

Cumulative Causation Versus Comparative Advantage

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In many areas of economic policy there is a lack of agreement among economists which either exasperates or amuses those outside the profession. It is therefore with some trepidation that I introduce an heretical view in an area of policy where agreement seems to have been reached. This agreement concerns trade policy and, in particular, the notion that protection is a "bad thing". Such sentiments can be found in every major analysis of Australian trade and they are shared by major political parties, employers and the ACTU alike. It is argued in this paper that the theory of comparative advantage which provides the intellectual foundation for this shared view on desirable trade policy is not relevant to trade in manufacturers on which our hopes for increasing the rate of economic growth must rest. Indeed, to continue to base our trade prescriptions on this faulty or inappropriate analytical framework will frustrate Australia's economic ambitions.

On a more constructive note, it is argued that an alternative paradigm is available in the concept of cumulative causation. This concerns the interaction between output growth and competitiveness. A fast growth in demand and output permits the specialisation and division of labour. This in turn allows relative improvements in competitiveness which allow further growth in output and so on. This is a positive feedback loop which can work for good or ill. That is, there may be either a virtuous circle of growth as just described or, where competitiveness is weak, a vicious circle of cumulative relative decline.

In the next section we note some of the observed trends which the theory of comparative advantage has some difficulty explaining. The second section introduces the concept of cumulative causation noting that this is associated with the presence of increasing returns in industry. The far-reaching theoretical implications of increasing returns are reviewed briefly here. The final section considers the evidence for increasing returns and the explanatory power of the cumulative causation model.

1. Comparative Advantage

The theory of comparative advantage is familiar to all students of economics. It was conceived by David Ricardo over one hundred and fifty years ago to show how trade will be mutually beneficial between two countries even when one of them is more efficient in the production of all commodities. It has since been developed and refined by many great economists including Australians such as Max Corden who developed the concept of effective protection. These intellectual achievements can be found in any standard text on international trade theory and will not be discussed further here.

The theoretical development is now far advanced and yet many people must feel some unease about it. If free trade is such a "good thing" why is there so much, apparently

irrational, protection in world trade? According to the theory of comparative advantage, there should be a convergence of living standards and economic growth rates between countries. This is not what has happened. Differences in living standards between rich and poor countries have grown. As Kuznets and others have shown, the divergence is quite recent on the timescale of human history. Two hundred years ago the differences were much smaller than they are today. Why have they grown? The theory is also very uncomfortable with the infant-industries argument because it can provide no intellectual support for it. Why can it not predict which infant-industries will mature and be successful and those which will become geriatric? Compared with many countries, Australia has tried to follow the precepts of comparative advantage and yet it has slipped down the league of nations. Why? It is now commonly recognised that this is partly due to the bulk of Australian exports being primary commodities for which the world income elasticity of demand is low. Yet, comparative advantage recognises no meaningful differences between traded goods. Why?

The following quotation goes to the heart of the unease about the theory of comparative advantage. It comes out of the 1903-05 Chamberlain-Asquith debate on free trade and is Chamberlain's reply to Asquith's point that protection will freeze inefficiency instead of encouraging a shift in resources:

I believe that all this is part of the old fallacy about the transfer of employment . . . It is your fault if you do not leave the industry which is failing and join the industry which is rising. Well sir, it is an admirable theory: it satisfies everything but an empty stomach. Look how easy it is. Your once great trade in sugar refining is gone; all right, try jam. Your iron trade is going; never mind, you can make mouse traps. The cotton trade is threatened, well, what does that matter to you? Suppose you try doll's eyes . . . But how long is this to go on? Why on earth are you to suppose that the *same process* which ruined the sugar refining will not in the course of time be applied to jam? And when the jam is gone? Then you have to find something else. And believe me, although the industries of this country are very various, you cannot go on for ever. You cannot go on watching with indifference, the disappearance of your principal industries.

(as quoted in Kaldor, 1977 with emphasis added.)

A more recent example of the same concern is provided by Professor Gregory Clark,

Economic theory says that if Britain abandons its motorcycle industry to Japanese imports, this is good because it can now concentrate its resources in the car

industry. Or, if Europe allows the Japanese to take over the audio industry, it does not matter because it can now specialize in up-market goods such as video-cassette recorders (VCRs) or compact discs. As the Japanese could have told the theorists long ago, it all works in reverse. If Britain loses its motorcycle industry, then its car industry becomes weaker, not stronger, because both were served by much the same technicians, parts suppliers, dealers and other staff and resources. If Europe abandons audio, it loses efficiency in producing certain items: say, the speakers needed for VCRs. An economy operates organically, not mechanically. The loss of one organ weakens, not strengthens, the rest of the body — as the Japanese realised long ago.

