



The Division of Labor and Knowledge is Limited by the Division of Ownership Over the Ultimate Resource: The Role of Economies of Scope in Julian Simon

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Abstract

Julian Simon famously argued that economic growth is correlated with population growth. The basis for this correlation is what Simon refers to as the “ultimate resource,” namely the human mind and the collective stock of dispersed, tacit, and inarticulate knowledge among individuals. Though not incorrect, this simple rendition of his argument does not do full justice to the inspiration that Simon took from the mainline of economic thought. The purpose of this paper is to situate Julian Simon’s *The Ultimate Resource* as part of the mainline of development economics. I do so by developing an implicit and underappreciated relationship between entrepreneurship and economic growth in Simon’s *The Ultimate Resource*. I argue that this correlation between economic growth and population growth is predicated on what Simon refers to as “economies of scope.” This implies twofold. First, that a Smithian division of labor and a Hayekian division of knowledge emerge simultaneously, but are inherently predicated on a Misesian division of private property rights. Secondly, population growth is a *proximate* cause of economic growth, and therefore a by-product of a more *fundamental* institutional foundation: an ever-increasing scope in the ability of individuals to exchange ideas, goods, and services.

Keywords Julian Simon · Economies of Scope · Increasing Returns · Property Rights

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1 Introduction

Julian Simon self-identified as an unconventional economist (Simon, 2002). His unconventionality rested on his appreciation of long-run economic growth based on the “ultimate resource”, which is “people – skilled, spirited, hopeful people – who will exert their wills and imaginations for their own benefit as well as in a spirit of faith and social concern” (1981 [1996], p. xxxviii). The optimism that Simon holds with regard to the future of economic progress rests on “taking a long view backwards so that we can see the continuity of the trends” (Simon, 1981 [1996], p. 585). Notwithstanding his own autobiographical characterization, Simon also remarks the following about himself: “I think of myself in the great economic tradition of Hume, Smith, Menger, and Hayek” (Simon, 2002, p. 331). Thus, following Simon’s own approach, if we take the long-run view of the history of economic thought, Simon’s ideas about economic growth and its consequences are far more conventional than otherwise perceived, representing a continuity in the mainline of economics.¹

In its simplest rendition, Julian Simon’s main thesis in *The Ultimate Resources* is that economic growth is correlated with population growth. Though not incorrect, this oversimplification of Simon’s main thesis does not do full justice to the subtlety and richness of *The Ultimate Resource*, particularly the inspiration that Simon took from the mainline of economic thought going back to Adam Smith. This being said, in what particular way is Julian Simon situated in the mainline of economic thought?

The purpose of this paper is to address this motivating question by developing an implicit and underappreciated relationship between entrepreneurship and economic growth in *The Ultimate Resource* (1981). Combining the insights of F.A. Hayek, Ludwig von Mises, and Adam Smith, I argue that Julian Simon’s theory of economic development sits firmly in the mainline of economic thought, rooted in the concept that he appropriately refers to as “economies of scope.”² This concept is analogous to Smith’s notion that the division of labor is limited by the extent of the market, the expansion of which, according to Simon, is predicated on entrepreneurial discovery.

If the institutional foundation of a market is based on the expected ability to exchange, otherwise known as private property, then expansions in the scope of exchange are predicated on entrepreneurial discovery of opportunities to remove existing barriers to trade. Such entrepreneurial discovery is manifested in the erosion of transaction costs associated with delineating, dividing, and (re)combining existing property rights over goods and services. “And thus the *certainty of being able to exchange*,” Smith writes, that “encourages every man to apply himself to a particular

¹ The term “mainline economics” (Boettke 2012) refers to the set of substantive propositions held in common among economists, which trace their origin back to Adam Smith. These include the following: “(1) there are limits to the benevolence that individuals can rely on and therefore they face cognitive and epistemic limits as they negotiate the social world, but (2) formal and informal institutions guide and direct human activity, and, so (3) social cooperation is possible without central direction” (Boettke, Haeffele-Balch, and Storr, 2016, p. 4).

² Building on Allyn Young (1928), this concept parallels what Buchanan and Yoon (1994, 1995, 1999) refer to as “generalized increasing returns.” See Boettke and Candela (2017, 2021) for an illustration of generalized increasing returns that closely overlaps Simon’s rendition of “economies of scope.”

occupation, and to cultivate and bring to perfection whatever talent or genius he may possess for that particular species of business” (emphasis added; Smith, 1776 [1981], p. 28). Greater residual claimancy resulting from more secure ownership, in turn, allows for individuals to specialize their acquisition of knowledge and be alert to opportunities to which they would otherwise be precluded in the absence of residual claimancy, resulting in a division of labor. Thus, the erosion of such transaction costs³ via entrepreneurial discovery unleashes increasing gains from trade in the form of future entrepreneurial discoveries that would otherwise not be realized.

