have hit the optimal threshold and entered the war at or before the corresponding time period. By presenting the probabilities in terms of time, it is possible to examine the timing of entry within McKinley's first term. For the case in which $B/C = 2$, the threshold is $M^* = 9.97$. According to the model, this corresponds to a probability of victory of 91%. As shown in Fig. 19.9, the probability of reneging on the commitment to peace and entering the war by the end of McKinley's first term is 4%. The probability of entering by some point in 1898 is approximately 1%.

If the perceived benefit-cost ratio is 2.5, the threshold is $M^* = 5.12$. According to the model, this corresponds to a probability of victory of 84%. As shown in Fig. 19.10, the probability of McKinley reneging on the commitment to peace by the end of his term is approximately 17%. In addition, the probability of reneging after only one year of McKinley's presidency is approximately 4.6%.

[9] As both Rockoff and Edwards note, the cost of the war turned out to be larger than its budgetary outlay due to things like pensions for veterans. Edwards also considers the uncompensated costs associated with war-related injuries. Nonetheless, I use the budgetary cost as a baseline estimate.

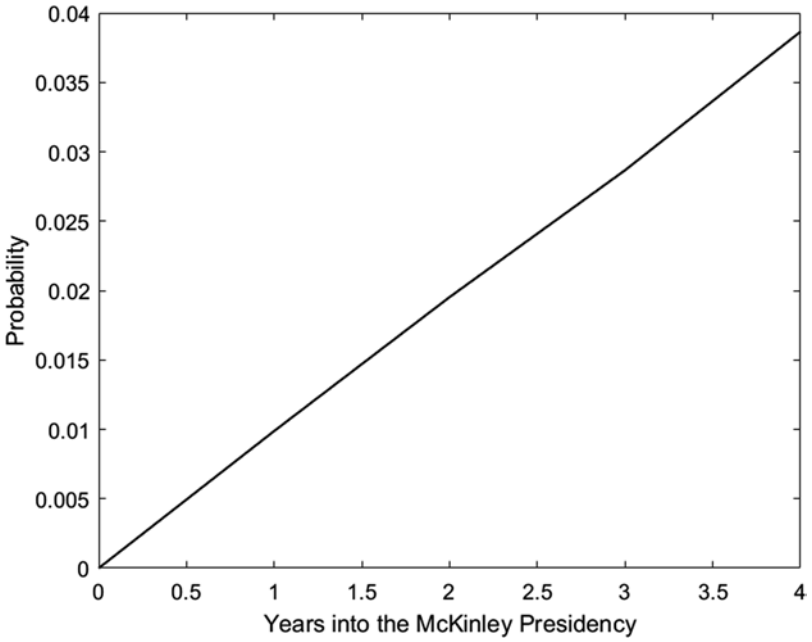

Fig. 19.9 Cumulative distribution function of reneging. This figure plots the probability that the United States would renege on its commitment to peace at or before time *t*, assuming a benefit-cost ratio of 2

If the perceived benefits were 2.6 times the cost, then the threshold is $M^* = 4.71$. According to the model, this corresponds to a probability of victory of 82%. As shown in Fig. 19.11, the probability of reneging on the commitment to peace by the end of McKinley's first term is nearly 35%. In addition, the probability of reneging in 1898 is 17.5%. It is important to note that once the perceived benefit gets to 2.7 times the cost, the probability of reneging at any point during the first term of McKinley's presidency is 100%, given the initial relative military capabilities of the United States.

The results of these simulations capture the basic idea of the model. The decision to go to war should ideally be made from a position of power. If a country does not have the military capabilities to make a victory sufficiently likely, then it is optimal to commit to peace and try to avoid conflict. However, there is some threshold of relative military capability at which it becomes optimal to renege on the commitment to peace and to enter into conflict.

The simulations illustrate that as the perceived benefits of war increase relative to the costs, a country lowers its threshold of relative military capability. This has two implications. First, it suggests that as the perceived benefits of war increase, a country is willing to enter conflict with a lower probability of victory. Second, the results suggest that as the perceived benefits increase, a country is likely to renege on its commitment to peace *sooner* than it would for a lower benefit.

