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The Idea of a Social Cycle

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Abstract

The paper aims to explore what it *means* for something to be a social cycle, for a theory to be a social cycle theory, and to offer a suggestion for a simple, yet, we believe, fundamentally grounded schema for *categorizing* them. We show that a broad range of cycle theories can be described within the concept of disruption and adjustments. Further, many important cycle theories are true endogenous social cycle theories in which the theory provides a reason why the cycle should recur. We find that many social cycle theories fit with a two-population disruption and adjustment model similar to the well-known predator-prey model. This implies that a general modeling framework could be established for creating agent-based models of many social cycle theories.

1 Introduction

"there is a rhythm of sentiment which we can observe in ethics, in religion, and in politics as waves resembling the business cycle."—Vilfredo Pareto (2000, p. 31)

David Lewis's work *Convention* seeks to identify the essential characteristics common to the various phenomena we call conventions, as well as to note how, despite sharing those characteristics, we can identify certain common variations among types of conventions, based on how they differ in embodying those essential elements.¹ Such an analysis, to the extent it succeeds, does so by clarifying the general phenomenon being dealt with by examinations of particular conventions and providing subsequent researchers into those particulars with a common framework within which they can discuss and compare their findings.

Taking Lewis' work as a paradigm, we aim to explore what it *means* for something to be a social cycle, for a theory to be a social cycle theory, and to offer a suggestion for a simple, yet, we believe, fundamentally grounded schema for *categorizing* them. In doing so we will simplify the schemata of business cycle theories established by Haberler (1946)² following our intuition that by reducing our categories to a minimum of truly fundamental distinctions in cycle theories, we can place them into broader categories more easily and can therefore include all kinds of social cycle theories. Ultimately, the goal is to search for ideal types that can clarify relationships among social cycle theories, and may enable better modeling of them, as we explore briefly in our appendix.

¹ Lewis writes: "But how much better to know what we are talking about: to have an analysis of convention in its full generality..." (2002, p. 3).

² See Appendix A for our attempt to summarize Haberler's classification scheme.

After outlining our categories we will begin with an analysis of the simplest type of cyclical social behavior of which we can conceive. We then move on to look for the patterns we have found there in the descriptions of more complex theories. Space will not permit us to explain any theory in depth. But we believe we are able to show that the theories fit our classification scheme. They can be described in terms of disruptions and adjustments and often share a common pattern of a two-population model, similar to the predator-prey model from population biology. We will examine:

- 1) Adam Smith's theory of cycles in fashion.
- 2) The Aristotelean-Polybian theory of anacyclosis.
- 3) Giambattista Vico's theory of a cycle of civilizational forms.
- 4) Vilfredo Pareto's theory of circulation of the elites.
- 5) Financial-market models of value investors and trend followers.
- 6) Hyman Minsky's business cycle theory.
- 7) Joseph Schumpeter's theory of creative destruction and economic development.
- 8) R.M. Goodwin's theory of the business cycle.

2 Our Fundamental Concepts, and the Resulting Classification Scheme

Abstracting the essential nature of cyclical phenomena in the natural world has attracted some attention. For instance, Alfred North Whitehead, discussing such cycles, wrote:

In the Way of Rhythm a round of experiences, forming a determinate sequence of contrasts attainable within a definite method, are codified so that the end of one such cycle is the proper antecedent stage for the beginning of another such cycle. The cycle is

such that *its own completion provides the conditions for its own mere repetition*. (1958, p. 21, emphasis ours)

The emphasized portion of the above quote is very important for us: for there to be true, endogenous social cycles, there have to be patterns of social activity the completion of which provides the conditions for their own repetition. In particular, what we mean by a truly social cycle is different from the fact that people will tend to flock to the beach in the summer, and the ski slopes in the winter, that they tend to use more artificial lighting in the evening than in the day, or that harvest festivals are in the fall while lamb is eaten in the spring. A social scientist may be curious as to why, say, people go to the beach or why there are harvest festivals at all, but given these things exist, it is pretty obvious why they happen when they do. While, as we will see in our subsequent schema, these are *true* cycles, the generation of the cyclicity is clearly exogenous to the social world. We may march through the same typical sequences of events repeatedly, but the fault is in our stars, or our solar system, or the Big Bang, or God. But the basic cyclicity is not a social product, and the social component consists in the chosen response to a cycle beyond human control.

What is of real interest to social theorists is cycles that arise endogenously in the social world. And not just that: are there purely social cycles that occur without being planned by anyone? So, if a village holds a maypole dance, there is not much of a puzzle as to why the dancers keep winding up in the same places: that is what they intended to do. But if an economy repeatedly arrives at a high level of unemployment, or a political regime keeps cycling through periods of order and of chaos, then those events are far more curious. Presumably, no one has arranged to have periodic business downturns or regular episodes of violent disorder, but there they are.

A possible explanation to the puzzle of why such states recur is, “Well, stuff happens.” This is largely the approach to the business cycle taken by proponents of Real Business Cycle

Theory: the economy suffers a shock, things get worse for a bit, the economy adjusts, things get better, and at some time in the future another shock occurs. The appearance of cyclicity is an illusion, produced by “random waves” (see Chatterjee, 2000).

