TOWARD A MORE RELEVANT THEORY OF ECONOMIC EXPANSION AND DEVELOPMENT: INSIGHTS FROM LUDWIG VON MISES

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Abstract: The history of modern growth theory can be characterized as a running debate between capital fundamentalism and technological fundamentalism. Both sides of the debate rely on mathematical models that suffer from problems of aggregation and serious limitations due to their assumptions. The economic framework and insights of Ludwig von Mises provide theoretical results pointing to a more robust and relevant theory of economic progress. Mises' emphasis on the market division of labor, capital formation, innovation, and entrepreneurship allow for the development of a more holistic theory of economic expansion and development that, therefore, is more likely to provide helpful policy guidance for purposes of economic progress.

Keywords: Economic growth, Economic development, Entrepreneurship, Economic Institutions.

JEL classification: O11, O40, L26, D24, O33, B25, B53.

Resumen: La historia de la teoría moderna del crecimiento puede caracterizarse como un debate continuo entre el fundamentalismo capital y el fundamentalismo tecnológico. Ambas partes del debate se basan en modelos matemáticos que sufren problemas de agregación y serias limitaciones debido a sus suposiciones. El marco económico y las ideas de Ludwig von Mises proporcionan resultados teóricos que apuntan a una teoría más sólida y relevante del progreso económico. El énfasis de Mises en la división de mercado del trabajo, la formación de capital, la innovación y el emprendimiento permiten el

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desarrollo de una teoría más holística de expansión y desarrollo económico que, por lo tanto, es más probable que proporcione una orientación política útil para los fines del progreso económico.

Palabras clave: Crecimiento económico, Desarrollo económico, Emprendimiento, Instituciones Económicas.

Clasificación JEL: O11, O40, L26, D24, O33, B25, B53.

> "There are no means by which the general standard of living can be raised other than by accelerating the increase of capital as compared with population."
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> —Ludwig von Mises, "Planning for freedom"

> "Capital does not 'beget' profit."
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> —Ludwig von Mises, *Human Action*

I
INTRODUCTION

With the disarray in modern macroeconomics in general, it should be no surprise that there is considerable lack of consensus about the theory of economic growth. It is telling that after over 250 years of focused study in political economy a recent survey of economic growth theory is entitled *The Mystery of Economic Growth* (Helpman 2004). Why the mystery? Notwithstanding the complexity of any economic question, it is the contention of this paper that a major reason modern macroeconomics has not yet solved the mystery is that as a whole—dare I say, in the aggregate—it uses an analytical framework that fosters neither asking nor answering the correct questions. If the troubled driver does indeed search for his lost keys near the lamp because that is where the light is, the analytical framework of modern macroeconomics makes for a very small beam indeed. Modern theories of prosperity make for an excellent case in point.

Two conflicting theories of economic growth developed during the Twentieth Century following the proliferation of Keynesianism.

A direct descendant of Keynesian theory, the Harrod-Domar model fueled so-called capital fundamentalism—the doctrine that capital alone was the determinate of economic growth. The Solow growth model and subsequent empirical studies drawing on that model asserted contrarily that capital accumulation was an insignificant contributor to economic expansion, but that technology was the driver of continued prosperity. Both frameworks rely on mathematical models and, hence, suffer from problems of aggregation as well as the serious limitations of rarifying assumptions. Much unproductive debate could have been avoided if economic analysis by Ludwig von Mises and other Austrians had been more fully understood and assimilated into the larger body of economic development literature. Austrian capital theory and Mises' conception of capital as a tool of economic calculation, *not* merely an aggregate of homogeneous physical goods reveals the important relationship between saving and investment in capital accumulation, technological advance, *and* wise entrepreneurship within the market division of labor as distinct, yet interrelated engines of prosperity. Such a link also helps to resolve the true relationship between capital and technology as sources of economic progress.

II
MODERN GROWTH THEORY

The first widely accepted model of economic growth coming out of the Keynesian Revolution was the Harrod-Domar model. The model was developed by integrating work done independently by Roy F. Harrod (1939) and Evsey Domar (1946). Ironically, neither were attempting to develop a model of economic expansion, but were rather investigating stability properties of the Keynesian model of macroeconomy (Easterly 2001; Solow 2000).

Lewis (1954) developed the model further and applied it to economic development issues by modeling a less developed economy as one incorporating two sectors—one large and agricultural and the other small and capitalist. The model is built in the simple Keynesian Cross framework. The model assumes a direct and proportional relationship between business investment and GDP. The

rate of saving is positively related to investment. Therefore, the higher the rate of saving, the greater the rate of growth in investment in physical production and hence in economic growth.

Because of its focus on the rate of saving and business investment and its assumption of a fixed capital to GDP ratio, the Harrod-Domar model fostered a perspective on economic growth that came to be known as capital fundamentalism. Investment in physical capital came to be seen as the sole driver of economic progress over time. The model also became the economic justification for foreign aid to less developed countries as it was thought that persistent poverty was due to an investment gap that could be plugged with aid from more developed countries. (Arndt 1987; King and Levine 1994).

By the late 1950s a number of economists were unsatisfied with the Harrod-Domar model's assumption of fixed proportions between capital and labor. In an attempt to analyze economic performance for the social economy while allowing for variable proportions in factor use, Robert Solow (1956; 2000, 16-35 and 106-21; 2002) modeled the entire economy as one giant neoclassical short-run production function. Solow's use of a short-run production function in his model incorporated the standard assumption of diminished returns to capital investment and the identification of a steady state equilibrium at which the quantity of saving is just enough to replenish depreciated capital. Any increase in economic progress due to an increase in saving is temporary. Sustained economic progress, therefore is the consequence of technological advance. Subsequent growth accounting empirical studies seemed to verify Solow's growth model. It is the empirical work spawned by Solow's model that has contributed various neoclassical and Austrian economists to significantly undervalue the importance of capital accumulation as a source of economic progress (Easterly 2000, pp. 47-69; Holcombe 1998, p. 58).

Some Austrian economists following Israel Kirzner have sought to establish entrepreneurship as the key explaining economic growth and development. While arguing that only a small part of economic progress can be explained by increases in investment, Holcombe (1998, p. 58) concludes, "The engine of economic growth is not better inputs, but rather an environment in which

entrepreneurial opportunities can be capitalized upon." Likewise David A. Harper (2003) sees the Kirznerian entrepreneur who alertly seizes profit opportunities is the source of economic progress.

