The Malthusian Paradox: Declining Food Prices in the Very Long Run

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Abstract: More than two centuries ago in his *Essay on the Principle of Population*, Thomas Malthus famously issued his dire prediction that mankind was doomed to survival at a subsistence level. His concept of population growth expanding to absorb the available food supply has been roundly contradicted by history, thanks in part to a declining birth rate in rich countries. However, economics is still the "dismal science", as the underlying idea of natural resource scarcity impinging on the prospects for progress remains a cornerstone of modern economics.

In the case of agriculture, the proposition is that more people or richer people increase the demand for food and given the constraint on arable land, this means that food becomes scarce. In economics, price is taken as the paramount indicator of scarcity. Yet, as we demonstrate with data stretching back to 1650, real prices of most food products, the price of food relative to those of other goods, have fallen dramatically. For example, in 2008 the real price of wheat was only 4% of its 1650 level, while corresponding ratio for the price of sugar was less than 0.05%. There are exceptions to the dominance of declining trend, particularly meat products in recent centuries, but for most periods and most products the trend is distinctly towards lower prices.

What is missing in the "dismal science" that explains the failure of the Malthusian prediction? We follow the suggestion in Schumpeter's *The Theory of Economic Development* that the answer lies in understanding the process of economic development. In particular, he contrasts the analysis of economic development to that of the equilibrium analysis of a stationary state implicit in the analysis of Malthus and other classical economists. This implies technical change is assured under capitalism, but it is discontinuous and its nature, location and extent are uncertain. We argue that this implies all inputs to production are subject to augmentation in their productivity, natural resources no less than capital or labour. The tendency toward declining real prices of food products can then be taken as evidence that technological change has augmented the productivity of land in food production to a greater extent than the average augmentation of all inputs utilised in production finished goods generally.

Keywords: Malthus, food prices, Schumpeter

1. INTRODUCTION

More than two centuries ago in his *Essay on the Principle of Population*, Thomas Malthus (1991 [1798]) famously issued his dire prediction that mankind was doomed to survival at no more than a subsistence level. His concept of population growth expanding to absorb the available food supply has been roundly contradicted by history, thanks in part to a declining birth rate in rich countries. However, even without Malthus' population growth dynamics, the general approach to the modelling of natural resources in economics poses a constraint on growth such that economics remains the "dismal science".

In the case of food, the proposition is that more people or richer people increase the demand for food, and given the constraint on arable land, this means that food becomes increasingly scarce. In economics, price is taken as the paramount indicator of scarcity. Yet, as we demonstrate with data stretching back to 1650, real food prices, the price of food products relative to those of other goods, have generally fallen, often dramatically. For example, in 2008 the real price of wheat was only 4% of its 1650 level, while corresponding ratio for the price of sugar was less than 0.05%.

The apparent paradox of a larger, better fed population and lower real food prices has been explained by recourse to technical change. Clearly, yields per hectare have increased dramatically over the centuries as new production techniques, new crop varieties and new methods of organising production have been introduced. The problem for economic modelling is that both the classical analysis of Malthus' time and more recent neoclassical analysis assume fixed technology and focus on the allocation of limited supplies of inputs to production among competing uses. Technological change is dealt with separately, as is growth in the supply of inputs to production.

Schumpeter (1934) criticises the standard treatment of technological change as an obstacle to understanding the development of the economy and society over time. Schumpeter argues that technical change comes from within the economic system, especially under capitalism where profits represent the return to successful innovation. Profitable innovation directly or indirectly increases the productivity of inputs to production in terms of their contribution to output as measured by its value to final consumers. In this way, innovation releases the constraints posed by limited quantities of inputs to production. Importantly, this process applies to all inputs to production, whether they are gifts of nature (such as land), human effort or produced means of production (capital).

We argue that Schumpeter's approach to technological change as arising from the opportunity to profit from innovation should be extended to consider all aspects of production, specifically to consider the quantity, quality and productivity of all inputs to production. There is some such consideration of the expected payoffs in the neoclassical analysis of labour supply, especially in terms of investment in human capital, and more so with the analysis of investment in physical capital, but only limited application to natural resource inputs. Most generally, the contribution of any input to production can be augmented through improvements in the quality or quantity of the input, where this augmentation may have investment characteristics, such as education for labour or irrigation for land, may have technological characteristics narrowly construed, such as new chemical compounds used in manufacturing or farming, or may have characteristics that mix investment and technological change, such as improved machinery or seeds for farming.

The decline in food prices has been far from smooth over the last three and a half centuries. Just as in recent years, food prices over the longer span are characterised by substantial volatility. One influence on price fluctuations that is emphasized in Schumpeter (1939) is the business cycle. We adapt Schumpeter's approach to separate out long cycles in the prices of nine food products: bananas, beef, cocoa, coffee, lamb, rice, sugar, tea and wheat; for up to six cycle periods; 1675 to 1731, 1731 to 1786, 1786 to 1842, 1842 to 1897, 1897 to 1953 and 1953 to 2008.