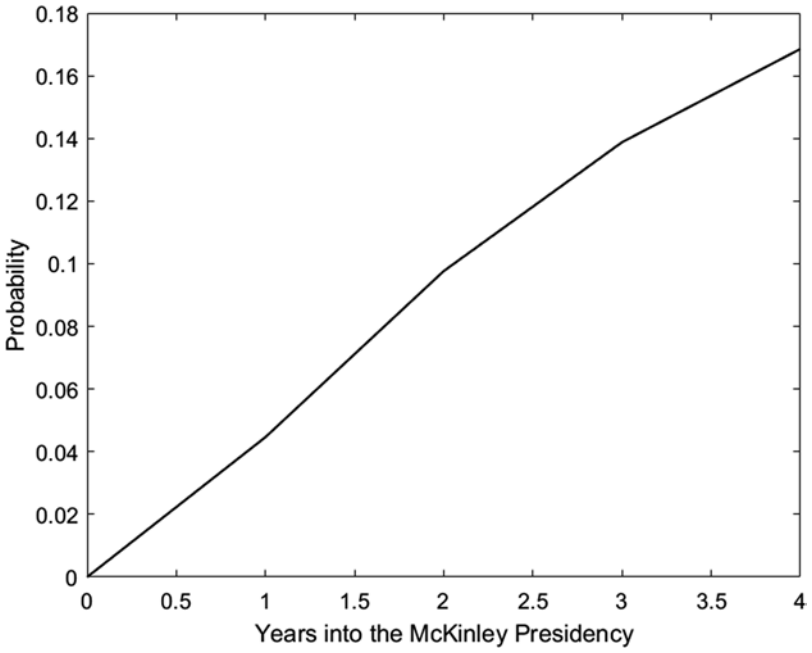

Fig. 19.10 Cumulative distribution function of reneging. This figure plots the probability that the United States would renege on its commitment to peace at or before time *t*, assuming a benefit-cost ratio of 2.5

The takeaway with regard to the Spanish-American War is particularly important. While the popular narratives among historians suggest that McKinley's decision to go to war was due to his weakness in the face of pressure, this paper provides an alternative explanation. In particular, my model suggests that the decision about whether or not (and when) to renege on McKinley's commitment to peace depends on the perceived benefits and costs associated with conflict and expectations about the relative military capacity of the United States. The model shows that if the perceived benefits of war were 2.6 times the perceived costs, then the probability of reneging within McKinley's first term is quite high. Whether or not this is an accurate estimate of the perceived costs and benefits depends on the counterfactual. In other words, what did McKinley, and others, believe would happen if the United States maintained the commitment to peace indefinitely? Suppose, for example, that McKinley and others believed that abstaining from the conflict would result in a destruction of the capital investment of US interests in Cuba or a continuation of the collapse of trade with Cuba. In this context, and given the investment and trade figures presented above, it is likely that the perceived benefits of preventing the destruction of capital and a loss of trade with Cuba would be sufficiently large on their own to generate a benefit-cost ratio of 2.6 or greater. This is not to mention the benefits to decision-makers, such as McKinley, who might stand to gain from better

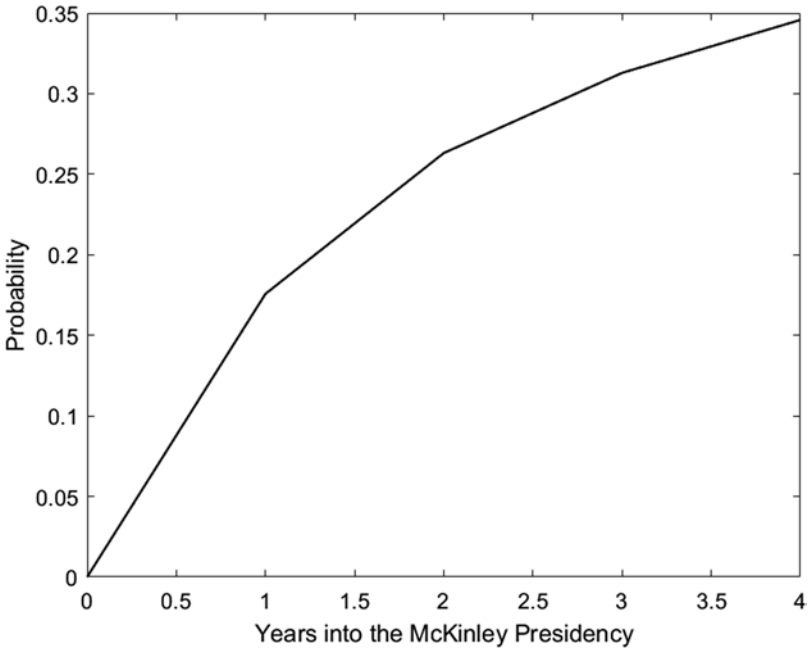

Fig. 19.11 Cumulative distribution function of reneging. This figure plots the probability that the United States would renege on its commitment to peace at or before time *t*, assuming a benefit-cost ratio of 2.6

re-election prospects and a greater standing in the world of the United States and its military.

It is also particularly important to note that the probability of entering conflict in this model should be seen as a *lower bound* estimate. The reason is that the model assumes that the only things that the president cares about are the perceived benefits, the perceived costs, and the expected future path of relative military capabilities. In reality, other events can influence decision-making. My model, for example, does not account for the explosion of the USS Maine off the coast of Havana in February 1898. Nonetheless, the model does present an important starting point to considering the possibility of conflict without attempting to ascertain the true nature and/or inner thoughts of William McKinley.

