

An Instrumental Approach to Political Economics

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Abstract: Through providing a historical background and by tracing Lowe's theories to earlier political economists, I hope that one gains an understanding of the influences of Lowe, as well as to show the historical relevance of economic growth theory and an integration of Lowe's analysis into a modern theory of the business enterprise. A main agreement in all heterodox economic theory is an emphasis on the re-integration of the social sciences into economics. The failure to include both economic and social institutions into a more complete framework has had a detrimental effect on policy prescriptions. Polanyi (1944) gives a historical account of this failure. It is seen through his seminal book, *The Great Transformation*: if one fails to frame policy prescriptions within an appropriate institutional context, policy prescriptions are all but ineffective. New institutions must be put into place in order to conform to the new policy. In addition, the failure to recognize the institutions of a society prior to the implementation of policy will have devastating effects. As a result, protective measures must be put into place in order to prevent the deterioration of both the economic system and society as a whole. This work will discuss the role "instrumentalism" plays in both economics and sociology.

Keywords: Economics and Sociology, Economic Methodology, Political Economy, Marxian, Sraffian Approaches

Introduction

Lowe has long called for the integration of all the social sciences. It was his viewpoint that in order to understand economic systems one must first understand the social make-up of societies. The economy is simply one element in a larger interconnected social system. Lowe attempts to move "towards a science of political economics." (1935) This science, which he refers to as "instrumentalism", takes into consideration the larger goals of society by positing an initial state and then analyzing the path to which the system moves towards a desired goal. Instrumental analysis, then, forces one to move beyond economics and formulate an accurate depiction of society and its influences and consider how these can be altered towards the

achievement of greater societal goals. To do this I will introduce the central place that both economics and sociology has in “instrumentalism”. Finally I will attempt to integrate Lowe’s analysis into a modern theory of the business enterprise.

Background

Adolph Lowe was born in 1893 in Stuttgart, Germany. He was educated in Berlin and Tübingen, receiving a degree in law and then continuing to study economics under Franz Oppenheimer, a physician turned economist. After his studies he headed the Ministries of Labor and Economics of the Weimer Republic from 1919 – 1924. In 1926 Adolph Lowe became the director of research at the University of Kiel. Lowe’s colleagues included Gerhard Colm, Hans Nesser, Alfred Kähler, and Noble Laureate Wassily Leontief. All these economists worked on structural growth models and business cycle theory at the Kiel Institute with Lowe until they were run out and forced to immigrate to other nations prior to World War II. Lowe, cited as a “dangerous intellectual,” was forced into exile and took a post at the University of Manchester, UK, then at the New School for Social Research in New York City. Given the academic freedom that residing in New York provided, he was able to continue his studies of the business cycle without political disruption. His colleagues from Germany eventually ended up at the New School for Social Research. In their new home, the “Kiel School” was left unabated and they continued work on structural economic growth and technological and structural unemployment, which, to this day, continues to flourish at the New School for Social Research (Krohn, 1987).

In order to fully conceptualize Lowe’s theory of the business cycle one must develop an understanding of his economics, as business cycle theory is just one leg of the tripod which makes up the foundation of Lowe’s political economics. Mathew Forstater (2000) discusses the three aspects of Lowe’s

political economics: 1) a methodology for the integration of economic and social analysis and public policy; 2) a theory of the business cycle that puts focus on the problems of technological and structural unemployment; and 3) the political-philosophical problem of maintaining individual freedom within a society requiring democratic controls. It is appropriate to take each of these in turn, noting that each “leg” is of equal importance. That is to say, without one, the tripod will fall.

In *Economics and Sociology* (1935) Lowe makes a “plea for the co-operation of the social sciences.” As Lowe argues, it was (and perhaps inevitably so) the division of labor within the social sciences that has caused each discipline to branch out on its own. However each individual discipline is incapable of providing a complete theory of individual and societal motivations and behavior, as well as the political, economic, and social consequences of such behaviors. Economic sociology attempts to: “...ascertain all social factors and influences which form and modify the ‘data’ of the economic order and its evolution. Thus economic sociology deals on the one hand with the social institutions of the economic system, and their specific local and historical structure...in treating these problems economic sociology renders the general premises of economic theory concrete and gives its deductions the individual colour of space and time.” (Lowe, 1935, p. 31-32).