The entrepreneurial insight that Simon adds to the concept of “economies of scope” goes as follows: “Discoveries, like resources, may well be infinite: the more we discover, the more we are *able* to discover” (emphasis original; Simon, 1981 [1996], p. 82). For example, the introduction of containerization in the 1950s increased the scope of international exchange, and consequently, allowed for increasing returns to finer-grained specialization by fragmenting the production of intermediate components of goods for final output into an international division of labor (Candela et al., 2020; see also Irwin, 2015, p. 18). However, containerization was the result of an entrepreneurial discovery by Malcolm McLean, whose innovation was a result of reshuffling existing technology and resources in intermodal transport, but in a manner that reduced transactions costs associated with defining, enforcing, and exchanging property rights over goods and services. Thus, economic growth is not predicated on increasing returns to scale from finer-grained specialization in a particular productive activity, per se, since all productive processes inevitably face diminishing returns within a *given size* of a market. Rather, it is based on increasing returns from transaction-cost reducing discoveries, from which new institutional as well as organizational arrangements emerge to extend the *scope* of exchange and productive specialization, the by-product of which is finer-grained specialization.⁴

Understood in this way, Simon’s rich understanding of economies of scope draws together insights from Smith, Hayek, and Mises to explain the correlation between population growth and economic growth. Increases in the division of labor based on population growth is limited only by the extent of the human mind, and the rules of property that emerge to harness the creative powers of individuals and their collective stock of dispersed, tacit, and inarticulate knowledge. Understood this way, the infinite bound of natural resources, based on a Smithian division of labor, is predicated on a Hayekian division of knowledge. This, in turn, is inherently predicated on

³ According to Israel Kirzner (1973, p. 227), transaction costs entail the cost “of obtaining the information necessary to enter into and complete bargaining negotiations.” These entail not only the cost of defining property rights, but also the cost discovering the value of the goods being exchanged, as well as the cost of discovering willing trading partners.

⁴ As an additional illustration of this point, Holcombe (1998, pp. 50–51) writes: “Henry Ford could not have succeeded in mass-producing automobiles until there was a substantial market, including infrastructure such as roads, gasoline stations, and repair facilities. Bill Gates could not have made his fortune had not Steve Jobs seen the opportunity to build and sell personal computers, and Steve Jobs could not have built a personal computer had not Gordon Moore invented the microprocessor. When entrepreneurs take advantage of profit opportunities, they create new entrepreneurial profit opportunities that others can act upon.”

a division of private property rights as emphasized by Mises, the exchange of which provides the institutional context for entrepreneurial discovery itself. Reframed in terms of Simon's concept of "economies of scope," population growth is understood to be a *proximate* cause of economic growth, and therefore a by-product of a more *fundamental* institutional foundation: an ever-increasing scope in the ability of individuals to exchange goods and services.

This paper proceeds as follows. In Sect. 2, I explain the concept of economies of scope, tracing its mainline roots back from Adam Smith. The main contribution of this section is to the more recent literature on increasing returns (Acemoglu, 1996; Romer, 1986, 1987), which is related, though distinct from, Simon's economies of scope that is rooted in Smith and other mainline economists. I juxtapose Simon's mainline understanding of this concept from a more mainstream interpretation of this concept based on general competitive equilibrium, the latter of which rules out both the institutional and entrepreneurial basis for economies of scope.

In Sect. 3, I contribute to the recent literature in Austrian economics on the relationship between institutions, entrepreneurship and economic growth (Benson, 2015; Boettke & Candela, 2017; Boettke & Coyne, 2003; Burns & Fuller, 2020; Coyne & Leeson, 2004; Holcombe, 1998; Leeson & Boettke, 2009; Manne, 2014; Redford, 2020), particularly by illustrating how Simon's rendition of economies of scope encapsulates the insights of Mises, Hayek and Kirzner as they pertain to economic development. My contribution, in particular, parallels that of Henry Manne (emphasis original; 2014, p. 253), who emphasized the role of the entrepreneur in "recognizing a distinctive kind of productive input – *in which one can have some form of property right* – not generally considered in the neoclassical market model." Following this insight, I build on Leeson and Boettke's notion of two-tiered entrepreneurship (2009), illustrating Simon's "economies of scope" by drawing from two historical case studies: (1) the discovery of double-entry booking, which contributed to increasing the scope of international commerce beginning in medieval Europe; and (2) the discovery and evolution of private property rights after 1978 in China, unleashing China's march from socialism to the market. In each case, entrepreneurial discovery, motivated by the lure or profit (and disciplined by potential loss), unintendedly generated an institutional change. Such institutional change, in turn, unlocked potential gains from trade by eroding the transaction costs associated with defining and enforcing property rights, which in turn facilitated more accurate calculation of the relative scarcity of scarce resources through relative pricing.⁵ Such massive economies of scope that were generated by such institutional entrepreneurship allowed for the increases in human population *and* natural resources that would follow. Section 4 concludes with implications for future research.

⁵ On this relationship between economic calculation, and the role that institutions and organizations play in reducing transaction costs, see Piano and Rouanet (2020).

2 Institutional and entrepreneurial implications of alternative models of economies of scope: A view from *The Ultimate Resource*

The theory that drives the central thesis of *The Ultimate Resource*, though simple, has been prone to misinterpretation. Before turning to the various claims about Simon's argument, let us first restate his theory in his own words:

More people, and increased income, cause resources to become more scarce in the short run. Heightened scarcity causes prices to rise. The higher prices present opportunity and prompt investors and entrepreneurs to search for solutions. Many fail in the search, at cost to themselves. But in a free society, solutions are eventually found. And the in the longrun *the new developments leave us better off than if the problems had not arisen*. That is, prices eventually become lower than before the increased scarcity occurred (emphasis original; Simon, 1981 [1996], p. 59).⁶

Though indeed Simon is optimistic about the capacity of human beings to discover solutions to economic problems, there is nothing either automatic or perfect about this discovery process. If anything, it illustrates an understanding of the market process shared by Austrian economists, one in which market processes are regarded as “imperfect,” not in the sense of being flawed or sub-optimal compared to a particular normative benchmark, defined by a closed-ended outcome. Rather, “imperfect” here is understood in the sense, derived from its Latin roots, of an *incomplete action* or a *continuous process towards completion* (see Candela, 2020), one that is open-ended and bound only by the imagination of the human mind. “The frequent assertion,” Simon states, “that *of course* our resources are finite is quite inconsistent with the fact that present scientific knowledge of our physical world is extraordinarily incomplete (and probably always will be)” (emphasis original; 1981 [1986], p. 80).

