

# Hayek's Price Fan Simile: The Seeds of the *Economy of Knowledge*?

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## **Abstract**

Friedrich Hayek's research focus shifted from a formal analysis of the capital structure in the early 1930s to the study of the economy of knowledge in 1945. He never, as it is too often said, abandoned economics. The abandonment narrative impedes understanding of Austrian economics generally and Hayek's works more specifically. Toward correcting the false narrative, we explore connections between his 1945 thesis and the price fan simile he set out in 1931 to facilitate understanding of the role played by emerging input prices as more capitalistic methods of production are adopted. Expanding on the price fan simile, we also seek to deepen the understanding of the allocative marvel that prices achieve in the free market system, and, consequently, the utter impracticality of using socialist calculation in place of the free market.

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*“Adam Smith famously argued that the greatest improvements in the productive capacity of mankind were due to the expansion and ever-greater refinements in the division of labor. Hayek simply pointed out that the division of labor implies also a division of knowledge. . . . Hayek never abandoned economics.”*

—Peter Boettke (2017)

## **I. Introduction**

From the early 1930s to 1945, Friedrich Hayek's research on capital structure and market equilibrium gave way to an investigation of the economy of knowledge that market prices marvelously deliver—harmonizing the diverse individual plans of market participants. Of this period, Hayek later said that he left “pure and narrow” theory, or

“technical economics,” to pursue an explanation of “how an overall order of economic activity is achieved which utilized a large amount of knowledge which was not concentrated in any one mind but existed only as the separate knowledge of thousands or millions of different individuals” Hayek (1967, pp. 91–92). These excerpts are part of a lengthy Hayek quotation that Bruce Caldwell highlighted as the epigraph of his seminal article in 1988, “Hayek’s Transformation.” Caldwell (1988, p. 538) aptly concludes: “Because he felt that the coordination problem was so crucial, Hayek ultimately turned away from *technical* economic theory to search for solutions” (emphasis added). Only incautious readings of Caldwell—that omit the qualifier “technical”—have led to the false, unqualified conclusion that “Hayek abandoned economics.”<sup>1</sup> For example, Skidelsky (2006, 2018, p. 87), perhaps after misreading Caldwell, maintains that Hayek “eventually abandoned economics for political philosophy.”

Boettke’s disagreement with Skidelsky, and with all who say “Hayek abandoned economics,” is that economics is defined so narrowly as to exclude the institutional tradition within which Adam Smith ([1776] 1976) theorized that “the division of labor is limited by the extent of the market.” Smith’s discovery, Boettke explains, inspired Hayek’s (1937) work on the “division of knowledge,” leading him straightforwardly into investigations of law, legislation, and liberty: “Hayek’s *epistemic institutionalism*, as articulated in the 1930s and 1940s, provided the foundation for his own reconstruction and restatement of liberal political economy as evidenced in *The Constitution of Liberty* and *Law, Legislation and Liberty*” (Boettke 2017).

This paper presents other, complementary reasons to think that Hayek’s transition from the 1930s through the 1940s was anything but an abandonment of economics. Our reasons trace to a price fan simile that Hayek used in 1931 to draw attention to the important role played by input prices as a free market economy’s production becomes “more capitalistic.” Leveraging Hayek’s (1937, 1945) work on the division and economy of knowledge, we revisit his 1931 discussion of the price fan. With the benefit of hindsight, the price fan simile suggests itself as a precursor to Hayek’s economy of knowledge thesis. The price fan simile is not only valuable for deepening understanding of Hayek’s change in focus, but also for its

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<sup>1</sup> Read together, Caldwell and Hayek make it clear that rather than abandoning economics per se, Hayek merely left behind the narrow, purist, technical, equilibrium models popular among economists of the pre-1940s era.

own sake, as a way to illustrate the interconnectedness of the division of knowledge, the economy of knowledge, and the division of labor.

The remainder of the paper is organized as follows: section 2 traces Hayek's (1945) economy of knowledge thesis to his 1937 critique of the formal economic analysis of the era for its failure to account for the problem of the division of knowledge. Section 3 revisits Hayek's (1931) price fan simile, to explain its connection to Hayek's subsequent work and to "expand upon" the simile in order to overcome the trepidation he expressed in 1931 (long before his research focus shifted to the economy of knowledge in 1945).<sup>2</sup> Section 4 explores the broader implications of the price fan simile—the division and economy of knowledge that have been achieved by our extensive market system, making it obvious that socialist calculation is impossible. Section 5 concludes.