For Lowe, there is no such thing as *pure economics*. In order for economics to be pure, one must be able to separate economic behaviors from social behaviors. Or alternatively, one must be able to discuss economics independently of the society and the social factors by which economics is constrained. This has been the goal of neoclassical economics, in which individuals, producers, and consumers alike are assumed to have: 1) full information of all available commodities, 2) ordered preferences, 3) and self interest maximization. This becomes problematic in present day theory. Classical economic theory, according to Lowe, was correct in its assumptions of the maximizing behavior of all economic agents, buyers and

sellers alike. However, given a modern form of capitalism in which we live today, these assumptions are no longer valid. The behavioral and motivational principles upon which classical and neoclassical theory rests is no longer as significant.

Polanyi (1944) made a similar point in his discussion of the self-regulating market, which lies at the heart of the traditional approach. The institutions upon which society had been previously built are not conducive to the self-regulating market. Given laissez-faire policies human and social society would have become annihilated (Polanyi, 1944 pp. 3-10). As a consequence, institutions, both formal and informal are required for the *implementation* of the self-regulating market. This is a paradox that Lowe finds issue with as well. His “plea for cooperation among the social sciences” (1935) recognizes the importance of developing a theory that encompasses all the social sciences and of developing policy which brings society, and societal goals back to the forefront. Consistent with Polanyi’s analysis of nineteenth-century England, the simplistic traditional theory is not and can not be used as a framework for public policy, due to its deteriorating effects.

An analysis of the modern business enterprise is a suitable starting point for the discussion of political economics. In the present system the business enterprise is a complex web of many different industries with different motivations, each with its own unique micro goals. The financial structure of today’s economy, the organization of the firm, and the motivations of the firm to engage in production, investment, and the implementation of pricing policies differs from firm to firm and, over time, within the same firm. The essential point that Lowe illustrates is that pecuniary motivations to maximize are still relevant today. However given the size and complexity of the modern business enterprise, the means to the pecuniary ends are no longer clearly defined. The nature of the business environment and the time span in which profits can be maximized can cause perverse economic actions. Increasing or decreasing output, raising or lowering prices can all be justified as profit maximizing behavior in the

modern age. The predictability of the classical models is not realistic in the current economic system. Instead in his two great works, *On Economic Knowledge* and *The Path of Economic Growth* Lowe provides an alternative framework. An “instrumental” approach in which societal goals or sets of goals (*terminal state*) are pre-specified. The corresponding *initial state* is devised based upon the terminal state. Then one works backwards from the terminal state to devise a path (or paths) in which the economy may traverse towards the fulfillment of pre-specified goals. This became the launching point towards a new political economics, as a theory, and as a guide for public policy.

The Functions of Political Economics

“Political economics, like traditional economics, is a theoretical science. As such it tries to derive a past state of the system (explanation) or a future state (prediction) from the knowledge of the given state (initial conditions) and from some ‘law of motion’.” (Lowe, 1987, p.157)

The crucial distinction between traditional and political economics is that traditional (classical and neoclassical) theory rests upon rules, behaviors, and motivations of the early phases of capitalism. These assertions are now losing realistic significance in present day capitalist society. Lowe does not deny that the motivation of the businessman is for the “maximization of pecuniary receipts,” but the nature of the business enterprise is simply too complex. Gardiner Means classifies these industries that have the ability to engage in profit maximization through the implementation of neoclassical price-cost models as atomistic. The modern day economic and business environment is not composed of atomistic enterprises; it is composed of corporate enterprises that have a high degree of technological and administrative organization and that can exhibit varying degrees of market power. Each corporation brings with it a complex matrix of inputs from numerous suppliers: it then becomes impossible to equate marginal revenue to marginal cost because the data is simply either not

known or perhaps even irrelevant. Depending upon the nature of the industry, one's payment to a supplier may not come due until after the final product is in the hands of its end user (i.e. grocery stores). However not all industries are organized in this manner. On the other side of the spectrum, industries such as the automobile and the construction industries require payments to suppliers prior to the final sale of the product. The fundamental idea is that there is no universal methodology that can be applied to all industries in the modern business enterprise (Lee, 1998). The traditional approach to economics is neither a relevant nor a realistic approach to the theory of production, or to the provisioning process.

