

**A Tiny Toolkit**  
(for helping make sense of historical sources)

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# INTRODUCTION

This kit takes an economic approach to the study of history. Some readers of this toolkit will be students of economics. Others won't be. I hope both groups will find that the simple tools in this kit help them to make sense of the past, in a way that encourages exploration, understanding and communication.

Economics studies the choices people make when resources are limited – how we choose between available opportunities and actions when we can't have them all. Resources can include time, information, health, influence, money, flora and fauna, land, health and more. Taking an economic approach lets us study tradeoffs, sacrifices, needs and wants, possibilities, limits, causes and consequences.

The word *economics* comes from the Greek: *oikos*, meaning home or household, and *nomia*, indicating rules, or management. The members of a household have different needs, goals and preferences – some of which may conflict with each other, as when a child wants to stay up late, and their parents want them to sleep. A household also has limited resources – a finite income (or set of incomes), limited time, and so on. An economist may study how the household satisfies those needs and wants – whether a particular hour is used for a sit-down meal or soccer practice, or \$100 is used to pay for groceries or school supplies, and the consequences of those decisions.

In the same way, an *economic historian* may study choices made by groups and individuals in the past. This is a very flexible purview, leading to papers with (actual) titles like, “On the origins of gender roles: Women and the plough,” “The effect of the tsetse fly on African development,” “Watersheds in infant mortality: The role of effective water and sewage infrastructure, 1880 to 1915,” “Medieval Universities, legal institutions, and the commercial revolution,” or “Revolt on the Nile: economic shocks, religion, and political power”.

To gain the insight needed to write on those topics, first an economic historian needs to understand the setting they're investigating – often, in a pioneering work, they'll need to piece together a picture of the necessary background from scattered primary sources (left by those who were there) and brief, tangential mentions by later writers.

That is what this tiny toolkit hopes to help with.

## WHAT THIS TOOLKIT IS, AND ISN'T

This kit will not, on its own, prepare you to conduct a detailed economic analysis of an historical subject. Instead, it's meant to help you make sense of an unfamiliar world glimpsed through a patchwork of fragmentary evidence.

It may help to think of a collection of historical records as a box filled with the pieces for many different puzzles, all jumbled together, with few clues as to what the final images look like. This kit's goal is to help you get started in putting together one or more of the puzzles in the box.

Once you know what you are looking at, then it's possible to start a more elaborate analysis.

## A “PERIPHERAL VISION” APPROACH

Most of the tools in this kit are part of standard economics, but we’ll be looking at many of them from a perspective inspired and informed<sup>1</sup> by Indigenous ways of knowing.

The term “two-eyed seeing” (Mi’kmaw: *Etuaptmumk*), coined in the early 2000s by Mi’kmaw Elder Albert Marshall, refers to situations where both Indigenous and Western worldviews are used to analyze a situation. The combined strengths of both approaches can lead to insights that would not be as accessible when looking through only one “eye”.

This toolkit is not an example of two-eyed seeing (though I hope it will become one in the future), as it was written by a Settler without Indigenous input. Instead, I think of it as a form of peripheral vision – the perspective taken is very much, at its core, a Western one, but lessons learned from accounts of Indigenous ways of knowing broaden the field of view in a way that students of history will hopefully find useful and insightful.

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<sup>1</sup> Three books which played an important part in this are Bastien, B. (2004). *Blackfoot Ways of Knowing: The Worldview of the Siksikaitsitapi*. Canada: University of Calgary Press, Johnson, H.R. (2016). *Firewater: How Alcohol Is Killing my People (and Yours)*. Canada: University of Regina Press, and Ross, R. (2014). *Indigenous Healing: Exploring Traditional Paths*. Canada: Penguin Canada.

# EPISTEMOLOGY: THINKING ABOUT KNOWING

Economics studies choices made in the face of scarcity. What you choose to do depends on what you know and notice, how you process that information, and how you evaluate an outcome. To understand decision-making, especially in the “foreign country” of the past, it is therefore important to understand the relevant *epistemology* (the study of knowledge), and that is what the first few tools in the kit are about.

We’ll start with a reminder that *culture precedes cognition*, leading to a discussion of *bounded rationality* – what happens when information gathering and processing take effort – and how *narratives*, stories and stereotypes can drive decision-making, even when they are not objectively “true”. Next is an introduction to two common ways of seeing the world – *cyclical thinking* and *linear thinking* – and their implications. To top off this section, we’ll end with a brief discussion of the importance of mapping out relationships.

## Tool 1: Culture Precedes Cognition

We make decisions based on what we know and notice. What we know and notice is based in part of our culture.

For example, in some cultures certain numbers are lucky or unlucky – 3, 4, 7, 13 and so on. Members of those cultures may be very good at noticing occurrences of those numbers when, say, buying an apartment or a lottery ticket, and may base their decision of whether to buy on the presence or absence of those numbers. Prospective buyers from a different tradition, considering the same purchase, may find the same numbers, if they notice them, to be irrelevant to their purchase decision.

Any given scene or situation in the physical world has an infinite number of details that could be noticed or perceived, from the direction in which the breeze is blowing to the structure of the molecular lattice of the sugar crystals served with tea. As humans, we lack the time and processing ability to take in this infinity of details. We have to choose a subset to focus on. It is, in part, our culture and traditions determine what we notice – that say, “*these* are the salient features here,” and “this is why they matter”. This process of taking *cognizance* of particular details is known as *cognition*.

## Culture → Cognition → Decision Making → Evaluation

Culture also informs our judgment regarding the *result* of a particular decision – whether it was good or bad, necessary or superfluous.

### WHY IS THIS ECONOMICS?

Economics studies choice. Choices are based on what is known and noticed. Some years ago, a group of social scientists noticed that behavioral studies that had been thought to shed light on universal truths were in fact extremely dependent on the cultural context of the subjects on whom the studies were conducted. Since then,

there has been a concerted effort<sup>2</sup> by social scientists (including economists) to take this cultural dependence into account in their studies.

### HOW CAN I USE THIS?

When looking at historical disagreements, especially between groups with different cultures, it is not unusual to find situations where a conflict is long-standing because the parties involved can't agree on what the situation they are looking at is, or means.

More often than not, the root of the difficulty will be that a difference in cultural background leads to the two groups interpreting the same scenario in radically different, possibly incompatible ways.

Understanding this, and investigating the cultural differences that led to the friction, can help a student of history to gain a deeper understanding of contentious issues.

### AN EXAMPLE

What is considered acceptable work can vary by culture. Two people, with similar characteristics except for their cultural background, could look at the same labor market and end up with very different ideas of what job opportunities were available – or if there were any jobs available at all.

Early British Columbia provides an interesting example. Most early settlers were male. British settlers strongly believed that certain jobs were “women’s work”. These included parts of cooking, laundry, sewing and domestic service, which were avoided by many male British job-seekers. Chinese settlers had a different cultural background, and did not share this view. The result, combined with various restrictions on Chinese employment, was that a number of male Chinese settlers specialized in work “that women could not be found to fill,”<sup>3</sup> opening restaurants, laundries and tailor shops, and working as household servants.

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<sup>2</sup> For an overview, see Henrich, J., Heine, S., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2-3), 61-83.

<sup>3</sup> “As a class Chinese were useful, truthful and honest [...] and filled domestic places that women could not be obtained to fill.” Legislative Council. (1871, January 27). *The British Colonist*, p. 3.



## Tool 2 – Bounded Rationality

As human beings, we have a limited ability to make decisions. Not only are we limited in our ability to take in details (see Tool 1), but decision-making itself can take time, effort, and other resources, of which we have a limited stock.

It's not too surprising, then, that our ability to make *rational* decisions is *bounded*, and we will often settle for what is possible, convenient, or “good enough”. To do this we may make use of *heuristics* such as rules of thumb or stereotypes.

Understanding the limits to information gathering and processing, and the compromises and shortcuts that different groups of human beings use to cope with them, can be crucial to understanding choices made in an historical setting.

### WHY IS THIS ECONOMICS?

In the words of a survey article from 1996, “deliberation about an economic decision is a costly activity, and good economics requires that we entertain all costs.”<sup>4</sup>

### HOW CAN I USE THIS?

By investigating the shortcuts and compromises were used in making a decision, we can better understand the causes and perhaps the consequences of that decision.

### AN EXTENDED EXAMPLE FROM HEALTH ECONOMICS

Consider a hospital emergency room. Life-and-death decisions on complicated cases must be made quickly, and constantly. Trying to reason carefully from the best available data is simply not possible.

An anecdote from a 2012 study<sup>5</sup> on clinical decision-making is telling. Investigators followed a small British hospital for 24 hours. During that time, 18 patients were admitted, and all were seen by a single attending physician.

Those 18 patients had a total of 44 diagnoses. The guidelines for those diagnoses filled over 3,500 pages. Even reading a page a minute, the physician would have needed over 60 hours to read those guidelines, which they then would have had to remember, and correctly apply, over that one 24-hour period.

This is why rationality is necessarily bounded. Humans *can't* consider everything involved in a decision.

So, what actually happens in emergency rooms?

Dual process theory suggests that health professionals use two types of thinking<sup>6</sup> for information processing: fast System 1 thinking, which relies on rules of thumb, and slower System 2 thinking.

System 1 thinking processes information very quickly. It's intuitive, and feels automatic and effortless. It's based on pattern recognition and simple guidelines (*heuristics*), developed by experience and repetition. “Common things are common” is

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<sup>4</sup> Conlisk, J. (1996). Why Bounded Rationality? *Journal of Economic Literature*, 34(2), 666-700.

<sup>5</sup> Bate, L., Hutchinson, A., Underhill, J. & Maskrey, N. (2012). How clinical decisions are made. *British Journal of Clinical Pharmacology*, 74(2), 614-620.

<sup>6</sup> An excellent introduction to this topic, intended for the general public, is Kahneman, D. (2011). *Thinking, Fast and Slow*. Canada: Doubleday Canada.

an example of such a rule (or, for fans of the *House* TV show, “It’s never lupus (except when it is).”)

System 1 thinking, while a practical necessity, can have tragic consequences when the guidelines used are stereotypes. A recent review of racism in British Columbia’s health care system found “extensive profiling of Indigenous patients based on stereotypes about addictions” that “results in a range of negative impacts, harm, and even death.”<sup>7</sup>

System 2 thinking is analytical, careful, slow and deliberate. This type of thinking is closer to the constrained maximization of the traditional *homo economicus* of undergraduate economics textbook problems.

Diagnosis starts with System 1 thinking. If System 1 fails, the practitioner moves to System 2. If System 2 finds a recognized pattern, that’s taken into account, and thinking moves back to System 1.

Switching between fast System 1 thinking and slow System 2 thinking allows medical professionals, and others, to be able to complete necessary decision-making in a reasonable amount of time, given the resources available.

#### AN EXAMPLE FROM CANADA’S PARLIAMENTARY HISTORY

Transcripts of parliamentary debates make excellent sandboxes for the investigation of bounded rationality. Members of Parliament frequently must vote on measures they have little information on, except for evidence and arguments brought up during the debates, and also included in the published minutes. Comparing the information brought up during the debates with other information available at the time can help us understand both why certain laws were passed (or failed to pass), and what the consequences of those laws were likely to be.

For instance, Canadian parliamentary debates about the Indigenous practice of the potlatch in 1884<sup>8</sup> relied largely on information provided by Christian missionaries and one Indian Agent<sup>9</sup>, all of whom expressed strong, negative views of the practice.. The result was an amendment to the Indian Act, banning the potlatch. Other information available at the time, but not brought up in Parliament, such as the testimony of anthropologists, non-Christian Indigenous participants in the

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<sup>7</sup> Addressing Racism Review. (2020). *In Plain Sight: Addressing Indigenous-specific Racism and Discrimination in B. C. Health Care*. B.C.: Addressing Racism Review.

<sup>8</sup> For example, the debates on March 24 and April 7, 1884, published in Dominion of Canada. (1884). *Official report of the debates of the House of Commons of the Dominion of Canada : second session*. Ottawa: Roger MacLean.

<sup>9</sup> W. H. Lomas, who in private correspondence had a more nuanced view of the potlatch: “[I]t is constantly remarked by parties visiting a potlatch that no other people could meet in such numbers as these Indians do with less friction occurring[.] [...] [I]t would be unwise to strictly enforce the law preventing these gatherings until something has been devised to take their place, as actions of this kind must result in bringing about a bad feeling against the authorities, particularly as the potlatch is dying out, and there are only one or two to take place, and the custom will be over.” Lomas, W. H. (1895). GENERAL CORRESPONDENCE REGARDING STEPS TO CURTAIL POTLATCH AMONG THE INDIANS OF BRITISH COLUMBIA. RG10, Volume number: 3631, Microfilm reel number: C-10110, File number: 6244-G. Item ID number 2060800. Ottawa: Library and Archives Canada. William Henry Lomas died in 1899.

potlatch, and the internal correspondence between some Indian Agents and the Indian Department, present a more tolerant view of the practice.