## II. From the *Division of Knowledge* to the *Economy of Knowledge*

In 1937, in "Economics and Knowledge," Hayek begins to discuss two questions about the assumptions and operationalism of formal equilibrium economics, setting set up his work on the economy of knowledge nearly a decade later. First, "to what extent," Hayek (1937, p. 33) asked, is it true that "formal economic analysis conveys any knowledge about what happens in the real world"? He contended it is "only in so far as we are able to fill those formal propositions with definite statements about how knowledge is acquired and communicated" that "formal equilibrium analysis . . . can be turned into propositions which tell us anything about causation in the real world" (1937, p. 33).

Second, Hayek (1937, p. 43) wonders: What could be the reason for concern with a "fictitious state of equilibrium"? The "only justification," he reasons, is to bring forth verifiable pattern predictions regarding an empirical "tendency towards equilibrium" (p. 44). Here, Hayek puts forward a challenge to create operational

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<sup>2</sup> "At this point the simile becomes liable to mislead and it is important to keep in mind all the time that the 'fan' refers to price relationships only, but that the length of the structure of production will move in the reverse direction compared with the width of the fan. When the price fan opens, the structure of production is shortened, and vice versa," writes Hayek (1931 [2012], p. 261, fn. 5). This trepidation may explain why Hayek never again in his career revisited this simile. In this paper we resurrect it to undermine the false narrative that Hayek abandoned economics and to provide a visual illustration of the linkages between market size, the division of knowledge, and the economy of knowledge.

hypotheses about the conditions under which the “knowledge and intentions of purposes of the different members of society” will “come more and more into agreement,” or, alternatively stated, the conditions under which “the expectations of the people and particularly the entrepreneurs will become more and more correct.” Putting it in the negative, Hayek (1937, p. 43) criticized the formal economics of the era because it had “simply assumed that the subjective data,” the divided knowledge dispersed across the many individual minds of those in society, “coincide with the objective facts.” In this way, economics had “jumped over an essential link” (1937, p. 52), overlooking the problem of the division of knowledge—a problem “at least as important as the problem of the division of labour” (1937, p. 49).

Hayek highlighted two avenues by which the problem of the division of knowledge had been “jumped over.” One was via the assumption that “everybody knows everything” to “evade any real solution of the problem” that they “pretend to solve,” namely, “how the spontaneous interaction of a number of people, each possessing only bits of knowledge, brings about a state of affairs in which prices correspond to costs, etc., and which could be brought about by deliberate direction only by somebody who possessed the combined knowledge of all those individuals” (1937, p. 49). The second avenue, by which the division of knowledge problem was jumped over, was by the “insidious” leap in applying the equilibrium analysis of an isolated individual to the “analysis of the situation in a society” (1937, p. 39).

By 1945, Hayek had abandoned technical equilibrium economic modeling entirely. His last attempt, published in 1941 as *The Pure Theory of Capital*, was in fact only the first half of a great book that he intended to assuage the critics of his 1931 book *Prices and Production*. Asked, “What message do you want to convey in that book [*The Pure Theory of Capital*]?” he responded:

To put it briefly, I think it’s that while Böhm-Bawerk was fundamentally right, his exposition in terms of an average period of production was so oversimplified as to mislead in the application. And that if we want to think the Böhm-Bawerk idea through, we have to introduce much more complex assumptions. Once you do this, the things become so damned complicated it’s almost impossible to follow it. (Hayek 1994, p. 141)

Explaining why he did not complete the equilibrium analysis of the economy's capital structure, Hayek explained that doing so "would have meant working for a result I already knew, but I had to prove it, which was very dull" (1994, p. 96).