The oversimplification with which Simon's central thesis has been interpreted can be fundamentally attributed to reading his argument outside of its appropriate institutional preconditions, namely private property and freedom of contract under the rule of law, all of which are necessary for harnessing the creative powers of the human mind in a productive manner. For example, in a review of *The Ultimate Resource*, C. Peter Timmer writes that “the book is wrongheaded and potentially dangerous. The danger comes from viewing problems as ‘opportunities’” (1982, p. 168) and that “only an author with an optimistic faith and vision can see such simplicity in history. Time is a straight line that solves all problems eventually, and sooner rather than later if pressures build for a solution” (1982, p. 164). Perhaps most importantly, Timmer takes issue with the alleged public policy implications of Simon's argument, namely that “public policy is to cease and desist –stand back and let the ultimate resource solve the problems. *But most of the different degrees of poverty and misery in the world are explained by differences in public policy*

⁶ This is a restatement of Simon's theory, which appears earlier in the book (see Simon 1981 [1996], p. 12), and later (1981 [1996], pp. 97–98, 382–383, 588).

– differences derived from human ingenuity to be sure, but differences that simultaneously dictate the environment in which that very ingenuity can flourish or wither” (emphasis added; 1982, p. 168). Such an interpretation has been shared not only by critics of Simon, but also his advocates as well. For example, Israel Kirzner writes, “Simon appears to rest his case for optimism upon his analysis of past economic performance and upon his general faith in the imagination and resourcefulness of human beings” (1985, p. 166). Kirzner goes further to state that “[w]hereas Simon appears not to pay much attention to the institutional environment in which his forecasts are to have relevance, my own discussion points very much to the crucial importance of a capitalist framework” (Kirzner, 1985, p. 167).

My point here is neither to directly address these interpretations of Simon’s *The Ultimate Resource*, nor to defend Simon against these particular claims per se. Though indeed Simon makes references throughout the book to the importance of institutions for channeling human creativity in a productive manner, as Aligica (2009) has recognized, it would not be unfair to claim that institutional analysis is not incorporated *systematically* into his argument, particularly in a manner that fully develops the implications of his central thesis. This is evidenced by a potential tension raised by Simon himself, as well as his own characterization of his book. As Simon states, a “key characteristic of a wealthy society is a well-developed set of rules. Wealth both creates such rules and depends upon them to produce the conditions of freedom and security that progress requires. *This subject is not developed in this volume*” (emphasis added; 1981 [1996], p. 13). Thus, the claims against Simon, as exemplified by Timmer and Kirzner, are not necessarily implausible, but they fundamentally miss a broader point. That is, such misgivings of Simon’s thesis misdirect attention away from a more implicit and subtle theme that fundamentally frames Simon’s underlying theory, one that, (1) apparently unbeknownst to Simon himself, addresses the causal relationship between wealth⁷ and institutions, and (2) has broader implications for understanding the dynamics of economic development than has been otherwise appreciated in *The Ultimate Resource*. I am referring to what Simon calls “economies of scope.” It is in this particular respect I argue that Julian Simon sits firmly in the mainline tradition of Adam Smith, and joined by others who have developed this concept, such as Alfred Marshall⁸ (1920 [2013]), Allyn Young (1928), Frank Knight⁹ (1921), and later revived by James Buchanan and Yong Yoon (1994, 1995, 1999).¹⁰

⁷ Simon defines wealth as “the capacity to control the forces of nature.” Moreover, “the extent of wealth depends upon the level of technology and the ability to create new knowledge” (1981 [1996], p.13).

⁸ On Marshall’s understanding of economies of scope, see Langlois (emphasis added; 1992, p. 101), in which he states “Marshall’s vision of economic progress was basically a Smithian one...Economic progress, then, is for Marshall a matter of improvements in knowledge and organization as much as a matter of scale economies in the neoclassical sense. We can see this clearly in his ‘law of increasing return,’ which is distinctly not a law of increasing returns to scale.”

⁹ On Knight’s contribution to the relationship between economies of scope, industrial organization, and economic progress, see Boettke and Candela (2021).

¹⁰ See also Koyama (2006).

The best way to understand what Simon appropriately refers to as economies of scope is by distinguishing it from a related, and more well-known concept in economics, known as “economies of scale.” Stated briefly, economies of scale refer to a *technical* relationship between the value of output and the variance of the units of valued inputs in a particular productive activity. Increasing (or decreasing) returns to scale refer to disproportionate increases (or decreases) in the value of output from increases in the quantity of valued inputs in production, such as land, labor, or capital allocated towards finer-grained specialization in a particular productive activity. This is distinct from “economies of scope,” which refers an *economic* relationship between the size of a particular market (hence the scope of market exchange), and the economic viability of specialization across various productive activities. Viewed in this way, increasing (or decreasing) returns to scale emerge as a by-product of expansions (or contractions) in the scope of productive specialization and exchange. Simon draws the distinction between these concepts as follows:

In economic affairs, there are always diminishing returns in the small scale, but increasing returns in the large. For example, taking oil from one oil well will gradually increase the cost of successive barrels from that well. But taking oil from *all* the wells will eventually lead to lower cost for energy taken as a whole. This is partly because the oil is used in the growth of an economy that then has a greater capacity to develop cheaper energy sources, and partly because people have an incentive to find new sources of energy (or whatever) when aggregate supplies are affected significantly. Eventually the new source turns out to be cheaper than the old one (emphasis added, 1981 [1996], p. 70).