The limited information presented to Parliament led to legislation that was not compatible with a broader understanding of the potlatch, and the ban (1884 – 1951) proved challenging to enforce, with large potlatches regularly taking place until the 1920s.

### Tool 3 – Narrative Economics

Stories matter. Whether they are true or not, stories can spread, become part of popular culture or “common knowledge,” and influence our decision-making. In the 21st century, scarcely a day goes by without another narrative or story “going viral” and leading to all sorts of choices being made that would not otherwise have taken place.

Narrative economics is the study of the creation, spread and impact of such stories. The concept was first popularized in economics by Robert Shiller, in a presidential address<sup>10</sup> to the American Economic Association that eventually became the basis for a best-selling book<sup>11</sup>. Paying attention to what stories were “viral” at the time the historical choices you are studying were made, may help you better understand their causes and consequences.

#### WHY IS THIS ECONOMICS?

Because stories can affect how people act and react, a popular story can affect the actions and reactions of large groups of people, and in some cases an economic analysis would be incomplete without taking this into consideration. As Dr. Shiller put it in his 2017 address, “We have to consider the possibility that sometimes the dominant reason why a recession is severe is related to the prevalence and vividness of certain stories, not the purely economic feedback or multipliers that economists love to model. The field of economics should be expanded to include serious quantitative study of changing popular narratives.”

#### HOW CAN I USE THIS?

Try to make sure that you are aware of what “everyone knew” in the time, place and context you are studying. Future economists will have to take popular memes and viral stories, accurate or otherwise, into account when studying the COVID-19 pandemic and its aftermath. You should make sure that you are aware of the equivalent narratives for your object of study. These narratives can sometimes be very simple.

#### AN EXAMPLE

A bank run is a classic example of a narrative influencing economic decision-making. At any given time, most of the money that a bank takes in as deposits is not kept in the bank, but sent out as loans, investments, and so on.

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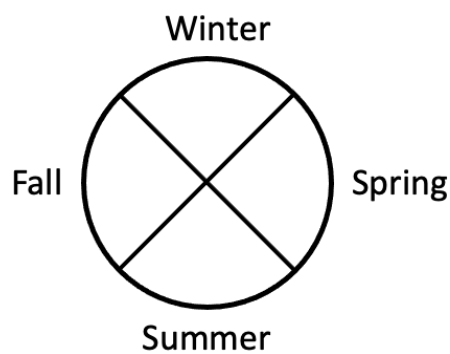
<sup>10</sup> Shiller, R. J. (2017). Narrative Economics. *American Economic Review*, 107(4), 967-1004.

<sup>11</sup> Shiller, R. J. (2020). *Narrative Economics: How Stories Go Viral and Drive Major Economic Events*. United States: Princeton University Press.

Suppose that a narrative, in the form of a rumor, goes viral, saying that Bank A is in trouble, and likely to fail in the next few weeks. Even if the bank's depositors aren't 100% sure they believe the rumor, they may decide to withdraw their savings as soon as possible, just in case. If enough depositors show up at once asking for their money, the bank won't be able to satisfy their demands immediately. They only keep so much cash on hand, and it takes time to call in outstanding loans. Seeing the bank unable to fill these demands may be seen as evidence that the rumor was true, leading more people to try to withdraw their deposits before the bank fails. In the end, the bank may end up failing because of these narrative-inspired withdrawals – even if was healthy prior to the rumor.

## Tool 4 – Cyclical vs. Linear Thinking

Two common ways of thinking about events are cyclical thinking, and linear thinking. With cyclical thinking, the main idea is “we will be here again”; it focuses on similarities: Spring leads to Summer, then Fall, then Winter, then Spring again. With linear thinking, the main idea is “we will not return to this”; it focuses on differences: 2019 leads to 2020 and then 2021, and we won't ever go back.



Cyclical Thinking



Linear Thinking

Cyclical thinkers will focus on *conservation*, since resources needed now will also be needed again later, and value the knowledge of those who have lived through past cycles, as being relevant to the present and future.

Linear thinkers will focus less on conservation and more on *exploitation* of resources, since they're not coming back to this situation, and may dismiss the knowledge and experience of their elders as being outdated and no longer relevant.

### WHY IS THIS ECONOMICS?

The difference between cyclical and linear thinking is connected to the difference between repeated and one-shot games, as studied by game theorists.

It is a well-known result of game theory that repeated games with no definite end allow for cooperative strategies to be dominant, which would not be viable in a one-shot game. Cooperative ways of life that work in a cyclical-thinking community, may be challenging to sustain for a linearly-thinking community.

## SHOW ME THE MATH!

Let's begin with a famous example, a version of the *prisoner's dilemma*.

Consider the following one-shot “game”: Two people, A and B, need to share a resource. Each of them must decide, simultaneously and independently, whether to *conserve* (C) the resource, or *exploit* (X) it. If both people conserve, each of them will earn \$200 that day. If both of them exploit, each of them will earn \$100 that day. If one of them conserves and the other one exploits, the exploiter will earn \$300, and the other person will earn \$0. This is summarized in the chart below:

		B	
		C	X
A	C	(\$200, \$200)	(\$0, \$300)
	X	(\$300, \$0)	(\$100, \$100)

Outcomes: (A,B)

No matter what (row) A chooses, B is better off picking X than choosing C. Similarly, A is better off choosing X than C, no matter what (column) B chooses. As a result, the expected outcome is that both A and B will choose X, even though they could have doubled their earnings by both choosing C. This is the *Nash Equilibrium* of the game.

If the game is repeated every day, forever, then an outcome of (C,C) is possible. All that's necessary is for both A and B to follow a simple rule: “Conserve until the other person Exploits, then choose Exploit forever.” On any given day, the incentive to “cheat” by choosing X is still there, but the rule means that after cheating once, the outcome will be (X,X) forever. This is a credible threat exactly because (X,X) is the Nash equilibrium of the one-shot game.

The choice then becomes clear. Day by day, outcomes are:

Cooperate (Conserve): \$200, \$200, \$200,...

Cheat (Exploit): \$300, \$100, \$100, \$100,...

For most reasonable tradeoffs between today and tomorrow, cooperating is preferable to cheating. Suppose that the time preference of A and B is that they feel that getting \$1 today is equivalent to getting  $$(1+r)$  tomorrow. We call  $r$  their *discount rate* between today and tomorrow.

It's well known<sup>12</sup> that the *present value* of an investment that pays \$Z every day, literally forever, starting tomorrow, is  $Z/r$ . (This is sometimes called its capitalized value). That is, if an individual feels \$1 today is worth  $\$(1+r)$  tomorrow, they should feel that getting \$Z every day forever, starting tomorrow, is worth  $\$Z/r$  today.

Using this, the present values of the outcomes in our example are:

Cooperate (Conserve):  $\$200 + \$200/r$

Cheat (Exploit):  $\$300 + \$100/r$

As long as  $r$  is 100% per day or less, cheating won't be worth it.

That's if the game is repeated literally forever, though it also works if the game has no *definite* end.

If the game *does* have a known ending, cooperation can break down.

Suppose the game is being repeated for 1,000 days. Imagine yourself taking a part of A or B on the last day. At that time, there is no penalty for cheating, because there are no more payments to be made. We're back to the one-shot game, and we will see the (X,X) outcome.

Now suppose you're in Day 999. You know, from the argument above, that on Day 1,000, the outcome will be (X,X). That means, though, that there's no penalty for cheating on Day 999. The penalty would normally be, 'get the (X,X) outcome for all remaining periods', but since that's going to happen now, anyway, you might as well cheat on Day 999. We'll see the (X,X) outcome.

On Day 998, the same logic applies, as it does on all earlier days as we go back, until finally we reach the conclusion that the most likely outcome is a constant stream of (X,X) from the first period onward.

For cooperative outcomes to be viable, an ongoing relationship with no definite end in sight can be important.

### INSIGHT FROM *ANIMAL CROSSING*

The 2020 video game *Animal Crossing: New Horizons* provides an unusually clear example of how resources are treated differently when thinking cyclically ("we'll be here again") and linearly ("we won't come back to this"). In the game, the player is the inhabitant of a small island with limited resources such as timber and stone, which are used to build houses and other amenities. Players soon learn that these resources should be used carefully and conserved: chop down too many trees in one day, and you'll have to wait a long while before they grow back, limiting your ability to build things. Since you will keep coming back to this island, day after day, indefinitely, conservation and "cooperation" with nature are important for a player to be able to achieve their goals.

In addition to the player's own island, it is possible to travel to an uncharted island, filled with resources but free from settlers. The first time the player makes a trip to an island of this type, the character that takes them there encourages the player to strip the island of as many useful resources as they can carry. Why? The

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<sup>12</sup> Using notation from engineering economics, the present (period 0) value of an annuity that pays  $A$  per period, from period 1 to  $N$ , is  $A \times (P/A, r, N)$ , where  $r$  is the per-period discount rate. Expanding,  $A \times (P/A, r, N) = A \times ((1+r)^N - 1)/(r \times (1+r)^N)$ . The limit of this as  $N$  goes to infinity is  $A/r$ .

reason given, in-game, is because the player will *not* be returning to that island, ever. Once they leave, they won't be coming back, so exploitation ("use it now, or lose it"), not conservation, is the preferred strategy.

#### AN EXAMPLE

A simple example may involve littering at a camping site. Suppose that a Canadian provincial park offers camping opportunities deep within a forest, a few hours away from the nearest source of electricity or tap water, and far from garbage collection routes. Also suppose that there are two types of campers who use these isolated sites: international visitors, who only visit this camping site once in their lives, and locals, who return to the camping site every year.

International visitors are likely to think of their camping experience in linear terms – a temporary stage of their life's journey, that they will leave behind once it's over – while locals are more likely to think of it cyclically: "this is the camp site we come to every summer, just like our parents did, and just like our children will".

Consider a situation where a camper is just about packed up and ready to leave, when a sudden gust of wind scatters the contents of a bag of plastic food wrappers across the nearby forest. How would each type of camper react?

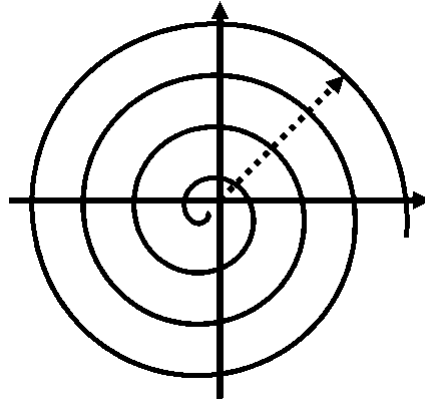
An international visitor may be thinking about the flight they have to catch in a few hours. They may spend some time picking up the most visible nearby wrappers, while avoiding going deeper into the forest to find more (after checking there's no ranger nearby observing them), even if their bag of wrappers only seems half as full as it was before the gust of wind. "Good enough" will have to be good enough – they have other places to be.

A local may find it worthwhile to find as many of the wrappers as possible, even if it means extra work – a wrapper missed is a wrapper they or their descendants may have to deal with when they return to this location. Conserving the camp site is important.

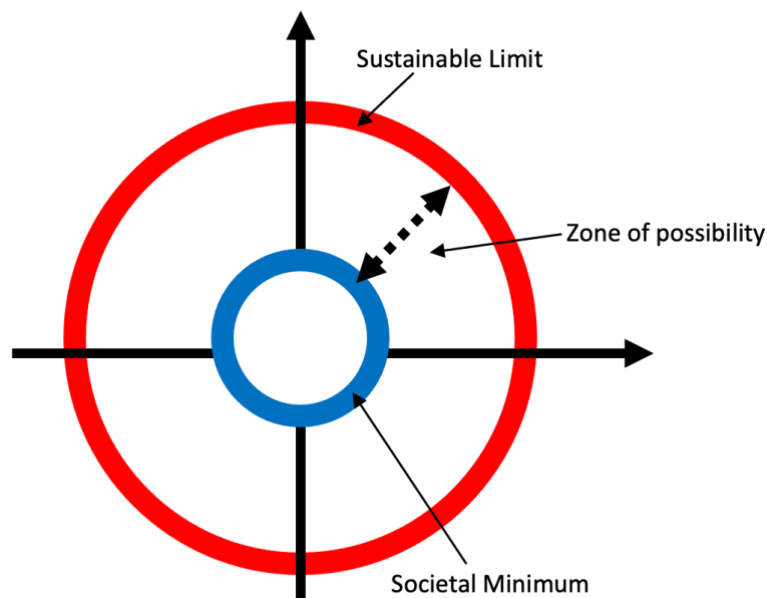
#### COMBINING BOTH WAYS OF SEEING

Cyclical "repeated game" thinking focuses on similarities and allows for cooperative outcomes focusing on conservation. Linear "one-shot game" thinking focuses on differences and often results in a mindset focused on growth: this year must be different from, and superior to, last year.