Alas, neither the theories of capital fundamentalists nor those of technology fundamentalists satisfactorily explain the process of economic expansion and development. This has been suggested by the endogenous growth theory developed by Paul Romer (1990; 1994). The economics of economic expansion and development itself would have progressed more rapidly and productively had more economists integrated several key insights from Ludwig von Mises who built his theory on the Austrian tradition of Carl Menger and Eugen von Böhm-Bawerk. Recognizing and embracing Misesian contributions to economics would have helped avoid much intellectual conflict and misunderstanding.

III
MISES ON ECONOMIC EXPANSION AND DEVELOPMENT

Mises developed various lines of economic theory that when brought together, incorporate a more rich, realistic, satisfying, and helpful theory of economic expansion and development than heretofore provided by either Keynesian or neoclassical economists. As the two epigraphs by Mises affixed to this paper indicates, Mises recognized and embraced the classical insight that capital accumulation is crucially important for economic growth. He argued that the *only* way for a society to experience economic expansion and development is for it to enjoy increased per capita capital (Mises 1990, p. 171). This is because countries with more capital than others enjoy higher productivity, real wages, and standards of living (Mises 1949, pp. 495-96; Mises 1980a, pp. 135-36). Conversely, he saw the economic weakness of less developed countries primarily as the result of the disintegration of foreign capital markets that cut them off from the savings of capitalists from other parts of the world (Mises 1990, p. 169).

At the same time he clearly understood that economic capital formation occurs in combination with other necessary factors that play

fundamental roles in economic development—namely the division of labor, technological improvement, and wise entrepreneurship.

1. The Market Division of Labor

One of the primary sources of economic growth cited by Mises is the division of labor. For Mises, the division of labor is a key market institution that makes economic development possible. It is basic to the formation of society, so much so that he calls it the "fundamental social phenomenon (Mises 1998, p. 157)[1].

Citing David Ricardo and John Stuart Mill, Mises thought the formal exposition of the increased productivity resulting from the division of labor to be one of the most important contributions of classical economics (Mises 1981, pp. 260-61; Mises 1998, pp. 163-64). If the mobility of capital and labor in an economic society is prevented, the division of labor benefits both the most and least talented via comparative advantage, as people specialize in producing goods at which they incur the lowest opportunity cost. As people specialize in production and cooperate in the division of labor according to their comparative advantage, productivity increases, leading to increases in output, the creation of wealth, and an expansion of prosperity (Mises 1952, p. 81; 1998, pp. 157-58). The increased productivity provided by the division of labor primarily comes from specialization in processes. The main reason for this is that the more frequent a person undertakes a process, the more it benefits to use specialized capital goods, the use of which further increases productivity (Mises 1981, p. 327, Mises 1985, p. 160).

Mises (1981, p. 261) saw this increased productivity as the great advantage of social cooperation. He, in fact, identifies the extension of the division of labor as economic progress because it is more productive, allowing for people to obtain more goods they can use to achieve more ends (1981, p. 266). Therefore, he identifies social cooperation and the division of labor as the "greatest accomplishment of reason" (Mises 1985, p. 120).

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[1] On the importance, for Mises, of the division of labor for the development of society see Salerno (1990).

Mises (1981, pp. 259-60) notes that the division of labor arises from the natural inequality of human skills and abilities as well as from differences in our environment. Some people are gifted with native intelligence and tend to specialize in intellectual endeavors. Some become psychologists, some property attorneys, some biologists, some teachers, and some minsters. Others are better at working with their hands and become machine tool operators, meat packers, sculptors, or chefs. Additionally, some locales contain large areas of open grassland that are conducive to cattle ranching. Other regions adjacent to seawater find crab harvesting easy pickings. Some countries have neither, but have a climate perfect for growing mangoes or cocoa beans. These sorts of differences generate differences in relative opportunity costs of production in different processes which open the door to the increased productivity that results from specialization and the division of labor.

Mises (1981, p. 260; 1999, pp. 163-64) also recognized that, as the division of labor develops, the inequalities in human skills, abilities, and environments that prompted specialization in the first place increase. As a person specializes in one task for a period of time, his skills in that task increase. A person who spends all of his time cattle ranching becomes even more suited to that task and comparatively less productive in others. As the differences between people grow, the benefits of the division of labor likewise increase, further increasing total social output and consumption possibilities. Additionally, as people in different regions specialize in specific processes, they invest in capital goods that are suitable for the specific tasks at which they are relatively more efficient, making regional differences even more pronounced.

The importance, for Mises, of the division of labor loomed much larger than fostering economic growth, however. The division of labor is the mutually beneficial response to human differences. As such, it is the unifying influence that builds society. The increased productivity of the division of labor has brought about cooperation, society, and civilization, allowing people to escape a Darwinian barbaric struggle for survival (Mises 1998, p. 669; Mises 1977, p. 126). Participation in the division of labor, "makes friends out of enemies, peace out of war, society out of individuals (Mises 1981, p. 261).

Mises, therefore, saw the market division of labor as the essential feature of civilization. Mises (1998, p. 266) identifies the division of labor as the institution by which people developed civilization, because both material prosperity and intellectual progress would be impossible without it. Likewise, any technological advance resulting from scientific research and scholarship requires the ability of people to specialize in such pursuits in the division of labor (Mises 1983, p. 119). Scientific and intellectual pursuits require time devoted to focusing on particular types of problems and the means to solve them. It requires that some people have the leisure to pursue such inquiry. It requires the social wealth generated by the increased productivity arising from the division of labor. Mises agrees with Josef Pieper (1963) when he says civilization is the product of leisure and peace of mind made possible only by the division of labor (Mises 1981, p. 271). In contemporary economic jargon, Mises might claim that the division of labor provides both economic growth and economic development.

Because specialization and the division of labor requires a network of voluntary exchange, it only thrives in societies with institutions supporting trade. To benefit from the market division of labor, therefore, people must have the right to private property. Additionally, society must enjoy peace. "The market economy involves peaceful cooperation. It bursts asunder when the citizens turn into warriors and, instead of exchanging commodities and services, fight one another" (Mises 1998, p. 817). Conflict destroys the division of labor, because it forces each group to consume only what it produces (Mises 1996, pp. 23-27). Nations fighting one another do not benefit from each other's comparative advantage because they do not exchange with one another. The development of the division of labor, therefore, needs liberty and peace (Mises 1981, p. 268; 1985, pp. 130-31; 1998, pp. 824, 827).

2. **Capital Formation**

Mises understood, however, that economic progress is not the product of the division of labor alone. Economic expansion in the

division of labor is furthered by capital formation. Mises identified investment in and accumulation of capital goods as a source of relatively greater wealth of more developed countries (Mises 1952, pp. 39, 82). Using capital goods increases the productivity of labor and thereby allows for increases in real wages (Mises 1952, pp. 86-89). The accumulation and maintenance of capital, however, requires saving, because capital goods wear out and are perishable (Mises 1952, p. 84). Savings, therefore, is the first step to economic progress (Mises 1998, p. 487).