Although, empirically speaking, economies of scale and economies of scope are interdependent, and therefore difficult to disentangle the two from each other, analytically speaking, the distinction can be clarified through a corresponding relationship between what Randall Holcombe (1998) refers to as a “Ricardian approach” and a “Smithian approach” to economic development. Moreover, this distinction in approaches to economic development is also useful in clarifying the way in which Simon’s arguments have been interpreted and absorbed into the literature on economic development.

The Ricardian approach corresponds more closely to the concept of economies of scale, viewing economic development as a function of increases of land, labor, and capital. As Holcombe also highlights, labor in the Ricardian approach is treated as exogenous, with increases in capital driving economic growth as in the Solow growth model (1956). This point is particularly important for the way in which Simon’s argument has been interpreted. To the extent that Simon’s theory has been referenced in terms of a relationship between population growth and economic growth, it has been filtered through this Ricardian paradigm. For example, economist Nobel Laureate Michael Kremer, in reference to Simon, states that “a higher population means more potential inventors” (1993, p. 684). My point here is not to argue that such an interpretation is incorrect, per se. Rather, it is to highlight that the extent to which Simon’s emphasis on “economies of scope” has not been recognized is only part of a larger trend in growth theory, one in which the concept of increasing returns has been interpreted (see Romer, 1986, 1987) and analytically grounded

(see Acemoglu, 1996) in terms of general competitive equilibrium.¹¹ Thus, my emphasis here is on the extent to which such a rendering overshadows the relationship between institutions and entrepreneurship that is key to the concept economies of scope, all of which are analytically precluded by a Ricardian approach to development that is filtered through an equilibrium paradigm. The ramifications of this paradigmatic shift are acknowledged by Simon in the following way:

And increasingly, economists have turned away from Alfred Marshall's definition of economics as the study of how people fulfill their material needs. They have turned instead to Lionel Robbins's definition of *economics as allocation*. But the key element in Crusoe's improvement of his situation was not better allocation. Rather, impelled by need and sparked by imagination, Crusoe developed his "economy" by adapting existing knowledge that he brought with him and by creating new techniques (emphasis added; Simon, 2002, pp. 326–327).

This last point is indicative of how and why Simon's exposition of "economies of scope" more appropriately fits into a Smithian approach of economic development, one that incorporates a Kirznerian notion of entrepreneurship.

Expounded by economists of the mainline tradition, the Smithian approach contends that economic growth is explained not by increases in factors of production per se, but rather the entrepreneurial discovery of combinations between land, labor, and capital, the by-product of which is the overall and inexhaustible increase of such inputs. To illustrate this point, consider the following parallel between economics and biology. Deoxyribonucleic acid, or DNA, represents the genetic coding of the billions of species inhabiting the planet Earth. However, DNA itself is based on four components: adenine; cytosine; guanine; and thymine. Thus, what explains the diversity of life on earth, and the reproductive capabilities of each species, is not the number of inputs in DNA, but the various combinations of DNA, the sum of which is greater, and not directly reducible, to its constituent parts. Similarly, economic development is based on four factors of production: land; labor; capital, and entrepreneurship. What explains the productive abilities of human beings to discover new resources with increases in the human population is the ability to take available resources and discover an infinite number of combinations to deploy them, which widens the *scope* for exchange and productive specialization. This, in turn, leads to the discovery of new resources as by-product of ever-increasing economies of scope.

"Economies of scope," according to Simon, "stem from (1) the ability to use large and more efficient machinery, (2) the greater division of labor in situations where the market is larger, (3) knowledge creation and technological change, and (4) improved transportation and communication" (1981 [1996], p. 391). The critical link between each of these aspects of economies of scope is an implicit notion of entrepreneurial discovery in a Kirznerian sense, which, according to Simon, takes

¹¹ Though beyond the scope of this paper, it's an important to note an extensive literature that has pointed out the theoretical anachronism with which the concept of increasing returns has been treated by filtering classical economists and early neoclassical economists through an equilibrium paradigm (see Kaldor 1972; Blitch, 1983; Currie, 1997; Sandilands 2000; Rima 2004).

“a view of resources as physical quantities waiting for the plucking, rather than as the services that humankind derives from some combination of knowledge with physical conditions...Hence, resources are, in the most meaningful sense, *created*” (emphasis original, Simon, 1981 [1996], p. 75). Though this Kirznerian insight is implicit, Kirzner himself acknowledges that “Simon’s message, although couched in different terms, parallels my own: the notion of society’s being constrained in scarce, given resources, as is the individual in the Robbinsian framework, is not a useful idea in predicting the long-run trends in capitalism” (Kirzner, 1985, p. 166).

