Wampum:
The Political Economy of an Institutional Tragedy

Preliminary: Do Not Cite

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This version: November 2017

Abstract: *Wampum*, shell beads allegedly used as money by northeastern Native American groups in the early colonial period, is a frequent example of a historical commodity money. Yet, there is little evidence that Native Americans used wampum as a general medium of exchange. Instead, Native Americans, especially the Iroquois, used wampum for political purposes. We argue that wampum was an institution that, before and immediately after the arrival of Europeans, was an efficient means to promote reciprocity and enforce credible commitment between previously warring groups. Wampum promoted commitment by (1) screening good from bad trading partners and (2) creating a public memory of past agreements for a pre-literate society. Wampum sustained the Iroquois League for centuries. We then argue that wampum was a harmful institution for Native Americans in the later colonial era. European tools were more productive in crafting wampum. Natives adopted them, and the quantity of wampum soared, which hurt the effectiveness of the wampum institution. But adopting alternative institutions is costly and the wampum institution persisted. Colonists exploited the increased supply of credibility made possible by their technologies in "forest diplomacy" with the Native Americans. Exchanges of wampum led to one-sided credible commitments that favored the colonists. Over time, wampum became so costly that Native Americans abandoned it for practical political purposes.

JEL Codes: D02 (Institutions: Design, Formation, Operations, and Impact), P48 (Other Economic Systems: Political Economy), P50 (Comparative Economic Systems)

Keywords: institutions, credible commitments, political economy, wampum, forest diplomacy

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> *[The] act of sacrificing wampum established reciprocity as the obligatory force or unwritten contract that would bind living to nonliving, kin to nonkin, village to village, and tribe to tribe to tribe in the league. Indeed reciprocity has been identified at the principle operating throughout Iroquois social structure[. ...] Ultimately, wampum gifts also bound Iroquois to colonials such as Johnson, who exploited the reciprocity obligations to their advantage as 'forest diplomacy' to acquire Iroquois lands and resources.*
>
> *Ceci (1982, 102)*

1. Introduction

How does a warring, pre-literate society establish peace and enjoy the benefits of peaceful cooperation and the division of labor? Moreover, how can it do this without resorting to a sovereign to enforce agreements? The people of the Mohawk, Onondaga, Oneida, Cayuga, and Seneca nations faced such problems before they formed the Iroquois League. Yet, these nations established a political alliance that helped them become the most important and powerful group in the New World outside of Mexico and Peru. Their political power allowed them to develop a vast trading network, which ultimately led to the successful development of the Dutch colony of New Netherlands, later New York for the English. The solution for the Iroquois resided in the creative use of a shell bead known as *wampum*. However, wampum ultimately became detrimental to the Iroquois. This paper studies the rise and fall of wampum as institution.

Effective institutions mitigate transaction costs; they facilitate mutually beneficial exchanges between individuals. The greater the decrease in transaction costs, the closer the outcome will be to an efficient allocation of resources across individuals (Coase 1960). However,

institutions may fail to effectively mitigate transaction costs, as Coase emphasized. Worse, perverse institutions can facilitate exchanges that are not mutually beneficial; they can promote coercion. Perverse institutions can provide the rules for zero or even negative sum games.

The ways that perverse institutions can promote coercion is sometimes underemphasized in the economics literature. Given the "Coase" theorem, economists have long recognized incentives for the adoption of effective institutions. Less attention has been given to puzzles regarding institutional conservatism: cases where institutions that do not effectively mitigate transaction costs are retained. In such cases, the assignment of property rights becomes "sticky" and resources are not reallocated from lower- to higher-valuing users (Leeson 2011). However, truly perverse institutions create property rights that are "flexible" but that "flex" in ways such that resources are coercively moved from higher- to lower-valuing users.

Institutional conservatism describes any case where an institution becomes less effective at promoting flexibility of property rights in the direction of efficiency; yet it is retained by virtue of being the status quo (Kuran 1988, 145–46; see also Goldberg 1974, 463–64; Tullock 1975). Among such cases, we can conceive of an *institutional tragedy* as one where the institution promotes flexibility of property rights in the direction of *inefficiency*. This paper explores the political economy of one institutional tragedy: wampum and its role in Europeans' exploitation of the Iroquois Native Americans.