Drawing upon Böhm-Bawerk's capital theory, Mises (1998, pp. 487-99) noted that the entire social economy is an integrated intertemporal aggregate production structure that supports the production of all consumer goods. Productive activity must occur at stages furthest from that of consumption before the production of consumer goods is possible. Before a loaf of bread can be produced, the baker must have flour. Before flour can be produced, the miller must have wheat. Before wheat can be produced, the farmer must have seed and fertilizer.

What is true for a loaf of bread is true for the entire set of consumer goods available for directly satisfying people in an economy. Before retail goods are available, the necessary tools, raw materials, factories, land, and labor must be available. At any existing instant, production occurs simultaneously at the various stages in the production structure. At the lowest stage producers of consumers goods exchange their products for money. At every stage of production farther removed from consumption, money is advanced to owners of land, labor, and capital goods, in exchange for the use of the services of those factors of production to produce a good sold for money in the future. The production of consumer goods, therefore, is supported by a vast, complex capital structure and the entire structure of production is supported by saving and investment.

Saving and investment is also crucial for the development of technology. Technology is essentially knowledge about the causal connections between material things. Technological advance allows producers to combine factors of production in a way that allows labor to be more productive. Therefore, technological improvement in the production of one good frees up labor to be

directed toward the production of other goods as well, increasing the general standard of living (Mises 1998, p. 617).

Although Mises recognized that technological advance is an important contributor to economic development, he rightly understood that technology is not autonomous. No increases in technology could occur without capital accumulation, for example (Mises 1952, p. 39). In the first place, Mises stressed that producers cannot utilize technology without capital (Mises 1990, pp. 169-79). Because production technology, to be useful, must be bound up in physical capital goods, the supply of capital goods determines which technological methods will be used (Mises 1998, pp. 493). The use of more and better tools is feasible only to the extent that the capital required is available (Mises 1998, p. 768). The stock of capital goods will therefore determine which technological methods of production will be used. Mises (1998, pp. 502-03) argues, consequently, that the quantity of pre-existing capital goods is a conservative factor which constrains the technology chosen by producers. Technology is not given.

Additionally, people need capital for any well-organized pursuit of knowledge (Mises 1977, pp. 126-27). Research and development requires laboratories, computers, various sorts of technical equipment, prototypes, and a variety of other capital goods. No capital goods, no invention nor innovation. Once again Mises' conclusion is apparent, saving and investment in accumulating and maintaining capital is necessary for economic progress. As he forthrightly puts it, "Saving—that is, a surplus of production over consumption—is the indispensable condition of every further stop toward technological improvement" (Mises 1998, p. 768). More saving and investment in the past would have resulted in our enjoying increased production from both better technology and an increased quantity of capital goods (Mises 1980b, p. 212).

It is for these reasons that Mises argued that lack of technology is not the reasons less developed countries (LDCs) are relatively poor. It is because they lack the capital goods necessary for increasing productivity. This points to one great benefit of foreign direct investment. It allows LDCs access to capital, and hence technological advance, much more quickly than if they had to save and invest solely by themselves.

3. Entrepreneurship and Economic Calculation

At the same time, as the second quotation by Mises in the epigraph notes, capital does *not* beget profit. Capital and capital goods do not have the power in themselves to increase prosperity. They need to be wisely invested (Mises 1952, p. 85). Capital, once accumulated, can be directed to the production of goods too little in demand to yield profits for their producers. Economic progress, therefore, requires entrepreneurship (Ritenour 2010, pp. 517-21). Entrepreneurship is especially important for economic progress because of the possible waste of malinvestment in incontrovertible fixed capital goods. (Mises 2003, pp. 239-43). If savings are invested in durable capital goods that are directed toward unprofitable production and that capital is not easily convertible to other uses, that capital is sunk and thereby consumed. There is no way to get it back. The firm has less capital going forward and therefore is less productive, hampering economic progress. Therefore, Mises argued that it is saving and capital investment *and* entrepreneurship that puts capital to new uses (Mises 2003, p. 243).

To make wise production decisions, entrepreneurs use economic calculation to direct the resources at their disposal to their most valued ends. Mises notes, therefore, that economic calculation is the intellectual basis of the market economy (Mises 1998, p. 260). The market division of labor cannot function without it, because, lacking the ability to calculate expected profit and loss, there is no way for economic decision makers to productively coordinate the vast network of specialized, decentralized, voluntary exchange.

The "foundational notion" of economic calculation is *capital*, an entrepreneur's whole complex of producer goods evaluated in money terms (Mises 1998, p. 260). A firm is able to assess its success or failure by calculating the magnitude of its capital value before and after a given production process. Capital accounting starts with market prices (Mises 1998, p. 488). The concept of capital cannot, therefore, be separated from the monetary calculation of profit and loss. Because the magnitude of capital is determined by market prices, the very concept of *capital* only makes sense, to Mises, in the sphere of economic calculation and no sense outside of the

market economy (Mises 1998, p. 262). Mises' observation is a crucial reason why we *must* have entrepreneurship for sustained economic progress and why capital does *not* beget profit.

The importance of entrepreneurship is heightened because the market economy is dynamic. It is continuously changing (Mises 1998, pp. 488-89). Different production processes are underway at different stages of production. These processes complement each other. At the same time, different production processes compete against each other for scarce resources. Every step in every production process at every stage is made possible by the conscious entrepreneurial decision to save and invest in a specific line of production. Mises' insights lead to the inevitable conclusion that the entire structure of various production processes is coordinated by entrepreneurial decision making. This is why, as Mises notes, a changing modern industrial economy simply cannot do without economic calculation and capital accounting (Mises 1998, p. 511).