To summarize, Simon argues that increases in population cause short-term scarcities in resources, which are communicated via the price mechanism. This, in turn, generates an entrepreneurial profit opportunity to discover more of a particular resource, as well as potential substitutes to that resource, than prior to the rise of the scarcity itself. This argument corresponds directly with Simon’s notion of economies of scope. However, viewed from a Smithian approach to development, population growth may be a necessary, though not a sufficient condition for the discovery of new resources, particularly in the case in which human beings are precluded by natural or artificial barriers to enter into productive specialization under the division of labor. Moreover, without private property in the first place, exchange ratios (i.e. prices) cannot emerge to communicate an increasing scarcity of resources to entrepreneurs as a profit opportunity to discover additional resources. Thus, analytically speaking, the whole concept of economies of scope seems to be predicated not just on entrepreneurship within an institutional framework that secures private property rights. It also depends, fundamentally, on discovery of a “fifth factor of production” (Boettke & Candela, 2014), namely the *expected* ability to define and securely exchange resources (i.e. private property). Put simply, economies of scope require institutional entrepreneurship to discover the conditions that reduce the costs of engaging in economic calculation, thereby unlocking gains from trade and productive specialization that otherwise would not exist.¹² This is exemplified by the discovery of institutional and organizational arrangements that have resulted in the growth of commerce across time and place, as illustrated in the next section.

3 The institutional foundations of the ultimate resource: Implications for mainline economics

“The history of human institutions,” according to Julian Simon, “describes ever more complex modes of organization, a more extensive body of law, richer languages, a more ramified corpus of knowledge, and a greater range of human movement throughout the universe. All this suggests more order rather than less order in

¹² Admittedly, Kirzner restricted his analysis of the entrepreneurial market process to an institutional framework of given property rights, thereby raising a potential objection that my argument may misappropriate Kirzner’s theory outside the parameters in which it’s relevant. “Yet, on the other hand,” Kirzner concedes, “it might be argued that in the broad sense of the term the concept of entrepreneurship *is not necessarily confined to capitalism*” (emphasis added; Kirzner 1985, p. 167), one in which entrepreneurial discovery can be applied to the level of institutional analysis itself. On this point, see Boettke (2014).

the human environment with the passage of time” (Simon, 1981 [1996], pp. 80–81). In the previous section, I outlined how Simon sits in the mainline tradition of Adam Smith, and particularly how his Smithian insights parallel those of Israel Kirzner on entrepreneurship and F.A. Hayek on knowledge. As Simon writes, Hayek “urges upon us that humankind has evolved sets of rules and patterns of living which are consistent with survival and growth” (Simon, 1981 [1996], p. 73). It is this particular notion of institutional evolution that also places Simon within a Smithian approach to economic development, one in which increases in land, labor, and capital are understood to be a *proximate* cause of economic growth, and therefore a by-product of a more *fundamental* institutional foundation for increasing economies of scope.

What’s most insightful about Julian Simon’s notion of economies of scope, and most relevant for Austrian economists, is how a subtle reading of Simon’s argument illustrates the close connection between Adam Smith and F.A. Hayek in understanding the *causal* link between population growth and economic development. “Clearly there is here a problem of the *Division of Knowledge*”, according to Hayek, “which is quite analogous to, and at least as important as, the problem of the division of labour.” (emphasis original, Hayek, 1937, p. 49). But the critical lynchpin between a Smithian division of labor and a Hayekian division of knowledge, which undergirds Simon’s economies of scope, is a *Misesian division of ownership* (1920 [1975]), which provides the institutional prerequisite for economic calculation, and hence the basis for economically viable productive specialization in labor *and* knowledge. Without exchangeable private property rights, the *contextual* economic knowledge required to know in what productive labor activities to specialize does not exist in the first place (Lavoie, 1985, p. 102; Boettke, 1998, p. 149). Therefore, what matters for ever-increasing economies of scope is not only productive specialization in labor and knowledge, but *specialization in ownership* which concentrates the costs and benefits of specializing in particular types of labor and knowledge. Though Simon is keen to point out the importance of private property, this is not systematically tied to the symbiotic relationship between the division of labor, as emphasized by Smith, and a division of knowledge as emphasized by Hayek, and how they emerge from a context of private property rights. In the illustrations below, I demonstrate the interaction effect between the two through historical examples of institutional entrepreneurship.

3.1 Growing into trade: double-entry booking and economies of scope

“The long view in population economics”, according to Julian Simon, “includes long-run structural change that does not fit comfortably within the standard economic framework of optimal allocation of a given set of initial resources. New structural and technological improvements often seem to appear unbidden and unbought, rather than as a deliberate tradeoff with other uses of inputs” (2002, p. 251). The unintended economic transition of the West from subsistence to exchange was fundamentally predicated on a series of institutional and organizational improvements

that cumulatively facilitated *economic calculation*. As Rosenberg and Birdzell state this point:

The very idea of varying and changing what one did in response to calculations of future consequences and present conditions of supply and demand lay outside the normal pattern of medieval life. *Calculation* is the crucial word here. The possibility of calculation, of assessing prospective magnitudes of cost and revenue and the probability of alternative outcomes in a novel enterprise, of profiting from judicious buying and selling...rather than from diligent service to one's lord or from industriously plying one's trade, was wholly alien to the customary order of feudal society (emphasis original; 1986, p. 53).

Putting aside the issue of whether the timing of the Western Europe's economic take-off corresponds with greater security and enforcement of property rights, as Deirdre McCloskey (2010) has questioned, the fact remains that the existing patterns of resource ownership and technological possibilities were not conducive to economies of scope in Western Europe until the latter half of the eighteenth century. Institutional entrepreneurship was required to discover the opportunity to monetize the transaction costs associated with dividing and exchanging property rights, and thereby facilitating economic calculation. Without such institutional entrepreneurship, the increasing returns that arise from ever-greater economies of scope would never been realized. This is exemplified by perhaps one of the most important, and neglected, institutional innovations that brought forth the economies of scope that allowed economic development to first take off in Western Europe: double-entry bookkeeping.