(*Far Eastern Economic Review*, page 55, 23 January 1986)

It is argued in this paper that the “process” alluded to in each of the comments above has a theoretical basis in the concept of cumulative causation.

2. Cumulative Causation

Cumulative causation is a challenge to the prevailing orthodoxy. Although Adam Smith made the first major contribution to it over two hundred years ago, it does not have over a century of research and theoretical development behind it like the theory of comparative advantage. Nicholas Kaldor, the main architect of the concept, attributes this lack of development to a “wrong-turn” in economics. In fact, he identifies this point as the middle of the fourth chapter of book one of Adam Smith’s own *Wealth of Nations*. This is where Smith got bogged down in the theory of value after his three chapters on the division of labour and the role of the market. Later economists also become bewitched by the intellectual puzzle of values and prices so that Smith’s original insights on growth processes were left unattended.

Some of the differences between comparative advantage and cumulative causation can be seen in Table 1. These differences will be discussed in what follows. The key difference is that the principle of cumulative causation results from the presence of increasing returns to scale in manufacturing activities. “These (returns) are not just the economies of large-scale production, commonly considered, but the cumulative advantages accruing from the growth of industry itself — the development of skill and know-how; the opportunities for easy communication of ideas and experience; the opportunity of ever increasing differentiation of processes and of specialisation in human activities”. (Kaldor 1970).

Table 1 A Taxonomy of Two Paradigms

Comparative Advantage	Cumulative Causation
Some Exponents	
David Ricardo Heckscher & Ohlin Paul Samuelson	Adam Smith Allyn Young Nicholas Kaldor
Some Assumptions	
Constant returns to scale	Increasing returns to scale in manufacturing
Resource endowment given	Resources created through growth
Factors of production substitutable	Factors of production complementary
Some features	
General equilibrium	Disequilibrium
Growth supply constrained	Growth demand constrained
One sector	Two sector
Change exogenous	Change endogenous
Markets allocate resources	Markets create resources
Some Conclusions	
Trade mutually beneficial	Trade can impoverish

Before we proceed any further, it should be noted that the notion of a two sector model is being introduced. This does not mean to imply that comparative advantage offers a single sector model in the sense of a single commodity but in the sense that Keynes’s “General Theory” was a single sector model: it considered the working of the economic systems as if *all* productive activity exhibited the same characteristics. Comparative advantage assumes constant returns to scale everywhere. However, exponents of cumulative causation are very careful to distinguish between “land-based” activity (eg agriculture and mining) and industrial activity. The former is subject to decreasing returns and the latter to increasing returns. This is not the only basis for the distinction. There are other important differences in behavioural characteristics too. In the restricted context of land-based activities, the comparative advantage assumptions of given resource endowments and decreasing returns have validity. The growth performance of land-based activities can be explained largely by resource endowment. Furthermore, the nature and character of the resource endowments which define comparative advantage for land-based activities usually need no further explanation. That is, there is usually a natural interpretation in terms of climate or geology.

The same cannot be said of industrial activities, despite the claims of comparative advantage. In industrial activities, differences in trade and growth performance between countries are largely explained not by “natural” factors but by the level of industrial development. Any attempt to explain relative levels of industrial development in terms of relative “capital endowments” is question-begging. Capital accumulation is as much a result of economic development as it is a cause of it. At any moment, the capital endowment is a product of history and not some gift of nature. The presence of increasing returns in industrial activity is incompatible with

the notion of resource endowment:

When every change in the use of resources (every re-organisation of productive activities) creates the opportunity for a further change *which would not have existed otherwise*, the notion of an "optimum" allocation of resources (when every particular resource makes as great or greater contribution to output in its actual use as in any alternative use) becomes a meaningless and contradictory notion: the pattern of the use of resources at any one time can be no more than a link in a chain of unending sequence and the very distinction, vital to equilibrium economics, between resource creation and resource allocation loses its validity. The whole view of the economic process as a medium for the "allocation of scarce means between alternative uses" fall apart.

(Kaldor, 1972)

Note that not only is the notion of resource endowment challenged by increasing returns but also the notion of equilibrium. As Young observed, with increasing returns "change becomes progressive and propagates itself in a cumulative way" and so no analysis of the forces tending towards equilibrium would be helpful because "movements away from equilibrium, departures from previous trends, are characteristic of it" (Young, 1928). In the cumulative causation model, change is endogenous. The main function of markets is to transmit impulses to economic change, and so *create* more resources through enlarging the scope for specialisation and the division of labour rather than to secure an optimum allocation of a *given* quantity of resources. Contrast this with the orthodox notion of general equilibrium which "carries the implication that the operation of economic forces is constrained by a set of exogenous variables which are 'given' from the outside and stable over time... Continuous economic change on these assumptions can only be conceived as some kind of 'moving equilibrium' through the postulate of an autonomous (and unexplained) time-rate of change in the exogenous variable of a kind that is consistent with 'continuous equilibrium' through time." (Kaldor, 1972)