Even the implementation of better production technology is an entrepreneurial decision and requires economic calculation. Technical knowledge, by itself, cannot establish which of all technically possible projects are best suited to meet the largest possible number of most highly valued ends. To successfully do that, economic calculation and entrepreneurial decision making is necessary (Mises 1998, pp. 207-10). In fact, on can conceive of the entrepreneur's task as choosing from among the various technologically feasible projects, the precise one that best satisfies the desires of the public (Mises 1980a, p. 117). Mises notes that a particular technology will only be utilized by a producer if it is deemed economically wise to do so. Technology that yields greater output may nevertheless be rejected by the entrepreneur because the increased output does not outweigh the increase in cost required to obtain and use the new technology (Mises 1998, pp. 300-01). The most "technologically productive" technology may not be used because it is not economical to do so (Mises 1998, p. 392). For more advanced production methods to be used, the expected gain from using the new technology must be greater than the cost of the new capital (minus the scrap value of the old capital). Often an entrepreneur finds it economically efficient to continue to use capital that is no longer technically most productive (Mises 2003, p. 233-35). Mises

points out, for example, that there are economic reasons we do not grow oranges in hot houses in the arctic, even though we have the technology to do so. While the cost of capital goods already purchased and used may be sunk, past investment does affect future relative costs. The existing stock of capital goods are dependent on past investment decisions and whether to switch to newer capital goods which embody new, more advanced technology will be partially affected by the productivity of the capital goods presently in use. Additionally, in choosing whether to utilize new technology entrepreneurs must take into account the future state of the market as well as a machine's technical life (Mises 1998, p. 345). Finally, new technology will not be utilized immediately by everyone all at once, but will be incorporated step-by-step as it become perceived as being economically viable (Mises 1998, p. 507). The decision issues for adopting new technology are the same as those involved with moving an industry to a different geographical location (Mises 2003, pp. 231-34).

The entrepreneurial nature of saving and investment decisions are further emphasized in Mises' explanation of why and how capital goods depreciate. While he, of course, recognized that capital goods perish as they wear out, he also noted that they can become economically useless due to changing market conditions (Mises 1998, p. 511). Machines that were once quite valuable in the production of 8-track tape cartridges are now obsolete and of no value in the production of recorded music media. A firm's capital value will wax and wane depending on the specific production processes in which its capital is invested. Such investment decisions, because they must be made in the face of uncertainty are necessarily entrepreneurial.

At the same time, Mises recognized that just as capital does not beget profit, profit does not beget capital accumulation. Capital maintenance and accumulation depends on how those who reap profits allocate their income (Mises 1998, p. 513). An entrepreneur who spends all his income on consumption will also consume his capital, decreasing productivity over time. Bringing all of these various lines of economic thought together, Mises understood that economic expansion and development is not merely the result of saving and capital investment nor advances in technology.

Economic progress is the product of saving and investment, technological innovation, and entrepreneurship operating in an unhampered market division of labor (Mises 1977, pp. 86, 127; 1952, pp. 39-40; 1998, pp. 292-95).

4. **Ideas and Institutions**

Mises also importantly recognized that economic development is not merely a material issue. It is not merely wise capital investment in more and better tools. There is an ideological aspect to prosperity. Mises recognized what, historically, many development technocrats failed to—societies that desire sustainable economic development must embrace the idea and institutions of economic freedom (Mises 1990, p. 173; Mises 1980b, pp. 201-02). A central board of development planning cannot coercively dictate a market order with economically judicious capital accumulation using the best technology, and it surely cannot engage in entrepreneurial activity guided by market prices. Such engines of prosperity must be allowed to develop freely if they are to truly benefit those in society.

In order to take advantage of the market division of labor, capital accumulation, technological advance, and entrepreneurship, we must have voluntary exchange, which requires private property. We can only specialize in producing certain things if we can trade away our excess supply to get other things we want. People have the incentive to save and invest in capital only if they have assurance that they use it as they decide and if they can keep results of profitable investments. Entrepreneurs can calculate profit and loss only if their calculations are guided by market prices that reflect the subjective values of people (Mises 1990, p. 173).

In order to enjoy economic expansion, therefore, we must have an economic system that fosters voluntary exchange. The economic system must be rooted in private property, and any political system and the broader culture must support private property, the institution that undergirds the free society. Private property provides people the incentive to accumulate and maintain their capital, because they are then able to reap the fruit of the investment. At the same time the free market price system encourages

and enables entrepreneurs to direct capital toward its most highly valued and productive ends. That is why, in his preface to *Omnipotent Government* he is adamant that "the creative and inventive spirit" that allows for economic progress and increases in the standard of living "flourishes only where there is economic freedom" (Mises 1985, p. x).

Mises' understanding of the vital link between the division of labor, capital formation, technological advance, and entrepreneurship and their necessary institutional requirement, private property, explains his rejection of foreign aid as a mode for sustainable economic progress in less developed countries. Instead of bringing prosperity, Mises argues, it facilitates the continuation of destructive policies by allowing the state to feed off the aid, while continuing to hamper the market from facilitating the engines of prosperity (Mises 1990, pp. 172-73).

IV
MODERN GROWTH THEORY IN LIGHT OF LUDWIG VON MISES

We are now in a position to examine modern economic growth theory in light of the economics of Ludwig von Mises. To do so, we need to keep in mind several key characteristics of the standard growth models, their conclusions, and the empirical work built on them. The main theoretical conclusion of the Harrod-Domar Model is that the rate of savings and investment is *the* determinant of economic growth. The main theoretical conclusion of the Solow Growth Model is that increases in savings and investment will not cause increased growth past the steady state. Continual economic growth, therefore, requires technological advance.

Remember that Solow models the economy as one great neoclassical short-run production function. To his credit, he refers to this grossly simplistic model as a "parable" but nevertheless hopes that it will shed light on the nature and causes of economic expansion (Solow 2000, pp. 1-2, 14). Solow's model and, hence, his conclusions hinge on two key assumptions. Solow assumes diminishing marginal returns to variable factors of production. He claims this

makes sense because the most productive capital will be utilized first and then less productive capital will be used later. Therefore, as the quantity of capital in the economy increases, the output attributed to the marginal unit of capital must decrease (Solow 2000, p. 16). Additionally, Solow assumes constant returns to scale for homogeneous labor and capital (Solow 2000, pp. 17-18). It is these two assumptions that, more than anything else result in the conclusion that continual economic progress is not possible via increased savings and investment in capital accumulation.

The plethora of Mises' economic insights and that of the economic literature following him allows for two powerful lines of critique—one with the theoretical models in question and one with the empirical studies following the theoretical literature.

1. **Theoretical Critique**

In light of the causal-realist approach of Mises, it is clear that conventional growth models have weaknesses related to their theoretical apparatus. Both the Harrod-Domar model and Solow's neoclassical growth model suffer from problems of aggregation and the limits of mathematical economics.

The Harrod-Domar model, for instance, posits investment as aggregate, homogeneous I. To the extent that $Y \equiv C + I$ is an identity, the model might be trivially correct. However, it ignores the fact that savings must be invested wisely from the point of view of members of society for such investment to actually contribute to sustained economic progress. Investment is not productive *per se*. As Mises (1980a, p. 120) noted, "Capital does not beget profit." There is no place for uncertainty or economic coordination by entrepreneurs engaging in economic calculation using market prices.

