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Knowledge and Coordination and Business Cycles

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Introduction

Daniel Klein's book *Knowledge and Coordination* is a fascinating look at two topics crucial to economic theory. Given the book's focus, it might seem natural that there would be some attention paid to business cycles, but the topic is absent from its pages.

The aim of this paper is to see how the framework Klein offers, particularly his concepts of "concatenate coordination" and "mutual coordination," might be used to shed some light on business cycles. We do so beginning with an analysis of the simplest type of cyclical social behavior of which we can conceive, move on to analyze a somewhat more complex phenomenon such as fads, then investment cycles, and finally, we examine two variations of business cycle theory, one broadly "Austrian" and the other developed by Hyman Minsky.

Coordination-1 Does Not Imply Coordination-2

The Two Kinds of Coordination. Daniel Klein lucidly explains how different authors in the history of economic thought have given different meanings to the word "coordination." Until the mid-20th century, he states, economists used the verb "to coordinate" mainly in descriptions from the perspective of a coordinator, or at least a potential coordinator. Someone coordinates something. Klein labels this kind of coordination "concatenate coordination." Ex-post (overall) concatenate coordination is pleasing to an observer, for Klein, usually Smith's impartial one. One of Klein's examples is a room designed with a harmonious combination of colors, shapes, and so on.

But roughly around the 1960s, a second kind of meaning of coordination came to be predominate, through the works of such notables as Schelling (1960). Coordination is viewed as the intended coordination of two or more people. Someone coordinates with someone or around

something, e.g. two people plan to meet for lunch. Klein labels the second kind of coordination "mutual coordination" (Klein 2012: pp. 37-41).

Mutual coordination may or may not imply a pleasing concatenate coordination from the perspective of Klein's impartial observer. Assume there are potential charitable donors who are rich and willing to give and potential recipients who are poor and willing to receive. If the rich donors mutually coordinate to raise as much money as possible to donate it to the poor, mutual coordination is also coordinating in the concatenate sense. Both groups find the result to be pleasing and as an improvement. Klein's impartial observer would favor the outcome.

On the other hand, assume that we are looking at a population consisting of elderly widows that aim to hold on to what they have and fraudulent policemen that try to make as much as possible on the side. If the fraudulent policemen mutually coordinate to defraud the latter of their belongings, this mutual coordination may be concatenate from the point of view of the fraudulent policemen, but not for the elderly widows. Klein's impartial observer would certainly not like the outcome.

A third meaning of coordination, perfect plan coordination, in the sense of a unique general equilibrium, refers to both meanings: mutual and concatenate coordination. Given perfect plan coordination, there are no frictions and no discoveries to miss. No alternative would be more pleasing to an observer. There is no room for further concatenate coordination. At the same time, everybody has coordinated plans perfectly with everybody else.

Coordinative Action is Adjustment and Disruption. Concatenate coordination makes sense from the point of view of the coordinator. The coordinator perceives a possibility to improve the overall situation and adjusts accordingly. But attempting to achieve a concatenate coordination may *disrupt* plans of others and result in a number of *adjusting changes*. Overall, coordinative actions adjust some plans and potentially disrupt some plans.

The example of the elderly widows and the corrupt police illustrates that the coordinative actions of the policemen (one group of actors) can be perceived as *disruptions* from the point of view of the widows (the other group of actors). Now, of course the widows may not be able to act and *adjust* with respect to the theft of their belongings if everybody else is a fraudulent policeman.

But when, e.g., a producer discovers a profit opportunity and coordinates resources in a way to exploit it, this *adjustment* to the new situation is a form of concatenate coordination. He believes the coordination process benefits him. The producer's actions may *disrupt the plans* of others and induce multiple *adjusting changes*. While before means were employed as well as possible to reach ends of other market participants, the actions of the producer open up opportunities to improve the concatenation

of means to ends. In particular, the availability of the new product *disrupts* plans and induces *adjustments* by competitors and consumers. 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 new good is perceived to be better than the old one, the producer earns a pure profit. Others will sell less than they planned. Once they understand the reason, they will adopt the innovation to arbitrage away the profit opportunities via imitation. Again, this *adjustment* is coordinative to the consumers and the innovator's competitors, but *not* for the innovator. The initial producer will end up profiting less and less and will have to come up with a new idea soon if he wants to continue to have the best product.