That sudden “shocks” hit the system is an interesting possibility, and we do not wish to dispute that it may even be true. But many prominent social theorists claim to have detected *truly, endogenously, and spontaneously* (unintentionally) cyclical social phenomena, and to have identified the cause of the cyclicity. Our research question is, “What commonalities, if any, do we find amongst such theories?”

2.1 An Esteemed Forerunner: Gottfried Haberler

A forerunner to our effort, whose work has served as a guide for us, is Gottfried Haberler. His work *Prosperity and Depression* provides a systematic overview of business cycle theories. While he argues that “it is quite conceivable that, under different social and economic conditions, periods of prosperity and depression should be produced by entirely different sets of causes, so that for different groups of cycles separate theories would have to be devised” (1946, p. 276), he is interested in finding general patterns in various theories. Therefore, in the first part of his work he strives to set out the general characteristics that distinguish different “families” of cycle theories. He considers the theories’ explanations of upswing, upper turn-around, downswing, and lower turn-around. He is interested in whether they posit endogenous or exogenous causes for booms and busts and what reasons they provide for there being periodically recurring macroeconomic conditions at all.

Haberler's classification schema has many dimensions. We aim for a simpler schema that looks only at the most fundamental properties of social cycles in general and leaves out everything that is related with business cycles or other types of cycles in particular. In doing

so we hope to isolate certain essential characteristics of many, if not all social cycle theories, and certain basic ways they might exhibit differences in terms of those essentials.

2.2 *A Simple Classification Matrix*

Our working hypothesis is that all social cycles, and thus all plausible theories of such cycles, are characterized by patterns of disruptions and adjustments. A disruption we define as an event that interferes with the smooth progress of the plans of one or more social actors. Adjustments are the means by which agents whose plans were disrupted respond to that disruption in order to continue toward realizing their goals as best they can in light of the new circumstances confronting them.

As a first step toward understanding the occurrence of cycles in social life, we distinguish stabilizing from destabilizing adjustments.³ A stabilizing adjustment creates, over the time frame in question, a series of further adjustments by others, that are, at each moment of time, of a lesser magnitude than the adjustment under examination. A de-stabilizing adjustment, on the contrary, creates over the time frame in question a series of further adjustments that are, at each moment, of a greater magnitude than the adjustment under examination.

Based on this distinction, adjustment processes may induce a cycle if they result in a significant period of largely destabilizing adjustments followed by a significant period of generally stabilizing adjustments. To generate a recurring, endogenous cycle, this pattern of adjustments must itself, somehow, lead to a situation in which disruptions similar to those that started the cycle are the likely result of agents' efforts to realize their goals. So in examining

³ Similarly, Haberler (1946, p. 276) wonders whether there are self-reinforcing processes that will bring the system further away from equilibrium whenever it is disrupted (exogenously or endogenously).

various cycle theories, one thing we will look at whether the disruptions that generate the cyclical behavior are endogenous to the theory, or are supposed to intervene from outside its scope.

We might formalize this notion using the simple logistic equation that is often used for population growth, $dD / dt = rD (1 - D / K)$, where D is the number of people experiencing destabilization, r is the rate of destabilization, and K is the “carrying population,” which here we can intuitively interpret as a limit to how much of the population can be destabilized by others’ adjustments at one time: certainly, by the time over half the population is involved in responding to a previous destabilization, that leaves less than half the population to be destabilized by that adjustment, assuming the adjusters are not engaged in self-destabilizing.⁴

A separate question is whether a theory provides a reason why truly cyclical patterns should occur at all. Here, the question is whether we can expect something similar to the initial disruption to recur, whether or not its source is endogenous or exogenous to the theory.⁵ If a theory gives us a reason to expect recurring patterns of disruptions at semi-regular intervals⁶, then we classify it as a “true” cycle theory; if not, it is a “pseudo” cycle theory.

⁴ Of course, there are many complexities that could be introduced here, such as the possibility that, even while the majority of actors or trying to self-stabilize, their actions are meanwhile defeating the plans of others: collective action problems, such as the Keynesian “paradox of thrift,” are of this nature. But nevertheless, even processes like that have some inherent limit: If everyone tries to save more, but instead has their income reduced, than cannot gone on forever: it is a safe assumption that aggregate income will never go to nothing as a result of an attempt by everyone to increase their savings.

⁵ How similar this subsequent disruption ought to be to the original one will be a matter of detail internal to particular cycle theories.

⁶ How regular is “semi-regular”? Again, we believe that is best answered within particular theories.

We believe it is important to distinguish these two dimensions of cycle theories because logic does not forbid, and history provides examples of, cycle theories that posit true, exogenous cycles: cycle theories pointing to sunspots and other such extra-human factors were once fairly popular. In such theories, because, say, sunspots wax and wane in a cyclical pattern, the effects they are purported to have on human economies can be expected to cycle in a similar fashion. The cycle is clearly caused exogenously: no one ever posited that business activity could cause sunspots! In contrast, a theory is both exogenous and a true cycle theory when the pattern of adjustments to an initial disruption is such that we can expect those adjustments, over some semi-regular time frame, to finally result in something resembling the initial disruption to be brought about by those very adjustments.