Placing the two ways of thinking together leads to a system of polar coordinates, where the angle tells us where in the cycle we are, and the distance from the origin allows us to track differences between successive cycles. The image below shows an example where across each cycle, a value of interest (e.g. per capita income) is increasing in some way.



Taking this a bit further, we can imagine a hollow donut or inner tube, where the inner wall of the donut represents the *minimum standard of living acceptable to society*, and the outer wall represents the *maximum sustainable level of resource use*. Desirable outcomes for society can be found in the gap between the walls: “know your limit, play within it,” as the Canadian lottery slogan puts it. Push too hard against the societal limit, and either society must change its perception of what is acceptable, or protests and possibly revolutions will encourage or force an upward change in living standards. Push too hard against the sustainable limit, and the world will change in a way that forces changes in resource consumption (droughts, extinctions, etc.). In this perspective, the role of government is arguably to keep society in the gap, with the exact position therein to be a subject for negotiation. This is the essence of the *donut economics* developed and popularized<sup>13</sup> by Kate Raworth.



<sup>13</sup> In Raworth, K. (2017). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. United States: Chelsea Green Publishing.



## Tool 5: Thinking in terms of relationships

We are used to thinking in terms of objects and people, but it can often be useful to change perspectives and think in terms of the relationships between them.

Writers on Indigenous thought in Canada have used the phrase “All my relations” to speak about a particular mindset that is very useful to the economic historian: seeing groups, individuals, and even rocks, plants and animals as collections of relationships, duties, purposes and responsibilities, as opposed to isolated ‘things’ or beings.

### A SIMPLE EXAMPLE: LICHEN ON A GRAVESTONE

Everything – even a rock – has an ability to have a relationship with everything else. Consider a gravestone with lichen growing on it.

The gravestone has a relationship with the people who put it there: it reminds them of past members of their group, and they in turn may visit the gravestone at certain times of year, send people to maintain or clean the stone, etc.

The lichen has a relationship with the stone, with the local ecosystem, and with the people who put the gravestone there: it breaks down the stone, allowing other things to grow, but in doing so it also breaks down the “memory” function of the gravestone by erasing its inscriptions.

Considering the gravestone not as an object, but as a *nexus*, or collection and intersection, *of relationships*, can be useful when deciding, for example, whether or not a town council should allocate funding to gravestone repair and maintenance, and what form this should take to minimize disruptions to the local ecosystem.

### HOW CAN I USE THIS TO UNDERSTAND HISTORY?

One of the most frequent difficulties economist historians run into when studying the past is the lack of tidy, structured data sets. We may only have a few observations, perhaps biased or censored in ways we are unaware of, to work with.

Thinking in terms of relations can help us deal with this.

Suppose you have a dozen photographs, each taken a day apart, of a ball on a field. The ball appears to be in the same place in every photograph. How would you go about establishing whether it was likely that the ball moved in between pictures, at least to within a reasonable doubt?

A physicist would draw a force diagram. Even though they were only interested in the ball’s position, they would have to understand the relationship of the ball to everything else around it, to be able to say with confidence that it stayed in the same place. You’d have to consider gravitation, normal forces, friction, etc.

Now suppose the photographs are of a population of rabbits, taken a decade apart. Although the individuals change, the size of the population stays constant. How could you establish whether it was likely that the population was constant in between photographs?

A biologist would have to understand not just the rabbits, but the role of the rabbit in the ecosystem, and in particular the relationships between the rabbits, predators, plant populations, climate, parasites and more.

Similarly, students of economic history may find it useful to think in terms of relationships – in terms of an eco(nomic)system – when trying to understand the past. While a patchwork of biased and censored sources may not be enough to create a complete dataset compatible with standard econometrics, we may be able to use it to tease out the network of *relationships* between the players in our history. Structuring our thoughts in this way can also alert us to where our blind spots are, by pointing out places where a relationship should exist, but for which we have no information. These are the missing strands in our web of relationships.

#### RELATIONSHIPS ARE CONTEXT-SPECIFIC

Thinking *relationally* (in terms of relationships) is challenging. Writers on Indigenous thought in what is now Canada often emphasize that this knowledge is closely tied to the land. Just because you know all the relevant relationships for the understanding of rabbit populations on Vancouver Island, does not mean your knowledge will transfer to rabbit populations in England’s West Midlands. That part of academic economics that most explicitly tries to think in terms of relationships – general equilibrium theory – is notoriously difficult both to understand and work in.

Nevertheless, if you can train yourself to put together “force diagrams” or eco(nomic)system network diagrams for what you are studying, you may find yourself able to obtain results and insights that were invisible or intractable before.

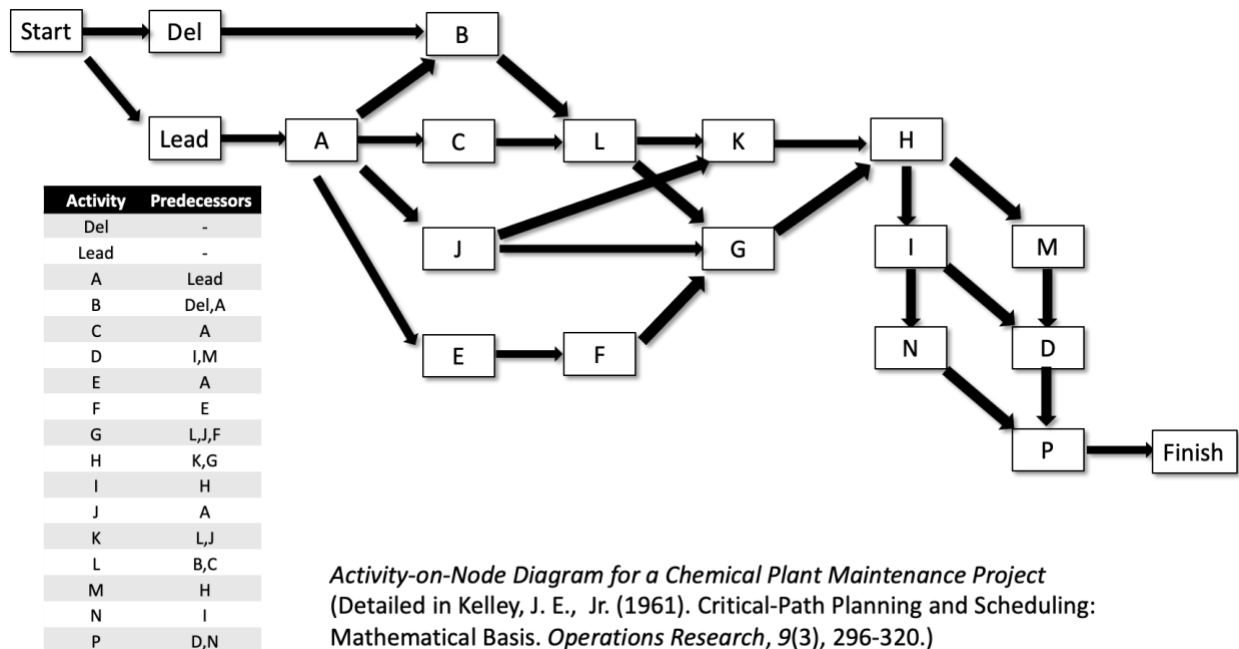
#### HOW IS THIS ECONOMICS?

It’s more closely related to a tool used in project management – *critical path theory*. Projects can be complicated, and involve many different steps, stages and responsibilities that are dependent upon each other in complicated ways.

Without explicitly mapping out these dependencies, it can be challenging to find such basic information as how long a project can be expected to take, what tasks must be completed on time for the project to remain on schedule, and which have a bit of “slack,” or where a manager should focus efforts if there is a need to finish the project earlier than expected.

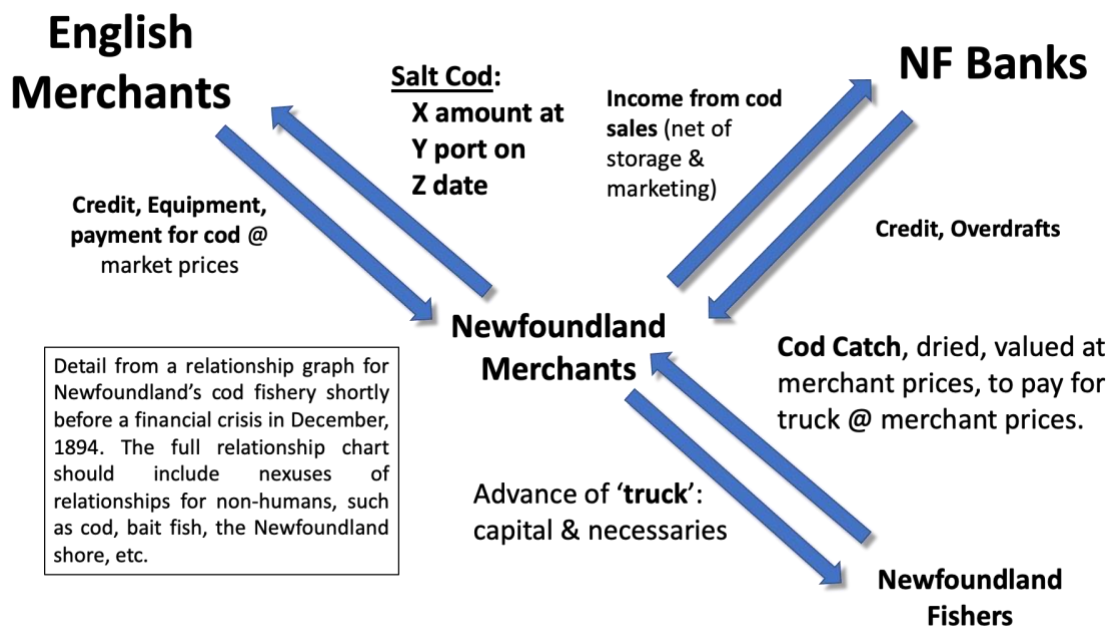
By drawing a network diagram that makes the relationships and dependencies between project steps explicit, these values of interest, and more, can be determined. In *critical path management*, the relationships of interest are typically those of *precedence* and *succession*, answering the question, which predecessor tasks must be completed before this one can begin?

An example of this sort of diagram is shown below:



### A SAMPLE DIAGRAM FROM A COURSE IN ECONOMIC HISTORY

Below is a detail from a relationship diagram that I use in an economic history course to help students understand the causes and consequences of a financial crisis in Newfoundland in the 1890s. The focus, for this particular question, was on human relationships, but a richer view of the situation should also include relationships for non-humans, such as cod, bait fish, the Newfoundland shore, the islands of St. Pierre & Miquelon, and so on.



# PRICES, QUANTITIES, CHOICE AND VALUE

From thinking about thinking, let's talk about numbers – specifically, prices and quantities. Economics has a number of important tools for understanding these, the relationships between them, and the choices people make when confronted with these numbers.

## Tool 6 – Opportunity Cost

When you spend an hour, a dollar, or another resource for one purpose, you sacrifice the opportunity of using the same resource for something else.

If you buy a burger for \$10, you sacrifice the opportunity of using those \$10 to buy fries, or help pay rent. If you spend an hour studying in the library, you can't spend that same hour at soccer practice.

These sacrificed opportunities, called *opportunity cost*, are considered by economists to be the true cost of doing something. What you give up for something isn't just what you spend on it in terms of time and money, but also every other possible world where you did something *else* with your time, money, and other resources. To choose wisely, we must make sure that our final selection is at least as good as the next best thing we could have done with those resources.

If you build a smoke-belching factory in a small town, the cost of that factory isn't just the amount paid for construction, salaries, etc., but also the sacrifice of a world where there is no factory there, and the local air is cleaner. Similarly, if the town council decides to disallow the factory's construction, what's being given up isn't just dirty air, but also the different number and types of jobs that would have been available nearby, had the factory been built.

The reader might notice that while the town council has an incentive to consider the job prospects of its constituents, historically factories have been notorious for *not* considering the costs to society of their pollution. An economist would say that as far as factory owners are concerned, pollution is often an *externality*.

The existence of an externality should be a call to action: it means that there is something, relevant to the stakeholders affected by a decision, that is not being considered by those empowered to make the decision. Fines for polluting, carbon prices and tax breaks for investing in clean energy are all ways in which governments have tried to *internalize* the externality of pollution – to turn it into something that businesses *do* care about.