Finally, the model does not draw any normative conclusions. My simulations and subsequent discussion should not be seen as my attempt to say that the Spanish-American War was a good idea or a bad idea. Similarly, the purpose of my paper is not to draw any conclusions about whether William McKinley was a good or a bad president. Rather, the point of my paper and of my model is to say that if we take seriously the notion that countries are more likely to use force when they are in a position of power, then we can better understand the decision-making process of leaders by modeling their decision-making with this characteristic in mind.

19.5 Conclusion

When President William McKinley took office, he claimed to be committed to peace with Spain. However, by 1898 the United States was at war with the Spanish. A common narrative among historians is that McKinley's inability to maintain peace is due to his weakness in the face of mounting pressure for war. These narratives seem to stem from a normative premise. For example, if one begins with the premise that the Spanish-American War was unnecessary, then one must explain why William McKinley reneged on his commitment to peace in such a short period of time. Historians seem to have accepted this premise and therefore have traditionally looked for factors that might explain why McKinley had a change of heart. If one accepts the premise that the war was unnecessary, then the abundance of evidence regarding the presence of outside pressures makes it easy to accept the conclusion that McKinley simply caved to external pressure.

However, there are problems with this line of thinking. First, to proclaim that the war was unnecessary requires an analysis of the relevant counterfactuals. For any historical event, the ability to construct counterfactuals is always easier with the benefit of hindsight. Second, by accepting the premise that the war was unnecessary, it frees the researcher from examining the incentives to go to war. For example, if the war was unnecessary, then there should have been little incentive to go to war. This therefore begs the question as to how the McKinley and the United States would end up at war. The researcher is naturally led to an examination of McKinley himself and the role of outside pressures.

In this paper, I approach the question from a different perspective. I focus on the incentives to go to war. This requires thinking about the war in terms of the ex ante estimates of the benefits of a successful war with Spain and the ex ante cost estimates of such a conflict. The United States had attempted to purchase Cuba from the Spanish and had made it an official policy that the control of Cuba would either rest in the hands of Spain or the United States. The rebellion in Cuba created unique problems for the United States. If the Cubans successfully expelled the Spanish, what role would the United States play? How would a Cuban victory affect US business interests in Cuba? Furthermore, how long would a prolonged Cuban rebellion against Spain affect the capital investment of US firms operating in Cuba? At the same time, the Spanish were nearly gone from the Western Hemisphere. If the United States went to war with Spain and won, the United States could potentially remove Spanish interests in Cuba and Puerto Rico and thereby establish the stronger role in the Western Hemisphere – an important goal of US foreign policy since the outline of the Monroe Doctrine.

When viewed in this context, it is easy to see why President McKinley might see potentially large benefits from a successful war with Spain. Such a conflict would protect established trade relationships and capital investment in Cuba, expel the Spanish from the Western Hemisphere, and enhance the international standing and reputation of the United States and its military.

Against this backdrop, I argue that the best way to think about McKinley's decision to go to war is by thinking about his decision as an optimal timing problem. While McKinley had expressed a commitment to peace, he also promised to use force if necessary. If one is going to threaten the use of force on a potential adversary, there must be some threshold for reneging on the commitment to peace. Furthermore, this threshold should be one that puts the United States in a position of strength. Given the potential costs and benefits of a successful military conflict with Spain, I show how to derive this threshold. I then use simulations of the model to determine the probability of reneging.

What the model demonstrates is that the probability of reneging at any given point in time is a function of the perceived benefit-cost ratio. If the ex ante estimates of the benefits of military conflict with Spain are sufficiently high then the probability that McKinley would renege in his first term are sufficiently high. My paper therefore suggests that to understand why McKinley reneged on his commitment to peace so early in his presidency, one should begin by examining the magnitude of the perceived benefits of a successful war within the McKinley administration. Furthermore, I show that back-of-the-envelope estimates of the potential loss of trade and capital alone might be sufficiently large to understand why McKinley was willing to renege on his commitment to peace after only one year in office.

Finally, I should note that my paper does not prove an absence of outside influence in McKinley's decision-making. In fact, it is possible that outside influence might have either increased the benefits or reduced the political cost of going to war in the context of my model. Nonetheless, the point of my paper is to challenge these conventional narratives. One can think of my model as an attempt to examine the likelihood that McKinley would have gone to war if none of these outside influences was a factor. Judged by this metric, the model and the simulation results suggest that one need not rely on outside influence to explain McKinley's decision to go to war.

Acknowledgments This paper is the last paper that I ever discussed with John Murray. I mentioned the paper to John during our last, long lunch together. I was afraid that economists would think this was political science, political scientists would think I was trying to make a contribution to theory, and that historians would think I spent too much time on a model and didn't disprove their existing hypotheses. However, John really liked the idea and encouraged me to pursue it. He agreed that I might find it difficult to find the correct audience, but he thought that it was a compelling argument. As we departed that lunch, he told me to keep him posted on my progress. It therefore seems appropriate to include it here.

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