Economists are familiar with wampum from textbook examples of historical commodity monies (Samuelson 1951, 53). Wampum is often described as shell bead commodity money that was used by northeastern Native American groups in the early colonial period (*e.g.* Friedman 1951, 204). However, there is negligible evidence that Native Americans used wampum as a money. Rather it was the Dutch and English colonists for which "years of ongoing negotiability of

wampum for the valuable beaver of the Iroquois created a confidence that underlay the beads evolution to colonial currency" (Ceci 1982, 100; see also Herman 1956; Bradley 2011, 27). Colonists used wampum because the Iroquois wanted it and would trade beaver furs for it. The evolution of wampum to money was also encouraged by the scarcity of specie in the colonies.

In contrast, the Iroquois valued wampum for non-monetary purposes. Wampum did not circulate as a medium of exchange for the Iroquois but was used or "consumed" (Hagedorn 1988, 63) to make strings and belts. Indeed, Dutch colonists who settled along the Hudson River complained in 1644 that "the cause of the current scarcity of wampum [is] that the Indians had removed large quantities [from circulation] and little new was being brought in" (Herman 1956, 26). If wampum was not being used as a medium of exchange, why did the Iroquois value it so dearly? What was the source of their demand?

The Iroquois valued wampum for its role in *establishing, recording, and enforcing reciprocal obligations* in a community without a central state.[3] Wampum was an institution that provided rules of a political and economic game that allowed peaceful cooperation and allocated resources in the direction of efficiency. Instead of a medium of exchange, wampum was more like a contract or record than money for the Iroquois. For a preliterate society, wampum provided a mnemonic device from which the obligations of the parties involved could be "read" (Fenton 1985, 17–18).

The most significant role for wampum in establishing and enforcing reciprocal obligations was for the Iroquois League. The reciprocity developed by the exchange of wampum held the League together for over three hundred years, allowing for peaceful cooperation and trade among

[3] There is now a large literature documenting how individuals overcome contracting problems without the state (*e.g.* Greif 1993; Landa 1994; Leeson 2006, 2007, 2008; Milgrom, North, and Weingast 1990).

the Five Nations. Cooperation was achieved through two mechanisms. First, wampum provided a mechanism to screen good from bad trading partners, cheaters from non-cheaters. To screen good partners from bad, political and trading ceremonies required both parties to produce wampum and offer it as a gift to the other party. These gifts were extremely expensive in the form of time and other resources. The gifts of wampum helped the Iroquois sort good partners from bad, as gifts have been shown to do in different contexts (Camerer 1988; Carmichael and MacLeod 1997; Landa 1994, 141–72; Araujo 2004).

In addition to screening, wampum helped people remember past dealings. For a preliterate society, wampum was a form of "written" document that described the obligations of the parties involved. Each side of a treaty would "read" the belts to keep the memory of past obligations fresh. Memory is vital to most models of cooperation and trade through repeated interactions, such as Milgrom, North, and Weingast (1990), Greif (1993), and Greif, Milgrom, and Weingast (1994). In general, optimal outcomes require perfect memory (Rogerson 1985).[4] For monetary economies, money is a way for a community to remember who provided a good for another person. For literate societies, written contracts and records are memories. For the Iroquois, a belt of beads played the role of the contract. Just as money is memory (Kocherlakota 1998), wampum was memory.

The arrival of Dutch colonists and their metal tools made the manufacture of wampum orders of magnitude more efficient. In the early colonial era, Iroquois increased greatly their use

[4] While in general some memory is required for efficiency, folk theorems do not always require perfect memory, such as when memory is short but the action set is rich enough (Barlo, Carmona, and Sabourian 2009) or when memory is bounded, but large enough (Barlo, Carmona, and Sabourian 2016).

of wampum, which increased the importance of the institution in both inter-Iroquois and external relations. Wampum was a critical component of what became known as *forest diplomacy*. As the interactions between Iroquois and colonists became more prevalent and important over time, the former continued to rely on wampum to establish reciprocal obligations while the latter increasingly shirked on those obligations. Yet the historical record shows the continued use of wampum in time-consuming ceremonies aimed towards binding both parties to treaties and recording the details of those treaties. An interesting question, then, is: why did the Iroquois maintain the institution of wampum even when it failed to provide effective rules for positive sum games? Why keep wampum after it allowed colonists to win at negative sum games against the Iroquois?