## HOW IS THIS ECONOMICS?

Arguably, opportunity cost is the foundation of all economic thought. It tells us that when choosing to do something, we must consider the sacrifice we are making in terms of what we could have done, instead.

## HOW CAN I USE THIS?

When trying to understand why someone chose to do – or not do – something, it's worthwhile to consider what the next-best alternatives were.

## AN EXAMPLE

Immigrants to Canada are offered some measure of English language training, often for “free,” in the sense of there being no tuition fees.<sup>14</sup> There is, however, an important opportunity cost.

Time spent learning English in a class is time *not* spent working or personally caring for a child. The opportunity cost of learning English in a “free” class is at least as great as the benefits from the work or childcare that could have been done with that time.

In light of this, prior to 1992 the Canadian government offered a small subsidy to make up for part of the foregone wages, and a limited amount of daycare support. This reduced the opportunity cost of the “free” classes by lowering the amount of childcare and wages sacrificed.

In 1992, the Canadian government changed its English training program for immigrants. Daycare and wage subsidies were eliminated, and the program was restricted to the first year after immigration to Canada. A *lot* must be done by immigrant families in that first year – time is at a premium, and the opportunity cost of an hour is very high.

As a result of these changes, the opportunity cost of a “free” English class was much higher than before. Some immigrants who in the earlier regime would have taken the class, may now decide to pay for private English classes a few years after their arrival in Canada, once they are more established. Not because there’s anything wrong with the quality of the free class, but because a 100% rebate on tuition isn’t enough to give up those valuable first year hours, even for someone who knows they want to take English classes eventually.

## Tool 7 – Money is a Catalyst

In chemistry, a catalyst is a substance whose presence facilitates reactions that would otherwise not have taken place, and is not itself used up in the reaction.

Among other functions, money is a catalyst. It allows exchanges that would otherwise not have taken place, to happen, without itself being used up (much). Money makes things happen.

For example, thanks to money, a shop manager can trade their work for a meal from a restaurant, even if the restaurant has no need of the services of a manager.

The more money you have, the greater your potential ability to make things happen. This can translate to power and influence.

### SHOW ME THE MATH

The Quantity Theory of Money can be thought of as a mathematical expression of the fact that money is used to make things happen – specifically, transactions. It is summarized by the identity  $MV = PT$ , where M is the amount of money (money supply), V is the velocity of money (how often money changes hands), P is the average price level (when this goes up, that’s inflation) and T is the number of transactions.

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<sup>14</sup> This example is based on information from Man, G. (2004). Gender, work and migration: Deskilling Chinese immigrant women in Canada. *Women’s Studies International Forum*, 27(2), 135 – 148.

This is an identity, not a result, and is true by definition. This makes it very useful, but the biggest skeleton in the closet is arguably the heavy lifting being done by 'V', the determinants of which are sometimes poorly understood. As an economic historian, if the story you're investigating has a strong money or price component to it, it may be worth your while to investigate how – and how often – money changed hands in your particular context. At the very least, you will want to know whether it is a reasonable assumption to hold V constant during the period under study.

Back to our identity,  $MV = PT$ .

The right-hand side of the equation is the value of everything sold. If there are 150 transactions, at \$2 each,<sup>15</sup> then a total of  $150 \times \$2 = \$300$  has been spent.

The left-hand side of the equation is equal to how much money circulated during the period under study. If the money supply is equal to five dollars (maybe in loonies), and each dollar changed hands, on average, 60 times, then a total of \$300 ( $\$5 \times 60$  times/dollar) must have circulated.

It must be everywhere and always true that the total value of money circulated, MV, is equal to the total value of money spent, PT.

#### AN HISTORICAL EXAMPLE

The mid 19th century saw several gold rushes around the world, at a time when many countries were on a gold standard of currency. The massive amounts of gold extracted from the mines of California, Australia and British Columbia were widely expected to lead to inflation (a rise in M was expected to lead to a rise in P).

At least one contemporary observer said that this had *not* taken place to the extent foreseen, and the reason given was as follows:

It was thought that “an enormous depreciation of the precious metals and a corresponding enhancement of the prices of all the objects they represented, must have been the result of the mighty influx of the precious metals which has taken place within the last decade. No such revolution has occurred. In some commodities prices have risen; in others they have fallen, and in a few they have undergone little or no change. [...] How, it may be asked, is this unlooked-for result to be accounted for? It seems to me that the new gold and silver have simply acted as a stimulant to industry, creating, as it were, a new market, and being themselves absorbed in representing the new commodities to which they have given rise.”<sup>16</sup>

In other words, the *rush* part (T) of the gold rush partially countered the effects of the *gold* part (M). The gold rushes created new transactions, and even new towns and colonies, such as Victoria and British Columbia. Since T went up at the same time as M, and  $MV = PT$ , if we assume V is constant, it makes sense that the price level P rose less than proportionately with M.

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<sup>15</sup> If the idea of each transaction costing the same amount of money bothers you, then you may prefer the version called “Fisher’s equation of exchange,” where PT is replaced with  $\sum_i p_i q_i$  – the sum of the costs of all transactions, where  $p_i$  and  $q_i$  are the price and quantity of transaction i.

<sup>16</sup> Craufurd, J. (1860, January 28). ON THE EFFECTS OF THE RECENT GOLD DISCOVERIES. *Sydney Morning Herald*, p. 8.

### ANOTHER GOLD RUSH EXAMPLE

Even under a gold standard, gold nuggets and gold dust are not legal currency. The metal must first be assayed to discover its quality, and then minted into coin. British Columbia, during the Fraser River and Cariboo gold rushes (1858 – 1864) was in the odd position of having massive amounts of gold, but a shortage of currency. The local government did not have a mint (a half-hearted attempt to set one up was abandoned by 1864).

Money is so useful a catalyst for trade, that B.C. merchants *imported* coin from the United States and other places, paying a few percent of the value for the privilege. The gold miners themselves, when coming down to Victoria from the interior of B.C. with their season's diggings, would only stay until the steamships headed for California arrived. They would then board the ships, with their gold, and go to San Francisco, where the U.S. government had established a branch mint. There they would turn their gold into currency, and spend a good deal of it – to the chagrin of Victoria's business community, who repeatedly advocated for a mint of their own to keep this gold from leaving the colony.

### MONEY IS ONLY HALF THE STORY

With rare exceptions, money is valued for what it can *do* (catalyze transactions, etc.). Cases where money seems to be valued for its own sake, tend to be situations where a stock of money buys something intangible, such as status, influence, or power, or where it is valued as part of a collection (and even collectors don't usually want 100 copies of the same coin or note).

This leads to two points:

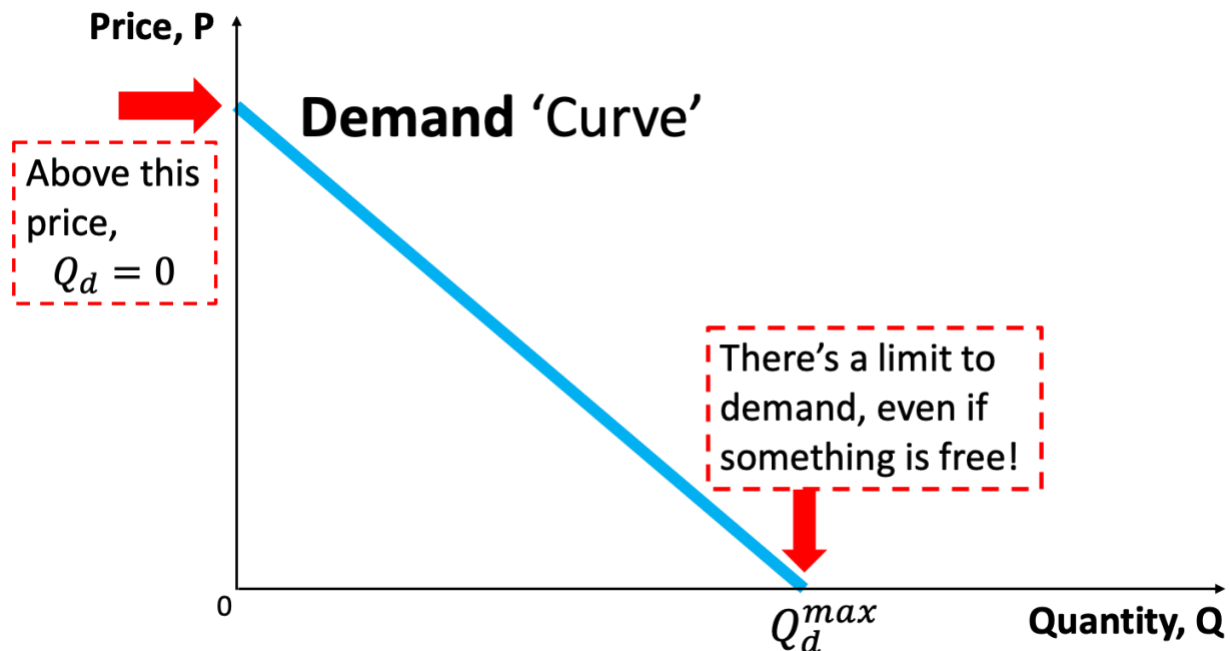
First, when studying money in an historical context, we need to be aware of what that money can *buy*. Price indices that trace the cost of a typical basket of goods, such as the CPI, can be useful for this purpose. Where no such indices exist ready-made, a good first step can be to look up the cost of a staple good such as flour or rice. It is also helpful to be aware of the type of goods available for sale in the place and period under study. Was industrial machinery available for purchase? Was there a market for fresh goods and vegetables? Could money be spent on securities such as Treasury Bills?

Secondly, if your historical insights are all in money terms (e.g. "average income went up by \$5,000 a year"), you're only telling half the story. Money is desirable because it makes things happen, and to take the story to its conclusion, we should follow up (if possible) and find out how, why, and by whom the money was spent. Though the dollar value is the same, a situation where one person spends \$10,000,000 on a fourth mansion is very different than a situation where 1,000,000 people each spend \$10 on essential food.

## Tool 8 – Supply and Demand

The concepts of supply and demand can be used to understand why prices and traded quantities of a good or service change, and in what direction. The essential points are as follows:

In general, the cheaper something is, the more of it people will be willing and able to buy. This is the “Law of Demand,” and the source of the demand curve of economics. This “curve” is often drawn as a downward-sloping straight line on a graph with price and quantity on the axes. The price intercept represents the highest price anyone is willing and able to pay, and the quantity intercept represents the highest quantity demanded of the good, even if it’s free. (There’s only so much room on the earth for lawn flamingos.)



In the graph above,  $Q_d$  stands for “Quantity demanded”.

The Law of Demand can be explained via opportunity cost. As the price of a given good goes up, more and more other things fall under the category of “things I could have done with my money instead”. Eventually, our consumer will decide they’d rather spend the money on something else, instead.<sup>17</sup> The more things a consumer sees as substitutes for a good, the flatter the demand curve is: raise price a little bit and they’ll go to the next best option.

Similarly, as the price offered for a good goes up, more and more businesses will be willing to supply it (or to supply more of it). When mugs sell for \$1, it may not be worthwhile to retool your plate factory to make mugs for sale. If mugs sell for \$1

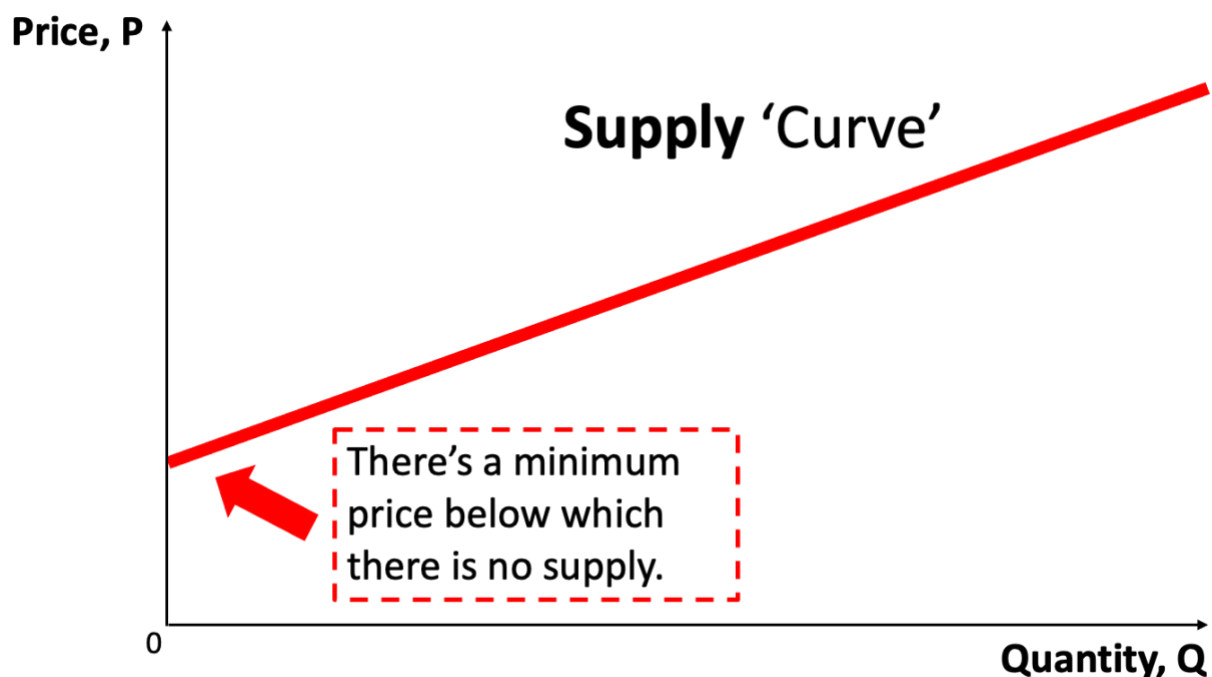
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<sup>17</sup> In the case of goods that are absolutely needed, in fixed quantities, to maintain life – such as certain medications – the consumer will have to pay the going price for the good, or die. We’ll look at this more closely in the next tool.



billion each, then not only would it make sense to retool the factory, but we may see people in unrelated fields of business enter the mug-making industry. At very low prices, only the lowest-cost sellers can make a profit, and even they may have better things to do. The quantity supplied is low. As prices rise, higher-cost sellers can offer the good, and sellers who were able to supply the good at lower prices may expand production. Quantity supplied rises.