Solow (2002) himself identifies what he sees as two gaps in the neoclassical growth model: 1) a lack of demand side and 2) the fact that the steady-state growth rate is determined solely by the rate of labor improving technology. The first gap seems to be a non-starter, because he means a lack of aggregate demand which misses the point in much the same way as the Harrod-Domar

model does. What matters for sustained economic progress is not sufficient aggregate demand, but accumulated capital not being squandered producing the wrong things, from the perspective of those in the social economy. The second gap Solow identifies is indeed a weakness and will be discussed below.

It should also be noted however, that similar to Harrod's and Domar's vision of I, Solow models capital as homogeneous K. K is the sum of homogeneous *units* of capital goods. As noted earlier, however, Mises recognized that capital is a tool of economic calculation. It is the sum of *market value* of heterogeneous capital goods used in specific economic processes and different stages in the production structure. Again capital investment is not necessarily productive. It can be misdirected toward use in wasteful ventures. As noted above, a chief insight by Mises is that economic progress requires not investment *per se*, but the entrepreneurial allocation of capital. The actual link between saving and capital accumulation and economic development is wise entrepreneurial investment.

Additionally, something not accounted for in Solow's model is that fact that, because capital as a tool of calculation is the sum of market value producer goods, any increase in technology which makes capital goods more productive increases the present value of those capital assets, thereby increasing capital.

Although well-intentioned, the neoclassical growth model ultimately is a misguided, superficial attempt at establishing "micro-foundations" in economic growth theory. It is thought that the key to incorporating microecoomic foundations for a macroeconomic model merely requires representing a maximizing agent. Embracing this premise, Solow modeled the entire social economy as a single firm that maximizes output.

While it is laudable to establish analysis of the entire social economy on a firmer foundation than aggregate supply and aggregate demand, the causal-realist approach is much more fruitful in that it strains neither credulity nor relevance. A Misesian understanding of "micro-foundations" recognizes that all economic phenomena are the result of individual human action. The actions of individual buyers and sellers establishes the price of every consumer and producer good in every market through voluntary exchange. Personal action also determines what is

produced, as well as where, when, and how it is produced. All of the individual markets are integrated into the social economy via the division of labor, the capital structure, and the use of a common medium of exchange. Therefore, the general principles of human action apply to the vast network of voluntary exchange we call the social economy.

The complex social economy is definitely not the same thing as a single firm with a single production function. An intertemporal network of voluntary exchange is not the same thing as a firm. In modeling as he does, Solow made an error similar to Krugman when he uses a baby-sitting co-op as a model for the economy (Ritenour 2000). Modeling an economy as producing only one output, Q, misses the real economic problem. Like the model of perfect competition, it abstracts from the real problem producers meet in the economy—investment and production in the face of uncertainty (Armentano 1990, pp. 25-27; Huerta de Soto 2008, pp. 1-27; Reekie 1979, pp. 153-57; Shapiro 2007, pp. 352-63). It merely assumes that Say's Law holds in a mechanical way, so markets clear and we are in "steady state" path (i.e. production and markets are always efficient). This may be reasonable, if, *a priori*, one wants to isolate the consequences of an increase in savings wisely invested in capital. It makes less sense if one is actually trying to discover the determinants of economic progress. A modern free economy is the farthest thing from a single firm one can imagine. It is a decentralized network of producers who buy and sell in a complex market division of labor. If such a single production function would ever be applicable as a model of an economy, it would be a socialist economy. In such economies, there is an industrial division of labor with specialization within firms and a bureaucratically directed division of labor between production processes, but no social market division of labor relying on comparative advantage coordinated by market prices. Despite the assertions of popular economics textbooks by economists such as Campbell McConnell, Paul Samuelson, and Lorie Tarshis, history reveals that socialist economies have never been the hotspots of productivity they were claimed to be (Levy and Peart 2011).

Another weakness of the neoclassical growth model that stems from its microeconomic orientation is Solow's assumption of

constant returns to scale.[2] It may be true that if the quantity of current capital goods and labor is doubled with identical capital goods and labor the quantity of output will also double. This conclusion, however, is a function of Solow's single production function, not of the actual social economy. If we consider that we are trying to investigate what can cause economic progress, we need to keep in mind that an increase in capital will be constituted by an increase in the quantity of capital goods that are economically productive. Remember that Mises noted that increased economically productive capital fosters a more expansive division of labor. A more developed division of labor, in turn, increases productivity above that from additional capital under constant returns to scale. Therefore, it is reasonable to think that from a macroeconomic perspective, productive capital investment yields increasing returns to scale. The endogenous growth literature may be more right than wrong, when they argue that endogenous growth is possible due to externalities of capital investment, but not necessarily for the reasons they claim.

2. **Empirical Critique**

A helpful critique of the empirical work supporting the conclusion of the neoclassical growth model can also be made. The primary body of literature supporting Solow's hypothesis that technological advance not saving and investment is the determinant of continual economic growth is growth accounting. Growth accounting is an effort to isolate the contribution of labor and capital to the output of the macro-economy.

It should be noted at the outset that the empirical literature does not form consensus. Solow (1957) and Denison (1962, 1967) provide empirical results that supporting the claim that capital accumulation plays very little if any role in economic growth on the steady state path. Jorgenson, however, identifies a much larger role for capital accumulation. Some of the earliest empirical literature on the

[2] This was pointed out to me by Guido Hülsmann.

question by Solomon Fabricant (1954) and Moses Abrahamovitz (1956) find mixed determinants of economic growth. Fabricant cites per capita capital and increases in productive efficiency as sources of economic growth. Abrahamovitz, on the other hand, cites increased per capita resources employed and increases in productivity. Dale Jorgenson and Zvi Griliches (1972) and Jorgenson (1991) subsequently found capital accumulation to be the dominant determinant of economic growth. Robert King and Ross Levine (1994, p. 24) find that rate of capital accumulation is positively correlated with rate of economic growth, however they conclude that "capital accumulation seems to be part of the process of economic development and growth, not the igniting source."

It seems there are good reasons for such a wide spectrum of empirical results attempting to identify the determinants of economic growth. Some, no doubt stem from the standard recognized problems with using Gross Domestic Product as a measure of economic well-being (Batemarco 1987; Huerta de Soto 2006, pp. 418-20, Osterfeld 1992, pp. 9-14, Rosenberg and Birdzell 1986, pp. 4-6). In the first place, often the Bureau of Economic Analysis must make their best judgements using imprecise or inaccurate data used to calculate GDP, which is why published figures can go through so many changes in successive revisions. Additionally, it is widely recognized that GDP does not measure human welfare. In fact, some additions to GDP could be misleading. A hail storm that ruins your roof, for example, will contribute to an increase in GDP. On the other hand some productive work, like that of the homemaker or the neighbor boy who mows the yard for cash is not included. At the same time, GDP includes government purchases funded by taxation, so that the prices of those goods purchased are not determined purely by voluntary exchange. Also, despite the statistic's name, GDP is a calculation of *net* income that excludes the value of all intermediate capital goods. Finally, and importantly, Mises (1998, pp. 218) himself argued that to try to calculate national income or wealth is nonsensical, because a nation cannot convert its entire property into money at once.