In our example, the situation after the introduction of the discovery can make existing plans appear less pleasing than before to many people. If so, the initial coordinative adjustment lowers the overall degree of coordination. Deciding whether an adjustment with respect to a perceived profit opportunity brings about a tendency towards plan coordination depends on how it affects the plans of others. Only if we assume all market participants have complete information about the impact of the discovery, will they instantly, mutually coordinate plans to adjust to the change and opportunity.

Coordination and Cycles: Fads

Stabilizing and De-Stabilizing Adjustment. Let us now distinguish stabilizing from destabilizing adjustment. A stabilizing adjustment creates, over the time frame in which the theorist is interested, a series of further adjustments by others, that are, at each moment of time, of a lesser magnitude than the initial adjustment. On the contrary, a de-stabilizing adjustment creates, over the time frame in question a series of further adjustments that are, at each moment, of a greater magnitude than the initial adjustment. Stabilizing adjustments result in a higher degree of overall plan coordination. De-stabilizing adjustments lower overall plan coordination.

We can 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.

Based on this distinction, adjustment processes may induce a cycle if they result in a significant period of destabilizing adjustments followed by a

significant period of stabilizing adjustments. To generate recurring cycles endogenously, the adjustments themselves have to become the cause of renewed plan disruption. The recurrence of a cycle then becomes a repeated process of alternating forms of coordination.

Fads. As a concrete example, let us analyze fads in fashion using this framework and Klein's terms. Adam Smith analyzed 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)

Following Smith[3], 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, have that which only some others have, and 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, the population of T first 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 concatenate 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 concatenate 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 concatenate 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 coordination that had been achieved by the members of T. As φ diffuses through F, members of T find themselves no longer on the cutting edge, so they *adjust* by 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, this time using 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 with a lag.

This analysis is, of course, highly simplified. Even Smith would probably acknowledge that 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, in Smith's model, the widespread adoption of the fashion generates the actions that will lead to its abandonment. The cyclical movement is endogenous to the phenomenon itself.

The Two Forms of Coordination and Business Cycles

From Fads to Asset Market Boom-and-Bust Cycles. To link Klein's types to business cycle theory, we first use the framework of the fads example to describe boom and bust cycles on asset markets. We have two types of investors who work in exchange alley: V is the small group of value investors, who rely on a Graham and Dodd (2008) style analysis of, i.e., fundamental values. T are the trend followers, who rely on popularity to determine asset purchases (Greenwald et al. 2001). V and T behave similarly to the trend setters and followers in the fads example.

First, our value investors V identify an asset with fundamentals that suggest a higher value than reflected by the market price. This represents a failure of concatenate coordination to them. 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 increases.

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 suggest that prices are likely to rise and the asset has become more desirable. The new outlook disrupts the plans of the 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 seemingly represents a concatenate 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 all they have to buy, and there no longer is anyone to drive the price up further.

Assuming that the group of T holds all of these 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 on to assets that are less valuable (according to the value investors) than they believe. Once prices stop rising, expectations about the desirability of the assets worsen, so that the trend followers want to sell. Asset prices fall because they are overvalued from the point of view of the value investors V. No one wants to buy at the high price. The cycle starts over again if prices fall below the fundamental value calculated by the value investors V.

Klein's Ideal Types and the Business Cycle. Multiple triggers have been posited for swings in outlook that may drive business cycles, such as a rises or shortfalls in demand, a supply shock, a monetary policy shock, or technological advances in a specific sector. Koppl and Yeager (1996) provide evidence that "Big Players", such as policy makers, can make it

harder for market participants, such as our value investors and trend followers, to price assets based on fundamentals. They argue that a high unpredictability of policy measures creates volatile expectations about future asset market developments and potentially asset market boom and bust cycles. If, e.g., a central bank cuts interest rates, banks and investors may mutually expand loans and invest short-term if short-run profits are attractive and others do so as well, given that long-run uncertainty over future policy prevails. Herding and speculation are triggered (Koppl and Yeager 1996: p. 68).