Veblen (1909) raises this issue. Economic growth, technological advances, and the corresponding changing nature and function of business enterprise *can not* and *should not* be explained using classical postulates, such as marginal utility, if one is to gain some insight as to how the economic and social system operates. Underlying the analysis of Veblen, Lowe, and Polanyi, the fundamental importance of the inclusion of institutions and institutional adjustment is the central core of the analysis. It becomes important not to get caught up in the vocabulary, what Veblen refers to as "settled habits of thought" (1909 p. 4) Lowe's, "behaviors and motivations," and Polanyi's, "institutional mechanisms" both refer to the importance of an analysis of society, with the inclusion of institutions encompassing both the formal laws and the informal rules of society.

Finally, human beings are not static, we do not live in a static society, and, therefore, institutions are not static and should not be treated as such. One must include institutional change (including the aforementioned technological change and change in the business enterprise) within the broader approach of political economy.

The machine process has transformed the nature by which society's behaviors and motivations are formulated. This is caused by the rise of the modern business enterprise. It is the move away from Means' atomistic production to a complex network of inputs and outputs in the production

process of the modern corporate enterprise. The machine process has created standardization, not just in the production of the physical product, but standardization in what Marx refers to as the non-productive sector. The necessity for standardization in the production process, given an input-output framework, is easy to surmise. However the non-productive sector, (administration, managers, etc.) also requires standardization in invoicing, payroll, administrative routines, etc. in order for the smooth flowing of the production process and the economy as a whole.

Given this framework, an industrial capitalist society involves a complex system of relationships driven by individual micro-processes, each with their own motivations and goals. Still, because each micro-unit (individual business or corporation) is dependent upon others within their own industry for inputs in the production process, and dependent upon business practices set by administrators and managers, as well as reliant upon the financial sector, micro decisions can have macro-economic consequences. The aim of the 'new' political economics then is to determine organizational rules which are appropriate for the fulfillment of pre-specified macro goals. Political economics assumes that actual forces that guide economic movements are not known *a priori*; rather they are in themselves categories of unknowns. For Lowe, the major undertaking of political economics is to devise an analytical framework in which these unknowns can be determined. This approach is precisely the opposite of the traditional neoclassical view. Under the neoclassical view, it is the macro goal which is treated as an unknown and the path the economy is moving along is treated as a known. Lowe's instrumental analysis inverts the problem. It is a macro-goal, whether it be full employment and full resource utilization, price stability, environmental sustainable economic growth, etc. that is clearly defined, and (semi) independent of any existing rules or behavior.

With regard to the initial state, it cannot be simply defined through an examination of economic and social relationships of the present day. Instead a comparison has to be made between the terminal state and the initial

state. Both states need to exhibit the same properties so that the same variables can be compared. To do this one must identify the features of the terminal state and then, through direct observation, one can select the relevant units of analysis of the current economic and social structure to devise an initial state. There can be many initial states, thus the definition of the initial state is relative to the precise definition of the macro goal or set of macro goals.

Having clearly defined the terminal state and having devised the initial state, an instrumental approach then determines the physical and social arrangements that must be implemented towards the achievement of macro goals. Additionally, it requires micro units (the business enterprise) to conform in order for the economic and social system to traverse off their existing path towards the new path which will allow for the attainment of the terminal state. The businessman must believe that the macro goal(s) is in the best interest of his micro goal(s). If so, there will be spontaneous conformity of the micro-processes and the macro goal is easily achieved. Given the delicate nature of the micro-process as outlined above, one individual unit can push the system off of its suitable path, therefore public controls are required to both initiate the traverse and to maintain the system on its desired path in order for the fulfillment of the greater societal goal. This is the outline of the theory of Lowe's traverse.

