

Give it some time?

Psychological frames, intertemporal choice, and hysteresis in sunk cost assessments

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Introduction

The Afghan Taliban's takeover of Afghanistan over the past few months has seemingly rattled the American public and elite alike—albeit temporarily—despite the fact that this outcome was somewhat predicted by scholars and policymakers alike since the Bush administration. Indeed, after the Taliban regained control over Kabul in Afghanistan on August 15th, President Biden released the following statement: “One more year, or five more years, of U.S. military presence would not have made a difference if the Afghan military cannot or will not hold its own country. And an endless American presence in the middle of another country's civil conflict was not acceptable to me.”¹ He reaffirmed this perspective in a later statement, noting that “there was never a good time to withdraw U.S. forces.”²

This stance reflects popular opinion about the US involvement in Afghanistan during this period as well. To the question, “When it comes to Afghanistan, do you think the war was worth it or not worth it?”, 69% of respondents said “no” after the Taliban took over, whereas this figure was significantly lower (47%) a month earlier. Americans are sticking with this decision despite the myriad problems associated with withdrawing forces and evacuating Americans (people are not mad about the fact that we withdrew, but rather believe that the “removal of troops has been handled badly by the U.S (74%)” and 67% agree that “Biden did not have a clear plan for evacuating American civilians.”³ Despite all of the sunk financial (over \$830 billion since the start of the war⁴) and human costs (over 2400 service members), it seems this decommitment to the conflict will stick, with policymakers and the public alike opposed to resuming American involvement.

The US military intervention and recent reactions to the withdrawal from Afghanistan poses an important question for foreign policymakers. The American public has been indifferent towards this conflict after the vast majority of US troops departed in 2014. The international community repeatedly warned the US of the fragility of the Afghan government and its total reliance on external actors for its physical and financial security. We sunk more in Iraq than Afghanistan in terms of both financial resources (\$2.4 trillion USD [Iraq] vs \$1.5 trillion [Afghanistan]) and human costs (over 4400 service member deaths [Iraq] vs 2400 deaths [Afghanistan]). Why did we stay in Afghanistan for as long as we did?

The study of sunk, or stranded, costs in the social sciences has largely revolved around the idea that these costs are fixed parameters that are incurred in the past and cannot be recovered. Actors often incur sunk costs when making important decisions that involve the forging of new relationships. Firms consider entry and exit costs in foreign and domestic investment, for instance. State decisions to enter international disputes may be contingent upon the anticipated sunk costs of initial involvement, as well. The existing literature in economics and political science notes that because these costs are irretrievable and cannot be recovered, they should not be factored into future decision-making. However, this is often not the case in social behavior; this desire to compensate for such fixed sunk costs has led to an interesting literature that explores dynamics of the sunk cost fallacy, as illustrated in the Afghanistan example above. Experimental and observational evidence alike strongly suggest that people are highly sensitive to sunk costs, especially once they are committed or resolved to pursue some sort of reward (“throwing good money after bad”).

¹ The White House, “Remarks by President Biden on Afghanistan,” August 16, 2021.

² Ibid.

³ Newport, Frank. “American Public Opinion and the Afghanistan Situation. August 27, 2021.

<https://news.gallup.com/opinion/polling-matters/354182/american-public-opinion-afghanistan-situation.aspx>

⁴ This is a conservative estimate, measuring only the Department of Defense's documented expenditures.

Prospect theory would lead us to believe that actors are loss averse and tend to commit even further when sunk costs are high. And yet, there is interesting variation in commitment when in the example of two similar foreign military interventions. **What explains this inconsistent commitment in the face of variable sunk costs? What are the conditions under which actors honor sunk costs?** Which types of actors are more likely to be susceptible to the sunk cost fallacy, as articulated by prospect theory? Is honoring sunk costs always irrational, and if not, what are the forcing variables that bring decision-makers into the realm of bounded rationality? This paper is a theoretical “first crack” at answering this stream of questions and seeks to review the relevant literatures in order to understand how decision-making varies across time. Unlike extant rationalist or psychological approaches—which tend to either theoretically separate decision-making processes into *ex ante* and *ex post* stages or universalize individual responses to loss aversion across time, respectfully—I posit that sunk cost sensitivity varies quite a bit across temporal and spatial contexts. This perspective is in line with discount theory accounts for the time value of costs and benefits; however, I hope to build on discount theory by thinking about the conditions under which time and risk are salient for decision-makers. As such, the valuation of sunk costs varies across time, and thus, can be considered to be a type of intertemporal choice. Discount rates vary across time due to uncertainty and missing information, and as such, the valuation of sunk costs and how “sinkable” or “recoverable” they may seem changes across time. This variation of cost-benefit assessments across time may also drive actors to oscillate between cycles of commitment and decommitment. These cycles tend to illustrate a type of persistent path dependency called hysteresis, and thus, can push states to be “stuck” in cycles of commitment, decommitment, and recommitment. I conclude with a brief application to intertemporal CBA in principal-agent relationships, but this type of approach has the potential to be applied to various types of decision-making in international relations.