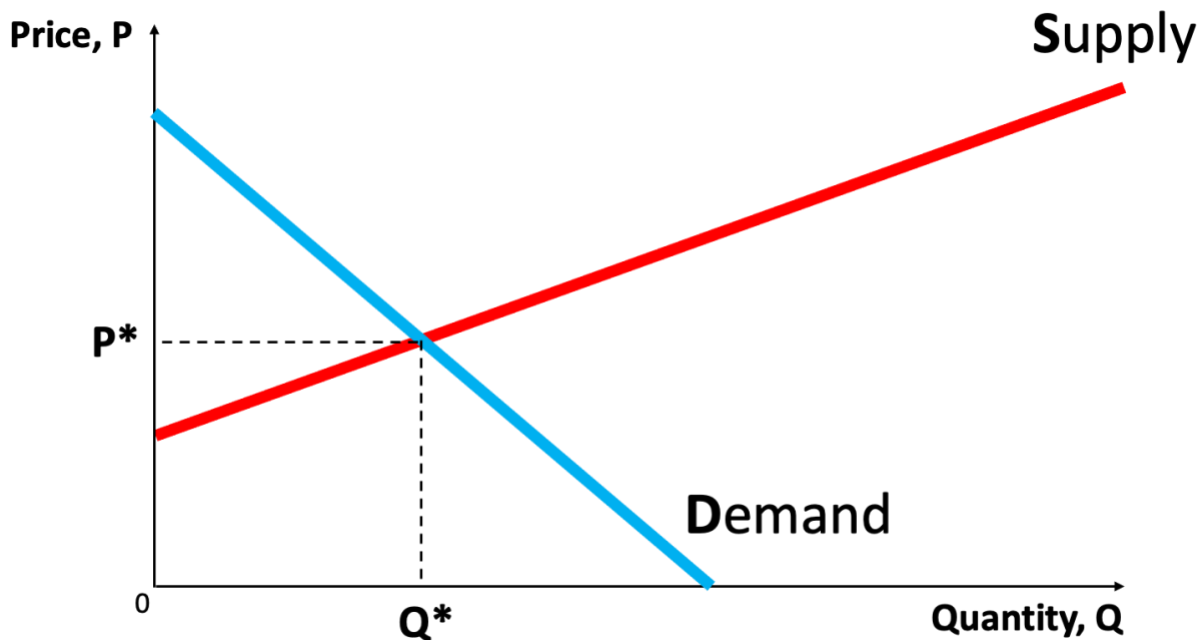
While there's no "Law of Supply", in some contexts it's an okay approximation to draw a "supply curve" as an upward-sloping straight line on a set of axes representing price and quantity. This is what's commonly done in introductory economics textbooks. The price intercept represents the lowest price at which any seller is willing to supply a unit of the good (if nothing else, there's a minimum cost of production.)



### EQUILIBRIUM

If we put our curves together on the same diagram, it's clear that there's a point where the supply and demand curves cross: at that price, the quantity consumers are willing and able to buy is the same as the quantity that sellers are willing and able to supply. These are the *equilibrium* price and quantity,  $P^*$  and  $Q^*$ , so-called because at that point the forces of supply and demand balance.

If we start at a price other than the equilibrium price, the market price of the good will move toward equilibrium unless there is something to stop it from doing so. If the price  $P > P^*$ , more goods are supplied than people want to buy. There's a *surplus* of unsold goods, and we expect to see prices fall. If  $P < P^*$ , we have a *shortage*: there's a greater demand for goods than the number supplied. Competition between buyers will push the price up.



If a government (say) tries to set the price of a good at a level other than  $P^*$ , the forces mentioned above don't go away, and we will usually see black markets and smuggling.

#### AN EXAMPLE FROM THE 1980s

In the 1980s, Brazil was going through a period of high inflation. Controlling inflation was a priority for a newly elected government, and they decided to do that by passing a law that said the prices of certain basic goods were to be frozen in place (“preços congelados”). What was the result?

In places where prices were checked officially, such as supermarkets, there were bare shelves – few sellers were willing to supply supermarkets at the official prices, and those few goods that *did* arrive were quickly snapped up by shoppers as the bargains they were.

For everything else, consumers had to turn to unofficial black markets, sometimes taking the form of vans parked outside the unstocked supermarkets, selling goods at illegally high prices.

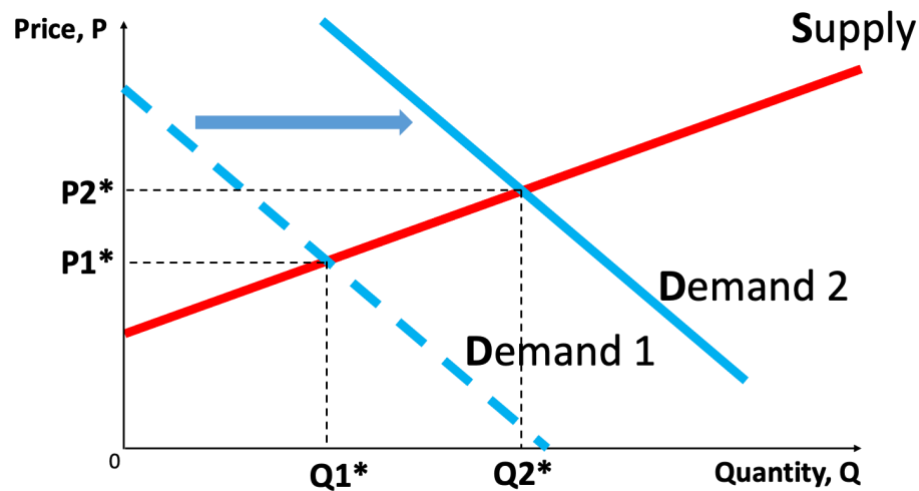
This is not to say that price controls never work – they sometimes do – but they need to be handled very carefully, and with the understanding that you will almost certainly create a surplus or shortage by using them.

#### SHIFTS IN SUPPLY AND DEMAND

Supply and demand diagrams are drawn on the assumption that everything except for  $P$  and  $Q$  is constant. There are certain things that can shift the supply and demand curves left/right or up/down.

If consumers suddenly have more money, e.g. due to winning the lottery, then whatever the price level happens to be, they will usually demand more goods than they did before. This can be represented by a rightward shift in the demand curve.

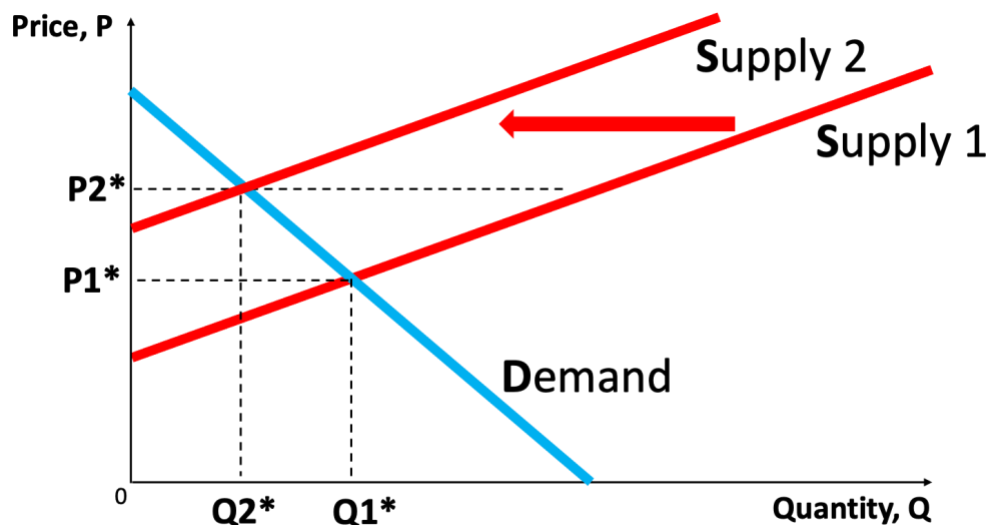
This rightward shift in the demand curve will move the equilibrium point up and to the right, and we'll see a higher  $P^*$  and a higher  $Q^*$ .



If the opposite should be true, and consumers all of a sudden have less money than before (due to a bank failure taking their savings, etc.) the process goes in reverse, and the equilibrium price and quantity fall.

If sellers face higher costs of production, this may make them less willing to supply goods, at any given price. This can be represented by the supply curve moving up and to the left: if you want sellers to sell as much as they did before, you're going to have to compensate them for the additional cost. The result is that the equilibrium moves to one with a higher  $P^*$  and lower  $Q^*$ .

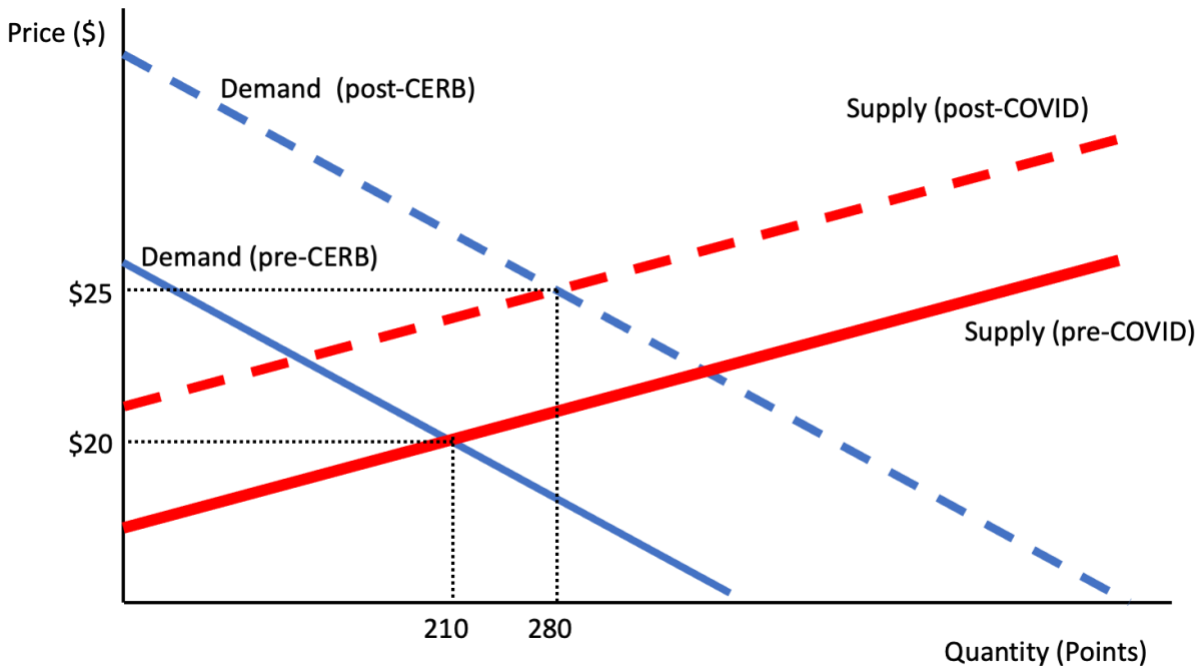
The process may happen in reverse (supply shifts right) in the case of a fall in costs, though in a situation with few firms and limited competition, this need not be the case. Prices tend to be “sticky downward” in some such contexts, seldom going down again after they've once gone up.