The Marxian Model of Simple and Expanded Reproduction

Lowe's theory of the traverse stemmed from Marx's analysis of simple and expanded reproduction. In Marxian economics, economic reproduction refers to the cyclical process in which the initial conditions are constantly re-created. Marx further developed Quesnay's ideas to help model the circulation of capital, money, and commodities. In Volume II of *Capital* (1978) Marx divides the economy into two departments of social production. Department 1 is the *Means of Production*, and Department 2 is the *Means of Consumption*. In each of these two departments the capital component is

then divided into fixed capital, c , and variable capital, v . Variable capital breaks down as well into the replacement of the variable capital that is used up in the production process and the surplus value, s , which is the amount that is over and above that which is consumed in the production process (1978, p. 471). Using this information an investigation of an economy that can create enough output to simply reproduce itself is examined. Therefore the economy can be represented by a system of equations:

$$\text{Department 1: } \alpha_1c + \beta_1v + \lambda_1s = \delta \quad (1)$$

$$\text{Department 2: } \alpha_2c + \beta_2v + \lambda_2s = \gamma. \quad (2)$$

The total annual product taken together is $\delta + \gamma$, which is the sum of the total products of Department 1 and Department 2. There are transactions that are necessary for simple reproduction. The workers' wages in Department 2, β_2v , and the surplus value of the capitalists, λ_2s , must be spent on means of consumption and therefore must be dropped out of the total annual product. The $\beta_1v + \lambda_1s$ in Department 1 are exchanged with Department 2 for an equivalent amount of constant capital. The capitalist class in Department 2 must convert its constant capital, α_2c , from the form of means of consumption into means of production. It must therefore be dropped out of total annual product as well. There still remains α_1c from Department 1. This consists of the means of production that can only be used in Department 1 and serve to replace the constant capital consumed there (Marx, 1978, p. 474). Therefore we end up with:

$$\text{Department I: } \alpha_1c + \beta_1v + \lambda_1s = \delta - \alpha_1c + \beta_1v + \lambda_1s = 0. \quad (3)$$

$$\text{Department II: } \alpha_2c + \beta_2v + \lambda_2s = \gamma - \alpha_2c + \beta_2v + \lambda_2s = 0. \quad (4)$$

Equations 3 and 4 show that there is no capital accumulation in Marx's simple reproduction model, contrary to the expanded reproduction model, where surplus value is being accumulated (Marx, 1978, p. 586). The basic idea behind Marx's expanded reproduction model is to analyze the conditions that are necessary for expanded reproduction to take place

without causing overproduction in either sector. Marx shows that the necessary conditions for achieving balanced growth are highly restrictive and that overproduction within a sector causes imbalances in the exchange between sectors. The conditions necessary to achieve balanced growth without causing a disproportional crisis are unlikely met in a capitalist economy. This framework prepared the starting point for John Hicks and Lowe to develop the analysis of the structural traverse. Hicks coined the name traverse to mean moving from one economic growth path to another (Halevi, p. 3). Hicks' neo-Austrian approach of the traverse problem implemented a two sector model similar to Marx's model. In Hicks' later writings he becomes dissatisfied with the two-sector approach, mainly this was due to capital equipment being highly specific and not easily transferable among different stages of the production process (Hagemann, 1998, p. 209). The modeling of short-run adjustment processes based on the assumption of shift-able capital goods is inaccurate under real economic and production conditions.

The Path of Economic Growth

Stemming from the earlier work of Marx, and to a lesser extent Hicks, Lowe (1950, 1976) in *The Path of Economic Growth* provides a nice theoretical model in which the economy can traverse from one initial steady state path to a terminal higher level of growth. Lowe's basic model is divided into three horizontal sectors, each is divided into four vertical stages, which can represent the inner-workings of the industries within a given sector. His models are different from other growth models like that of Solow, because he makes the assumption that both the initial state and the terminal state must be known.