This gives us a 2-by-2 matrix of cycle theory classification, one in which we ignore the relatively uninteresting case of planned cycles (dancing around the maypole or running laps at the gym), and classify only spontaneous cycles:

	Endogenous generation	Exogenous generation
True cycle	Ex: Circulation of the elites	Ex: Ski season
Pseudo Cycle	Ex: Random shocks produced by periodic financial manias	Ex: Random shocks produced by extreme weather events

3 A Simple Social Cycle: Merging onto a Highway

While we believe both true and pseudo cycles can be understood using the concepts of disruption and adjustment, in this paper we are particularly interested in analyzing true social cycles. Therefore, we proceed by fleshing out our ideal types with some plausible content to

clarify the scheme we believe is essential for there to be a true cycle. We start with a fairly simple example of a true social cycle in examining what occurs when drivers are forced to merge onto a busy highway at low speeds. This shall help clarify our scheme and visualize the concepts of adjustment and disruptions. We demonstrate how the concept of disruption and adjustment can give way to behavior that on aggregate produces a cyclical pattern.

Above, we have defined stabilizing adjustments as those that generate further adjustments by others, that are, at each moment of time, of a lesser magnitude than the adjustment being evaluated, and de-stabilizing adjustments as those that prompt subsequent adjustments of greater magnitude. But estimating the magnitude of adjustments necessary in response to some disruption, in order to judge them stabilizing or de-stabilizing, often could prove to be a tricky matter. One of the attractions of the present example is that it reduces this problem to the relatively easy one of measuring deviations in driving speed from an initially planned speed: In one phase of the cycle, we have de-stabilizing adjustments: those adjustments are increasing the total deviation of driving speed from driver's preferred speed. The adjustments are stabilizing in the phase of the cycle when that total deviation is decreasing, e.g., drivers are returning to the speed they preferred before the initial disruption. And note that in the present example, the phases of the cycle are spread out geographically, not chronologically: while some drivers nearing an entrance are entering the "downturn" phase of the cycle, others well past the entrance are simultaneously in the "recovery" phase.

So let us picture a busy highway with entrances and exits every mile. The entrances are not well-designed: there is no lane for smoothly merging into traffic while getting up to speed, but a stop sign at the end of the entrance ramp. (This, in fact, is pretty much a description of the Merritt Parkway in Connecticut as of 30 years ago.) What this means is that every time heavy traffic nears an entrance, there occurs a cluster of disruptions, as people enter traffic at a slow speed and force those already on the highway to adjust.

Imagine a car, in this situation, entering into the right lane, the lane in which you are driving, at low speed, a short distance ahead of you. You typically have two adjustments to this disruption that might enable you to avoid a collision:

- 1) You can slam on your breaks; or
- 2) You can shift over to the left lane.

Which of these (if either) is stabilizing and which de-stabilizing will depend upon the traffic pattern around you. Now, imagine there are four cars following closely behind you in the right lane, but the left lane is empty. Then, hitting the breaks is de-stabilizing, since your adjustment will result in a greater magnitude of adjustments in its wake—in response to my breaking, four other cars must similarly adjust, resulting in four times the magnitude of adjustment. Shifting lanes will be a stabilizing adjustment, since in response to your move, no one else has to do anything—there is zero times your adjustment as a result of your choice.

But if traffic is heavy, say at rush hour, either adjustment is usually de-stabilizing, since the left lane is also packed with cars. In such circumstances, the disruption of a driver merging at a low speed inevitably will produce a cascade of further disruptions, as the adjustments made by drivers breaking for merging automobiles thwarts the plans of other drivers who wish to continue at a steady speed. Thus we get a logjam around the entrance ramp. This is the downturn phase of our cycle.

But, gradually, the adjustments begin to produce dovetailing plans again, as drivers re-establish comfortable spacing between themselves and other vehicles, and regain the speed they had before the disruptions at the entrance ramp. This is the recovery phase of the cycle. But just as our recovery is nearly complete, another wave of disruptions occurs — we have reached the next entrance ramp.

So here we have a simple social cycle with a period of roughly one minute (if the non-disrupted driving speed is about 60 miles per hour), exhibiting the characteristics of our ideal

type very clearly. What's more, this is very much like what driving on the Merritt Parkway really was like thirty years ago, demonstrating that even such a simple model can capture a good deal of a real-world phenomenon.

What we have just described is a genuine cycle: there is a good reason for us to expect the pattern to repeat at quite regular intervals. But its source is exogenous: the disruptions arise from outside the flow of traffic on the highway itself. The placement and design of the entrances is the cause of the disruptions.⁷ In this respect, it is similar to a sunspot theory of the business cycle. Let us turn our attention to genuine cycles that are also endogenous.