Conventional Explanation of Sunk Cost Behavior

Traditional cost benefit analysis (CBA) considers costs to be objective, fixed, and irreversible entities incurred at a point in time. Rationalist perspectives in particular have adopted these assumptions wholesale in political science and international relations, especially in expected utility applications to the causes of war,⁵ bargaining issues in decisions to go to war⁶ and successful international cooperation, just to name a few examples.^{7,8} Actors that take past costs into account or re-evaluate costs or benefits at later points in time only do so due to missing information that was unavailable *ex ante*. In other words, variation in decision-making across time is typically relegated to the problem of uncertainty and missing information in international relations. This perspective entails that information-sharing mechanisms are likely to reduce uncertainty (though this claim has been challenged as well—see Mitzen and Schweller (2011) on misplaced certainty).⁹

⁵ De Mesquita, B. B. (1980). An expected utility theory of international conflict. *American Political Science Review*, 74(4), 917-931.

⁶ Fearon, J. D. (1995). Rationalist explanations for war. *International organization*, 49(3), 379-414.

⁷ Fearon, J. D. (1998). Bargaining, enforcement, and international cooperation. *International organization*, 52(2), 269-305.

⁸ Axelrod, Robert. *The Evolution of Cooperation*. New York: Basic, 1984.

⁹ Mitzen, J., & Schweller, R. L. (2011). Knowing the unknown unknowns: misplaced certainty and the onset of war. *Security Studies*, 20(1), 2-35.

Assumptions about the fixed nature of costs is not unique to international relations or political science. This perspective finds its roots in expected utility theory, a simple derivation from principles of rational choice. Tversky and Kahneman highlight that principles of transitivity of preference and cancellation most directly influence the premise of most sunk cost analyses.¹⁰ The former refers to the ability to assign to each option a value that does not depend on other available options (i.e. independence of value). In other words, it does not allow for the value of options to be dependent on other available options. Secondly, and more importantly, the principle of cancellation allows for the “elimination of any state of the world that yields the same outcome regardless of one's choice.”¹¹ In other words, past decisions such as sunk costs should be canceled or ruled out in future decision-making. Similarly, the bygones principle (“let bygones be bygones”)—also sometimes formalized as separability—considers behavior as independent of history and any prospective events.¹²

And so, this simple assumption took off and enjoyed applications across various fields within the social sciences. Sunk costs were easily incorporated into *ex ante* decision-making, and more importantly, explained an actor's willingness to remain resolved and committed to a particular decision. Most notably in international relations, Fearon conceptualizes sunk costs as “...actions that are costly for the state to take in the first place but do not affect the relative value of fighting versus acquiescing in a challenge.”¹³ In foreign policy decision-making, states may either create domestic audience costs—in which domestic political audiences punish leaders if they fail to follow through on their promises—to tie their hands to an international commitment. On the other hand, states may sink costs and invest in organizational activity, troop deployment, etc.—financially and perhaps politically costly actions—to signal their resolve. It is critical to note that this understanding of sunk costs is *definitionally* irrecoverable and what will be sunk can be anticipated *ex ante*, i.e., before the decision is made.

For example, Fearon's bargaining model of war finds that states are better able to signal their resolve by tying their hands as opposed to sinking costs. This aversion to sunk costs is why Fearon claims that “international crises are characterized more by public contests to generate audience costs than by spending contests in which states sink costs to signal resolve.”¹⁴ However, this logic all hinges upon the idea that sunk costs are fixed parameters in two key ways: firstly, that they are only incurred at one point in time and can be anticipated by the decision-maker, and secondly, that these costs are completely irrecoverable and have no effect on the likelihood that a state will emerge successful in their foreign policy venture. Fearon takes this one step further to show that these costs also have no effect on the other side's decision to cooperate or resist with potentially adversarial behavior. Others similarly find that hand-tying may be more effective at preventing crisis escalation, as is the case in nuclear deterrence.¹⁵ Even though there is some experimental evidence that indicates sunk costs are perceived just as—if not more—effective than hands-tying by observers, these newer studies also assume that sunk costs are fixed entities only realized and

¹⁰ Tversky, A., & Kahneman, D. (1989). Rational choice and the framing of decisions. In *Multiple criteria decision making and risk analysis using microcomputers* (pp. 81-126). Springer, Berlin, Heidelberg.

¹¹ Ibid.

¹² There is some experimental evidence that suggests the separability principle is not violated, however, it is not clear if this true of group-level (i.e. firm or state) behavior, where the stakes are higher, see Cubitt, R., Ruiz-Martos, M., & Starmer, C. (2012). Are bygones bygones?. *Theory and decision*, 73(2), 185-202.

¹³ Fearon, J. D. (1997). Signaling foreign policy interests: Tying hands versus sinking costs. *Journal of Conflict Resolution*, 41(1), p. 70.

¹⁴ Fearon, 1997, 71.

¹⁵ Fuhrmann, M., & Sechser, T. S. (2014). Signaling Alliance Commitments: Hand-Tying and Sunk Costs in Extended Nuclear Deterrence. *American Journal of Political Science*, 58(4), 919-935.

incurred *ex ante* and *should have no influence* on agent reoptimization or reevaluation of such costs *ex post*.¹⁶ Actors that actively try to recover these costs, or factor them into their *ex post* decision-making, are thus thought to deviate from conventional rationality (operating under the sunk cost fallacy). Prospect theory seems to explain some of this behavior and highlights how loss aversion and reference points (i.e. reflection effect, see Figure 1) alter risk orientations under uncertainty.¹⁷ Some have gone so far to argue that despite these cognitive limitations, this type of decision-making is still quite consistent with the expected utility model.¹⁸