There is another corollary to the presence of increasing returns which is worth mentioning too. As Tony Thirlwall observed in his introduction to a symposium on Kaldor's growth laws, "Equilibrium theory is obsessed with substitution and ignores the complementarity between factors of production and activities. If factors of production and activities are complementary, there can be no such thing as a full employment equilibrium because in the process of resource allocation and production, the productive possibilities of the community increase." (Journal of Post Keynesian Economics, 1983)

It should be clear from the above that the theoretical implications of increasing returns to scale in industry are devastating. The question which immediately arises is that a lot depends upon which assumption is correct; constant returns or increasing returns? This can be seen as an empirical question and the evidence for increasing returns will be considered in a moment. But first, we must deal with the role of assumption in theory; if economic theory could be challenged on how realistic its assumptions are, there would not be much left. Clearly, because theory abstracts it must make simplifying assumptions. If the assumptions fit observation, so much the better but it is not a necessary requirement. To quote Einstein, "the justification (truth content) of the system rests in the verification of the derived propositions by sense experiences". We shall consider the explanatory power of the cumulative causation model in the

next section.

If increasing returns are both a fact of life and help us to understand economic processes better than comparative advantage, the existing theory must be dropped (except for land-based activity). The adjustment will not be easy. The presence of increasing returns is very complex to handle theoretically. Marshall attempted to accommodate both increasing and decreasing returns within the same analytical framework using the notion of "external economies" and the partial equilibrium technique. This was found to be logically faulty (Sraffa, 1926). The general equilibrium school has always excluded the possibility of increasing returns because it is too hot to handle: "the phenomenon of increasing returns negates the nice convexity properties that are so beloved of us lazy mathematical economists hell-bent for elegance of formulation. Instead, we are in a world of multiple local maxima, one in which things often get worse before they get better. A horrible combinatorial problem of description and computation faces us, with all the unmanageable complexities of digital programming and much worse." (Samuelson, 1981)

3. Evidence and Explanations

While there is a growing body of evidence of economies of large scale production at plant level it is more difficult to find evidence of the dynamic economies of scale considered by Young and Kaldor. They argue that the existence of increasing returns to scale in manufacturing is a macro-phenomenon which "cannot be discerned adequately by observing the effects of variations in the size of a particular firm or of a particular industry" (Allyn Young). Countries with the fastest rates of growth of productivity in manufacturing also tend to rank highest in terms of individual industries. That is, "productivity growth is a characteristic of manufacturing as a whole. As a particular manufacturing industry grows, its operations can be broken down into a number of specialist activities. This division of labour both increases output per worker in that industry and spills over into other industries. A new specialist toolmaker, for example, may as well provide tools for the motor trade as for textile machinery." (Eatwell, 1982)

At the level of manufacturing, it has to be admitted that conventional production functions find little or no evidence of increasing returns to scale. A survey of Cobb-Douglas production function studies (Douglas, 1976), concluded that, for studies where the output elasticities of the factors of production has not been constrained to unity, the degree of increasing returns found was very small at around 1.03. That is, a 1 per cent increase in all factors of production would lead to an increase in output of only 1.03 per cent. However, it should also be noted that such studies have to attribute a large part of economic growth to technical progress. For example, Solow found that in the period 1909-1949 only one eighth of the increase in output per manhour in the USA could be attributed to increasing capital per man and the rest was attributable to unexplained shifts in the production function (i.e. technical progress). In other words, such studies cannot explain much of the differences in growth rates between countries in terms of the growth of the various factors of production.

Kaldor's main evidence of increasing returns comes from the Verdoorn law. This concerns an empirical relationship between productivity growth and output growth in manufacturing. This estimated relationship was first presented by Kaldor in 1966 but has been subject to real scrutiny only since 1975. Taking account of the contribution of capital to the

growth in output, the degree of increasing returns implied by the Verdoorn relationship is very large at around 1.33. Although Kaldor interprets the Verdoorn Law as a production relationship, it is not derived from a conventional production function. (McCombie, 1982)

Although the magnitude of returns to scale appears to be an empirical question, it is doubtful whether statistics will resolve the issue. In a recent paper (McCombie, 1985) estimates of the degrees of return in seventeen manufacturing industries were made. Using the same data, contradictory results were obtained depending upon the specification of production relations chosen. Estimates of conventional production functions suggested either constant returns to scale or occasionally very small returns to scale. However, when the Verdoorn Law was specified the resulting estimates suggested that nearly all industries are subject to substantial increasing returns to scale.