4 Is There A Common Pattern in True-Endogenous Social Cycle Theories?

After having outlined a very basic examples of a genuine social cycle, we move on to analyze more complex theories of social cycles. If we detect a similar basic pattern in these more complex theories, this will be a finding of some importance. Space will not permit us to present any of these theories in detail. Instead, we shall present the theories in a nutshell to detect the mechanism producing the cyclical pattern for some core theories of the social sciences.

a. Adam Smith's Theory of Fads in Fashion

We don't follow fashion

That would be a joke

⁷ See Kerner (2009) for an analysis of traffic that includes endogenous generation of such jams.

You know we're going to set them, set them

So everyone can take note, take note—Adam Ant and Marco Pirroni, “Goody Two Shoes”

We will begin to analyze fads in social customs, such as fashions, using the ideal types posited above. We will analyze one famous example from the literature.⁸ Adam Smith commented on fashion as follows:

Fashion is different from custom, or rather is a particular species of it. That is not the fashion which every body wears, but which those wear who are of a high rank, or character. The graceful, the easy, and commanding manners of the great, joined to the usual richness and magnificence of their dress, give a grace to the very form which they happen to bestow upon it. As long as they continue to use this form, it is connected in our imaginations with the idea of something that is genteel and magnificent, and though in itself it should be indifferent, it seems, on account of this relation, to have something about it that is genteel and magnificent too. As soon as they drop it, it loses all the grace, which it had appeared to possess before, and being now used only by the inferior ranks of people, seems to have something of their meanness and awkwardness. (Smith, 1790, Part V, Chapter 1)

⁸ We think it is important to clarify our intent here: there exists an extensive social science literature on fads and fashion, which we will largely ignore. That is because our aim, in this section, is not to present a superior theory of fads to existing alternatives, but to show how our ideal types can be employed to construct a plausible theory of fads, with the aim of elucidating the types themselves. Therefore, it is of little importance to us that there may be some theory of fads that captures empirical reality far better than what we present here: if such a theory exists, it would not lessen the value of our example for our purposes at all.

Following Smith, let us posit a population consisting of two types of people: T, is a small group of people who are trend-setters. They want to be on the leading edge and want to have (wear, exhibit, etc.) what only some others have and to be recognized for this by their peers. F is a large group of people who are followers. They want to have what everybody else has.

In a fad, first the population of T mutually coordinates around some fashion or other cultural element, ϕ . What they wish is to identify themselves as members of T by adopting ϕ while other members of T *but only other members of T* do so. That situation, to them, represents a pleasing coordination.

When ϕ becomes widespread amongst T, the members of F begin to notice it doing so. The plans of the members of F have been disrupted. To them a pleasing coordination is to have what everybody else has. The more members of F learn about the new fad, the more members of F realize they are behind the times. Therefore, they adopt ϕ in an effort to *adjust* to the *disruption* the adoption of ϕ by the members of T created in their plans. The initial coordinative adjustments of the members of T around the new fashion turns out to be destabilizing as it results in a series of adjustments that are greater than the initial adjustment for the members of F.

But what is a pleasing coordination to members of F is very displeasing to members of T: if the "rubes" have adopted ϕ , then it is no longer hip. The adoption by the members of F itself is a *disruption* of the plans for the members of T. As ϕ diffuses through F, members of T find themselves no longer on the cutting edge, so they *adjust* plans again by seeking for some new "cutting edge" fashion to adopt. When they do so, we are back at the start of the cycle above. But since the adjustment of members of F results in a series of smaller adjustments than did those of the small group of T, the adoption of the fad can be characterized as *stabilizing adjustments*.

Once again, we can look to population biology to formalize our intuitions here in a simple way: here, the Lotka-Volterra equations relating predator and prey populations. In this case, the trend-setters are the “prey,” and the followers the “predators.” (Of course, we imply no normative judgment here of whether trend-setters or followers are better people!) So, we have:

$$dx / dt = x(\alpha - \beta y)$$

$$dy / dt = -y(\gamma - \delta x)$$

Where x is the number of trend-setters adopting a fad, and y is the number of followers. This system of equations produces sine-wave-like cycles with the followers' cycle lagging that of the trend-setters, as we would wish it to. Here, we should interpret each trough in the graph of x as an instance of the trend-setters abandoning a trend, and the subsequent peak as representing a new trend, and the same for the followers in the graph of y , with a lag.

This analysis is, of course, highly simplified: We really have an entire spectrum of people from extreme trend-setters who are happy to, say, wear something no one else at all wears, to followers so sluggardly that they are barely now adopting fashions from a decade ago. In any event, the widespread adoption of the fashion generates the actions that will lead to its abandonment. The cyclical movement is endogenous to the phenomenon itself.

This stands in sharp contrast to an exogenous fashion cycle: the change in clothing worn, in temperate climates, from winter to summer. This, also, is a true cycle, but the driver of the cycle is something quite outside of the realm of fashion, namely, the relative movements of the earth and the sun.

b. The Aristotelian-Polybian Cycle of Constitutional Forms

We continue with the Aristotelian-Polybian cycle of constitutional forms. While Aristotle presents a very complex and subtle analysis of constitutional changes, Polybius's is a simplified version.