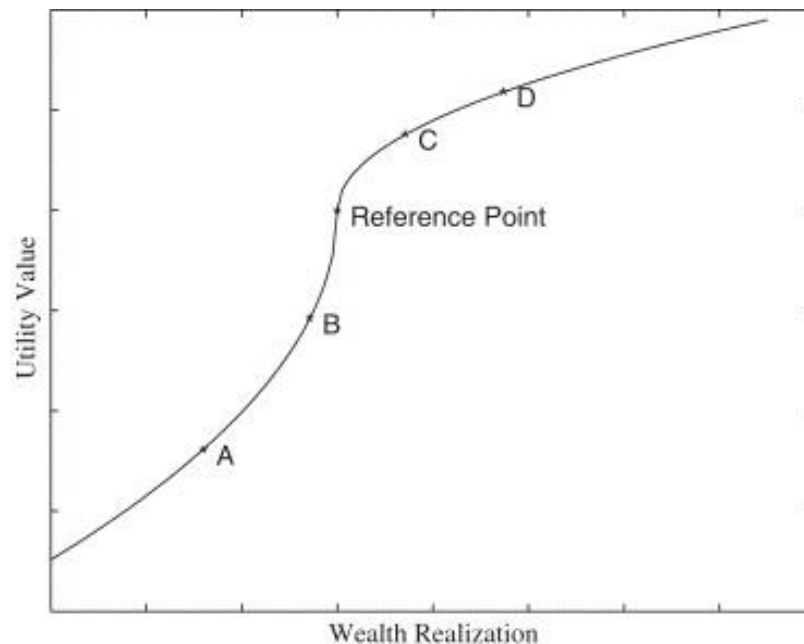


Figure 1: An illustration of the reflection effect, as articulated by Kahnemann and Tversky (1981).¹⁹ People tend to be risk-seeking when in the realm of relative losses (C and D) and risk-averse when in the realm of relative gains (A and B). Chatterjee and Taylor (2005) show that this effect is moderated by an individual’s tendency to avoid uncertainty; this uncertainty tolerance influences shifts in individual reference points.²⁰

The idea that costs are objective, static entities—especially something like fixed sunk costs—is pervasive in international relations. Though Kahnemann and Tversky account for framing effects, they do

¹⁶ Yarhi-Milo, K., Kertzer, J. D., & Renshon, J. (2018). Tying hands, sinking costs, and leader attributes. *Journal of Conflict Resolution*, 62(10), 2150-2179.

¹⁷ Kahneman, D., & Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen.

¹⁸ Levy, J. S. (1997). Prospect theory, rational choice, and international relations. *International studies quarterly*, 41(1), 87-112.

¹⁹ Kahneman, D., & Tversky, A. (1981). *The simulation heuristic*. Stanford Univ CA Dept of Psychology.

²⁰ Subimal Chatterjee and David W. Taylor (2005), "Preference Reversals and the Reflection Effect: the Moderating Role of Uncertainty Avoidance", in E - European Advances in Consumer Research Volume 7, eds. Karin M. Ekstrom and Helene Brembeck, Goteborg, Sweden : Association for Consumer Research, Pages: 595-596.

not consider if the effects of frames are heterogeneous and how frames change over time. Can costs be subjective, and if they are, what's at stake? Most decisions are made without knowledge of downstream consequences. Vaughn points out that costs are subjective precisely because they are based upon *anticipations*; therefore, this is necessarily a forward-looking concept with *ex post* implications. According to Kahnemann and Tversky, psychological frames that are *internal* to the decision-maker can shift the reference points. Because these frames are internal, and often subjective, it is difficult for the analyst to understand the conditions under which reference points shift and make actors more or less risk averse, for instance.²¹ In addition to these psychological frames, I focus on an *external* frame: time.

While discount utility models have accounted for time and shifting reference points by incorporating the rate at which certain costs and benefits deteriorate or augment over time, they do not consider the fact that discount rates are not constant across time. It is possible for actors to reevaluate their discount rate as new information is revealed over the course of a commitment. For instance, experimental evidence suggests that choices framed in terms of multi-stage decision-points shortens the time horizons of respondents. Lowenstein finds that people who are faced with a two-stage decision (whether they are willing to incur a cost and the timing at which they would pay up) are less willing to delay downstream decisions.²² Such framing, even under conditions of full information, can produce impulsive decision-making like renegeing on a commitment last minute when they feel like they are being "cheated" or deprived of what is rightfully owed to them. These temporal frames are particularly important in contexts where the value of the cost is non-monetary (e.g., human costs, credibility, and even time). Indeed, studies of behavior with non-monetary consequences, such as those that involve additional time investment, show that individuals are *more* optimistic about gains and pessimistic about losses when operating under time instead of money units ("time is not money" and "risk perception is influenced by the nature of the unit used to measure consequences.")²³ If sunk costs are measured in non-monetary units, time becomes even more relevant when it comes to assessing the value of what has been sunk. This reassessment across time can shift reference points and influence the risk tolerance of respondents, especially if the consequences of the decision are not apparent until much later in time. While time has been accounted for in IR models of decision-making, as Kertzer does in his analysis of resolve of individuals operating under short vs long-time horizons, the IR literature does not provide a satisfying answer to the dynamic nature of changing time horizons.^{24,25} Consequently, it is difficult for analysts to diagnose the *conditions under which* actors are operating under short or long-time horizons or when they switch orientations.