Leaving formal equilibrium analysis behind, Hayek explained, freed him to pursue "an intellectual problem" in economics that was "much more fascinating": "*What does economics really look like when you recognize it as the prototype of a new kind of science of complex phenomena, which could no longer employ the simple model of mechanics in physics, but had to deal with what then I described as 'mere pattern predictions,' 'certain limited predictions?'*" (1994, p. 96). If we take Hayek at his word, then he abandoned the dull, formal, equilibrium modeling in order to expand the operational applicability of economics to complex phenomena. Furthermore, to claim that he "abandoned economics" from 1941 onward is also, and more importantly for our purposes, to ignore Hayek's authorship of one of the most widely cited articles to ever appear in the *American Economic Review*, "The Use of Knowledge in Society."<sup>3</sup> In this seminal work, Hayek identifies the economy of knowledge as the "most significant fact" about the free market price system:

The most significant fact about this [the price] system is the economy of knowledge with which it operates, or how little the individual participants need to know in order to be able to take the right action. In abbreviated form, by a kind of symbol, only the most important information is passed on, and passed only to those concerned. It is more than a metaphor to describe the price system as a kind of machinery for registering change, or a system of telecommunications which enables

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<sup>3</sup> The number of citations to this article, according to a Web of Science citation search on January 30, 2018, was 3,049. As a point of comparison, Ronald Coase's publication "The Problem of Social Cost," according to our Web of Science search, had 5,901 citations. The count on Hayek's article vastly understates the citations to the ideas in the article because, for example, the article is also found in Hayek's 1948 book *Individualism and Economic Order*, which is often cited by those referencing it. It is also interesting to note that the Web of Science citation count was much smaller—only several hundred—for Hayek's 1937 published discussion of the division of knowledge and critique of equilibrium theory ("Economics and Knowledge"), which was the presidential address to the London Economic Club given in November 1936. Hayek's 1937 publication laid groundwork, but his 1945 paper that presents his economy of knowledge thesis has been cited nearly ten times more often.

individual producers to watch merely the movement of a few pointers, as an engineer might watch the hands of a few dials, in order to adjust their activities to changes of which they may never know more than is reflected in the price movement (Hayek 1945, pp. 526–27).

The economy of knowledge resulting from the free market price system is the key to understanding the error correction process, the “tendency toward equilibrium,” that he alluded to in 1937—by which the “knowledge and intentions of purposes of the different members of society” will “come more and more into agreement,” and by which “the expectations of the people and particularly the entrepreneurs will become more and more correct” (Hayek 1937, p. 43). Market prices guide the system’s processes, and adapt in turn as the processes play out, working as “knowledge surrogates” (Thomsen 1992, p. 41) to coordinate individuals “to take the right action” Hayek (1945, p. 526).<sup>4</sup>

### III. Hayek’s Price Fan Simile in Hindsight

Hayek’s 1945 conclusion was that the economy of knowledge of the price system is capitalism’s most essential fact. How did he get there? As we have already explained, this conclusion followed naturally as an extension of his discussion of the division of knowledge in 1937. But is it completely unconnected to his earlier work on capital theory, as those who say he “abandoned economics” would argue? Or were

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<sup>4</sup> In 1941, in an article that originally appeared in *Nature*, Hayek (2009) explains this thesis similarly, sans the economy of knowledge moniker he coined in 1945: “The competitive price system makes possible the utilization of an amount of concrete knowledge which could never be achieved or approached without it. . . . There is no possibility of a division between the general outline of the plan and the detail of the execution—or at least no way for such a division has yet been shown. The reason for this is that the general features are just the result of an infinity of details, and there are no principles which, without harm, can be laid down irrespective of the detail. Yet, in order that in a decentralized system the individual decisions should be mutually adjusted to each other, it is of course essential that the individual entrepreneur should learn as promptly as possible about any relevant change in the conditions affecting the factors of production and the commodities with which he is concerned. Now this is precisely what the price system brings about if competition is functioning. It is in effect a system under which every change in conditions and opportunities is promptly and automatically registered so that the individual entrepreneur can read off, as it were, from a few gauges and in simple figures, the relevant results of everything which happens anywhere in the system with respect to the factors and commodities with which he is concerned” (Hayek [1941], 2009, p. 214).

there seeds of the economy of knowledge thesis in that earlier work? With the benefit of hindsight, we are inclined to say there were, based on Hayek's (1931) heretofore uncited simile that he alluded to with regard to the Böhm-Bawerkian model of roundaboutness he was focused on at the time.<sup>5</sup>

Hayek presented this allusion during his second lecture at the University of London in 1931. In an effort to explain the complications of the price adjustments involved, Hayek suggested a simile of a hand-held fan: "It will, perhaps, facilitate the understanding of these complications if we think of production in its successive stages as a fan, the sticks of which correspond to the prices of the different stages."