The model is a production schema that describes inter-dependent flows that are themselves related to the system's stocks (Lowe, 1976, p. 33). The model is vertically integrated through the successive stages towards the production of consumer goods. The incidence of the vertical flow of

resources towards consumption goods is contingent upon the horizontal flow between the three sectors. Lowe's model contains four sets of relationships between labor (N), which Lowe defines as "all human agents producing productive resources" (Lowe, 1973 p. 28), natural resources (R), fixed capital (F), and w , the working capital that gets transferred from successive stages. There exist causal relationships between labor, natural resources, and capital. For purposes of production these items have fixed proportions. The four stages show how crude goods go through intermediate steps, given varying amounts of capital, labor, and resources in each step, to then become finished consumable goods. This simple model presents itself in a form that is good for its simplicity and also for its realism.

In his dynamic model, Lowe implements an instrumental approach. He describes the terminal state in which all inputs are continuously and fully utilized (Lowe, 1976, p. 21). Lowe defines three methods which the economy can traverse to a new higher rate of growth. The first is by a change in the labor supply, a change in natural resources, or conversely a change in the productive capacity of the system (technological progress). In Lowe's model, output in Sector 1a must produce outputs to reproduce the fixed capital that was used up in the production process and must produce outputs to be used as inputs in the production of Sector 1b. Sector 1b then must produce enough outputs to replace the fixed capital that was used up in that production process and produce outputs to be used as inputs in Sector 2. Sector 2 then produces consumption goods, which is then consumed by laborers in all three sectors. Given this framework adjustment to a higher rate of growth, using a structural analysis approach requires output that is produced in Sector 1b to be transferred to Sector 1a, which then reduces the working capital that is made available to Sector 2 and reduces production in the consumption goods sector initially.¹ The next phase of the traverse process is in Sector 1a, given an increase in productive inputs that were borrowed from Sector 1b. Sector 1a now produces a greater number of intermediate outputs to be used in Sector 1b. Note this

may take some time because Sector 1b is currently at a reduced stage of production. Following an increase in inputs from Sector 1a, Sector 1b can now produce at a higher level achieving higher outputs used in the consumption sector, and achieving growth in the consumption sector.

Output from Sector 1b, as was the case for Sector 1a, must be greater to replenish the capital that was used up in production, and to be used as intermediate inputs into Sector 2 (Lowe, 1950, 1976). However, Lowe stipulated that this is only a first step. In order for the adjustment process to be possible it must be supplemented by *force analysis*, whereby the micro-management of individual firms must be motivated in some way in order to initiate the traverse (Gerhke and Hagemann, 1996).

Modern Day Implications of Lowe's Analysis

The importance of the micro-aspect of Lowe's instrumental approach cannot be overlooked. Public controls can be put into place to force individual agents to conform and to allow for the achievement of the terminal state. Under centralized planning the means of devising and implementing public controls is neither here nor there because it is only the achievement of the macro goal that is of any importance. Under a capitalistic system public controls may be necessary in order to forcibly align the micro and the macro goals. Lowe's notion of spontaneous conformity only exists when there is a marriage between the macro goal of the state and the micro goals of agents within that system. This assumption may however be a heroic one. Given the disjointedness of the micro and the macro goals, public control becomes necessary in order to keep the micro-units from deviating off the path. Perhaps it may be of importance to develop a full understanding of how the business enterprise functions so that one can align both the micro and macro goals when defining the terminal state. The inclusion of individuals and businesses in pre-specifying the terminal state makes the adjustments which are necessary for its achievement palatable which then lessens the control by the government of

the business enterprise. It is then easy to surmise that the role of political economics is simply to serve as a means to greater social ends.

Lowe's structural analysis of traverse processes is primarily concerned with the structural conditions that are necessary to achieve desired social ends. One problematic concern is the amount of physical time it takes for the economy to complete the movement from its existing path to the new, socially beneficial path. There is not a smooth flow of new capital inputs into the production process in successive periods. The problem that the economy confronts when departing from a steady growth path via the utilization of new capital is that the adjustment process that must take place requires real time and cost. Capital is itself not an original factor of production but is a result of the production process. Therefore real capital can be treated as both an output and an input, the production of which determines the growth path for the whole economy. But it is the real time it takes for the implementation of new capital which causes imbalances in the exchange between sectors and possible overproduction within a sector (Hagemann, 1990, p.147). In addition the labor supply must increase proportionately with the addition of capital which is necessary in order to accommodate the increase in capital in sectors 1a and 1b.