Polybius describes the basic cycle of political forms as follows:

Now the first of these [political forms] to come into being is monarchy, its growth being natural and unaided; and next arises kingship derived from monarchy by the aid of art and by the correction of defects. Monarchy first changes into its vicious allied form, tyranny; and next, the abolishment of both gives birth to aristocracy. Aristocracy by its very nature degenerates into oligarchy; and when the commons inflamed by anger take vengeance on this government for its unjust rule, democracy comes into being; and in due course the licence and lawlessness of this form of government produces mob-rule to complete the series. The truth of what I have just said will be quite clear to anyone who pays due attention to such beginnings, origins, and changes as are in each case natural. For he alone who has seen how each form naturally arises and develops, will be able to see when, how, and where the growth, perfection, change, and end of each are likely to occur again. And it is to the Roman constitution above all that this method, I think, may be successfully applied, since from the outset its formation and growth have been due to natural causes. (1924, Book VI)

The causal process can be boiled down to the following:

Sketched in rather broad strokes, the mechanism goes roughly as follows: the simple good regime degenerates into its vicious form, because the new generations, the king's children, for example, take their advantages for granted and give into their appetites, and thus they provoke the revolt that brings about the new simple regime that will in its turn undergo the same alteration and the same fate. (2013, p. 180)

Here, we again have two populations, the rulers (who may be just the king, the aristocracy, or the majority of the people) and the ruled (who may be everyone but the king, everyone but the aristocracy, or those in the minority in a democracy), with the actions of one population disrupting the plans of another, and causing that second population to make adjustments and giving way to a change in political regime which starts the cycle again, albeit within a slightly different setting.

At the start, the political regime is well-accepted by the ruled. The rulers are, of course, glad to be in power. The ruled, on the other hand, accept the rulers and political regime as long as they have enough space for themselves.

After some time, being in power produces the urge in the rulers to expand their influence, and little-by-little they treat the ruled worse. The rulers become more abusive. For a while this abuse may go unnoticed. Only few people will point out that the regime has changed its face. So that the rulers will feel more and more obliged to expand their powers. At some point the majority of the ruled feel unhappy with the rulers. In order to keep stability the rulers may need to repress the ruled even more. This will amplify the tensions between the two groups. The ruled want a new constitution.

The cycle theory is again one of disruption and adjustment. The initial disruption is the hunger for power expansion. The notion of government will adjust little, which reinforces the powerful in their behavior. The greater the greed, the more people will find the situation displeasing and become vicious toward the ruler. Thus, we have a stream of adjustments that cause greater adjustments over the time period in question. At a point the rulers will be pushed out and a new constitution is installed.

The cycle finally comes around to the beginning again when democracy turns into mob rule:

From inspection of the other cases also you can see the changes take place pretty well after the same manner: in order to win the favour of the multitude they [demagogues] treat the notables unjustly and cause them to unite. Sometimes they make them split up their possessions or income in order to finance their public duties; sometimes they bring slanderous accusations against the rich with a view to confiscating their money. (1992, p. 311)

This sets the stage for a return to monarchy.

c. Vico's Cycle of Civilizational Forms

Vico's cycle of civilizational forms is another prominent theory of the social sciences that fits our classification scheme. Cities themselves arise from the interaction of two distinct populations:

The origin of cities, which developed from extended families which included both children and servants. We find that cities were naturally founded on two communities, the nobles who commanded and the plebeians who obeyed: for these two parts make up the entire polity or law of civil governments. I shall show that the first cities could not have arisen at all merely on the basis of simple nuclear families. (1999, pp. 16-17)

As civilizational forms progress from the Age of the Gods through the Age of Heroes to the Age of Men, governmental forms progress from theocracy through aristocracy to democracy. The two-population model drives the changes. For instance, Vico describes the impetus driving the change from aristocracy to democracy as follows:

The plebeians of the heroic age now grew numerous and warlike besides, which frightened the [aristocracy], who must have been very few in a commonwealth

comprising so few citizens. By the force of their numbers, the plebeians began to enact laws without senate authority, so that the commonwealths changed from aristocratic to democratic. (1999, p. 441)

The conditions for the repetition of the cycle come about through the degeneration of the democratic form of government:

Like beasts, such people [in late democracy] are accustomed to think of nothing but their own personal advantage, and in their extreme fastidiousness, or rather pride, they are filled with bestial rage and resentment at the least provocation. Although their bodies are densely crowded together, they live like monstrous beasts in the utter solitude of their private wills and desires... [causing] their obstinate factional strife and desperate civil wars to turn their cities into forests and their forests into human lairs... Eventually, the few survivors, finding themselves amid an abundance of life's necessities, naturally become sociable. Returning to the pay but it's simplicity of the early world of peoples, they naturally become religious, truthful, and faithful. (1999, pp. 488-489)

Thus we find ourselves back in the Age of the Gods.

d. Pareto's Circulation of the Elites

Once again, in Pareto's description of the circulation of elites, we find a two-population model, where the adjustments of one population to the disruptions caused by the other population drive the cycle. In Pareto's case, the two populations are a currently ruling but decrepit elite, and a new rising elite class, poised to take over.