### AN EXAMPLE FROM THE COVID-19 PANDEMIC

Vancouver, B.C., has had a vibrant market for illegal drugs almost since its creation in the 1880s. During the COVID-19 pandemic, this market was disrupted in two ways: first, people who use drugs had more income thanks to supplementary income payments (CERB) by the government. Second, due to supply-chain issues, the wholesale cost of illegal drugs went up.<sup>18</sup>

In terms of supply and demand, demand shifted to the right due to increased income, and supply shifted to the left due to higher wholesale costs. The shift in demand raised equilibrium prices and quantities, and the shift in supply raised prices and lowered quantities. Both forces tended to raise the price of illegal drugs, and we did see the retail price of drugs go up by more than the wholesale price (25% vs 13%). The impact on the equilibrium quantity is theoretically ambiguous, since the shift in demand tended to raise the equilibrium quantity, while the shift in supply tended to lower it. In practice, the demand effect dominated, and the quantity of drugs sold went up.



<sup>18</sup> For more details, see Mathew, N., Wong, J. S. H. & Krausz, M. (2021). An Inside Look at B.C.'s Illicit Drug Market During the COVID-19 Pandemic. *BC Medical Journal*, 63(1), 9-13.

## Tool 9 – Elasticity and Incidence

Suppose that the government charges a tax of \$10 on each unit of a good, or that the good's cost of production goes up by \$10 per unit. Who ends up paying most of the extra cost? Some of it will be passed on to the consumer in the form of higher prices, the rest will be paid by the seller. What determines how much of the extra cost is paid by each group?

In general, *the group most credibly able to say, "I don't have to be here," will shoulder the lowest burden from a tax or cost increase.*

If the tax is on insulin, which certain diabetics need to stay alive, consumers of insulin will pay most or all of the tax. They need to be "there," in that market, to stay alive. Pharmaceutical companies have more options – if insulin no longer looks profitable, they can move on to other products.

If the tax is on blueberry jam, producers of blueberry jam will probably end up absorbing most of the cost. If they tried to pass through<sup>19</sup> most or all of the tax to consumers, they could always buy raspberry jam or grape jelly instead. In this case, it's consumers who have the strongest case for "I don't have to be here," as there are plenty of substitutes.

### SHOW ME THE MATH

Economists have a measure of "I don't have to be here"-ness, called *elasticity*. Price elasticity of demand measures by what % quantity demanded changes when the price of a good goes up by 1%.<sup>20</sup> Price elasticity of supply measures by what % quantity supplied changes when the price of a good goes up by 1%.

When a consumer has little choice in what to buy, and must buy the same quantity of the good even if the price is very high (e.g. insulin), we say that demand is *inelastic* – not very stretchy in response to price increases (price elasticity of demand < 1). The more inelastic the demand, the closer to a vertical line the demand curve looks like.

If a consumer doesn't have to be there, say, because there are many other valuable things they could be doing with their money, then a small increase in price may see the company in question lose a big chunk of their sales. We say that demand is *elastic* – very stretchy in response to price changes (price elasticity of demand > 1). The more elastic the demand, the closer to a horizontal line the demand curve looks like.

Similar descriptions can be made of inelastic and elastic supply.

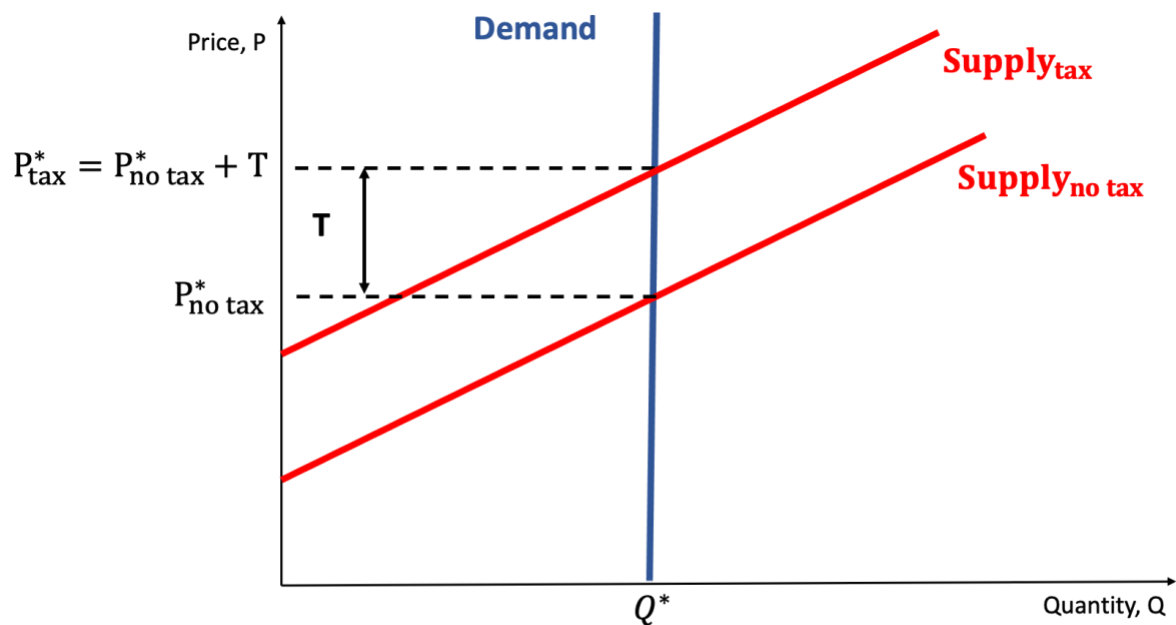
In general, whichever group's 'curve' looks closest to a vertical line will end up paying the *most*, and whichever group's 'curve' looks closest to a horizontal line will end up paying the *least*.

In the diagram below, T is the amount of the per-unit tax, but this result generalizes to taxes which are a % of the value, such as sales taxes.

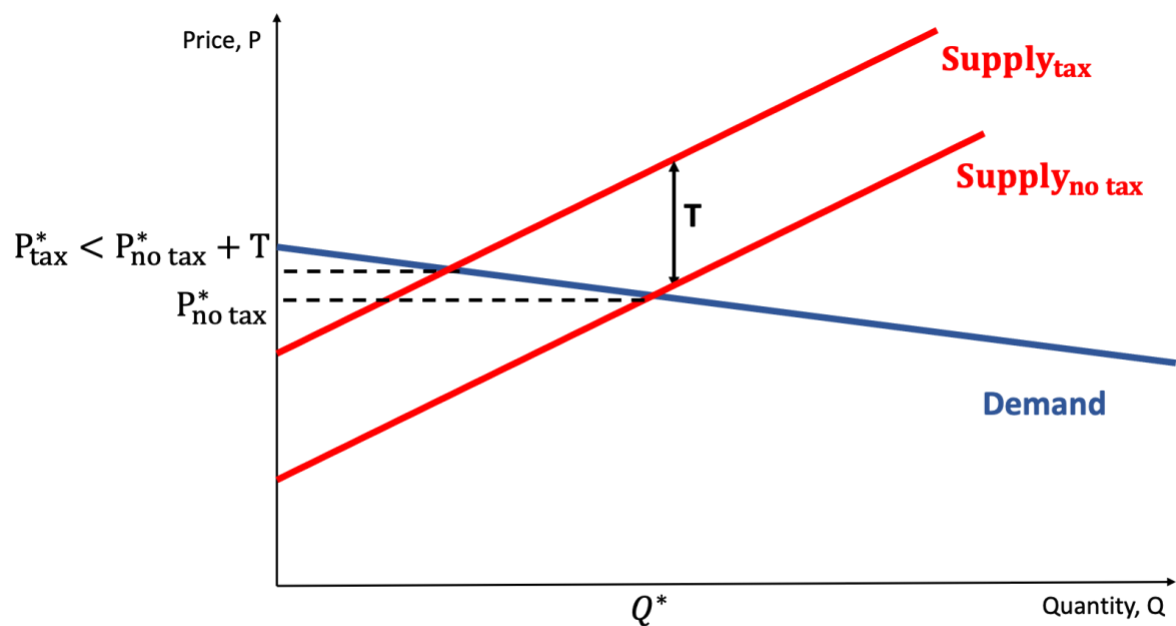
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<sup>19</sup> It doesn't matter whether the tax is paid by consumers at the till, or producers at the factory gate – the result is the same. This was one of the first results of mathematical economics, and the one with popularized the use of supply and demand diagrams.

<sup>20</sup> Price elasticity of demand = % change in quantity demanded / % change in price.



**If Demand is 'Stuck', buyers' burden = 100% of the tax**



**If Demand is elastic, buyers' burden << 100% of the tax**

The exact relationship is that the buyer's burden is  $\frac{\eta}{\eta - \varepsilon}$ , where  $\eta$  is the price elasticity of supply, and  $\varepsilon$  is the price elasticity of demand, which is always negative due to the Law of Demand – a 1% increase in price leads to a fall in quantity demanded. Proofs of this relationship are most easily done with calculus.

## I REALLY WANT TO SEE ALL THE MATH

What follows<sup>21</sup> is probably overkill for most readers.

Before we begin, it'll help to write our elasticities in terms of calculus.

Suppose there's a very small change in price paid by buyers,  $dP_D$ , leading to a small change in quantity demanded,  $dQ_D$ .

For very small changes, it's approximately true that the % change in quantity =  $dQ/Q$ , where  $Q$  is the original quantity. Similarly, for very small changes, the % change in price is approximately  $dP/P$ .

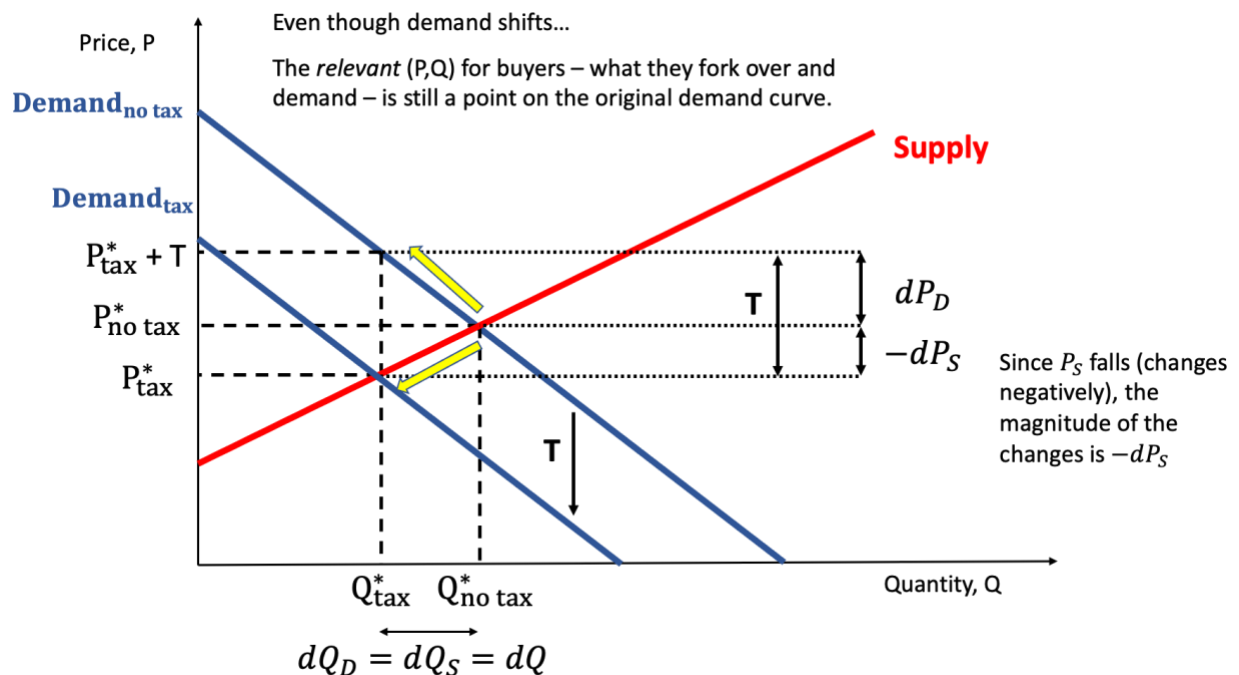
Price elasticity of demand = % change in quantity demanded / % change in price = % change in  $Q$  / % change in  $P = \varepsilon = \frac{dQ}{Q} \frac{P}{dP} = \frac{dQ}{dP} \frac{P}{Q}$ .

Following a similar train of thought, price elasticity of supply is  $\eta = \frac{dQ_S(P)}{dP_S} \frac{P_S}{Q_S}$ , where the 'S' subscript stands for 'supply'. Normally, we wouldn't bother putting the S or D on the P and Q, but in this case it'll save confusion later on.