Recall what was said above about Hayek's reflections on the "great book" he never finished in 1941, whose planned purpose was to answer the critics of his 1931 book. Again, the "more complex assumptions" he introduced in 1941 into his "oversimplified" model of 1931 made it "so damned complicated it's almost impossible to follow" (Hayek 1994, p. 141).<sup>6</sup> With this in mind, it is clear that Hayek's 1931 simile was an early, informal attempt to facilitate understanding of the complications that price adjustments introduced into stages-of-production modeling. These same complications are those that made the formal modeling he abandoned in 1941, again, "almost impossible to follow" (Hayek 1994, p. 141).

The context in which Hayek introduced the price fan simile was a discussion of the price adjustments that result in a lowering of the natural interest rate. Starting with the "supposition that consumers decide to save and invest a larger proportion of their income,"<sup>7</sup>

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<sup>5</sup> Evidence of his interest in the importance of price adjustments in capital structure theory, independent of interest rate effects, can be found even earlier than 1931. For example, see Hayek (1984 [1928], pp. 71–117). We thank Steven Horwitz for alerting us to this early Hayek essay.

<sup>6</sup> To our knowledge, this is the *only* occasion in which Hayek used profanity (in this case, "damned") regarding an aspect of his work. This atypical word choice to emphasize the complications that had precluded understandable formalization is consistent with his failure to be able to answer his critics despite an enormous expenditure of time and effort: "I had been criticized for the fact that in *Prices and Production* I had a very inadequate theory of capital; that in this crude Böhm-Bawerkian form of an average period of production, it was inadequate. So I had started writing a great book on capital and money, which ultimately dealt with the money phenomenon. It took me very much longer than I thought; I worked seven years on *the thing*" (Hayek 1994, p. 90, emphasis added).

<sup>7</sup> The topic of Hayek's second lecture was "The Conditions of Equilibrium between the Production of Consumers' Goods and the Production of Producers' Goods."

Hayek ([1931] 2012) explains that the price fan will close as the interest rate falls because of a rise in the demand for producers' goods relative to consumers' goods:

[If] a shift of demand from consumers' goods toward producers' goods takes place, the fan will close, i.e., the difference between the stages will become smaller and goods will tend to gravitate toward the higher stages where prices are now relatively higher, and new and hitherto unused possibilities exploited. The closing of the fan has brought a greater number of stages of production within the range of practical possibilities. (p. 261)

We must consider the price fan simile in context. First, the simile appears in a chapter in *Prices and Production* titled *The Working of the Price Mechanism in the Course of the Credit Cycle*. There can be no confusion over the meaning of the word *prices* in this context—they are the *monetary* prices that arise within a capitalist economy that has expanded enough to have seen a sufficient division of labor to have a banking industry, rather than the *prices* that arise in either a conceptual exchange economy or a Robinson Crusoe economy.

Second, within this chapter on the credit cycle, Hayek's discussion of the simile must be placed in the context of the discussion that immediately preceded it (the discussion that Hayek hoped would be clarified by the simile):

The additional stages of production which have been started as a consequence of this transition to more capitalistic methods of production will probably require new goods of a specific character. Some of these will be new products, some natural resources which formerly it was not profitable to use. (Hayek [1931] 2012, p. 260)

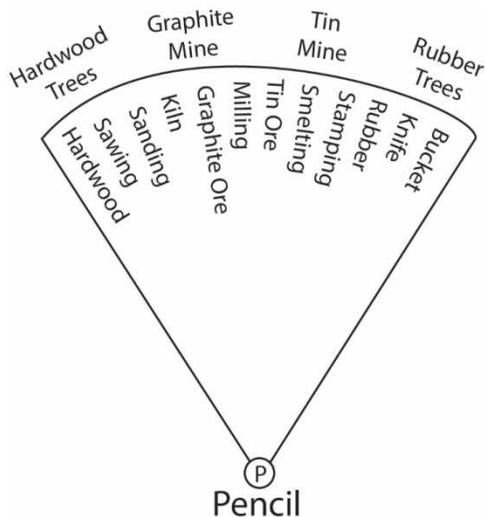
New goods, of which some become new products, are the complication that Hayek highlights here. Previously existing only as unproductized, unpriced natural resources, these new goods and new products emerge during the transition to more capitalistic methods of production. On the heels of this transition, Hayek deploys his price fan simile in an attempt to clarify the market activity attending the emergence of new products.