The decline of the old elite, for Pareto, follows a quasi-biological law that dictates that social groups' decline with age just as organisms do. Of the predicament of the current but declining elite Pareto says:

1. The declining elite becomes softer, milder, more humane and less apt to defend its own power.

2. On the other hand, it does not lose its rapacity and greed for the goods of others, but rather tends as much as possible to increase its unlawful appropriations and to indulge in major usurpations of the national patrimony.

Thus, on the one hand it makes the yoke heavier, and on the other it has less strength to maintain it. (2000, p. 59)

It is these increasing disruptions that drive the new elite to fight and eventually displace the old. As an elite declines, its best tend to join the rising new elite instead of sinking with the old: “When... a gentleman is faced with the dilemma of either proving the malpractices of his class such as embezzlements of banks... or of his joining the socialists, he is irresistibly driven towards the latter” (2000, p. 73).

Naturally, however, the youthful vigor of the new elite will not last:

For the time being, the new elite is flexible and open to all, but after the victory the same that happened to others will happen to it also: after victory, the elite becomes more rigid and more exclusive. (2000, p. 86)

It is obvious why this sets up the same conditions that led to the rise of the new elite in the first place, and why Pareto’s two-population model cycles.

e. Investment Behavior and Financial Market Cycles

“It is well known at the Stock Exchange the public at large buys only in a rising market and sells in a declining one. The financiers who, because of their greater practice in this business, use their reason to a greater extent, although they too sometimes allow

themselves to be swayed by sentiment, do the opposite, and this is the main source of their gains.”—Vilfredo Pareto (2000, p. 94)

Our two-population model can also be found in theories of boom-and-bust cycles in asset markets.⁹ Imagine there to be two types of investors who work in “exchange alley:” V is the small group of value investors, who rely on a Graham-and-Dodd-style (2008) analysis of fundamental values. T is the trend followers, who rely on chart techniques and trends or simply popularity to decide on asset purchases (see Greenwald et al 2001). V and T behave similarly to the trend-setters and followers in the fashion example.

First, our value investors V identify an asset with fundamentals that suggest a higher value than reflected by the market price. If prices have been stable for a long time, based on chart-technique, the assets have not been very desirable and there are no gains to expect from a price rally. As enough trend followers T have divergent expectations from the value investors V, when some value investors mutually show demand for the assets, the trend-followers T sell to the value investors V.

For both the coordination process implies an improvement. One group believes it is purchasing more valuable assets and the other believes it is selling assets that are no longer desirable. As the members of V bid away several assets for a price that is above the old market price from the members of T the price of the assets increase.

The adjustment causes a series of further adjustments in the following periods when the group of T realizes that the market price of the assets has risen. As they use chart-technique to analyze the profitability of the assets, the data now suggests that prices are likely to rise and the asset has become more desirable. The new outlook disrupts the plans of the

⁹ Gracia (2004) reaches a similar conclusion.

group of trend-followers T. Not holding the asset now represents a failure of concatenate coordination. With more and more members of T repurchasing the asset at a price higher than the members of V think the value of the asset should be, assets are handed over from V to T and prices rise again.

Now, everybody seems happy. V sold at a higher price and T has a seemingly desirable asset. The outcome represents a pleasing coordination from the point of view of V and T. The members of V, however, now have already sold all of the assets they have to sell, the members of T have now bought, and there no longer is anyone to drive the price up further.

Assuming that the group of T holds all the assets and the initial valuation of the group of V is unchanged, no one in the group of V is willing to buy assets at this higher price anymore. Members of the group of T might keep on trading stocks at ever-increasing prices within the group. But already the group of T holds assets that are less valuable (according to the value investors) than they believe. Once prices stop rising, views about the desirability of the assets worsen, so that the chartists want to sell. Now no one wants to buy at the current price. The cycle starts over again once prices fall below the fundamental value calculated by the value investors V. This cycle, again, is both endogenous and a genuine cycle.

f. Minsky's Business Cycle Theory

Multiple triggers have been posited that may drive business cycles (Table 1), such a rise or shortfall in demand, a supply shock, a monetary policy shock, or technological advances in a specific sector. Kindleberger (2000, pp.38-41) argues - more generally - that to produce substantial boom periods that eventually turn bust, an (mostly external) event or change has to be important enough to substantially change the "horizons" and "expectations" of market participants, i.e., to present a major *disruption* requiring *adjustments* that are at first, anyway,

de-stabilizing. From an historical perspective he finds wars, revolutions, monetary policy changes, bank deregulations, but also financial innovations such as derivatives to be capable of radically changing expectations in the market and producing cycles. To explain the stages of the cycle and the coming financial crisis he draws on Minsky's theory of financial instability.

In Minsky's theory the cycle, "Profit opportunities within a robust financial structure make the shift from robustness to fragility an endogenous phenomenon" (Minsky 2008, p. 234). When profit expectations are low, households have it hard to get loans from banks. Banks are scared of the risks entailed and will ask for good collateral. Financing is well hedged and risks in the economy are limited. When expectations about future profits rise, banks are willing to take additional risks. More and more projects are financed. Banks move "from hedge to speculative and Ponzi finance" (Minsky 2008, p. 233).