Why did the Iroquois suffer an institutional tragedy?

We present a simple theory to help account for the Iroquois League's experience with wampum. Our theory is in the spirit of Allen and Leeson's (2015) theory of institutionally constrained technology adoption. In their paper, the adoption of a socially beneficial technology requires collective action initiated by the political elite; however, that elite is resistant to the technology because it threatens their political power. Allen and Leeson apply their theory to account for failure of France and Scotland to adopt the longbow for 150 years following England's adoption of that technology in the early fourteenth century. Similarly, existing institutions give elites their power; socially beneficial institutional change requires, again, collective action initiated by the elite who are resistant because such change decreases their political power. Hence there is *institutionally constrained institutional change*.

In the case of the Iroquois, wampum was an important institutional component of the Condolence Council, a ritual through which the Iroquois installed new chiefs, adjudicated disputes,

undertook diplomacy, and established treaties. Wampum was essential to the establishment and archiving of obligations at the Condolence Council. Iroquois chiefs were exclusively permitted to construct and interpret the wampum belts. Furthermore, of the five original (and later six) nations of the Iroquois League, the Onondaga chiefs were the keepers of wampum belts associated with treaties between the League and colonists. Wampum, then, was an important source of political power for the Iroquois chiefs and had an incentive to maintain the institution to the point of negative social returns.

To understand the success of forest diplomacy and wampum's role in it, we rely mainly on a well-developed archeological and anthropological literature. Although primary sources are often preferred when doing historical work, primary sources are insufficient for our topic for two main reasons. First, because the Iroquois did not have an alphabetic script, primary sources do not exist before European contact. Second, for a long time after European contact, all primary sources are from the perspective of Europeans, who grossly misunderstood aspects of Iroquois culture. Recent studies have complemented the primary sources and generated immense knowledge of the workings of Iroquois culture. Twentieth-century researchers discovered much about the use of wampum, which due to its material has been preserved and uncovered in many archeological digs.

This paper is organized as follows. In section 2 we provide a historical overview of wampum and its use by the Iroquois. In section 3 we elaborate on the Condolence Council of the Iroquois League, the use of wampum by Iroquois chiefs within that ritual, and the incentives that made the wampum effective. Our theory of institutional tragedy is presented in section 4. Then we argue in section 5 that the Iroquois' continued reliance on wampum despite its failure to bind

colonials to their obligations is made intelligible by our theory. We conclude in section 6.

2. What was wampum?

Wampum was a term for small beads made from marine shells that were generally tubular (and hence could be strung together) and of standardized size (about 1/4" long and 1/8" in diameter).[5] Some beads were white (made from the inside of a conch) and others were a deep purple, blue, or black (from a quahog) (Jacobs 1949; Ceci 1980; Bradley 2011). In addition to having standardized sizes for individual beads, wampum was eventually counted in terms of "handfuls" and "fathoms" of beads (Herman 1956, 23). The standardized sizes grew over time as the quantity increased due to shifts in both the demand and supply sides.

From the colonials' perspective, wampum originally had one purpose: to buy furs. In the commonly quoted words of Weeden (1884, 15), "wampum was the magnet which drew the beaver out of the interior forest."[6] Much of the literature surrounding wampum focuses on its role in the fur trade, which made wampum a vital part of the development of New Netherlands and then New York. Ceci (1982, 98) summarizes the importance of wampum to New Netherland's development as follows: "this high value given wampum by the Iroquois that created wealth for the Europeans and colonials, that underlay colonial 'confidence' in this unusual shell bead coinage, and that contributed finally to the success of colonial expansion." The fur trade grew so much, and wampum became so prevalent, that wampum started to circulate as a medium of exchange within the colonies. The director of New Netherlands Willem Kieft started to pay employees and debts in

[5] *Wampum* was the most common name used among the English, while *sewan* was the Dutch word. Other variations include *wompam, wampom-peage, wampeage, peage, peake, zewand* (Woodward 1878, 8), *onekoera, kekw, roanoke,* and *porcelaine* (Otto 2017, 2). Today, wampum is almost the exclusive term in the literature, although sewan does occur.