Without loss of generality, suppose that there is a tax of \$T per unit of a good, paid by consumers at the till. (The result is the same if we have sellers physically pay the tax, but this makes the math a bit shorter.)

The after-tax demand curve is the pre-tax demand curve shifted up by T: if you want consumers to buy the same amount they bought before the tax, you're going to have to compensate them for the tax.

The situation, then, is as below:



Note that the total tax,  $T = dP_D - dP_S$ .

<sup>21</sup> This discussion is taken from a 100-level course I teach to engineering students.

After the tax, consumers pay  $P^* \text{tax} + T$ . The *before-tax* price of the good,  $P^*$ , has gone down, but the after-tax price,  $P^* + T$ , which is what consumers must fork over at the till, has gone up.

The burden of the tax on buyers is equal to the increase in price, compared to what they used to pay before the tax. In units of % of the tax, this is  $\frac{dP_D}{T}$ .

Meanwhile, suppliers receive a lower price for their goods, after the tax.

The burden of the tax on sellers is  $-\frac{dP_S}{T}$ .

$$\frac{\text{Buyers' Burden}}{\text{Sellers' Burden}} = -\frac{dP_D}{dP_S} = -\frac{\eta}{\varepsilon}$$

To see this more clearly, let's start from the pre-tax equilibrium:

$$-\frac{\eta}{\varepsilon} = -\frac{dQ}{dP_S} \frac{P^*}{Q^*} \times \frac{dP_D}{dQ} \frac{Q^*}{P^*} = -\frac{dP_D}{dP_S}$$

The  $dQ$ s cancel out because the change in  $Q$  is the same for supply and demand. Now let's write the buyer's burden in terms of elasticities:

We want  $\frac{dP_D}{T}$ . We know  $T = dP_D - dP_S$  and  $\frac{dP_D}{dP_S} = \frac{\eta}{\varepsilon}$

$$\rightarrow T = \left(\frac{\eta}{\varepsilon} - 1\right) dP_S, \text{ so } dP_S = \frac{T}{\left(\frac{\eta}{\varepsilon} - 1\right)}$$

$$\rightarrow T = dP_D - \frac{T}{\left(\frac{\eta}{\varepsilon} - 1\right)}$$

$$\rightarrow \text{Buyers' burden} = \frac{dP_D}{T} = 1 + \frac{1}{\left(\frac{\eta}{\varepsilon} - 1\right)} = \frac{\eta}{\eta - \varepsilon}$$

$$\rightarrow \text{Sellers' burden} = -\frac{\varepsilon}{\eta - \varepsilon}$$

If you've followed along so far, this may make intuitive sense. The burden on buyers is the seller's share of the total magnitude of elasticities. If sellers are perfectly inelastic ( $\eta = 0$ ), they absorb all the tax. If buyers and sellers are equally elastic, they share the burden equally. If buyers are more elastic than sellers, they bear less than half the burden. If buyers are less elastic than sellers, they bear more than half the burden. If buyers are totally inelastic ( $\varepsilon=0$ ), they bear 100% of the burden.

#### AN EXAMPLE

In the early 1900s, the Canadian government charged a *head tax* on Chinese immigrants. It was intended to reduce Chinese immigration by making it more costly. Eventually, the head tax was set at the prohibitively high rate of \$500.

In many occupations, Chinese people in Canada had little choice but to pay nearly the full tax themselves, leave Canada, or never enter Canada in the first place. They lacked the ability to pass on the tax to their employers. This is the tax working as designed.

The exception was the occupation of domestic servant. In early British Columbia, it was considered important for wealthier families to have at least one servant. Domestic service was considered "women's work," and there were few (if any)



white men willing to work in that trade. White women could do so, but it was unpopular as a calling, and there was a shortage of white women workers in early B.C. Chinese men did not share the same cultural scruples, and they quickly became valued for their willingness to take on jobs “that women could not be obtained to fill.”<sup>22</sup>

Chinese immigrants working as servants had other options available, in the form of other jobs or returning to China. While they didn’t have a wealth of attractive options, they had enough that if push came to shove, they “didn’t need to be there”, working as a servant. British Columbia’s better-off families felt they absolutely must have a servant, and since white women servants weren’t available,<sup>23</sup> they would need a Chinese servant – in economic terms, they had *inelastic demand* for this type of servant.

Our discussion above predicts that in this situation, the employer would bear most of the burden of the head tax – and that’s exactly what we see, in the form of complaints that the wages of Chinese servants rose dramatically in response to the tax, and repeated appeals by the affected families to get rid of the head tax.<sup>24</sup>

One petition, handed around Vancouver in 1903, read as follows:

“And whereas since the bill increasing the said tax to \$500 has been passed by the House of Commons, the Chinese household servants are already demanding much higher wages than formerly, those who have received \$30, \$35 and \$40 per month in the past are now asking for an increase of about 30 per cent., and as no white servants can be obtained to take their places the result of this must inevitably be what it has been in San Francisco and other Coast cities in the United States, viz., that the large majority of people who cannot afford to pay these exorbitant wages will be compelled to eat in hotels and restaurants, and the home life largely broken up.”<sup>25</sup>

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<sup>22</sup> “As a class Chinese were useful, truthful and honest [...] and filled domestic places that women could not be obtained to fill.” Legislative Council. (1871, January 27). *The British Colonist*, p. 3.

<sup>23</sup> There’s evidence that some households preferred Chinese servants. Several attempts to import white women servants failed, partly because some families didn’t see Chinese servants and other domestic servants as close substitutes.

<sup>24</sup> This didn’t happen – instead, the Canadian government doubled down and virtually banned Chinese immigration from 1923 to 1947.

<sup>25</sup> From Angus, F. (1903, May 19). CHINESE SERVANTS. *Victoria Daily Times*, p. 4. Written by Forrest Angus (1826 – 1919).

## HOW MUCH IS ENOUGH?

In this section we'll look at how we decide what something is worth, why jealousy can be stronger than envy, and how to budget a resource across competing uses.

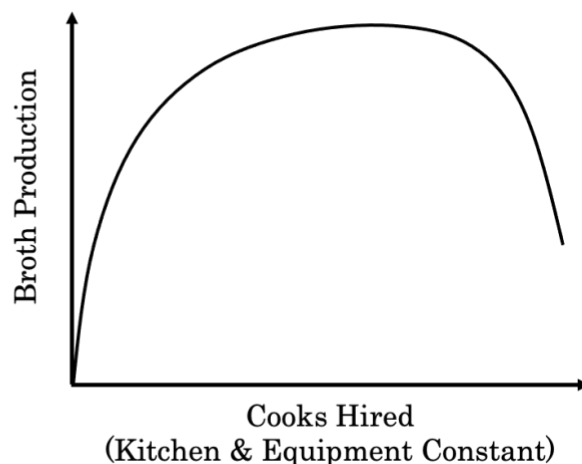
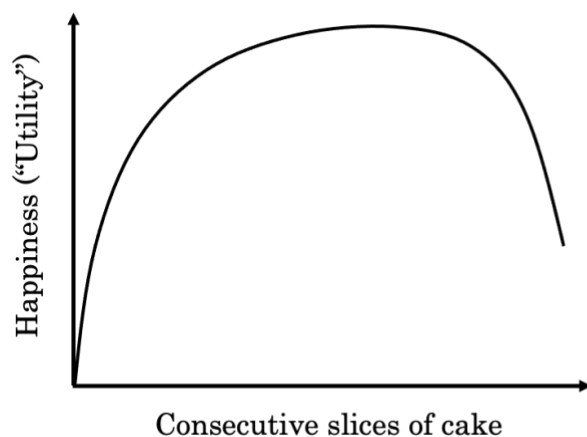
### Tool 10 – Diminishing Returns

It's often true that *the more you already have of something, the less each additional unit of it brings to the table*. Economists call this “diminishing returns”.

#### COOKS AND CAKES

The first slice you eat of your favorite cake probably makes you very happy. The third slice in a row, less so. By the time you've had ten slices in a row, the next one may even make you feel sick, instead of making you happy.

If you manage a commercial broth kitchen, but start out with no cooks, the first cook you hire will increase production by a lot. The second cook adds slightly less to production. Keeping everything else constant, including kitchen size and equipment, by the time you hire the tenth cook in a row, they may even *reduce* broth production due to overcrowding: too many cooks spoil the broth.



## Tool 11 – Knight’s Law of Choice

In 1921, economist Frank Knight wrote a *Law of Choice* that applies to situations where there are diminishing returns:

*To avoid regret, when you’re done budgeting the bang for the buck should be the same across all activities.*

### THE ORIGINAL PHRASING

From Knight’s *Risk, Uncertainty and Profit* (1921);

*“In the utilization of limited resources in competing fields of employment, which is the form of all rational activity in conduct, we tend to apportion our resources among the alternative uses that are open in such a way that equal amounts of resource yield equivalent returns in all the fields.”*

Translation: We have limited resources (time, money, mental health, etc.) and *lots* of different things we could be doing with them. In budgeting, we tend to go for the highest ‘bang for the buck’ (utility per resource cost), and in doing so, eventually equalize ‘bang for the buck’ across possible uses of the resources. This happens because of diminishing returns.

### EXAMPLE: HOW MANY COOKS? HOW MANY POTS?

Suppose you’re the manager of a commercial broth kitchen. You’re stuck with the kitchen you have, but you can decide how much money to spend on pots (and other equipment), and how much money to spend on cooks. You’ve been given a budget of \$1,000.

Suppose that in your first draft of the budget, you decide to split the money 50/50 between cooks and pots. After running the numbers, you find that if you had an additional \$1, it would on average increase broth production by 15 if you spent it on cooks, and by 10 if you spent it on pots. That is, the *bang for the buck* from the next dollar spent is 15 broth for cooks, and 10 broth for pots.

That suggests that your 50/50 split gives too little money to cooks, and too much to pots. Why? Because you could take a dollar away from the “pots” pile (\$500 → \$499), put it in the “cooks” pile (\$500 → \$501), and raise production by about 5 broth (15 – 10).

So, for your next budget draft, you start taking money away from pots and applying it to cooks.

Diminishing returns means that as you do so, you will *lower* the bang for the buck from spending money on cooks (too many cooks spoil the broth) and *raise* it for spending money on pots. Eventually, as you keep moving money, the bang for the buck will be higher for pots than for cooks. (Don’t see this? Suppose you went so far that *all* the money was in the “cooks” pile and \$0 was available to buy pots.)

Once that happens, you’ll start moving money in your budget the *other* way: from cooks to pots. In doing so, you’ll raise the bang for the buck for cooks, and lower it for pots.

The only time when you *won’t* want to move money around – in a sense, the only time when you won’t *regret* the budget you’ve chosen – is when the bang for the buck is the same for cooks as for pots. That’s Knight’s Law of Choice at work.

### IT GENERALIZES

The example above was for finding the right mix of inputs (the “optimal input mix”) for producing broth. The same reasoning applies to budgeting consumption – for example, when a child brings \$10 to a candy store and must decide how to split it between different types of candy. There, the bang for the buck could be in terms of happiness or satisfaction (“utility”) per additional cent spent.

### SHOW ME THE MATH!

The standard mathematical explanation for this concept is far beyond the scope of this short pamphlet, as it usually takes up at least a few lectures in first- and second-year economics courses.

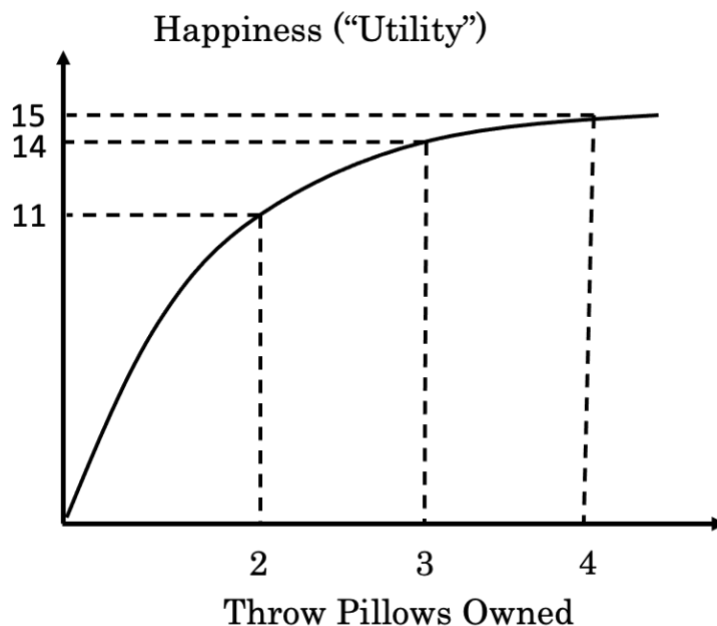
If you want all the details, search<sup>26</sup> for “optimal input mix using isoquants and isocost curves,” and “optimal consumption bundle using indifference curves and budget constraints”.