Although having been utilized in public administration in China, the practical and commercial application of double-entry bookkeeping had evolved in northern Italy, as early as the 1300s, and later became systematized in 1494 by a Franciscan monk and mathematician named Luca Paccioli, with the publication of his *Summa de arithmetica, geometria, proportioni et propotionalità* (Goetzmann, 2016, pp. 246–247; Bernstein 1996, pp. 41–42). The economic consequences of this innovation was “comparable to the discovery of the steam engine three hundred years later” (Bernstein, 1996, p.43). Two important results came from employing double-entry bookkeeping. First, it reduced the transaction costs of dividing ownership, namely by assigning and calculating assets and liabilities more accurately. In effect, to an entrepreneur, double-entry bookkeeping assigns residual claimancy, “either as a debtor to its owners or as itself the owner of its own net worth” (Rosenberg & Birdzell, 1986, p. 127), without which statements of profit and loss could not be calculated as well. Secondly, by reducing the transaction costs of assigning property rights over assets and liabilities, the effective division of ownership assignment created by double-entry bookkeeping results in specialization in knowledge of particular trades, and hence specialization under the division of labor, creating an expansion in economies of scope. As Mises best illustrates how this cumulative process unfolds:

Economic calculation as practiced in the market economy, and especially the system of double-entry bookkeeping, make it possible to relieve the entrepre-

neur of involvement in too much detail. He can devote himself to his great tasks without being entangled in a multitude of trifles beyond any mortal man's range of sight. He can appoint assistants to whose solicitude he entrusts the care of subordinate entrepreneurial duties. And these assistants in their turn can be aided according to the same principle by assistants appointed for a smaller sphere of duties. In this way a whole managerial hierarchy can be built up (1949 [1966], p. 304).

Though this quote by Mises specifically relates to specialization within a particular firm, to the extent that double-entry bookkeeping erodes the transaction costs of calculating the net value of a firm, there are other immediate by-products that extend outside the firm that allow the coordination of large groups of people to produce a growing number of goods and services without deliberate command. These include the realization of other organizational arrangements that extend the scope for productive specialization and exchange, including the assignment of limited liability to firms, the extension of credit by reducing transaction costs between borrowers and savers, and the accumulation of capital via more accurate calculation of profits and losses. Greater labor productivity, and the subsequent rise in wages that result from capital accumulation, creates new markets for other goods and services by creating wealth that makes greater consumption possible, and in turn frees up labor for the production of goods and services to satisfy growing consumer demands.

3.2 Chinese economic transition and the “rediscovery” of private property rights

According to Julian Simon, “many lament that there are so many people alive to enjoy the gift of life. And it is this worry that leads them to approve the Chinese and other inhumane programs of coercion and denial of personal liberty in one of the most precious choices a family can make – the number of children that it wishes to bear and raise” (1981 [1996], p. 321). However, the “world’s problem is not too many people,” Simon states, “but lack of political and economic freedom” (1981 [1996], p. 11). To complete Simon’s point here, poverty and economic deprivation cannot be explained by overpopulation, but rather the *opposite*.

One of the most important implications of *The Ultimate Resource*, following from our prior discussion of double-entry bookkeeping in Sect. 3.1, is the following: though indeed population growth is necessary for the possibility of more fine-grained specialization, it is not a sufficient condition. This is because, like any given resource, what is *economically* relevant is not the physical amount of labor in terms of population size, or other factors of production in terms of their physical quantity per se. Rather, it is the ability for individuals to *discover* how to specialize, in what to specialize, with whom to trade, and under what contractual conditions (in terms

of quality, price, time of delivery,¹³ etc.), the requisite knowledge of which is precluded in the absence of private property.

A growing population is economically irrelevant to the extent that individuals are precluded by barriers to specialize and trade. However, such barriers represent unrealized gains from trade that can be monetized via their reduction by entrepreneurs, as was the case with the introduction of double-entry bookkeeping. It is from such institutional innovations that *economic*, not just physical, accumulations of land, labor and capital *become* relevant to a greater division of labor and increase as a by-product of economic calculation. This is best illustrated in the case of economic transition as it has unfolded in China since 1978, where economic development was led by an institutional reform in agriculture, followed by *economic* increases in land, labor, and capital through entrepreneurial discovery.¹⁴ Although China's population stood at approximately 1 billion people at the time in which economic reforms began (see World Bank, 2021), from an economic standpoint, the fact that its GDP per capita stood at 200 dollars implies that it remained grossly *underpopulated* due to the fact that such individuals had been precluded from realizing the gains from productive specialization and exchange, which can only be realized within a context in which private property, the ability to exchange, and hence market pricing, are secure.

While the emergence of private property in China was not designed by government policy, bottom-up reform through institutional entrepreneurship would not have flourished without a commitment on the part of the state not to obstruct the *de facto* changes in property rights. After the rise of Deng Xiaoping in 1978, the "first priority under the new economic policy was agriculture" (Coase & Wang, 2012, p. 157). However, agricultural reform was not initiated by the *de jure* privatization of farmland.

Although land remained formally owned by the state, the introduction of a "household responsibility system" led to a *de facto* privatization of property rights in land. The household responsibility system arose in the late 1970s gradually out of a series of particular acts of institutional entrepreneurship by Chinese peasants. The most famous of these was that initiated by Yan Junchang, who was a villager in Xiao Gang, a poverty-stricken village in Anhui province of China. As Li et al. (2006, p. 245) describe the account, "[s]truggling to escape absolute poverty, on November

¹³ Agreement over time entails transactions costs, which were eroded by more accurate calculation of time through entrepreneurship. For example, in terms of increasing economies of scope, the invention of the clock in the late thirteenth century "had a subtle social importance, cultivating the sense of time to the organized collaboration of large number of people" (Rosenberg and Birdzell 1986, p. 58). The introduction of time zones by U.S. railroad companies in the nineteenth century also exemplify how crucial the accurate accounting time is to realizing economies of scope (see Bartky 1983, 1989).