[6] Isaack de Rasière complained about attempts to acquire furs without wampum, saying "I suppose your Honors sent them [copper kettles] here for the French Indians, who do not want such things from us… They come to us for no other reason than to get wampum" (Starna and Brandão 2004, 732).

wampum when European coins fell in short supply. Wampum even became legal tender (Ingersoll 1883, 472–73). The flourishing of New Netherlands happened because wampum could be bartered for furs. Or as the Europeans saw it, wampum could buy furs.

The whole fur trade hinged on the value that Iroquois attributed to wampum, "the most precious article they possess" (Tremblay 2006, 93). While scholars do not understand every use and role for wampum within Iroquois culture, it is clear that wampum "was not regarded as money by the Indians" (Tooker 1978, 423). Since the Iroquois gave furs in exchange for wampum, the "white man fooled himself into believing wampum was Indian money" (Snyderman 1954, 470; see also Woodward 1878, 20). It was not a medium of exchange, let alone a commonly circulating medium of exchange. Nor was wampum a unit of account or a means of payment.

Describing wampum as money starts the story at the end. To understand wampum's value to the Iroquois, it is important to go to the beginning of both. The oldest use of wampum traces to the founding of the Iroquois League, the political alliance between the Mohawk, Onondaga, Oneida, Cayuga, Seneca, and later Tuscarora nations. Of all Natives Americans in the seventeenth and eighteenth century, the Iroquois had the most influence. The strength of the League as a political unit was the key factor for the Iroquois's prominence (Tooker 1978, 418). The Iroquois League was the most advanced civil/political organization in the New World outside of Mexico and Peru (Morgan 1851, 1:3).

Although the Iroquois governments were different than a modern state in form, they closely matched a modern state in function: a monopoly on violence that provided security and collective goods (Crawford 1994, 350). The Iroquois League, sometimes called the Iroquois Confederacy, was a genuine confederacy, an association of sovereign states. Out of these local monopolies on violence developed a peace pact. Before the trade triangle could flourish, the Iroquois League was

required to provide a peaceful environment for the movement of goods across the forests of upstate New York.

However, prior to the formation of the Iroquois League and The Great Peace it ushered in, life was extremely violent among the Iroquois nations (Snow 1994, 61–66) and between the Iroquois and other nations (Richter 1995, 30–49). While there is disagreement about the exact timing of the founding of the Iroquois League, according to Jennings (1993, 77), "current thinking" places the origin to the fourteenth century. League chiefs have set a date of 1390.[7] As a formidable alliance, it lasted until the American Revolution (Foster 1985, 100–101). Taking those dates, the Iroquois League survived and provided protection for around four hundred years. The Great Peace was a remarkably long-lasting political outcome, especially given the level of violence that preceded the alliance. Over this time of peace, the Iroquois were able to transform from small fishing villages into larger villages with fewer resources devoted to providing defense (Tuck 1978, 324–28). Eventually, the League's role as an economic organization became more important as the fur trade flourished. Only then could wampum have value as a money for the Europeans. The next section shows how wampum led to the success of the Iroquois League.

3. The Condolence Council and the Iroquois League

The Iroquois League and the "roots of forest diplomacy can be traced to the Iroquois Condolence Council, a ritual for mourning dead chiefs and installing their successors" (Hagedorn 1988, 61).

[7] Fenton (1985, 16) argues that "it is *certain*, however, that the League was founded before European settlement, probably about A.D. 1500" (emphasis added), generations before the Mohawks first made contact with Jacques Cartier. Tooker (1978, 420–21) places the origin later, saying the League was most likely established roughly 1400 and 1600. Tooker concludes that the "lack of wampum in prehistoric sites" and traditional narratives tying wampum to the formation of the League indicate a date closer to 1600. Seneca sites that have been dated to between 1540-1620--a period after initial contact with Europeans--produced increasing numbers of wampum (Fenton 1998, 226). However, carbon dating work by Ceci suggests an earlier date and places shell beads in western New York as early as 2500 B.C. and "proto-wampum" before European contact (Ceci 1990, 49). Ultimately, the exact date of the founding is unknown.

Wampum was vital to the entire system of the Condolence Council.

> Wampum was to be used to alleviate the grief of the family, clan, and tribe of the deceased chief before a replacement could be elected and installed. These Condolence Ceremonies assured the continuance of the superstructure by healing the wounds of the basic units comprising the foundation (Snyderman 1954, 478).