Since the possibility of increasing returns is largely confined to the manufacturing sector, it follows that countries with the most successful manufacturing sectors will tend to be the most successful overall. In fact, Kaldor's "First Law" is based on the strong relationship between the growth rates of manufacturing output and GDP (the "Second Law" is the Verdoorn relationship). There are three characteristics of manufacturing which make it so special (the following comments draw heavily on Eatwell, 1982). First, there is an almost infinite demand for manufactured goods. Not only is there a high income elasticity of demand for the final product, but also the manufactured content of other sectors including services has grown. Second, there is unlimited scope for technical change in manufacturing industry. It would be difficult today to find any manufactured product that existed in 1950; and if one could be found (possibly a food item) it would certainly not be made in the same way as then. More and more comes from less and less. In particular, the amount of labour required to produce any particular manufacture steadily diminishes. Third, and most important, manufacturing embodies an internal dynamic (i.e. cumulative causation) through which change promotes demand which in turn promotes change. Innovation in production and the ability to sell both feed on and stimulate each other.

The combination of these three factors makes manufacturing an engine of growth in the economy. Not only is manufacturing capable of sustained growth in and of itself, but the prosperity of manufacturing in large part determines the prosperity of other sectors. Agriculture benefits from the provision of chemicals and machinery, while displaced agricultural workers find better-paying jobs in manufacturing. Commercial services grow to satisfy the needs of industry and benefit from the technological innovations that industry provides, from railways to data processing. Growth of a successful manufacturing industry is *the* basis of national economic progress.

We may ask in what sense cumulative causation may claim to provide a better explanation of the growth and pattern of world trade. In a recent study of the Australian economy (Caves and Krause, 1984), Krause attempts to explain the trade structure of Australia, Japan and the USA in terms of comparative advantage. However, his evidence, based on observed trade shares, amounts to a tautology: comparative advantage predicts that Australia will specialise in the exports in which it specialises. No independent evidence of the factor endowments which lead to specialisation in exports is provided. There is no doubt that Australia does have a comparative advantage in particular factor endowments such as certain mineral deposits and this is reflected in its trade structure. It

was noted earlier that cumulative causation defers to comparative advantage in the explanation of trade in 'land-based' commodities. However, trade in manufactures is more important in terms of world trade, growth prospects and the effect on long term economic growth. Cumulative causation has already produced a model which can explain the increasing divergence in living standards between countries which was referred to earlier (Dixon and Thirlwall, 1975).

If increasing returns are as substantial as the Verdoorn Law suggests, the cumulative causation process must be very powerful. The question that immediately arises then is why the virtuous and vicious circles resulting from cumulative causation are not always self-perpetuating. How could Britain which once monopolised the virtuous circle of cumulative causation now find itself in a vicious circle of relative decline? Conversely, how did Japan succeed in breaking into the virtuous circle of cumulative causation?

In Britain, the main problem was that its commitment to 'Laissez-Faire' or free trade outlasted its usefulness. Britain's head start forced other countries to adopt a different growth strategy. This usually involved active state intervention and protection; policies diametrically opposed to those pursued in Britain. For example, Eric Hobsbawm has noted that Britain was the only country which systematically refused any fiscal protection to its industries, and the only country in which the government neither built, nor helped to finance or even planned any part of the railway system. In 1904 the average level of tariffs on industrial products imported from Britain was 25% in Germany, 34% in France and 73% in the United States. The British tariff on manufactured imports was zero. Locked out of the fast-growing American and European markets, British manufacturers did not stand a chance. In 1913 Argentina and India bought more steel from Britain than did the whole of Europe. Denied growth opportunities and shackled by outdated ideologies, the process of cumulative causation slipped into reverse.

In Japan, a quite different approach was taken although not without some debate (Eatwell, 1982). In 1949 the orthodox view put forward by the Governor of the Bank of Japan was that since Japan should develop its foreign trade on the basis of the international division of labour, efforts to develop the automobile industry would be futile. However, MITI countered that since the development of the automobile industry to a high level would lead to the modernisation of the machinery industry, and, consequently, all other industries, it was desirable to concentrate all possible efforts on raising its productivity and international competitiveness so that it could catch up with other advanced countries. MITI won.

In Australia there is, as yet, no contest. The theory of comparative advantage is so much a part of the conventional wisdom that alternative economic policies starting from different assumptions are dismissed out of hand. Yet it has been argued above that there is an alternative view which deserves a hearing. It has also been shown that cumulative causation has intellectual roots stretching back to Adam Smith. The new paradigm provides an alternative view of growth processes and the dynamics of trade performance which in itself should be of interest to all economists. More importantly, cumulative causation suggests that policies for improving industry and trade performance based on comparative advantage may be counter-productive.

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