Of course, labor is also required for the initiation of the traverse. The absence of a reserve army of labor would essentially cause the system to breakdown, as an increase in the labor supply is a necessary precondition to the addition of new capital, and therefore, increased output. Without unemployed labor, adjustment to a new growth path becomes impossible. That is unemployment provides flexibility within the system. This is a paradox because a fully employed workforce is socially desirable, yet a reserve army is required for the achievement of other macro-goals. There exists a trade-off between flexibility within the system and unemployment (Forstater, 1997, p. 14). In addition rigidities in the system could occur due to regulations in the quantity or use of natural resources and is of course assuming a finite supply of natural resources. In addition, it is not only the

adjustment of new capital that causes rigidities in the system, but it is also the attainment of new capital. However the rigidities could be eliminated if firms have produced capital in excess of what is currently required (Forstater, 1997). So the two conditions that provide for system flexibility are excess capacity and unemployment. It has been suggested that, given the high social cost of unemployment which has been shown to lead to poverty, crime, and suicide, the problem could be alleviated through a fourth sector. Using Lowe's model that was presented earlier, the fourth sector would be a government producing sector. This proposal seems like an ideal solution for a number of reasons. First, the government sector would be able to hire the unemployed workforce while still maintaining system flexibility which alleviates the social burden of unemployed workers in the economy. Additionally, a government sector is not a profit maximizing institution; its function is the maximization of social well being. A government sector in addition to not being profit maximizing has no capital labor ratios as the other three sectors have. A government sector has an infinitely elastic demand for labor (Forstater, 1997). The inclusion of a fourth government sector allows for both full employment and system flexibility. Full capacity utilization is desirable, although the negative effects of unused capital are not nearly as detrimental to the economy as unemployment is (Forstater, 1997).

Conclusion

The historical framework of a two-sector analysis to the system of production has been shown. It was first developed by François Quesnay and the Physiocrats and later expanded upon by Karl Marx in the nineteenth century. It was shown how Marx's two-sector model achieved simple reproduction in the economy as well as expanded reproduction via capital accumulation. This framework was then used by John Hicks who developed a

vertically integrated model, which was soon abandoned in favor of Adolph Lowe's horizontally integrated model. This model showed how the outputs of Sector 1a and 1b were merely working capital, and that Sector 2 produced consumption goods for all three sectors. Lowe's model has become the framework for the study of economic growth and development and is conducive to macro economic policy. The changes in the production process cause changes to the employment level and the price level. Therefore employment or inflation targeting governments may use this analysis to further their respective economic goals. Last, the causes of rigidity in the Lowe model were analyzed as well as a possible solution through the use of a fourth sector was presented.

Further avenues of research in this area are to develop models in order to analyze the size effects of structural changes in the models, as real variables, prices and employment are affected by changes in the structural coefficients. Natural resources should not be assumed to be in infinite supply. There could easily be negative supply shocks of the availability of natural resources, most notably oil (which has historically been shown to be true and the effects of which have been realized). So the assumption of an infinite supply of natural resources is a rather heroic one and models could be developed showing the effects of a negative supply shock of natural resources and showing ways to adjust the production process in order to prevent the detrimental affects to the economy. In addition the Lowe model can be used to show the implementation of government programs in geographical areas that exhibit higher than acceptable rates of unemployment.

References

- Amendola, M. (1984) "Towards a Dynamic Analysis of 'Traverse'" *Eastern Economic Journal*, Vol. X, No. 2. pp.203-210.
- Courvisanos, J. and B. Verspagen (2004) "Innovation and Investment in Dynamic Economies, 1870 - 2000: Kaleckian Dynamics and Evolutionary Life Cycles" in Wray, L.R. and M. Forstater (eds.)