Instead of having the death of a chief lead to political turmoil, tensions were smoothed by the sacred gift of wampum.[8] Not only was the gift of wampum a tool for alleviating the grief, but the "dramatic words of the council are recorded in and carried by the wampum beads" (Snyderman 1954, 480). All the dealings of the Condolence Council were recorded on and connected to wampum. Already at the start of the Condolence Council, we can see wampum's dual usage as a gift and recording device.

Wampum became the centerpiece of the whole, successful political system, "uniting the families, clans, tribes, and finally nations socially" (ibid.). The Condolence Council was so successful at achieving peace, and thereby wampum was so successful, that wampum's "use in political councils was inevitable. Wampum, the chief instrument of the Council, became the vehicle necessary for *all important political transactions*" (ibid, 479, emphasis added). Originally,

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[8] Wampum received a mythical backing for the Iroquois. Wampum discussion is traced to the mythical Hiawatha (possible translation: "seeker after wampum") as the inventor of

> the distribution system in which wampum gained its highest value and symbolic meaning. He appears to have strung together the critical elements for the founding of the League in which the wampum belt became the metaphor for the new social fabric. The beads became sacred, as did the League, because the rules for their exchange became established as moral conduct" (Ceci 1982, 104).

Beliefs helped sustain the use of wampum, as beliefs are important for many institutions (see Posner 1980)). However, most anthropological accounts of wampum do not ask what role the beliefs play but simply document them.

the League served political ends as a "kinship state" (Fenton 1971, 39). Over time, the League served economic ends as a "trade alliance" (Tooker 1978, 430) and “corporate entity” (Ceci 1982, 103–4). The economic roles ensured the free flow of goods across much of New York. Wampum’s role in forest diplomacy more broadly was set.

3.1 The Incentives from Wampum

Because of its role in the Iroquois League, it is best to describe wampum not as a money but as an institution—quite an ingenious one. We take the definition that institutions are “the written and unwritten rules, norms and constraints that humans devise to reduce uncertainty and control their environment” (Ménard and Shirley 2005, 1).[9] After European contact, wampum took on another institutional role in addition to the League. Up through the eighteenth century, wampum was the “vehicle of international negotiations” for the Iroquois (Fenton 1998, 7) and treaty-making became “an extension of the Great Peace to a broader scale” (Richter 1995, 41), especially between the Iroquois and the new colonists.

While the role of wampum in the Iroquois League and forest diplomacy is well-documented, less is known about why wampum worked so well and for so long. This section argues that wampum allowed people to credibly commit to their agreed-upon obligations. Such commitment was vital to the peaceful cooperation and four-hundred-year survival of the Iroquois League. This section lays out two ways that wampum able to maintain commitment: a screening role and a memory role. The screening role is commonly discussed in models of repeated interactions; the memory role is more implicit.

[9] Ménard and Shirley (2005, 1) elaborate that “these include (i) written rules and agreements that govern contractual relations and corporate governance, (ii) constitutions, laws and rules that govern politics, government, finance, and society more broadly, and (iii) unwritten codes of conduct, norms of behavior, and beliefs.”

When there are short-term incentives to cheat or steal, peaceful cooperation requires commitment. For that commitment to be credible, the benefits of cooperation in the future through more peaceful dealings must outweigh the temptation of short-term incentives to cheat the other party. If people are sufficiently patient, future benefits of peace are relatively more attractive. If people are impatient, future benefits of peace are relatively less attractive. Therefore, credible commitments require that both parties be sufficiently patient and be able to verify that the other party is patient as well. This is the constant struggle of repeated interactions. As the opening quote from highlights, wampum established a reciprocity that linked exchanges through time. The reciprocity was key to the whole social operating structure of the Iroquois (Ceci 1982, 102).

In a world with people with diverse types of people, each side would like to separate good trading partners from bad. If you are certain that your trading partner is good, you want to commit to also behaving as a good trader. If you are certain that your trading partner is bad, you want to cut and run. One way to screen is to require a large upfront cost from the other party, like a bank requiring a down payment for a mortgage. The borrower pays an upfront cost to show the lender that she will be a trading partner in the future. The rituals of forest diplomacy and the manufacturing of wampum required a large upfront investment by all parties. Using wampum was a costly signal for participants. In the words of Snyderman (1954, 487), “forest diplomacy was a painstaking business.” Those pains, that is those costs, could be divided into two types: manufacturing costs and other ritual costs. Both were high.