Kindleberger (2000: pp. 38-41) argues—more generally—that to produce substantial boom periods that eventually turn bust, an (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, destabilizing. From a 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.

Given the multitude of possible reasons for booms and busts, it is not surprising that there are many business cycle theories. We apply Klein's ideal types of coordination to examine the latest business cycle using the Minskian and Austrian business cycle theories. These theories have regained some prominence among economists and historians in explanations of the 2007-8 crisis (Ferguson 2009, Lejivonhuvud 2009, and White 2009). As with Smith's fashion cycle theory, we are not interested in examining whether these theories are accurate; instead, we are seeing how we might use Klein's ideas to better understand the theories.

According to Austrian Business Cycle Theory (ABCT) as, e.g., presented by Mises ([1949] 1998), Garrison (2006) or Salerno (2012), the Federal Reserve kept policy rates too low for too long following the bursting of the dot-com bubble at the turn of the millennium. The low rates resulted in *destabilizing adjustments* of the real economy and triggered the building-up of the US subprime market bubble.

Banks took the opportunity to mutually provide easy credit to customers until 2005-6. The artificially low interest rates disrupted the attempts of savers and investors to achieve mutual coordination. Savers saved less while investors invested more. Thus, the bankers' attempts to achieve their preferred concatenate coordination following the cuts in refinancing rates by lending at lower rates produced poor mutual coordination between savers and investors.

During the boom, investors falsely assumed that the fall in interest rates corresponded to a rise in saving activity of households. And because a fall in interest rates raises the profitability of interest rate sensitive investments, investors adjusted to this disruption by making investment

more round-about. The financial and capital goods sectors boomed. However, given lower interest rates, saving was less attractive. Households consumed more instead of less, and even went into debt. Demand for interest rate intensive goods such as housing climbed.

In ABCT, this failure to achieve mutual coordination between savers and investors is finally revealed in the bust, when the fact that many ongoing capital projects will not be completed can no longer be disguised. When inflation raised nominal interest rates, firms and households that needed to roll-over debt were not able to do so, as the marginal efficiency of their investments was below the risen interest rates. Firms closed down and households were insolvent. This situation generally strikes *everyone* as failing to achieve concatenate coordination. In response to this obvious failure, many, remembering the good times of the boom, believe the remedy is easy money and low interest rates. We end up with a vicious cycle of big player intervention, booms and crises.

Based on Minsky's (1992, 2008) theory, monetary and fiscal policy has to do what it can possibly do to prevent a deflationary spiral and depression. From this point of view, the Fed's actions to stabilize the US economy following the bursting of the US dot-com bubble prevented the major *destabilizing changes* that would follow from a severe and unnecessary crash of the real economy. Minsky, however, is quite clear that such bailouts are not the optimal fix for these downturns, as they themselves prepare the ground for the next inflationary boom (2008: p. 17). In this respect, he shares the Austrian concerns about recent bailouts.

Interpreted based on Minsky, the upswing started when the economy stabilized - perhaps in 2003. Because real estate prices increased faster than consumer prices since the 1990s and the US economy had not seen general declines in house prices for a long time, Americans started to buy housing. Banks mutually financed the purchases at relatively low rates of interest. In this situation, both the banks and households were trend-followers in mutual hope for future profits.

Given the success and the development of the housing market in the early 2000s, banks as well as customers took higher risks. "Profit opportunities within a robust financial structure make the shift from robustness to fragility an endogenous phenomenon" (Minsky 2008: p. 234). Bankers moved from hedge to speculative and Ponzi finance (Minsky 2008: p. 233). The underlying investment depended more and more on low flexible mortgage rates and the development of real estate prices themselves. In the 2000s, banks made use of new financial instruments to further expand credit and share risks with other financial institutions around the world. Banks' risk portfolios seemed to be optimized and households were happy to live in houses with ever-rising value.