Keep in mind that most explanations will use a lot of geometry, algebra, calculus or all three.

### Tool 12: A loss can feel weightier than an equivalent gain

Losing \$1 can lower your happiness by more than getting \$1 increases it. This is often the case when there are diminishing returns to what we’re looking at.

Suppose that there are diminishing returns to throw pillow ownership, so that the situation is as below:



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<sup>26</sup> Not just for textbooks or articles. At the time of writing, in Summer 2022, these are popular topics for YouTube tutorials.

If you start out with 3 throw pillows, you also start at 14 happiness (in arbitrary units, sometimes called “utils”). Gaining a throw pillow (3 to 4) only increases your happiness from 14 to 15, a gain of 1 util. Losing a throw pillow (3 to 2) would lower your happiness from 14 to 11, a loss of 3 utils. Losing a throw pillow changes your happiness by more than gaining a throw pillow raises it, starting from the same *status quo* of 3 throw pillows.

#### THE STATUS QUO MATTERS: HALF EMPTY OR HALF FULL?

The *status quo* refers to the existing situation. Gains and losses are always relative to some such situation, observed or implied. Because humans react differently to gains and to losses, what is *perceived* as the status quo can influence our valuation of a particular good or situation.

Suppose you’re at a restaurant and your server fills your empty glass with water, up to the halfway mark. If your status quo is, “this glass should be full,” then filling the glass only halfway feels like a loss: the glass is half empty, *relative to that status quo*. If, instead, your status quo is “all glasses start out empty,” then, relative to that, you have *gained* half a glass’s worth of water.

Writers will sometimes choose their words to imply a particular status quo. This is part of what is called *framing*. A policy described as saving the lives of 50% of the population is bound to be more popular than a policy under which 50% of the population dies, *even if they’re the same policy*.

Students of history may wish to look out for *framing* of this kind both in the sources they read, and in the ones they eventually write.

#### JEALOUSY CAN BE STRONGER THAN ENVY

How can you tell what something is worth if there’s no official price tag on it? A sunset, clean air, or a civil right?

We could try asking two questions.

Question 1: “If you don’t already have it, how much would you be willing to pay, to get it?” The answer to this question is called the *willingness to pay*, or WTP.

Question 2: “Suppose you already have something. How much would you be willing to pay, to avoid losing it?” Or, put another way, “If we took it away from you, how much would we have to pay you to make you just as happy as you were before the loss?” This is called the *willingness to accept* the loss, or WTA.

Economics and others have found that  $WTA > WTP$ .<sup>27</sup> This is consistent with our finding that losses can weigh more heavily than gains – and with the observation that jealousy can be mightier than envy.

Jealousy is related to the fear of losing something you have. In that sense, WTA can be seen as a measure of jealousy.

Envy is related to desiring something you don’t already have. In that sense, WTP can be seen as a measure of envy.

Since  $WTA > WTP$ , jealousy can be stronger than envy.

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<sup>27</sup> See for example Georgantzis, N. & Navarro-Martinez, D. (2010). Understanding the WTA-WTP gap: Attitudes, feelings, uncertainty and personality. *Journal of Economic Psychology*, 31, 895-907.

### WHO HAS A CLAIM TO WHAT?

What is a loss and what is a gain depends on the *status quo*, as we saw in the example of the partially filled glass. Losses weigh heavier than gains, so using the right measure matters.

If the situation you're looking at involves a possible *loss* to someone that has an existing claim, ownership, or right to what will be lost, WTA is the appropriate measure to use to measure that.

If the situation involves a possible *gain* to someone who *doesn't* have an existing claim, ownership, or right to what will be gained, then WTP is the appropriate measure.

It's entirely possible that different parties in a negotiation will disagree on claims, rights and ownership, in which case their valuations of what is being negotiated over will also disagree.

Students of economic history may therefore find it useful to pay close attention to what groups claim, own or have a right to the objects under study.

Although the WTA-WTP gap is well documented and understood, nearly all existing economic valuations as of 2022 use WTP, regardless of underlying claims to ownership and rights. This may change in the future.

### I WANT TO HEAR MORE!

In this pamphlet we've only scratched the surface of the fascinating field of *behavioral economics*. If you'd like to learn more, I recommend *Prospect Theory* as your next stop, as it expands on our discussion of losses vs. gains.<sup>28</sup>

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<sup>28</sup> For the reader wanting a more general introduction, my go-to recommendation is Jha, S. & Powell, A. (2014). A (Gentle) Introduction to Behavioral Economics, *American Journal of Roentgenology*, 203(1), 111-117. <https://www.ajronline.org/doi/full/10.2214/AJR.13.11352> At the time of writing, the article is free to the general public.

## WRITING

We'll close the kit with a few tools you can use to share what you learn.

### Tool 13 – The CRAAP test

Librarian Sarah Blakeslee created the following test<sup>29</sup> for checking the reliability of sources:

Currency – Was your source written at the time of the event you're studying?

Relevance – How relevant is the source to the topic you're studying?

Authority – Can your source's author speak with authority on the topic?

Accuracy – How accurate are your source's statements? Can you verify them?

Purpose – Why was your source written? Could that lead to bias?

Asking these questions can help you choose which sources are most likely to be useful to you. This can be especially useful when you have sources that disagree with each other.

### Tool 14 – “Nothing about us, without us”

Because culture precedes cognition, it is important to include the voices of “insiders” to the groups being studied, whenever possible. Even a well-intentioned outsider, such as an anthropologist or historian, can interpret things in unintentionally inaccurate or misleading ways.

### Tool 15 – McCloskey's Path

Economic historian Deirdre McCloskey once described an economic narrative as “a path between two equilibria” – from “once upon a time” to “happily ever after”. At an equilibrium, relationships (e.g., supply and demand) are in balance, and there is nothing pulls in one direction or another. If a *shock* changes the world so that it is no longer in balance, it will take some time to move toward the new equilibrium and settle down.

This can be a useful way to decide where to start and end your story, and it is one that professional storytellers make use of. It is appropriate for linear narratives.

The opening to the animated series “Avatar: The last Airbender” (2005 – 2008) is a master class in the use of this tool. Paraphrasing: “Once, the nations lived in harmony. / Then, the Fire Nation attacked. / A century later, we're almost at a new equilibrium, with a dominant Fire Nation. / Recently, something changed, / and this show tells the story of a movement toward a new, third equilibrium.”

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<sup>29</sup> For more on the CRAAP test, I recommend Kilcrease, B. (2021). EVALUATING SOURCES WITH THE CRAAP TEST. In *Falsehood and Fallacy: How to Think, Read, and Write in the Twenty-First Century* (pp. 47-74).

## Tool 16 – The Story Circle

“Emotion matters in the structure of narratives, economic and otherwise, and it reveals itself in *stories*.” -Robert J. Shiller, in *Narrative Economics*<sup>30</sup> (2019).

In the late 1960s, Joseph Campbell pointed out<sup>31</sup> that many of humanity’s most popular stories share very similar structures - that in each of them, a protagonist goes on a specific ‘hero’s journey’ with multiple stages. Since then, novelists, screenwriters, motivational speakers, marketers and more have used variations on Campbell’s ‘hero’s journey’ to create relatable, effective narratives.

Harmon’s Story Circle is one such variation. It was originally developed by screenwriter Dan Harmon for use in plotting episodes of *Community*, *Rick and Morty*, and more, but has since become a very popular tool for writers of all types.

Instead of dividing a story into beginning, middle, and end, the Harmon story circle divides a story into 8 sections. Quoting directly from Harmon’s own discussion of the circle<sup>32</sup>:

- “1. A character is in a zone of comfort
2. But they want something
3. They enter an unfamiliar situation
4. Adapt to it.
5. Get what they wanted
6. Pay a heavy price for it
7. Then return to their familiar situation
8. Having changed”

In structure, it’s very similar to McCloskey’s path, in that it’s the story of a journey (2 – 7) from one equilibrium (1) to another (7 – 8). It’s a *wheel* because this episode’s Step 8 sets up a new status quo, that is then Step 1 for the next episode.

In this sense, Harmon’s Story Circle can be seen of as a more detailed version of McCloskey’s path that allows for cyclical narratives.

### USING THE CIRCLE TO TELL AN ECONOMIC HISTORY

While developed for fiction, this tool can also help tell economic and historical stories. Consider the story of the merger between the Northwest Company (NWC) and the Hudson’s Bay Company (HBC) in 1821.<sup>33</sup>

The Story Circle can be used to break it down as follows:

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<sup>30</sup> The book, not the article by the same author in the *American Economic Review*.

<sup>31</sup> In *The hero with a thousand faces* (1968). This book was an inspiration for George Lucas when writing *Star Wars*. The curious reader should be warned that the style of writing can feel dated.

<sup>32</sup> Harmon, D. (n.d.). Story Structure 101: Super Basic Shit [Web Page].  
[https://channel101.fandom.com/wiki/Story\\_Structure\\_101:\\_Super\\_Basic\\_Shit](https://channel101.fandom.com/wiki/Story_Structure_101:_Super_Basic_Shit)

<sup>33</sup> For an overview, see Carlos, A. M. & Hoffman, E. (1986). The North American Fur Trade: Bargaining to a Joint Profit Maximization under Incomplete Information, 1804 – 1821. *The Journal of Economic History*, 46(4), 967 – 986.



1. The Northwest company is making profits off the fur trade, with a home territory in Athabasca and marketing based out of Montreal.
2. But they want to lower their transport costs.
3. They contact their rivals, the Hudson's Bay Company, and try to negotiate for free passage through Hudson's Bay Company territory. The HBC's demands for cash or a buyout prove too high.
4. The NWC and HBC have a period of informal cooperation, but the Napoleonic wars and over-hunting bring this to an end. The NWC's plan to buy HBC shares backfires and ends in their main supply territory at Red River being taken over by the HBC. Violence and deaths ensue.
5. Talks re-open. The NWC finally gets its free passage through Hudson's Bay by becoming part of the Hudson's Bay Company via merger.
6. Lives have been lost, half the trading posts are shut down, the NWC lost its name, and after the NWC's attacks on the legitimacy of the HBC charter, the HBC's powers within Rupert's land are weakened.
7. The merged HBC goes back to focusing on making profits in the fur trade...
8. ...but things are different: Indigenous and mixed-race employees have lost status, the HBC's authority in Rupert's Land is weakened, and the Company is more highly scrutinized by the British government.

This is not the only way the story of the NWC & HBC merger can be split into those 8 points – it's not even the most *effective* way this division could be made – but just by imposing a familiar structure on the narrative, it makes it easier to understand and access.

### **Tool 16 – “As above, so below” (Small is beautiful)**

When sharing your historical research, it's tempting to talk in terms of “-isms” and movements, countries, wars, “the economy”, GDP and statistics.

Consider, instead, narrowing your discussion to the smallest case study that you can tell from start to finish, and incorporates all the forces you want to talk about. By doing so, you can make your story easier for a general audience to relate to and be interested in.

This is a tool often used by marketers and others. Television commercials asking for donations to a hunger-stricken country may cite a few statistics, but many spend most of their time showing you a specific starving child or family, and giving concrete examples of how a small donation could improve their lives.

As the saying goes, “One death is a tragedy; a million deaths is a statistic.” It's arguably the tragedy that stays in readers' minds.

## **Tool 17 – Avoid reifying “the economy” (and other abstract concepts)**

“Reification” happens when you assign action and intention (or other attributes of a material form) to an abstract force. It’s a useful shorthand that we’re used to seeing: “The economy did this,” or “such-and-such will lead to economic growth”.

When used in articles about the world we live in, we know it’s not “the economy” doing things, but rather groups and individuals, companies and consumers. There’s no need to spell it out every time we want to talk about it, because that takes a long time and we’re immersed in this culture and its shorthand – we know what “the economy” stands for. Sometimes.

When studying the past, we don’t have that luxury. “The past is a foreign country,” it’s been said, and one with a culture alien to ours. We can’t take for granted that our shorthand applies.

As a rule of thumb, if an article introducing a general reader to an economic history relies crucially on phrases such as “the economy” or “economic growth,” it’s a sign of one or both of the following:

1. You are using those terms because your topic is very “zoomed out”. To make it more relatable, you may consider making use of Tool 16.
2. You are missing important information, and are writing about (e.g.) “the economy” because you don’t know, exactly, which groups or individuals were affected, or how. You may wish to try to fill in those blanks.

## **THE BOTTOM OF THE TOOLKIT**

That’s it for now – I hope you found the tools useful!

Chris Willmore  
Victoria, B.C.  
September 1, 2022