Wampum was difficult to manufacture. A fathom, the six-foot standard length of a wampum string, took around seven days of labor to manufacture (Beauchamp 1901, 350). And many of these fathoms were exchanged in any meeting; “just as it was customary to document each ‘word’ or item with a gift, string of wampum, or belt symbolic of it; so each work must be

returned and attested by comparable gift, string or belt" (Fenton 1985, 24). This means that a lot of wampum and therefore a lot of labor spent by both sides of the negotiation. The costly signal of wampum took the form of a gift to the other side, compared to a costly signal like a blood oath where the other side receives nothing. Gifts have been shown to be effective tools in repeated interactions, such as in the models of Camerer (1988) and Carmichael and MacLeod (1997). Not only did the one offering side pay a cost, but that cost provided some benefit to the receiving party for the reasons mentioned above.

Producing wampum was not enough to *trade* wampum. Forest diplomacy required that the whole ceremony be done correctly. Nearly half of a treaty exchange involved an invitation process that colonial records describe as "trifling" and "tedious" (Foster 1985, 104). However, these "formalities were essential to successful diplomacy among the Iroquois" (Snyderman 1954, 473). In forest diplomacy "proceedings apparently took up 'an abundance of time and consumed a large Quantity of Wampum'" (Hagedorn 1988, 63). These costly actions meant that trade would not occur between impatient traders or traders who believed the relationship would have small benefits and therefore who would not be willing to pay the upfront cost to make the necessary wampum and learn the protocol.

In addition to screening good partners from bad partners, wampum acted as a form of memory. Although memory may be perfect in many economic models, humans have far from perfect memory. Without a memory of what people promised in the past, people cannot be held accountable in the future. The whole benefit of repeated dealings disappears. In models, standard trigger strategies that are used in repeated games require every player to remember a single deviation perfectly and forever. How can someone commit if they do not remember what they committed to?

The problem of memory becomes especially important for a society like the Iroquois that was pre-literate. How could a confederacy made up of distinct groups constantly interacting with different outsides possibly keep track of all agreements? Wampum filled the role of memory. Agreements and treaties were "written" on wampum. The words were recorded in the design of the belt using combinations of white and purple beads (Snyderman 1954, 480). Each belt contained imagery related to the agreement the belt was associated with. In that way, wampum belts were "the official records of agreements between Iroquois League nations" (Crawford 1994, 351). To maintain communal memory, the records were then displayed publicly (Jacobs 1949, 601).

However, given wampum belts did not contain the exact words of a treaty, not everyone could know what a belt was a memory of. The Iroquois required more to maintain a public memory of the treaty. First, for each belt, someone within the Iroquois delegation was chosen to commit the item of business to memory. The imagery on each "distinctive emblematic design, could be brought out at a later time as a 'mnemonic aid' for recalling details of an agreement." (Foster 1985, 99). People had to practice so the mnemonic aid worked.

> Periodically, they were brought out and rehearsed. This "reading" of the wampum belts was possible so long as the memory of the particular verbal stream could be recalled and taught by association with the character and design of the particular belt (Fenton 1985, 17–18).

Recalling the details of an agreement was a sacred duty (Jacobs 1949, 601). For a society without modern writing, wampum and the reading of wampum was a creative solution to the problem of properly remembering past obligations and treaties.

These roles for wampum continued into the early colonial period. Screening was especially important when dealing with Europeans who could overpower the Iroquois with guns. To see how wampum helped consider the trade of wampum for furs in two steps. First, before the trade of wampum, the colonists had to pay the production costs mentioned above. Again, that is a costly signal. However, once the wampum was produced, the costs changed for the Europeans relative to the Iroquois. The wampum had no religious or use value for the Europeans. That is, wampum only had value if the Europeans could use it to trade for furs. Upon approaching the Iroquois in forest diplomacy, the Europeans had already exerted a large sunk cost for something that had no use value to them. The opportunity cost of wampum was tiny after it was produced. Once at the negotiating fire, from their perspective, the Europeans were giving away worthless beads for valuable furs. This process helped to commit themselves more to peaceful trading strategy, avoiding a holdup problem even though they had guns.[10]

On top of the production costs, the Europeans had to pay a high cost to participate in the rituals of forest diplomacy. They had to learn a new form of diplomacy and communication. Learning these rituals, although not strictly necessary for a trade of wampum for furs, was another costly signal by Europeans. This signal lowered the social distance between the two groups, allowing for more peaceful trade (see Akerlof 1997; Leeson 2008). The total costs of forest diplomacy were extremely high. That allowed the Iroquois to achieve a better level of commitment from the Europeans than without requiring the costly actions.