The shift in expectations is *destabilizing* as more and more risks are accumulated over time, which create the necessity for larger *adjustments* later on. During the upswing of the cycle an increasing number of people turns optimistic. Financing conditions of banks become easier. The rise in expectations creates a stream of adjustments during which more and more people start to coordinate around high-risk products. Increases in risk are only perceived when first defaults spread and optimism is replaced by pessimism about the future. Then investors, households and banks become risk averse and pessimism spreads: they coordinate around a low-risk / low-return strategy. At this point, agents realize that much existing financing is very risky. Households and firms start to pay down debt and hoard liquidity. Banks deal with losses, shorten balance sheets and contract credit. A destabilizing deflationary spiral continuous unless monetary and/or fiscal policy stimulates aggregate demand to stop the balance sheet recession (Minsky 1992). When investment and stock markets pick up again,

households, banks and businesses gain through rising equity prices. Optimism spreads again and the cycle starts over again.

Minsky's theory is both endogenous, at least once the central bank is included in the model to revive the economy, and a true cycle, since there is a good reason to think it will often do so.

g. *Schumpeter's Creative Destruction and Economic Development*

Schumpeter's theory of economic development (1934, 1942) combines psychological, sociological, technological and economic elements to explain the medium to long run development in a capitalist society. The dynamic entrepreneur is at the center of the theory and the engine of progress.

According to Schumpeter:

The opening up of new markets, foreign or domestic, and the organizational development from the craft shop to such concerns as U.S. Steel illustrate the same process of industrial mutation?—if I may use that biological term—that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.

(1942 [2008], p. 83)

In Schumpeter's theory dynamic entrepreneurs are alert to profit opportunities and willing to take the risks needed to implement technological innovations. If successful, economic development is fostered (via creative destruction as the implementation of the technological advance destroys the value of old technology and the industries using it).

The theory describes a cycle that is based on our scheme of disruption and adjustment. Before Schumpeter's dynamic entrepreneur introduces a technological innovation the economy proceeds smoothly. The entrepreneur's innovation disrupts plans of other economic

actors in the economy and induces multiple adjusting changes in the economy. First, both consumers and competitors face uncertainty about how the new situation affects their plans. Therefore, the following adjustment process may take time and comprise multiple feedback loops.

If the innovation earns the entrepreneur a pure profit, others will sell less than they planned, a monopoly may lose its monopoly rents, or the innovation will make some industries oblivious. Once other, less innovative entrepreneurs understand the reason of profits they will adopt the innovation to arbitrage away the profit opportunities via imitation. They, too, want to make the gains. While imitation helps spread the innovation throughout the economy it also drives down the profits of the dynamic entrepreneur as the technological advance is absorbed throughout the economy. So, again, we have a two-population model, with the innovators creating changes that the followers respond to, creating a new equilibrium.

h. R.M. Goodwin's Growth Cycle

We finally turn to a variety of business cycle theory that has very explicitly made use of the predator-prey model and the Lotka-Volterra equations. In the initial statement of this model, after a page of mathematically positing relationships between output, capital, wage rates, productivity and employment, Goodwin writes:

In this form we recognize the Volterra case of prey and predator... to some extent the similarity is purely formal, but not entirely so. It has long seem to me that Volterra's problem of the symbiosis of two populations—partly complementary, partly hostile—is helpful in understanding what the dynamical contradictions of capitalism, especially when stating any more or less Marxian form. (1967, p. 55)

One would guess from Goodwin's statement above and his Marxist background that the two populations would be the capitalists and the workers, with the capitalists obviously taking the role of predators. But one would be wrong: in Goodwin's actual model, the populations are not really populations at all: the "prey" turns out to be the employment rate, while the "predator" is the worker's share of output. But Goodwin still sees a relationship between the formal model to the actual populations of workers and capitalists:

[A] low growth rate leads to a fall in output and employment to well below full employment, thus restoring profitability to its average value because productivity is now rising faster than wage rates. This is, I believe, essentially what Marx meant by the contradiction of capitalism and its transitory resolution in booms and slumps. It is, however, un-Marxian in asserting that profitability is restored not (necessarily) by a fall in real wages but rather by their failing to rise with productivity. Real wages must fall in relation to productivity; they may fall absolutely as well, depending on the severity of the cycle. The improved profitability carries the seed of its own distraction by engendering a too vigorous expansion of output and employment, thus destroying the reserve army of labour and strengthening labour's bargaining power. This inherent conflict and complementarity of workers and capitalists is typical of symbiosis. (1967, p. 58)

Since Goodwin's original paper, he and others have done further work within this framework. For instance, Mehrling (1986) added game-theoretic foundations to the original model, while Desai et al. (2004) fix some problems in the mathematics that had allowed wages to be over 100% of output and employment to rise over 100%, and Sportelli (1995) seeks to eliminate the instability in Goodwin's original model.

In any case, this paper can be seen as a generalization of this insight of Goodwin's: not only the Marxist business cycle theory, but many other cycle theories can be modeled starting with the predator-prey foundation.