To draw together Hayek's price fan simile of 1931 and his 1945 thesis of the economy of knowledge, we create diagrams, not offered by Hayek, to draw attention to the contrast between an economy

with and without priced intermediate goods.<sup>8</sup> Consider the production of pencils in two polar cases—one in which pencils are produced from materials that are natural resources and the opposite case in which pencils are produced from materials that are productized and priced. In both cases, finished pencils are priced and sold in open markets.

Figure 1 shows an open price fan to illustrate pencils produced from natural resources. With the fan completely open, as shown, pencil producers harvest the hardwood from trees, then saw and sand to create the bodies of pencils. Pencil producers then mine graphite ore, heat it in kilns, and mill it for the centers of pencils. Tin ore, too, is mined by pencil producers, who then smelt and stamp it into the ferrules that house erasers. Rubber trees are cut with knives so that their sap can be gathered in buckets. The sap is then vulcanized and cut into eraser materials to be fitted into ferrules.

**Figure 1. Open price fan (making pencils from natural resources)**

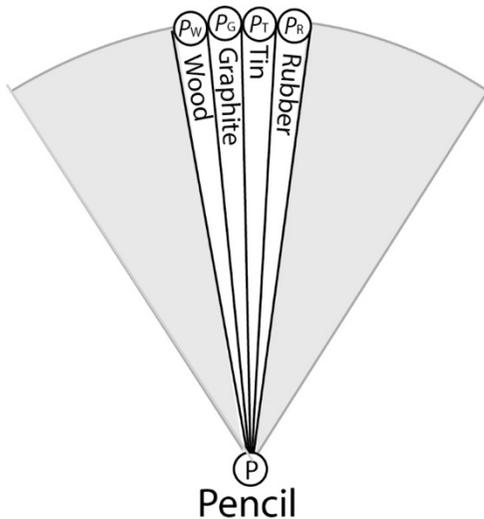


<sup>8</sup> For whatever reason, Hayek never created any diagrams to facilitate understanding of his price fan simile. Following the subsection in which the price fan is discussed, he *does* offer a graphical analysis of how the “shifting of the demand curves for any *single factor* in the different stages of production operates” (Hayek [1931] 2012, p. 261, emphasis added). This diagram is clearly not an illustration of the price fan—the simile meant to facilitate understanding of the complications arising from the emergence of new productized and priced goods attending the transition to more capitalistic methods of production that are beyond simplistic discussions of roundaboutness.

Pencil producers must possess a vast amount of knowledge in this case. Not only must they possess knowledge of how to make a pencil from the four basic components (wood, graphite, tin, and rubber), but they must also possess the knowledge of where to find and how to process the natural resources into these components (knowledge of trees and forestry, knowledge of geology and mining, etc.). Think of the surface area of the open fan as the extra amount of knowledge—beyond what would be necessary with the four basic components in hand—to produce pencils.

None of this extra knowledge, of course, is required if the basic inputs are purchased by those who use them to produce pencils. Figure 2 shows a closed price fan to illustrate this case. In figure 2, there is not only a price point  $P$  for pencils (indicating their sale on open markets), but there are also price points for each of the basic components used to make pencils.

**Figure 2. Closed price fan (making pencils with priced components)**



As figure 2 shows, the price of wood is denoted  $p_W$ , the price of graphite  $p_G$ , the price of tin  $p_T$ , and the price of rubber  $p_R$ . The proliferation of prices of new goods and new products is, as Hayek explained, an expected consequence as an economy makes the transition to more capitalistic methods of production.<sup>9</sup> Just as Hayek

<sup>9</sup> An anonymous referee pointed out that the complications here (the complications that Hayek discussed immediately prior to presenting the price fan simile) surpass the following, more standard story of roundaboutness that the referee related: “For

explained in 1931, we see the open price fan in figure 1 closing in figure 2 as newly priced components emerge. Making pencils from priced inputs obviously economizes on the knowledge that pencil-makers require, but the economy of knowledge would extend beyond pencil makers to the producers of anything that uses the newly priced components.

#### **IV. The Economy of Knowledge Is Limited by the Extent of the Market**

Thinking about wood as a priced input more broadly, not only is there an economy of knowledge realized by pencil producers as shown in figure 2, but there is also an economy of knowledge realized by all producers who use wood as a priced input. These might include the producers of houses, furniture, boats, and paper. Herein lies an opportunity to expand another version of Hayek's price fan simile to illustrate that the economy of knowledge, like the division of labor, is limited by the extent of the market.