The fundamental problem, however, is the aggregative nature of these statistics. Both the Y of the Keynesian Harrod-Domar model and the Q of Solow's neoclassical growth model are measured by GDP. $Y = C + I + G$, Q and K are all variables representing aggregate

quantities and all measured in homogeneous units. How C or I or G is constituted and how the money is spent does not matter to the person who equates GDP with national prosperity. As indicated above, however, where precisely in the economy factors of production, including capital, are utilized matters significantly for actual economic expansion and development. It is possible, for instance, to have increased nominal I, but if that is due to monetary inflation (or to foreign aid in less developed countries), such investment is unlikely to be productive. In fact, such action actually *consumes* capital. Given the way GDP is calculated, such an increase in I would appear as contributing to GDP, but in fact makes society relatively poorer.

Alternatively, it is possible that GDP could, indeed, increase without increased I, if there was an increase in government spending. Such government spending gives the appearance of growth, because GDP will increase. However, government spending also consumes capital via government consumption.

Another weakness inherent in the aggregate nature of the national income statistics is that it misses a key attribute of the production structure. As the Austrian economists have explained better than anyone else, the capital structure is intertemporal. Trying to incorporate the importance of saving and investing is more complicated than merely positing that I at time *t* results in K at time *t* plus 1. The actual effects of increased present investment may be years down road. Therefore, it will likely be hard to see the distinct quantitative correlation between a change in aggregate I and a change in Y in the same year or between and change in I one year and a change in change in national income the next.

The Bureau of Economic Analysis has recently begun publishing Gross Output (GO), a data series that serves as a more expansive alternative to GDP. It is a statistic that seeks to measure the "sales or revenue from production for most industries, although it is measured as sales or revenue less cost of goods sold for margin industries like retail and wholesale trade" (Bureau of Economic Analysis 2019). As such, it includes the majority of business-to-business spending that is excluded from GDP. Publication of GO has been praised most vociferously by Mark Skousen (2015, pp. 104-05; 2017, pp. 155-57) who argues that it more accurately emphasizes that production rather than consumption actually drives economic prosperity, it

better tracks the business cycle, and it can bring both monetarist and Keynesian economics together with Austrian analytical tools. At the same time, GO has been given faint praise by some (Collander 2014) and condemnation by others (Block and Barnett 2016)

While the calculation and publication is surely not, "the greatest discovery in Austrian economics since Friedrich Hayek won the Noble Prize in 1974," (Skousen 2017, p. 155) on the margin it does seem to be significantly better than GDP for accounting for gross saving and investment, which is, indeed, what drives the economy. The single largest benefit of GO is that it reminds the social scientist that consumption does not actually make up seventy percent of the economy. The fact that GO is reported by industry also makes it easier to see how investment in production in different sectors fare during the business cycle. However, it should be noted that, by nature, GO is merely a statistic that sums up aggregate spending. It does not measure investment spending that is necessarily productive. It would be a misnomer, therefore, to point to a specific quarter's GO as a sign of the economy's health. Just as the spending in GDP does not, per se result in economic prosperity, neither does spending in GO. Additionally, regardless of its benefits, it is unlikely that the publication of another aggregate statistic will prove to be a significant bridge between Austrian economics and modern macroeconomics.

V
IMPLICATIONS FOR ECONOMIC THEORY AND POLICY

1. **Expansion and Development Theory**

Many applications of the causal-realist economics developed by Mises abound, including significant implications for theorizing about economic progress—economic theory that is relevant to the real world inhabited by both less developed and more developed countries. One of the most important is a point that the present author has stressed elsewhere that mono-causal explanations for economic expansion and development are insufficient (Ritenour 2010, pp. 507-21).

As noted before, Mises identified, three sources necessary for economic progress: the division of labor, capital accumulation, and entrepreneurship. The division of labor opens the door to increased productivity by allowing people to specialize at lines of production where they are most efficient, increasing productivity and generating higher real incomes and societal wealth. Capital formation and the technological progress often embodied therein further increases the productivity of the user. Because every real economy is dynamic and the future uncertain, sustained economic progress also requires that entrepreneurs not waste accumulated capital. To direct factors of production toward their most valued uses, entrepreneurs must use economic calculation based on market prices.

One cannot neatly sever the components responsible for economic expansion from one another and find a single key that explains economic progress. A highly developed division of labor would be impossible without the accumulation and use of capital goods. Likewise, the entrepreneur must invest real capital in the production process and if he errs in his market forecast, he can indeed reap large losses. At the same time, capital *per se* never guarantees economic progress either, because it must be wisely utilized. Economic progress, therefore, is the happy consequence of a highly developed division of labor, taking advantage of an increasing capital stock wisely invested by entrepreneurs.

The necessary implication for economic policy is that to facilitate economic progress, we need social institutions that foster the development of the division of labor, the accumulation of capital, and successful entrepreneurship. Searching for a common condition that is necessary for all of the above to function, one finds that all require the institution of private property.

Because it is voluntary exchange that makes the development of the division of labor possible, people benefit from the division of labor only if dwelling in a society with institutions supporting voluntary trade. We can only engage in exchange in an environment of private property. Therefore, in order to take advantage of the division of labor and benefit from the economic development that flows from it, members of society must be secure in their property.

Likewise, for capitalists to have the incentive to accumulate capital, they also must be secure in their property. If, for example, the

state enforces confiscatory taxation, capital accumulation is hindered because taxes reduce net incomes and rates of return, reducing both the ability and incentive to save and invest in capital accumulation and maintenance. Likewise, regime uncertainty brought about by an aggressive business regulatory state makes rates or return less certain and can discourage capital investment (Higgs 1997).

The entrepreneur's need for monetary market prices in order to calculate profit and loss also points to the necessity of private property for entrepreneurship. Only voluntary prices are manifestations of the subjective values of the buyers and sellers in society. Again, voluntary exchange requires private property. Without voluntary exchange there can be neither money nor market prices. Without economic calculation, those directing factors of production have no way to know how to allocate them wisely. Capital is consumed and standards of living fall.

A corollary of security of private property is security in general. For the division of labor to develop and extend, society must enjoy peace. As Mises (1998, pp. 817) notes, "The market economy involves peaceful cooperation. It bursts asunder when the citizens turn into warriors and, instead of exchanging commodities and services, fight one another." The division of labor is able to develop only because its participants expect lasting peace and the ability to exchange that goes along with such peace. Conflict destroys the division of labor, because it forces each group to consume only what it produces.