¹⁴ As Adam Smith states this direction of causality in economic development: "According to the natural course of things, therefore, the greater part of the capital of every growing society is, *first*, directed to agriculture, afterwards to manufacturers, and last of all to foreign commerce. This order of things is so very natural, that in every society that had any territory, it has always, I believe, been in some degree observed" (emphasis added; Smith 1776 [1981], p. 380). And as Julian Simon builds on this Smithian point, given that agricultural productivity has increased in China since the late 1970s, "it follows that the total amount of land use for crops in poor countries will eventually decline" (1981 [1996], p. 423), freeing up a larger amount of land available for other economic uses.

24, 1978, he and 17 other farmers signed a secret agreement to divide up the land and let each household work by itself, running the risk of jail sentences. They had the implicit support of local reform-minded officials. One year later, their innovation proved to be a big success: the total grain in production was equal to the sum of production over the previous five years” (see also Coase & Wang, 2012, p. 47).

The gradual transitional process toward securing private property, and realizing the economy-wide increasing returns from extending the scope of exchange, cannot be understood without first understanding the attributes of private property rights, and how they were gradually accumulated. Property rights refer, first and foremost, to a set of social relationships (Furubotn & Pejovich, 1972) defining the expected ability to exclude, use, and exchange goods or services, with the ability of exchange being the distinguishing attribute of *private* property (Mises 1920 [1975], p. 112; Alchian, 1965, p. 822). What explains the emergence of increasing economies of scope is not that the total economic output that emerges from securing private property is either the sum or directly reducible to these three composite attributes. Rather, the ability to divide and assign such attributes in various combinations across individuals, in the form of lease rights, usufruct rights, share contracts, piece-rate contracts, etc., is what generates an infinite number of possibilities for specialization in ownership, which as a by-product generates specialization in knowledge about the activities in which an individual wishes concentrate their labor.¹⁵

The process of economic transition as it unfolded in Chinese agriculture first granted the ability to exclude plots of land, then the ability to use, and later the ability to exchange agricultural output. As David Prychitko (1987) elaborates, the tacit acceptance of exclusive plots of land did not immediately imply the abolition of production quotas or price controls set by the state. It meant that “instead of making the commune responsible for its farming activities, the new system places responsibility in the hands of smaller units such as work groups and households, who must contract with the commune” (Prychitko, 1987, p.2). Each household, in turn, remained liable for meeting the contracted share of the state’s production quota at artificially low prices. However, this institutional system “turned rural households into motivated residual claimants after the fulfillment of state quotas,” in which agricultural output could be sold on the market (Coase & Wang, 2012, p. 76). By 1982, the Chinese government official recognized private farming (Coase & Wang, 2012, p. 49), gradually allowing farmers the ability to choose those crops in which to specialize their production, and granting them ability to exchange their output, hence the

¹⁵ As Armen Alchian states the point: “If ownership rights are transferable, then specialization of ownership will yield gains. People will concentrate their ownership in those areas in which they believe they have a comparative advantage, if they want to increase their wealth. Just as specialization in typing, music, or various types of labor is more productive so is specialization in ownership. Some people specialize in electronics industry knowledge, some in airlines, some in dairies, some in retailing, etc. Private property owners can specialize in knowledge about electronics, devoting much of their effort and study to learning which electronic devices show promise, which are now most efficient in various uses, which should be produced in larger numbers, where investment should take place, what kinds of research and development to finance, etc.” (1965, p. 825).

emergence of market prices, particularly after price controls on agricultural products had been lifted in 1984. Moreover, exchange of responsibility contracts became formally permitted thereafter in 1983 (Cheung, 1982 [1986]: 66), in effect creating de facto private property rights.

The effects of the household responsibility system not only increased agricultural productivity, but as by-product freed up labor and land for the accumulation of capital through the emergence of a wider scope for productive specialization and exchange. “It took very little time,” Coase and Wang (2012, p. 68) write, “for ambitious entrepreneurs to find and pursue economic opportunities underexplored and unexploited.” Such entrepreneurial profit opportunities were realized by monetizing the reduction of transaction costs via institutional and organizational innovation. These included the emergence and growth of “township and village enterprises” (TVEs) outside the scope of state control as well as the internal, de facto privatization of state-owned enterprises (SOEs) through the emergence of a “contract responsibility system” (Coase & Wang, 2012, p. 88).

Though the structure of property rights in TVEs have been regarded as “vaguely defined” and “should result in unproductive firms” (Xu, 2011, p. 1118), the best way to understand the organizational nature of the TVEs is to compare them to that of existing state-owned enterprises (SOEs), particularly before 1985. *De jure*, TVEs were not formally owned as private property, in the sense that the firm is owned collectively by individuals in a particular township or village, and governed by the governing authority of the township or village in which it has been established. De facto, the structure of property rights governing a TVE were fundamentally different from other state-owned enterprises because unlike “state-owned enterprises, township and village enterprises faced genuine budget constraints” (Coase & Wang, 2012, p. 55).