In the euphoria of the boom, everybody coordinated around the high-risk, high-return scenario. From an ex-post perspective, however, the

banks' risk appetite was *destabilizing* as more and more risks were accumulated over time, which created the necessity for larger *adjustments* later on. The coordination around high-risk products was revealed when inflation picked up, interest rates had to be raised, some households defaulted, and the demand for housing, upon which the scheme was built, faded. The economy went into a crisis in 2007-8.

In the recession, investors, households, and banks are overly risk averse and pessimistic: they coordinate around a low-risk, low-return strategy. Households pay down debt and prefer to hold liquidity. Banks deal with losses, shorten balance sheets, and contract credit. Businesses lose equity and pay down debt instead of investing. A deflationary spiral continues 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.

Conclusion

We believe we have shown that while Klein himself did not address business cycle theory in his book, his ideal types of mutual coordination and concatenate coordination can shed light on business cycle theories. We have, of course, not been able to do more than scratch the surface of how the concepts dealt with in Klein's book can be fruitful for understanding business cycles. Nevertheless, we hope we have at least pointed out some promising paths for future research. More specifically, we feel it would prove fruitful to examine a broad range of cycle theories in light of Klein's concepts, which we feel would reveal a greater unity in such theories than has hitherto been understood to exist.

Notes

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[3] Nota bene: Our only goal here is to model Smith. There is a vast literature on fashion cycles, some of which indicates that Smith's model may not fit the empirical facts (see, e.g., Acerbi, Ghirlanda, and Enquist, 2012). That literature, however perspicacious it may be, is not relevant to our aim, which is simply to show that our ideal types clarify Smith's model.

References

Acerbi, A., S. Ghirlanda, M. Enquist. 2012. "The Logic of Fashion Cycles," PLOS One. 25 April 2013 <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0032541>.

Ferguson, N. 2009. "Dead Men Walking," *Foreign Policy*, December 2009.

Garrison, R. 2006. *Time and Money: The Macroeconomics of Capital Structure*. Routledge, NY.

Graham, B. and D. Dodd 2008. *Security Analysis*, 6th ed. New York: McGraw-Hill.

Greenwald B., J. Kahn, P. Sonkin and M. von Biema 2001. *Value Investing: From Graham to Buffett and Beyond*. Hoboken, NJ: Wiley Finance.

Kindleberger, C. 2000. *Manias, Panics, and Crashes: A History of Financial Crises*, 4th ed. New York: Wiley.

Klein, D. 2012. *Knowledge and Coordination*: *A Liberal Interpretation*. Oxford University Press.

Koppl, R. and L. Yeager 1996. "Big Players and Herding in Asset Markets: The Case of the Russian Ruble," *Explorations in Economic History*, 33 (3): 367–383.

Leijonhufvud, A. 2009. "Out of the Corridor: Keynes and the Crisis," *Cambridge Journal of Economics*, 33, 4: 741-757.

Minsky, H. 1992. "The Financial Instability Hypothesis," Working Paper No. 74, Bard College. The Levy Economics Institute. Prepared for *Handbook of Radical Political Economy*, Ph. Arestis, M. Sawyer and E. Elgar (eds), Aldershot, 1993.

Minsky, H. 2008. *Stabilizing an Unstable Economy*, 1st reprint. McGraw-Hill.

Mises, L. von [1949] 1998. *Human Action*, Scholar's Edition. Auburn, AL: Ludwig von Mises Institute.

Salerno, J. 2012. "A Reformulation of Austrian Business Cycle Theory in Light of the Financial Crisis." *Quarterly Journal of Austrian Economics*, 15, 1: 3-44.

Schelling, T. 1960. *The Strategy of Conflict*. Cambridge: Harvard University Press.

Smith, A. 1790. *The Theory of Moral Sentiments*. Library of Economics and Liberty. 28 October 2012. <http://www.econlib.org/library/Smith/smMS5.html>.

White, W. 2009. 'Modern Macroeconomics Is on the Wrong Track', *Finance and Development*, December 2009: 15-18, IMF.