2. **Fiscal Austerity**

Mises' insights related to economic progress also helps explain empirical literature about fiscal policy. Recent studies indicate that, when attempting meaningful fiscal reform to reduce government budget deficits, cuts in government spending are more beneficial to the economy than tax increases (Alesina and Ardagna 2010; Alesina, et. al. 2015). This literature is consistent with earlier empirical results (Giavazzi and Pagano 1990).

The relative benefits of government spending cuts versus tax increases can be explained by Mises' insights about the benefits of

capital formation, entrepreneurship, and the division of labor. If a government desires to reduce its budget deficit via tax increases, private disposable incomes would decrease, reducing the ability and incentive of people to save and invest. Decreased investment results in a reduction in the capital stock over time, so society would be less productive, reducing real incomes and wealth. Additionally, reducing budget deficits by increasing taxes leaves government bureaucratic decision makers in control of economic resources. Such entities do not make decisions guided by economic calculation, thus allocation of scarce factors of production distorted away from that which would obtain in the market division of labor. Such inefficiencies leave societies relatively poorer than they would be in an unhampered market.

Fiscal reform through reducing government spending, on the other hand, will ultimately result in relative prosperity if a society maintains institutions of private property. While reducing government spending may initially reduce statistical GDP due to decreases in government expenditure, such a reduction frees more scarce economic resources to be used and allocated by productive entrepreneurs. A reduction in government spending means a reduction in deficit spending. Less deficit spending would result in fewer distortions and malinvestment due to government inflation via debt monetization. There would also be less borrowing from the non-bank public, thereby increasing the quantity of capital and physical factors of production in the hands of private entrepreneurs who have an incentive to invest productively and who use economic calculation as a guide to do just that. The market division of labor again would be less hampered, all of which results in more profitable investment in the short run and increased capital and prosperity over time.

VI
CONCLUSION

Against the backdrop of modern growth theory, Mises' contributions stand in rather bold relief. Because he was not tied to Keynesian income equations, he was not led astray into concluding that spending on capital goods *per se* was the sole determinant of economic

growth. Because he was not wed to mathematical neoclassical production functions, he did not downplay the importance of capital in favor of technology as the single cause of economic progress. His causal-realist framework, beginning with human action in the midst of real constraints of time and uncertainty, allowed him to develop economic insights that provide a holistic theory of economic progress. In doing so, Mises anticipated endogenous growth theory, but did so more richly, recognizing the vital link between capital investment, the market division of labor, and entrepreneurial innovation. Likewise he stressed the importance of social and economic institutions before economists' focusing on institutions was cool. He even anticipated McCloskey (2016) by identifying the role that attitudes and ideology play facilitating a culture of commerce and industriousness, without, again succumbing to the temptation to forget other necessary engines of prosperity.

Revisiting the economics of Ludwig von Mises, therefore, is not merely an academic junket through the history of economic thought. To the contrary, contemporary economists interested in a robust theory of economic expansion and development have much to gain by taking Mises' insights seriously. A growing body of literature does just that and is ripe for harvesting helpful policy prescriptions (Boettke 1994; Coyne and Boettke 2006; Garrison 2001; Huerta de Soto 2006; High 2009; Holcombe 1998; Manish and Powell 2014; Ritenour 2010, pp. 507-32; Shenoy 1991, 2007, 2010; and Young 2009). Drawing upon the insights of Mises and his tradition will only further develop the frontiers of our knowledge about the nature and causes of economic prosperity.

WORKS CITED

Abramovitz, M. (1956): "Resource and Output Trends in the United States since 1870", Occasional Paper No. 52, National Bureau of Economic Research, New York.

Alesina, A. and S. Ardagna (2010): "Large changes in fiscal policy: Taxes versus spending" in Jeffrey R. Brown, ed. *Tax policy and the economy*, Vol. 24 Chicago, University of Chicago Press, pp. 35-68.

Alesina, A., O. Barbiero, C. Favero, F. Givavazzi, and M. Paradisi (2015): "Austerity in 2009-13" *Economic Policy*, Vol 30, No. 83, pp. 383-437.

Armentano, D. T. (1990): *Antitrust and Monopoly: Anatomy of a Policy Failure*. 2nd ed. Oakland, The Independent Institute.

Arndt, H. W. (1987): *Economic Development: The History of an Idea*. Chicago, The University of Chicago Press.

Batemarco, R. (1987): "GNP, PPR, and the Standard of Living." *The Review of Austrian Economics*, Vol. 1, pp. 181-86.

Barnett II, W. and W. Block (2016): "Gross Output — Another Government Con." *Procesos de Mercado: Revista Europea de Economía Política*, Vol. XIII, No. 2, pp. 13-39.

Boettke, P. J. ed. (1994): *The Collapse of Development Planning*. New York, New York University Press.

Bureau of Economic Analysis (2018): "What is gross output by industry and how does it differ from gross domestic product (or value added) by industry?" Accessed on-line at https://www.bea.gov/help/faq/1246 on 21 September 2019.

Colander, D. (2014): "Gross Output." *Eastern Economic Journal*, Vol. 40, pp. 451-455.

Coyne, C. and P. J. Boettke (2006): "The Role of the Economist in Economic Development." *The Quarterly Journal of Austrian Economics*, Vol. 9, No. 2, pp. 47-68.

Denison, E. F. (1962): *Sources of Economic Growth in the United States and the Choices before US*. New York, Committee for Economic Development.

— (1967): *Why Growth Rates Differ*. Washington, DC: The Brookings Institution.

Domar, E. (1946): "Capital Expansion, Rate of Growth, and Employment." *Econometrica*, Vol. 14, No. 2, pp. 137-147.

Easterly, W. (2002): *The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics*. Cambridge, The MIT Press.

Fabricant, S. (1954): "Economic Progress and Economic Change". *National Bureau of Economic Research 34th Annual Report*, pp. 3-18.

Garrison, R. W. (2001): *Time and Money: The Macroeconomics of Capital Structure*. New York, Routledge.

Giavazzi, F. and M. Pagano (1990): "Can severe fiscal contractions be expansionary? Tales of two small European countries", in

Blanchard J. Olivier, Fischer Stanley (eds), *NBER Macroeconomics Annual 1990*, pp. 75-122. Cambridge, MIT Press.

Harper, D. A. (2003): *Foundations of Entrepreneurship and Economic Development*. London: Routledge.

Harrod, R. F. (1939): "An Essay in Dynamic Theory." *The Economic Journal*, Vol. 49, No. 193, pp. 14-33.