- Contemporary Post Keynesian Analysis*, Cheltenham, U.K.: Edward Elgar Press. pp. 205-226.
- Courvisanos, J. (2006) "Galbraith and the Political Economy of Technological Innovation: Critical Perspectives and a Heterodox Synthesis" in Laperche, B. et al (eds.) *Innovation, Evolution and Economic Change*, Cheltenham, U.K.: Edward Elgar Press pp. 205-228.
- Forstater, Mathew, (1997) "Selective Use of Discretionary Public Employment and Economic Flexibility," Working Paper No. 218, Jerome Levy Economics Institute.
- Gerhke, C. and H. Hagemann (1996) "Efficient Traverses and Bottlenecks: A Structural Approach" in Landesmann, M and R. Scazzieri (eds.) *Production and Economic Dynamics*, Cambridge, UK: Cambridge University Press. pp. 140-166.
- Halevi, J. and P. Kriesler (1992) "An Introduction to the Traverse in Economic Theory" in Halevi et al (eds.) *Beyond the Steady State: A Revival of Growth Theory*, London: St. Martin's Press. pp.225-234
- Krohn, C-D. (1993) *Intellectuals in Exile*, Amherst, MA: University of Massachusetts Press.
- Leontief, W. (1951) *Input-Output Economics*, Scientific American Inc.
- Lowe, A (2004 [1935]) *Economics and Sociology* London, UK: Routledge Press.
- Lowe, A. (1950) "A Structural Model of Production," *Social Research*, 19, reprinted in A. Oakley (ed.): *Essays in Political Economics: Public Control in a Democratic Society*, Sussex: Wheatsheaf, 1987. pp 27-59.
- Lowe, A. (1965) *On Economic Knowledge*, New York, NY: Harper and Row.
- Lowe, A. (1969) "Economic Means and Social Ends," in R. Heilbroner (ed): *Economic Means and Social Ends*, New Jersey: Prentice Hall.
- Lowe, A. (1969) "Toward a Science of Political Economics," in R. Heilbroner (ed): *Economic Means and Social Ends*, New Jersey: Prentice Hall. pp. 157-192.
- Lowe, A. (1976) *The Path of Economic Growth*, Cambridge University Press.
- Lowe, A. (1988) *Has Freedom a Future* Praeger Press.
- Lowe, A. (1997) "How is Business Cycle Theory Possible as All?" *Structural Change and Economic Dynamics*, 8:2.
- Marx, K. (1976) *Capital: A Critique of Political Economy Vol. 1*, London: Penguin Books.
- Marx, K. (1978) *Capital: A Critique of Political Economy Vol. 2*, London: Penguin Books.
- Morishima, M. (1994) "Capital and Growth" in Hageman, H. and O.F. Hamouda (eds.) *The Legacy of Hicks: His Contributions to Economic Analysis*, London: Routledge Press.
- Pasinetti, L. (1981) *Structural Change and Economic Growth*, Cambridge, UK: Cambridge University Press.
- Shackle, G.L.S. (1968) *Expectations Investment and Income*, Oxford, UK: Oxford Press.

- Solow, R.M. (1984) "Mr. Hicks and the Classics" in D.A. Collard *et al* (eds.) *Economic Theory and Hicksian Themes*, Oxford, UK: Oxford Press. pp. 13-25.
- Teece, D.J., Pisano, G. and A. Shuen (1997) *Dynamic Capabilities and Strategic Management* 18:7.
- Winter S.G. (1967) "The Norm of Closed Technology and the Straight-Down-the Turnpike Theorem" *The Review of Economic Studies*, 34:1. pp.67-84.
- Winter, S.G. (2003) "Understanding Dynamic Capabilities" *Strategic Management Journal*, Vol. 24. pp. 1105-21
- Veblen, T. (1909) "The Limitations of Marginal Utility" *Journal of Political Economy* Vol.17. pp. 620-636.
- Veblen, T. (1996 [1935]) *The Theory of the Business Enterprise* Brunswick, NJ: Charles Scribner's and Sons.

Endnote

ⁱ Note: this creates technological and structural unemployment. This is a serious problem in both the macro and the micro-economy. And is an issue that has been debated by both micro-economists and macro-economists across the discipline. Unemployment causes a deterioration of skills which causes higher production costs for firms. See: Gregory R. Woirol (1996) *The Structural and Technological Unemployment Debates* Greenwood Press.