Dynamic Frames: Temporality, Hysteresis and Path Dependence

Economists have started to account for the dynamic and temporal nature of sunk costs by analyzing their path dependence. A more specific case of path dependency, hysteresis often refers to the "stickiness" or persistence of certain phenomena in dynamic systems. These historical systems tend to have long-lasting

²¹ Vaughn, K. I. (1980). Does it matter that costs are subjective?. *Southern Economic Journal*, 702-715.

²² Loewenstein, G. F. (1988). Frames of mind in intertemporal choice. *Management Science*, 34(2), 200-214.

²³ Abdellaoui, M., & Kemel, E. (2014). Eliciting prospect theory when consequences are measured in time units: "Time is not money". *Management Science*, 60(7), 1844-1859.

²⁴ Kertzer, J. D. (2017). Resolve, time, and risk. *International Organization*, 71(S1), S109-S136.

²⁵ For example, Kertzer evaluates whether actors operating under short vs long-time horizons are more resilient or not, but does not explore where these preferences for myopia, etc., come from. Are they universal in some conditions or time-dependent (e.g. based on how much has been sunk in the past)?

memory, where the effects of some external shock persist far after it has dissipated (especially in closed systems, as developed in the study of physics and engineering). True or genuine hysteresis exists where temporary shocks affect downstream outcomes permanently. This is often the case following systemic shocks, such as financial crises. However, even sub-systemic shocks like rapid changes in exchange rates can induce hysteresis in unit-level behavior, such as sunk-cost decision-making.²⁶

Hysteresis at the unit level is explicitly modeled in economics, particularly in the study of firm investment decision-making. Often these markets are characterized with high entry and exit barriers and uncertainty about the existence of sunk costs. In other words, investors are often not aware of what material, financial, human, etc. resources are needed to successfully start-up a new venture. This uncertainty surrounding the existence of sunk costs significantly changes the way these investors behave in the long-run, especially if some costs are realized at a later point in time. Many authors have found that sunk entry and exit costs alike produce persistent shifts in trade flows, especially when there is uncertainty in market conditions. These trade flows tend not to be driven by stochastic processes, as previously theorized, nor are they unstable; rather, investors stabilize these trade flows by hedging their bets in the face of uncertainty.²⁷ As Baldwin clearly states, “In the presence of sunk market entry costs, a firm's entry and exit conditions are asymmetric so a temporary shock can lead to a hysteretic change in market structure and thereby induce hysteresis in prices and quantities”²⁸; this finding is robust to temporal and geographic scope conditions as well. Strong market fluctuations consistently result in disproportionately large hysteresis losses for producers that must be accounted for *ex post*.

Hysteresis may reconcile and consolidate the some of the conflicting findings on the role of sunk costs in individual- and group-level decision-making and explain why see more seemingly irrational cost benefit assessments. Firstly, systemic shocks may place actors in a position to rule out certain options because of either past failures or a desire to not repeat those decisions (true hysteresis = total irreversibility). This interdependence of decisions can be applied to the study of sunk costs by considering entry and exit costs, incurred *ex ante* and *ex post*, respectively. Secondly, hysteresis may exacerbate the effect of information asymmetries on uncertainty, and as such, the *ex post* revaluation of those commitments. In other words, it is not clear what the agent has sunk and how much of the commitment is truly irrecoverable until it is revaluated after the costs are incurred. Depending on the context, it may not be possible to make

²⁶ Empirically, these types of processes are modeled by accounting for unit root heterogeneity within variables (i.e. modeling how far a variable deviates from a steady-state equilibrium). Hysteretic processes on the other hand, are typically modeled at the system-level as opposed to the variable or unit-level. In other words, these types of models are helpful for scholars seeking to model processes, as opposed to outcomes themselves. These models manipulate the timing and rate at which a system absorbs or incurs a forcing variable as well as the rate at which the system changes following those shocks. In the context of my sunk costs example, we may consider manipulating the rate at which sunk costs are incurred by actors and the timing at which they are observed or exhibited by the system. It is important to note that because hysteresis is an attribute of a model, it may emerge because of a variety of variables, mechanisms or direct/indirect causal pathways. Many studies treat the variables that induce hysteretic shocks as exogenous to the system; it is the downstream effects of this shock that produce endogenous effects. See Bassi, F., & Lang, D. (2016). Investment hysteresis and potential output: A post-Keynesian–Kaleckian agent-based approach. *Economic Modelling*, 52, 35-49.

²⁷ Roberts, M. J., & Tybout, J. R. (1997). The decision to export in Colombia: An empirical model of entry with sunk costs. *The American Economic Review*, 545-564.

²⁸ Baldwin, R. E. (1989). Sunk-cost hysteresis. *Available at SSRN 459421*.

a rational valuation of sunk costs *ex ante*.²⁹ I exclusively focus on the latter form of hysteresis to illustrate path dependency in individual decision-making.

The *ex post* reevaluation of costs is not only a decision that investment firms must make to maximize profits; it has huge implications for the dynamics of agent commitment, recommitment, and decommitment. Agents may reevaluate the sunk entry costs following their decision and decide to uphold the commitment (recommit) or withdraw completely (incur exit costs and decommit). Take the example of UK's membership in the European Union. Though there were entry costs incurred to form and join the organization, the reassessment of those sunk entry costs in 2015-2016 in light of rising domestic forces pushed the state to opt out of the organization. This was followed by a host of exit costs, such as loss to national revenue, etc., which may not be fully realized until 2022, over six years after the decommitment.