5 Conclusion

We have found the ideas we have developed here useful for better understanding social cycles. We have described a broad range of cycle theories within the concept of disruption and adjustments. Many important theories are true endogenous social cycle theories in which adjustment processes themselves give rise to new disruptions or the theory provides a reason why the cycle should recur. Further, analyzing the theories we have found that many social cycle theories seem to fit with a two-population disruption and adjustment model similar to the well-known predator-prey model. This implies that a general modeling framework could be established for creating agent-based models of many social cycle theories.

Appendix A: A Schemata of Haberler's Cycle Theory Types

Theory	Exogenous/endogenous	Reason
<p><i>Purely Monetary Theory:</i> Hawtrey</p>	<p>Exogenous (not specified by Haberler)</p>	<p>Changes in consumers' outlays due to changes in the quantity of money (banking system creates credit and regulates its quantity)</p>
<p><i>Over Investment Theories</i></p>		
<p>A) Monetary Over-Investment Theories (Hayek, Machlup, Mises, Robbins, Röpke, Strigl)</p>	<p>New upswing endogenous (seems difficult to determine whether upswing brought about by external or internal forces)</p>	<p>Fall of prices comes to an end. If outlooks are more optimistic, the money rate falls below the natural rate, which leads to an increase in credit demand and a new upswing. No stimulus needed to start new upswing</p>
	<p>Endogeneity/exogeneity depends on causal factor of discrepancy of interest rates</p>	
<p>B) Non-monetary Over-Investment Theories (Spiethoff, Cassel)</p>	<p>Question of endogeneity or exogeneity not satisfactorily answered by authors of school; Endogenous and exogenous forces</p>	<p>Responses of the economic system to external shocks (Cassel: cyclical movement would die down if no stimuli (inventions and discoveries) were provided</p>
<p>C) Over-investment resulting from Changes in the Demand for Finished Goods: The Principle of Acceleration and Magnification of Derived Demand</p>	<p>Classification not specified by Haberler: Question of endogeneity or exogeneity depends upon cause for change in consumers' demand, since a rise in demand for consumers' goods leads to a rise in investment and vice versa</p>	<p>For technological reasons, slight changes in the demand for consumers' goods produce much more violent variations in the demand for producers' goods</p>
		<p>Proposition, combined with other relationships between economic variables, leads to explanation of business cycle</p>
<p><i>Factors put forward as causes of periodic recurrence of crises and depressions</i></p>	<p>No classification</p>	
<ul style="list-style-type: none"> • Changes in costs and movements in efficiency • Horizontal maladjustments (over-development of a particular 		

branch of an industry):

- Error theories
- Over-indebtedness (Irving Fisher) (closely related to over-investment theories, Fisher stresses that these investments have been made with borrowed money as cause of depression)
- Financial organisation and severity of depression (Loveday)
- (long-term credit contracts/rigidity of claims affect distribution of income due to changes in the price level, intensify changes)

Under-consumption theories

(theory of crises and depression rather than theory of business cycle)

- Over-saving theory
Capital shortage (ex-ante investment exceeds ex-ante saving)
- Insufficiency of consumer demand (ex-ante saving exceeds ex-ante investment)

Monetary under-consumption theory (Neisser): *endogenous* cause of deflation

Trouble arises at first in consumption good industries and then spreads to upper stages of production, since investment is shortened

- Lag in wage-rise (closely connected to monetary over-investment theory: profits accumulate due to an insufficient rise in wages, which provides a stimulus for credit and investment expansion. Over-investment theories: inflationary credits lead to over-investment

Under-consumption theories: excessive profits lead to excessive savings)

Psychological theories complementary to and compatible with all previous theories (Psychological factors: mainly expectations/anticipations)

Endogeneity/exogeneity (not classified by Haberler) depends upon cause of expectations

new investment possibilities due to, for example, interventions, inventions, changes in demand, and interest rate changes

Errors of optimism lead to errors of pessimism when optimistic error is discovered

Harvest theories, Agriculture and the business cycle (no alternative to previous theories, agricultural fluctuations as stimuli in the economic system)

Exogenous (not specified by Haberler)

Cosmic influences influence weather conditions which influence harvests which influence general business (disagreement about channels, sign and direction of influence)

Theory of under-employment (Keynes, closely related to theory of under-consumption)

Endogenous or exogenous, depending on factor that influences unemployment (not classified by Haberler) Static nature of theory implies, however, exogeneity

Unemployment not determined by single factor: employment increases with the propensity to consume, the marginal efficiency of capital, and the decrease in the liquidity preference. Employment decreases if

banks contract the quantity of money...

Classifications: active and passive factors, controllable and uncontrollable factors. More commonly, a distinction is made between causes which originate within and causes which originate outside the economic system (economic, non-economic factors or circumstances).

Distinctions between factors are frequently a matter of convention rather than of argument.

Closely related to economic, non-economic factors: distinction between exogenous and endogenous theories of the business cycle

Exogenous theories: assume external disturbances, law about (cyclical) change in certain data

Endogenous theories: rely exclusively on movements which can be explained economically, dynamic theory, magnitude explained by another magnitude (relating to an (earlier) point in time)

(more detailed explanation: pages 8f)

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