This commitment means that leaders could use wampum to make credible promises of future obligations. The chiefs could order the production of wampum for any pledge of national

[10] The two stages of the trading process mirrors the creative use of credit by people in west central Africa during late precolonial era (Leeson 2007).

importance (Snyderman 1954, 478). While analogies can never be perfect, the modern analogy of wampum is the contract. The connection between wampum and European contracts was realized by a Jesuit missionary, who said that wampum had "the same use that writings and Contracts have with us" (Thwaites 1897, 40:164). Like a contract, wampum was an agreement to terms both for current actions and future actions. That memory role, that is often taken for granted for written contracts and law, is an important hurdle to the establishment of future obligations. The Iroquois developed their form of writing to establish peaceful cooperation. However, contracts are effective in certain times and places while ineffective in others. The next section outlines how a theory of how the institution of wampum became destructive over time.

4 A Theory of Institutional Stickiness and Tragedy

With the historical background from above, we now present a simple theory of how a political elite may prevent institutional change even though it is socially beneficial. The results are fundamentally based two assumptions: first, that institutional change requires political elites to initiate the change and, second, that institutional change can threaten the political power of the elites. While the theory is highly stylized, in the following section 5 we argue that the model helps make the Iroquois' continued reliance on wampum intelligible; furthermore, evidence regarding that continued reliance is consistent with the assumptions of the theory.

Assume that society is composed of two groups of individuals: political elites and non-elites. Both elites and non-elites work within some institutional framework, I. Within framework I, elites receive a return, E, while non-elites receive a return, N.

Institutional change is possible but only with costly coordination services provided by the elites. In particular, the institutional framework can be changed from I to I' if the elite incur a cost,

C. Under this alternative, *I′*, elites receive a return, *E′*, and non-elites receive a return, *N′*.

Furthermore, assume that a change from *I* to *I′* potentially threatens the elite's political power; the probability of the elite remaining an elite following a change to *I′* is $0 \leq P < 1$. Thus the expected returns to elites and non-elites under the alternative institutional framework are a follows.

elites under *I*:	E
elites under *I′*:	$PE' + (1 - P)N' - C$
non-elites under *I*:	N
non-elites under *I′*:	N'

Given these expected returns, we can make the following statements.

(1) Elites prefer a change from *I* to *I′* if $PE' + (1 - P)N' - C > E$.

(2) Non-elites prefer a change from *I* to *I′* if $N' > N'$.

(3) A change from *I* to *I′* is socially net beneficial if

$$PE' + (1 - P)N' - C - E + N' - N > 0.$$

(4) A change from *I* to *I′* is socially net beneficial but resisted by the elites if

$$PE' + (1 - P)N' - C - E + N' - N > 0 \text{ and } PE' + (1 - P)N' - C - E < 0.$$

Based on the above, *institutional stickiness* can occur when there is a shock ($-\eta$ where $\eta > 0$) to non-elite returns, *N*, under the initial *I*. such that:

(5) $$PE' + (1 - P)N' - C - E + N' - N < 0;$$

(6) $$PE' + (1 - P)N' - C - E + N' - (N - \eta) > 0;$$

(7) $$PE' + (1 - P)N' - C - E < 0.$$

Conditions (5), (6), and (7) characterize a scenario where the initial institutional framework, *I*, becomes less effective (i.e., yields lower returns, *N*) to an extent that the alternative, *I′*, becomes socially net beneficial; yet *I′* is not adopted because doing so is not in the interests of the political

elite.

A scenario of institutional stickiness can be one of full-blown *institutional tragedy* if the shock leads to I creating net losses for the non-elites. Conditions (5), (6), and (7) are consistent with the case of $(N - \eta) < 0$ and $E' > E$. In that case, the institutional framework, I, actually creates negative net wealth for the non-elites but the alternative, I', is not adopted because it threatens the political power of the elites via the probability P.