In order to stabilize these fluctuations, some have modeled how macroeconomic policy such as fixed exchange rates and financial market regulation can reduce uncertainty and prevent sunk adjustment costs, for example.³⁰ These examples illustrate that sunk costs can have long-run destabilizing effects on systems. In foreign policy analysis, the conditions under which sunk costs are poorly estimated or surrounded by uncertainty may contribute to systematic miscalculations of time horizons, for instance. These miscalculations have clear implications for signaling and commitment in the bargaining space, for example. If decisions are truly endogenous, separating them may contribute to poor predictions of state behavior during and after wartime, for instance. Alternatively, adhering to the by-gones or cancellation principle may lead to inappropriately characterizing unit behavior as irrational; actors may be maximizing their expected utility in the aggregate by factoring in both entry and exit costs.

Empirical Application: Modeling Shifting Frames and Hysteresis

Thus far, I have merely reviewed the literature to illustrate that temporality in decision-making can be an important determinant of persistent, path-dependent or hysteretic sunk costs. The most basic illustration of hysteresis occurs in a type of microeconomic decision-making called non-ideal relay (also referred to as the “wait-and-see” behavior of firms operating under conditions of macroeconomic uncertainty). I adopt a basic model of hysteresis from microeconomic decision-making.³¹ Take a state j that decides at time t to intervene militarily in a foreign territory. Two different types of costs must be taken into consideration when it comes to this type of commitment: (a) fixed starting, or sunk entry costs, (k_j) which are state-specific and decay if the state chooses to drawdown and (b) variable costs (c_j), which increase as the intensity of the intervention increases (e.g. deploying troops or sending drones, US Air Force support, etc.) If the state is intervening for the first time or is ramping up its intervention from the previous period ($x_j, t-1 = 0$) then it must pay sunk entry costs and variable costs. On the other hand, if it is continuing its commitment from a previous period, the state just pays variable maintenance costs. The cost function of the state j can then be formalized as follows in Figure 2.

²⁹ “Economic values linked to the irreversibilities embodied in *ex post* or *de facto* sunk costs can be crucially defined, in general equilibrium, by the impact of partially, or wholly, unforeseen contingencies. This distinctive category of sunk costs may be termed *sunk costs with endogenous effects*...when there are unforeseen contingencies, economic agents will reoptimize their earlier decisions, thereby internalizing such news. This leads to an associated endogenous determination of economic values linked to sunk costs.” (Owen, 2006, p. 5)

³⁰ Adamonis, J., & Göcke, M. (2019). Modelling economic hysteresis losses caused by sunk adjustment costs. *Journal of Post Keynesian Economics*, 42(2), 299-318.

³¹ Göcke, M. (2002). Various concepts of hysteresis applied in economics. *Journal of economic surveys*, 16(2), 167-188.

$$K_{j,t} = \begin{cases} c_j & \text{if } x_{j,t} = x_{j,t-1} = 1 \\ c_j + \kappa_j & \text{if } x_{j,t} = 1 \text{ and } x_{j,t-1} = 0 \\ 0 & \text{if } x_{j,t} = 0 \end{cases} \quad \text{with } c_j, \kappa_j \geq 0 \quad (1)$$

Figure 2: Unit cost function of the state ($K_{j,t}$), given sunk entry costs (k_j) and variable costs (c_j).

If we assume that the state is myopic in its intervention strategy, and only cares about planning one time period out, the state is not considering the future advantage of maintaining an intensive commitment in the current period. Let's add a forcing variable that could shift the decision-making frame of the state, for example. If the level of public support for this type of intervention can be denoted by p_t , then the commitment of the cost-incurring state j can be summarized in the function below (Figure 3). Public support for military interventions may feasibly exceed the variable costs of the intervention, for example, and this variation could drive the level of overall investment into the foreign policy. This is especially important if the state is starting this policy from scratch (when $x_{j,t-1} = 0$)

$$x_{j,t} = \begin{cases} 1 & \text{if } (x_{j,t-1} = 0 \text{ and } p_t > c_j + \kappa_j) \\ 1 & \text{if } (x_{j,t-1} = 1 \text{ and } p_t \geq c_j) \\ 0 & \text{if } (x_{j,t-1} = 0 \text{ and } p_t \leq c_j + \kappa_j) \\ 0 & \text{if } (x_{j,t-1} = 1 \text{ and } p_t < c_j) \end{cases} \quad (2)$$

Figure 3: Commitment function of a myopic state j in the face of variable public support (p_t), accounting for whether the state was active or inactive in the previous period (i.e. if k_j) has been incurred.

Given these simple assumptions, levels of state commitment can feasibly vary between active and inactive periods of intervention. The state will initiate the policy only if public support exceeds the critical threshold needed, which is simply the sum of the sunk entry costs (k_j) and variable costs (c_j). Once they incur these costs and jump into the active stage of policy initiation (from points B to C in Figure 4), they may oscillate between points E, C, and D, depending on fluctuations in public support. For instance, even if public support decreases to point E, the state will continue to uphold its commitment because the sunk

entry cost k_j is no longer relevant.³² Depending on the activity in the past period, a second branch of the relationship between public support and state commitment can emerge (between points F and B). This reflects the lowest support limit the state needs to maintain the foreign policy commitment, and as illustrated in the graph, can push the state out of “stable” commitment stages into stages of de-commitment (withdrawal) or re-commitment (doubling down). These oscillations are referred to as a pathway of “non-ideal relay” because the “switch between those two possible scenarios are determined by the activity status of the previous period”.³³ In other words, this model gives a sense about the conditions under which these costs might be reinterpreted or reevaluated in a later period. The area of decision-making between points F and B can also be referred to as the “band of inaction” or the “hysteresis band” because *temporary* changes of the foreign policy input (in this case, defined as changes in public support) lead to a switch in state activity and produce *long-lasting* effects on the outcome, which is state commitment to persist with the policy (sometimes referred to as “remanence” in the macroeconomics literature).³⁴ These oscillations in commitment given real or perceived changes in the valuation of cost (mediated by public support in this example) contributes to the hysteresis curve/loop illustrated in Figure 5.³⁵