Helpman, E. (2004): *The Mystery of Economic Growth*. Cambridge, Harvard University Press.

Higgs, R. (1997): "Regime Uncertainty: Why the Great Depression Lasted So Long and Why Prosperity Resumed after the War." *The Independent Review*, Vol. 1, No. 4, pp. 561-590.

High, J. (2009): "Entrepreneurship and Economic Growth: The Theory of Emergent Institutions," *The Quarterly Journal of Austrian Economics*, Vol. 12, No. 3, pp. 3-36.

Holcombe, R. G. (1998): "Entrepreneurship and Economic Growth." *The Quarterly Journal of Austrian Economics*, Vol. 1, No. 2, pp. 45-62.

Huerta de Soto, J. (2006): *Money, Bank Credit, and Economic Cycles*. Auburn, The Ludwig von Mises Institute.

— (2008): *The Austrian School: Market Order and Entrepreneurial Creativity*. Cheltenham, Edward Elgar.

Jorgenson, D. W. and Zvi. Griliches (1972): "Issues in Growth Accounting: A Reply to Edward F. Denison," *Survey of Current Business*, Part II, pp. 65-94.

Jorgenson, D. W. (1991): "Productivity and Economic Growth." In *Fifty Years of Economic Measurement: The Jubilee of the Conference on Research in Income and Wealth*. Edited by Ernst R. Berndt and Jack E. Triplett, pp. 19-118. Chicago, University of Chicago Press.

King, R. G. and R. Levine (1994): "Capital Fundamentalism, Economic Development and Economic Growth." *Carnegie-Rochester Conference Series on Public Policy*, Vol. 40, pp. 259-292.

Levy, D. M. and S. J. Peart (2011): "Soviet Growth and American Textbooks: An Endogenous Past." *Journal of Economic Behavior & Organization*, Vol. 78, No. 1-2, pp. 110-125

Lewis, W. A. (1954): "Economic Development with Unlimited Supplies of Labor." *The Manchester School of Economic and Social Studies*, Vol. 22, No. 2, pp. 139-191.

Manish, G. P. and B. Powell (2014): "Capital Theory and the Process of Inter-Temporal Coordination: The Austrian Contribution to

the Theory of Economic Growth." *Atlantic Economic Journal*, Vol. 42, No. 2, pp. 133-142.
Mccloskey, D. (2016): *Bourgeois Equality: How Ideas, Not Capital or Institutions, Enriched the World*. Chicago, University of Chicago Press.
Mises, L. Von (1952): *The Anti-Capitalistic Mentality*. Princeton, Von Nostrand
— (1977): *The Ultimate Foundation of Economic Science*. Kansas City, Sheed Andrews and McMeel, Inc.
— (1980a): "Profit and Loss." In *Planning for Freedom and Sixteen Other Essays and Addresses*, 4th edition, pp. 108-150. South Holland, Libertarian Press.
— (1980b): "Capital Supply and American Prosperity." In *Planning for Freedom and Sixteen Other Essays and Addresses*, 4th edition, pp. 195-214. South Holland, Libertarian Press.
— (1981): *Socialism*, Indianapolis, Liberty Press.
— (1983): *Bureaucracy*. Cedar Falls, Center for Futures Education.
— (1985): *Omnipotent Government: The Rise of the Total State and Total War*. Spring Hills, Libertarian Press.
— (1998): *Human Action*. Scholars Edition. Auburn, The Ludwig von Mises Institute.
— (1990b): "The Plight of the Underdeveloped Nations." In *Money, Method, and the Market Process*, edited by Richard M. Ebeling, pp. 168-173. Auburn, The Ludwig von Mises Institute.
— (2003): *Epistemological Problems of Economics*. Auburn, The Ludwig von Mises Institute.
Pieper, J. [1952] (1963): *Leisure: The Basis of Culture*. New York: Random House, Incorporated.
Reekie, W. D. (1979): *Industry, Prices and Markets*. New York: John Wiley and Sons.
Ritenour, S. (2000): "Post-Modern Economics: *The Return of Depression Economics by Paul Krugman*." The *Quarterly Journal of Austrian Economics*, Vol. 3, No. 1, pp. 79-83.
— (2010): *Foundations of Economics: A Christian View*. Eugene, OR: Wipf and Stock.
Romer, P. M. (1994): "The Origins of Endogenous Growth." *Journal of Economic Perspectives*, Vol. 8, No. 1 (Winter), pp. 3-22.
— (1990): "Endogenous Technical Change." *Journal of Political Economy*, Vol. 98, No. 5, pp. S71-102.

Rosenberg, N. and L. E. Birdzell, Jr. (1986): *How the West Grew Rich*. New York: Basic Books, Inc.

Salerno, J. (1990): "Ludwig von Mises as Social Rationalist." *The Review of Austrian Economics*, Vol. 4, pp. 26-54.

Shapiro, M. M. (2007): *Foundations of the Market Price System*. Auburn, The Ludwig von Mises Institute.

Shenoy, S. R. (1991): "Austrian Capital Theory and the Underdeveloped Areas: An Overview." *Austrian Economics: Perspectives on the Past and Prospects for the Future* edited by Richard Ebeling, pp. 379-423. Hillsdale, Hillsdale College Press.

— (2007): "Investment Chains Through History or an Historian's Outline of Development: Using Goods of Ever Higher Orders." *Indian Journal of Economics and Business*, Special Issue, pp. 185-215.

— (2010): *Towards a Theoretical Framework for British and International Economic History: Early Modern England, a Case Study*, Auburn, The Ludwig von Mises Institute.

Skousen, M. (2015): "Linking Austrian and Keynesian Economics: A Variation on a Theme." *The Journal of Private Enterprise*, Vol. 12, No. 1, pp. 97-112.

— (2017): "Blocking Progress in Austrian Economics: A Rejoinder." *Procesos de Mercado: Revista Europea de Economía Política*, Vol. XIV, No. 2, pp. 153-172.

Solow, R. M. (1956): "A Contribution to the Theory of Economic Growth." *The Quarterly Journal of Economics*, Vol. 70, No. 1 (Feb.), pp. 65-94.

— (1957): "Technical Change and the Aggregate Production Function." *Review of Economics and Statistics*, Vol. 39, pp. 312-320.

— (2000): *Growth Theory: An Exposition*, 2nd Edition. New York: Oxford University Press.

— (2002): "Neoclassical Growth Model." In *An Encyclopedia of Macroeconomics*, edited by Brian Snowdon and Howard R. Vane, pp. 518-521. Cheltenham, Edward Elgar.

Young, A. (2009): "A Capital-Based Theory of Secular Growth." *The Quarterly Journal of Austrian Economics*, Vol. 12, No. 1, pp. 36-51.