This fundamental difference had important implications for economic calculation and the increasing economies of scope through which the private sector of the economy grew relative to the state sector of the economy. Although in neither case did the ability to divide and transfer shares of title over SOEs or TVEs exist *de jure*, the local governing authority over TVEs “had to behave like real entrepreneurs – they had to take risks and bear full responsibility for their decisions.” (Coase & Wang, 2012, p. 55). Given that TVEs competed against the state sector of the economy for labor, and was susceptible to bankruptcy, the only way it could bid labor away from alternative uses was by offering higher wages, which in turn required TVEs to increase labor productivity in order to minimize its costs in accordance with a hard budget constraint. All this implied that capital investment was the necessary result, or by-product if you will, of expanding the scope of the market in China relative to the state sector of the economy. Although SOEs gradually allowed for the retention of profits, the existence of soft budget constraints implied that SOEs were not liable for their losses, thereby precluding the context-specific knowledge required to allocate land, labor, and capital to its most valued uses and the incentives necessary to detect and eliminate waste. Without the appropriate conditions for economic calculation, retained profits spent for increased investment and employee compensation failed to deliver value-added output. It was only with the emergence of the “contract responsibility system,”

adopted nationwide after 1984 and the implementation of a “dual-track system” that introduced greater residual claimancy into SOEs through de facto employee contracts for market production (Coase and Wang, p. 88). This dual-track system allowed workers to produce output for market exchange, with inputs bought from the market, after state plans and quotas had been met (Prychitko, 1987).

It is no accident that the rise of the TVEs, as well as other economic reforms, such as the creation of special economic zones, that expanded the scope of market exchange coincided with institutional reforms that limited state action in terms of taxation and regulation within Chinese provinces. Starting in 1980, China instituted a fiscal revenue-sharing system between the provincial governments and the central government. This fiscal arrangement further explains the extent to which the conditions for residual claimancy existed in TVEs. According to this fiscal arrangement, revenue income in each province is divided between a fixed share of revenue, which is remitted to the central government, allowing the remaining share of tax revenue to remain within the local jurisdiction (Montinola et al., 1995, p. 63). Moreover, the Communist Party has retained authority to appoint and dismiss government officials according to their ability to foster pro-growth policies. “Specifically, appointments, promotions, and demotions (or more severe punishments, such as imprisonment for serious violations of the rules) of subnational officials in China are ultimately determined by the central government, and their career paths are tied to the performance of their jurisdictions.” (Xu, 2011, p. 1093). Such institutional features of China’s economic reform addressed the incentive and informational problems associated with TVEs, namely, by incentivizing and selecting for those local officials whose interests would be aligned with the pursuit of pursue growth policies that encourage increased labor productivity and capital accumulation.

To summarize, given this institutional backdrop of “market-preserving federalism” (Qian & Weingast, 1997), a de facto division of ownership first emerged over property rights in land, giving rise spontaneously to agricultural reform via institutional entrepreneurship. The by-product of this initial division of ownership in land increased productive specialization and exchange in agricultural labor, which in turn incentivized specialization in knowledge about competing consumer demands for agricultural output, guided by market pricing as well as by profit and loss signals. Increased productivity in agriculture, in turn, freed up land and labor for entrepreneurs to establish TVEs, which, along with special economic zones, would become the main drivers of China’s economic development throughout the 1980s and 1990s through foreign and domestic investments in physical and human capital. This sequence of events, which emerged through human action, though not of human design, was, according to Simon, “the largest social movement in history” to take place, “in an unprecedentedly short time” (1981 [1996], p. 121). China was able to harness the creative powers of its population, in order to propel its economic development, by incorporating individuals into an ever-expanding scope of productive specialization and exchange. Economic development in China, or anywhere for that matter, cannot be understood without placing Simon’s central argument in his broader paradigm of increasing economies of scope.

4 Conclusion

Julian Simon was, in the words of James Buchanan (1987 [2001]), a “natural economist.” He offered profound economic insights that were simple, but not simplistic in nature. A subtle reading of *The Ultimate Resource* is a testament to that. Taking the long view in the history of economic thought, as Julian Simon had done in his own work on population and resource economics, I have argued that Simon’s work should be regarded as neither unusual nor controversial when appropriately situated in the mainline tradition. This reframing of Simon’s argument on the relationship between population growth and economic development is not meant to take away anything from his brilliance. Rather, it is to illustrate how *The Ultimate Resource* should be read as a continuation of the mainline tradition in development economics in the twentieth century, rooted in Adam Smith.

The implications of my argument are twofold. First, failure to situate Simon’s central thesis, namely that population growth drives economic development, in the broader context of economies of scope misleadingly leads to the presumption that increases in population must necessarily and inevitably generate economic growth, regardless of the institutional context. By placing Simon’s argument in the context of increasing economies of scope, this implies that population growth is more appropriately identified as a proximate cause of economic growth, rather than a fundamental cause of economic development. This implies, secondly, that the fundamental cause of economic development is predicated upon increasing the scope of choice in productive specialization and exchange.

My second implication provides an important avenue for future research, one which connects Austrian economics with the literature on increasing returns. If increasing returns are predicated on extending the scope of specialization in the division of labor, this implies a tendency towards an efficient allocation of resources cannot be generated without communicating knowledge regarding the relative scarcity of labor according to alternative consumer uses. Such knowledge embodied in market prices, as well as profit and loss signals, only exist in a context in which individuals are able to exchange title to goods and services. Thus, the implication here is that study of economies of scope, filtered through a Smithian paradigm, requires not only a division of knowledge, but also, more fundamentally, a division of ownership.

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