³² Though this could be modelled differently by accounting for the relevancy of sunk costs across time. I didn’t do that here to illustrate a simple example of hysteresis, but I hope to manipulate this model moving forward.

³³ Gocke, 2002, p. 171.

³⁴ Baldwin, 1989.

³⁵ Hysteresis is but one type of path dependent relationship that can account for path, instead of equilibrium, dependency. These systems are dependent on both initial conditions as well as long-run values of exogenous parameters. The persistence of the exogenous parameter on a system is not necessarily random or generated by identically and independently distributed (iid) or Brownian motion processes; these might be driven by systematic endogenous processes. If so, estimation equations that seek to model a long-run equilibrium are highly susceptible to misspecification and bias. The use of fixed coefficients or lag structures—as is often employed in time series analysis—is likely to produce misleading results and wash out the meaningful variation needed to predict important systemic outcomes (Baldwin, 1989; Baldwin and Krugman, 1989).

Substantive Application: Principal-Agent Problems in Proxy Wars

The previous sections have illustrated some examples of time-dependency in cost-benefit analysis, particularly when the actor is evaluating sunk costs. The non-ideal relay model in particular hopefully demonstrates that this persistence can continue even when the starting conditions to initiate the commitment (e.g. public support) are no longer present. If this perspective is correct, in that cost-benefit analysis is inherently temporal and the valuation of costs depends on time, this might explain why some states remain committed to a policy and fail to withdraw or terminate. In this section, I illustrate the potential for applying this time-dependent decision-making in principal-agent relationships that are governed by two distinct stages of decision-making.

Delegation is the most recognizable and basic example of a principal-agent relationship, which has been applied across the social sciences across a variety of contexts. In international relations, Hawkins et al apply this theory to explain why states delegate to international organizations (IOs) under conditions of anarchy.³⁶ They define delegation as "...a conditional grant of authority from a *principal* to an *agent* that empowers the latter to act on the behalf of the former...this grant of authority is limited in time or scope and must be revocable by the principal..."³⁷ States empower agents to accomplish certain policy goals, and are expected to abandon these agents once the costs outweigh the benefits of delegation, or if the agent is no longer working towards accomplishing the political goals set by the principal at the start of the relationship (commonly referred to as "agency slack"). This dynamic is illustrated well in state interactions with IOs such as the European Union, for example, where states not only reduce the costs and increase the quality of decision-making, but also to enhance the credibility of commitments by tying their hands and ensuring the independence of delegates.³⁸

Other types of principal-agent relationships—such as cooptation, orchestration, and trusteeships—emerge as a result of varying levels of *ex ante* (granting vs enlisting authority) and *ex post* (hierarchical vs non-hierarchical management) controls by the principal, especially given the inevitable information problems in typical principal-agent relationships.³⁹ Delegation is distinct from orchestration, for example, in the ability of the principal to both grant authority *ex ante* and rescind it *ex post*.⁴⁰ Principals ("governors") must strike a balance between their desire to hire *competent* agents that are able to implement policy and their desire to *control* agents over the course of these relationships. However, they are unable to strike a balance between these issues because of their inability to access the same levels of information as the agents they employ. Competent agents are hard to control, but tight controls *ipso facto* decrease their competence. More interestingly, agents may only communicate their efficacy in behaviors or actions that are observable by the principal. In other words, agents may only "obey" principals to the extent to which this behavior can be observed by the principal and shirk covertly to evade external punishment.

³⁶ Hawkins, D. G., Lake, D. A., Nielson, D. L., & Tierney, M. J. (2006). Delegation under anarchy: states, international organizations and principal agent theory. *Delegation and agency in international organizations*, 3, 21.

³⁷ Hawkins et al, 2006, p. 5.

³⁸ Majone, G. (2001). Two logics of delegation: agency and fiduciary relations in EU governance. *European Union Politics*, 2(1), 103-122.

³⁹ Abbott, K. W., Genschel, P., Snidal, D., & Zangl, B. (2019). Competence versus control: The governor's dilemma. *Regulation & Governance*.; Abbott et al also discuss other types of principal-agent relationships that involve enlisting authority instead of grants of authority (e.g. cooptation and orchestration), which are not addressed in this paper. I exclusively focus on grants of authority.

⁴⁰ Abbott, K. W., Genschel, P., Snidal, D., & Zangl, B. (2016). Two logics of indirect governance: Delegation and orchestration. *British Journal of Political Science*, 46(4), 719-729.