5. The Tragedy of Wampum

An institutional tragedy has three parts: (1) a shock to the payoffs, (2) a failure to change, and (3) change does not occur the old institutions still benefit elites. One shock to payoffs came because the screening role of wampum deteriorated. Costly signals did not stay costly. First, many colonists and their allies "learned the essential lessons in forest diplomacy" (Fenton 1985, 24). They learned the patterns of speech and the norms of conduct. After someone in society pays the initial cost, the ritual costs decline for other people. One Englishman can explain everything to the next. Secondly, and more importantly, the production of wampum was no longer as costly. European tools drastically lowered the cost of producing wampum. Productivity increased to 375 beads a day by the end of the eighteenth century (Beauchamp 1901, 350). The English took control of wampum production and set up wampum factories that manufactured millions of beads (Synderman 1954, 471). The productivity increase meant that the time involved in the production of wampum fell by around a factor of ten (Ceci 1982, 100). The screening role that wampum played was no longer as strong. In our theory, worse screening is a η shock that hurts the non-elites through more reneging on treaties, as can be seen in the loss of Iroquois land.

An institutional tragedy also requires a failure to change institutions. Unfortunately for the Iroquois, the institution of forest diplomacy did not immediately change with the production costs

(the η shock). The role for forest diplomacy and wampum grew. Forest diplomacy began before European contact but came into full form through an interaction of the two societies (Fenton 1985, 7). The eighteenth century saw forest diplomacy's "perfection" (Fenton 1998, 7), even though this same period saw the loss of the Iroquois's last settlements in New York State (Foster 1985, 100–101). Forest diplomacy was devastating to the Iroquois people. Yet, it persisted.

The third part of an institutional tragedy requires that a certain group still benefits from the old institution. In the case of forest diplomacy, the people with an incentive to keep an old system to the point of negative returns are two groups: traditional political elites and middlemen. The traditional political elites had similar incentives to all political elites to hold onto power and prevent change. What is unique about this episode is that in the elaborate negotiations of forest diplomacy, certain people became middlemen or cultural brokers between the societies. These middlemen were often people who spent a significant amount of time in both societies. Many were *métis*, of European and Iroquois descent, and were employed by both sides of the negotiations. Their "intermediate position, one step removed from final responsibility in decision making, occasionally allows brokers to promise more than they can deliver" (Richter 1988, 41). As the community expanded, certain agents became more separated from principals.[11] There was less oversight; as "no one was capable of checking on the interpreter, he could slant speeches in ways advantageous to himself and his merchant partner/protector (Jennings 1984, 63).[12] The additional principal-agent friction, combined with the other problems from the cheapening and abundance of

[11] This trading friction also occurred between the colonists and the coastal Algonquians, on the other side of the trading triangle.

> [L]and become the dominant issue of Indian and white relations during the eighteenth century. [...] In Indian polity, land titles reposed in the nation or tribes, and the sachems (chiefs) were the trustees but not the owners of the land. [...] What further complicated Indian affairs and confused colonials was that principals typically remained silent and appointed as their speakers artful men who were not of chiefly status. These speakers were often confused with the principals and labeled as sachems in the records (Fenton 1998, 7).

[12] Hagedorn (1988, p. 61n8) argues that Jennings's interpretation is too harsh, although he does not explain how.

wampum, put more stress on the system. In our theory, the η show grew larger. Yet, the institution persisted. While our theory does not have an explicit mechanism that is a shock to the elites, eventually, even the elites changed their actions. Forest diplomacy, and with it wampum, was effectively abandoned near the time of the American Revolution.

6. Conclusion

This paper documents the rise and fall of wampum as an institution and provides a simple theory of why the institution did not *fall efficiently*. For over three hundred years, wampum played an important political and economic role for the Iroquois league by establishing, recording, and enforcing reciprocal obligations in a community without a central state. Wampum promoted commitment to good dealings by (1) screening good from bad trading partners and (2) creating a public memory of past agreements for a pre-literate society. However, wampum also generated a new political class that benefited from their role in forest diplomacy. That political class maintained the institution to the point of negative social returns. While the colonists are clearly to blame for the destruction of the Iroquois as a political unit, the paper provides a theory of why the Iroquois continued to use an institution that made the transition worse.

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