Consider figure 3. An open fan at the top shows the conversion of hardwood trees into the priced input, wood, processed by the firms that specialize in producing this input. It is because this input is used to produce so many final consumer goods (among them pencils, houses, furniture, boats, and paper, as shown in figure 3) that specialist firms in the production of wood emerge—the market for this input is extensive. The arrows in figure 3 illustrate that the price of wood economizes on the knowledge not only of pencil producers, but of all firms that use priced wood as an input.

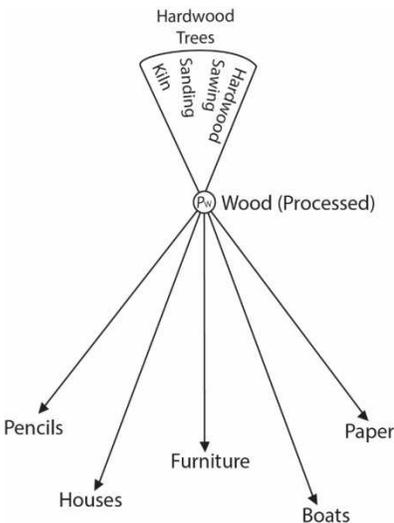
As the market grows, expansions of the division of labor and the economy of knowledge reinforce one another, causing even more market expansion. But these reinforcing influences have typically

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example, a more standard story would say that Production Technique B involves using some of the wood and tin to first build more axes, so that the workers can fell more hardwood trees per hour of labor than in Technique A. When all is said and done, Production Technique B produces more pencils per unit of labor, but it takes an extra month of waiting.” The more capitalistic methods of production stemming from the emergence of newly priced inputs, as mentioned in footnote 8, again, extend beyond the simplest stories about roundaboutness. Thinking beyond standard stories is essential to accommodate considerations that observational reality emphasizes are important. For example, consistent with Hayek's mention of the complication of new products coming into play in the transition to more capitalistic methods of production, Roger Garrison (2013), in a presentation of his famous Power Point slides, designates “research and development” among the earliest usages of capital.

been studied only separately. For example, exploring the consequences of the division of labor, George Stigler (1951) argues, “Broadly viewed, Smith’s theorem [on the division of labor and extent of the market] suggests that vertical disintegration is the typical development in growing industries, vertical integration in declining industries.” As an economy grows, the extent of the market grows with it and causes labor to become further divided. Relating figure 3 to the modern US economy, we understand that a series of specialized firms intermediates between forest and wood wholesalers—for example, timber companies, saw mills, and trucking companies that use tools made by yet other firms that specialize in producing such things as saws, kilns, sanding machines, trucks, and fork lifts.

**Figure 3. Price fan for wood facilitating the production of multiple goods**



Just as important as the division of labor, Hayek (1937) argues, is the division, and economy, of *knowledge* delivered by the free market price system. Referring to figure 3, it becomes clearer that just as the division of labor expands in a growing economy, so does the economy of knowledge delivered by market prices. Prices, as Hayek (1945) emphasizes, are the “marvel” of markets. The additional point, which can be made clearer by keeping the price fan simile in mind, is that as the market expands, there are more prices providing a greater economy of knowledge—the greater the number of market prices in play, the more marvelous the price system becomes. The static interpretation of figure 3 is that the price of wood economizes on the

knowledge required by the producers of pencils, boats, houses, furniture, and paper. But thinking about figure 3 more broadly—say, in the extensive marketplace of the contemporary United States—the price of wood is not the only price in play.

Indeed, the number of prices coordinating and constraining the production of just the products in figure 3 (along with all the upstream processes that produced all the inputs to these products) is probably beyond anyone's ability to count. This point can be seen in Hayek's (1945, *p.* 526) discussion of tin-making catallactics:

Fundamentally, in a system where the knowledge of the relevant facts is dispersed among many people, prices can act to coordinate the separate actions of different people in the same way as subjective values help the individual to coordinate the parts of his plan. It is worth contemplating for a moment a very simple and commonplace instance of the action of the price system to see what precisely it accomplishes. Assume that somewhere in the world a new opportunity for the use of some raw material, say tin, has arisen, or that one of the sources of supply of tin has been eliminated. It does not matter for our purposes—and it is very significant that it does not matter—which of these two cases has made tin more scarce. All that the users of tin need to know is that some of the tin they used to consume is now profitably employed elsewhere, and that in consequence they must economize tin. There is no need for the great majority of them even to know where the more urgent need has arisen, or in favor of what other needs they ought to husband the supply. If only some of them know directly of the new demand, and switch resources over to it, and if the people who are aware of the new gap thus created in turn fill it from still other sources, the effect will rapidly spread throughout the whole economic system and influence not only all the uses of tin, but also those of its substitutes and the substitutes of these substitutes, the supply of all things made of tin, and their substitutes, and so on; and all this without the great majority of those instrumental in bringing about these substitutions knowing anything at all about the original cause of these changes. The whole acts as one market, not because any of its members survey the whole field, but because their limited individual fields of

vision sufficiently overlap so that through many intermediaries the relevant information is communicated to all. The mere fact that there is one price for any commodity—or rather that local prices are connected in a manner determined by the cost of transportation, etc.—brings about the solution which (it is just conceptually possible) might have been arrived at by one single mind possessing all the information which is in fact dispersed among all the people involved in the process.

It is only “just conceptually possible,” as Hayek says here, that the solution brought about by market prices could be brought about by a “*single mind possessing all the information which is in fact dispersed among all the people involved in the process.*” Market prices are at once (1) a consequence of the actions of dispersed individuals who alone possess the knowledge of their particular circumstances; and (2) the means by which individuals are able to economize on the knowledge needed to be able to take the “right” actions—those actions that give rise to the empirical tendency toward equilibrium. With this in mind, the impossibility of the socialist calculation of market prices is palpable. How might one even begin to try to calculate the prices that both emerge from, and economize on, the particular knowledge in the minds of the many dispersed individuals—knowledge that is only in these minds as a result of interactions that occur in ongoing free market processes that produce only a tendency toward equilibrium?

At least as early as 1937, Hayek appears to have concluded that the calculation of market prices by a single mind, or by any group of central planners, was impossible. Consequently, it is no surprise that he came to realize—during his seven-year quest to write the “great book” on capital theory to respond to his critics—that the complications involved with trying to complete an explicit model that would represent his evolving thoughts about market processes was not only tiring and “dull,” but was unworthy of further effort (Hayek 1994, p. 96). Hayek’s two conclusions here are related: (1) he thought it impossible for socialist calculation to replicate market processes; and, subsequently, (2) he concluded that an explicit model of market processes would be a “thing” so “damned complicated” that it would be “almost impossible to follow” (Hayek 1994, pp. 90–91).

## V. Conclusion

In 1931, Hayek summoned a simile of a hand-held fan that closed with the adoption of more capitalistic production using greater numbers of *priced* inputs to alert his audience to the complications that emerging market prices would add to the capital structure theory he was presenting. Since 1931, neither Hayek nor anyone else, to our knowledge, has ever referenced his price fan simile. In 1937, Hayek criticized static equilibrium theorists for taking prices as givens and consequently “jumping over” the problem of the division of knowledge—a problem “at least as important as the problem of the division of labour” (Hayek 1937, p. 49). In 1941, Hayek published as *The Pure Theory of Capital* only the first of a planned two-volume work that was meant to respond to critics of his 1931 capital structure theory who had deemed it very incomplete for its slight of various complications. In 1945, Hayek (p. 526) defined “the economy of knowledge” with which the free market price system operates as “the most significant fact about capitalism”—“how little the individual participants need to know in order to be able to take the right action.”

In this paper, we have resurrected Hayek’s long forgotten price-fan simile for two reasons. First, we have argued that, looking back with the full benefit of hindsight, the seeds of Hayek’s 1937 division of knowledge critique and his 1945 economy of knowledge thesis can be seen in his 1931 price fan simile. Seeing these interconnections leads us away from the often-heard story that Hayek abandoned economics. Second, we think that, in light of our diagrammatic representation and discussion of the price fan, the simile is worth reviving for two pedagogical purposes: (1) as a way to visualize Hayek’s economy of knowledge thesis generally, and, more specifically, the proposition that the economy of knowledge, like the division of labor, is limited by the extent of the market; and (2) as a way to facilitate understanding of Hayek’s critique of the socialist calculation.

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