Many problems associated with principal-agent relationships—the selection of an agent’s type *ex ante* and the monitoring of an agent *ex post*—are exacerbated in a conflict context, such as proxy wars. In these situations, the external state sponsor (principal) will delegate resources to the rebel group (agent) in order to accomplish a policy goal (typically, to win the war). External sponsors may pursue certain rebel groups or intervene in some conflicts over others with the information they have about the ideological motivations, policy objectives, tactics, and constituencies of the rebel group. Insurgents may incorrectly signal their competence or willingness to “obey” to principals to attract foreign support. Rebel groups are often not transparent about their intentions and goals in conflicts, for instance. In fact, they often purposively misinform principals about their type to procure arms, funds, and foreign support. Internal competition within insurgencies over ideological platforms, combat operations, or wartime and post-conflict governance is pervasive, but not clearly communicated to third parties. Such internal divisions make it harder for agents to effectively signal their type, and even more difficult for principals to discern their type and their reputation for being able to credibly commit to established terms.

Time inconsistency problems very persistent in these types of conflicts, but especially for principals trying to exert control over agents. Agents and principals alike may commit to something at time *t* but fail to uphold those commitments down the road as conflict dynamics change and new information about the actors is revealed.⁴¹ Similarly, principals may be less likely to exert control over agents simply because they are not aware of the extent to which agent noncompliance occurs or establish lax controls in the absence of suitable alternatives. The revelation of new information or reduction of information asymmetries over time only occurs *after* the principal has sunk some costs and committed to assisting a rebel group (see Table 1).

Table 1: Stages of the Principal Agent Relationship and Goals/Strategies of the Principal. Note: though I do not address all of the P-A issues in this brief example, I want to show that the passage of time after the initial commitment, in the *ex post* phase creates opportunities for time-dependent cost reevaluation to occur.

Selecting an Agent <i>Ex ante</i> (Initiating P-A Relationship)	Controlling an Agent <i>Ex post</i> (Maintaining P-A Relationship)
<p><i>Goal:</i> find an agent that is <i>competent</i> and can effectively accomplish a policy goal</p> <p>Identifying agent’s type through</p> <ul style="list-style-type: none"> - Past behavior/reputation for upholding commitments - Attributes (size, constituency, etc.) - Ideological/political motives <p>Anticipating sunk costs based on expectations of agent compliance under conditions of uncertainty</p>	<p><i>Goal:</i> find an agent that is <i>obedient</i> and susceptible to principal <i>control</i></p> <p>Address information asymmetries about the agent through</p> <ul style="list-style-type: none"> - Monitoring - Enforcement <p>Revelation of new information and the enforcement of <i>ex ante</i> agreement; re-assessment and revaluation of sunk costs</p>

⁴¹ Simmons, B. A. (2000). International law and state behavior: Commitment and compliance in international monetary affairs. *American Political Science Review*, 94(4), 819-835.

The literature identifies these information asymmetries apparent prior to the initiation of principal-agent relationships (i.e. adverse selection *a priori*) and assume that it is the misidentification of the agent's type that results in agency slack down the road. It is especially difficult to resolve this slack if it creates ongoing problems for the agent or prevents the agent from controlling the principal in the future. This extant perspective in the study of indirect governance assumes that principals possess a high degree of authority at the start of the relationship because they dictate the terms of the agreement *ex ante*. Agents may estimate the type of the principal *ex ante* and foster relationships with principals that are least likely to monitor them and maximize their autonomy vis-à-vis political participation and policy implementation. This selection is in part a function of the principal's attributes, including their regime type and position in the international system. More importantly, ***agents may extend the temporal horizons of the political objectives in order to prevent them from being resolved***, as its resolution would pose future problems for the agent in the future.⁴² This temporal horizon produces opportunities for a principal to reinterpret what has already been sunk in rebel support, and produces a band of inaction, as Powell notes. For example, the reliance of the US (principal) on Pakistan (agent) for counterinsurgency and counterterrorism in South Asia is a classic example of a failed de-commitment. Though the US is capable of monitoring enforcing Pakistani noncompliance in counterterrorism, such as through the termination of foreign aid or economic/military sanctions, it is stuck in the band of inaction because decision-makers believe exit costs are too high. The US cannot abandon Pakistan because the US believes agent termination ensures the resilience of regional security threats, even if the commitment is not working and there are no positive incentives, like from domestic audiences, to continue the support.⁴³ As a result, we are left with a "persistent problem that persists" where the US is stuck in the band of inaction, not because the incentive structure for the agent prioritizes non-compliance, but one in which the principal's incentive structure prioritizes non-enforcement.

What's at stake? Directions for future work

Recall that I started this paper with the foreign policy quagmire in Afghanistan: why did we stay there as long as we did and what explains the variation in honoring sunk costs in some interventions versus others? Though I admit I have not fully answered that question in this paper, I am hoping to convince the reader that factoring time into our understanding of decision-making can explain how and why states can revalue costs. Psychological frames indeed play a huge role in this reinterpretation, as the legacy of Kahnemann and Tversky show, but it is not clear where these frames come from, or if they shift with the passage of time. By accounting for time-dependency in sunk cost decision-making in particular, the analyst might be able to predict the persistency of a commitment instead of just diagnosing it after the fact. The short formal model illustrates how a shifting frame—induced by public support, for example—can play out even for a myopic actor and induce a persistent path dependency called hysteresis. Proxy support—a type of foreign policy plagued with principal-agent problems—similarly have a time dependence that is baked into the decision-making process. Frames shift when information about the agent (rebel group) is revealed over time, but because the state has already committed to the policy in the previous period and internal

⁴² Powell, R. (2019). Why Some Persistent Problems Persist. *American Political Science Review*, 113(4), 980-996.

⁴³ Powell, 2019.

audiences seem to be indifferent at best, de-commitment or policy termination does not occur. Instead, the commitment is characterized as hysteretic, with long-term path dependency.

This approach could have several interesting theoretical implications for the study of cost-benefit analysis in international relations more broadly. The efficacy of sunk cost signaling may depend on the rate at which those costs are realized by states as well as the time elapsed since the costs were incurred. According to the non-ideal relay model this influences *ex ante* entry and *ex post* exit costs for war. This is especially the case for evaluating the efficacy of sinking costs versus tying hands. In a critique of Fearon's (1995) rationalist explanations for war, Kirshner (2000) notes that leaders may look at the same information and arrive at very different political outcomes. Building on this, even if actors within a system face the same sunk costs, their understanding of the timeline of the sunk costs and when/how they are incurred will likely drive their decision-making and the strength of the costly signal(s) they send. Domestic or individual frames filters the willingness of an actor to uphold or renege on a commitment. Depending on particular applications, it may be theoretically meaningful to model the value of sunk costs over time, not unlike the way discount rates are modeled and evaluated over time. Even if these rates turn out to be less dynamic as theorized here, perceptions and projections of these sunk costs influence decision-making of leaders in issues of domestic investment and international war alike. Accounting for time and changes of sunk cost behavior across time may uncover the conditions under which states oscillate between being pure expected utility maximizers or pure honorers of sunk costs. We might discover that its sometimes in the best interest of the state to take a middle ground instead of falling firmly into one category (Figure 6).

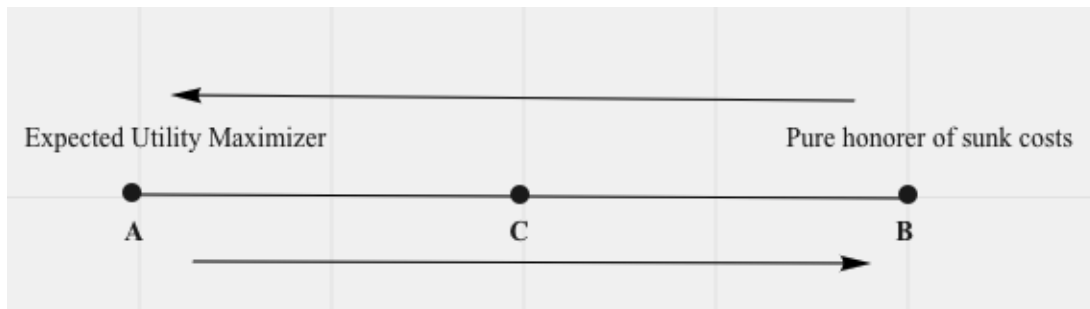


Figure 6: States may operate between the two models of decision-making: expected utility maximizers (rationalist) and pure honorers of sunk costs (psychological). Accounting for the role of time in determining the value or weight of sunk costs, for example, may help us uncover the conditions under which states fall into either category or how they might shift stances.

Even if some states are pursuing a seemingly irrational policy due to internal dynamics that shift their reference point for evaluating costs, how can this type of decision-making influence the international system? Consistent with economic analyses of micro- and macro-analyses of time-dependent decision-making, hysteresis in individual decision-making can generate systemic level of uncertainty. At the level of the international system, the hysteresis of sunk costs may disrupt state behavior by creating further uncertainty about future payoffs. If states perceive high hysteretic losses from risky foreign policy ventures, for instance, they may be less likely to cooperate with other states in the long run. The memory of past failed foreign policy may persist both at the domestic and international level, as illustrated in state reluctance for foreign military interventions, but may also fade away once a certain amount of time has passed. Whereas macroeconomic policy at the domestic level can stabilize hysteresis losses by minimizing

uncertainty and information transmission, a hegemon could feasibly do the same if at the helm of an international order (a la Kindleberger's hegemonic stability theory). Therefore, hysteresis may not always have “bad” implications in international politics, depending on what type of sunk costs persist. It might be ideal to maximize sunk cost hysteresis to disincentivize certain state behavior, such as withdrawing from international organizations. Though my scope is more limited to explore time-dependent decision-making in foreign policy applications (particularly conflict behavior), further theorization may explore the dynamics of sunk cost hysteresis and the conditions under which they emerge, as well as their downstream implications for the stability of international politics.⁴⁴

⁴⁴ How can we test some of these suppositions more empirically? Experimental tests of time-sensitivity of decision-making have been done before in economics and psychology, so there is a rough foundation to draw on. The costs that might be incurred will perhaps be a combination of material and non-material costs, the latter of which, allows for some subjectivity and revaluation following framing. Adding temporal frames in those applications is useful to determine how commitments vary across time, especially if the costs are being measured in human or time units in examples of foreign policy commitments. On the other hand, leveraging observational data to understand which types of states are more likely to commit to a foreign policy decision like conflict initiation or crisis escalation over long periods of time might be more difficult. However, if I can conceptualize and identify measures that capture frames cross-nationally and use state behavior to deduce how that frame shifts across time, I might be able to provide a rough proof of concept. Finally, case studies seem like another good option, but case selection and teasing out the full scope of how decisions vary over time is critical. Can anything influence changes in “real or perceived” costs? What if these changes in costs don’t result in changes to behavior? I am painfully aware of these issues and would greatly benefit from feedback about this, especially since I want to use this framework as a jumping-off point for my prospectus.