Negative trends dominate among the intra-cyclical movements, but there are differences across products that suggest the operation of factors specific to each. Particularly notable is that beef, cocoa and lamb actually experience a net increase in real price over the full period for which data are available. At the other extreme, the net price declines for sugar and tea are particularly severe. Importantly, all food mproducts experience both positive and negative intra-cyclical trends. Unevenness is the overwhelming characteristic of the pattern of movements in real prices of food commodities.

The remainder of the paper is organised as follows. First, we examine the Malthusian model and its neoclassical successor, focussing particularly on the static model without technical change or growth in input supplies. We contrast this treatment to the dynamics in Schumpeter's analysis of the endogenous technical change, generalising the approach to allow for changes in input supplies. This is followed by an examination

of the data on intra-cyclical price trends for the nine agricultural commodities, leading to a summary of the findings in the conclusion.

2. CLASSICAL AND NEOCLASSICAL MODELLING

Classical economists, including Malthus, sought to explain how a self-regulating, market-based economy with private property could generate growth and prosperity. Smith (1910 [1776]) emphasised the role of the invisible hand in ensuring that production guided by self interest would nonetheless satisfy the needs and desires of the ultimate consumers. Ricardo (1911 [1821]) worked out the implications this process for the distribution of income of expansion of the economy in terms of employing more labour and capital on fixed amounts of land, while Malthus (1999 [1798]) developed his principle of population and its implications for the standard of living.

Classical analysis implicitly treats the supply of land as given. Expansion of production occurs through increasing the use of either produced means of production or labour, which in either case increases the relative scarcity of land and increases its price. With technology also implicitly assumed to be unchanged, products that require relatively more land in their production rise in price relative to other products. Hence, prices of food products are expected to rise relative to prices of manufactures.[1]

Neoclassical economics formalises the input-output relation in terms of a production function,

$$X = f(L,K,N) \tag{1}$$

where X is the amount of output produced, K is the amount of capital (man-made means of production) used in production, L is the amount of labour used and N the amount of land (or natural resources more generally). Here, as with classical analysis, the assumptions of fixed technology and non-negative marginal productivity of inputs (the derivative of output with respect to each input is not negative) imply that output increases only as inputs increase.

In neoclassical analysis high prices of inputs are related to high productivity at the margin. Increasing marginal productivity of a fixed quantity of land results when there is capital growth with saving (the diversion of some production into expanding the means of production) or labour growth with population expansion (Malthus' principle of population being an extreme version of the general expectation that rising living standards reduce death rates and thereby expand the population). The rising marginal productivity of land then implies a rising land value and rising real prices for products that are relatively intensive in their use of land.

3. SCHUMPETER AND ENDOGENOUS TECHNICAL CHANGE

Schumpeter (1934) ascribes economic growth to a discontinuous process of innovation rather than to the steady growth of inputs of capital and labour as in classical and neoclassical analysis. In particular, he identifies economic development with the introduction of new methods of production, new products, new markets, new sources of supply and new forms of organisation. In terms of (1), the difference is between a fixed function where input growth drives output growth and a function that changes over time in such a way that the same amounts of input lead to greater output, so that there is technology driven growth rather than input driven growth.

This difference in the drivers of growth is essential from the perspective of understanding the likely impact of economic growth on food prices. While growth in classical or neoclassical analysis drives up the real price of land-intensive products, there is no such presumption in Schumpeter's analysis. Instead, movements in real prices depend on the locus of innovation, with innovations that raise productivity of any input contributing to declines in real prices. With innovation driving increases in productivity, the neoclassical link between real

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[1] A major focus in classical analysis is on the contribution of international trade to a high standard of living. Trade helps raise living standards by lowering the domestic price of products whose production uses relatively large amounts of inputs that are scarce at home relative to their availability abroad. With growth in Britain pushing food prices up during the early 19th Century, David Ricardo argued for repeal of the Corn Laws, which restricted imports of wheat into Britain, because this would improve the living standard of the working class.

input prices and real output prices is weakened. The real price of an input can rise while its contribution to the real cost of output falls, such as has occurred with the use of labour in many manufacturing processes.

Much discussion of the role innovation in economic development emphasises the Industrial Revolution and the subsequent rapid expansion of manufacturing. However, Schumpeter (1939) points to numerous examples of innovation in agriculture, mining and handicraft production going back to well before the Industrial Revolution. Agricultural production has continued to grow with use of the products of the Industrial Revolution, especially machinery and chemicals, but also through innovations in the organisation of production, introduction of new plant varieties and expansion in areas of cultivation. Whether innovation in food production is sufficient to offset the effect of other developments in the economy, including growth in the real price of land, depends on specific historical developments and could differ across particular products.

Before examining the historical data to see what has actually happened to real prices of food products over the past three and a half centuries, we consider the cyclical nature of price movements in Schumpeter's analysis. Cycles in price movements are an expected consequence of innovation leading to structural change and uneven development. The price level rises during the upswing of a cycle and falls during the downswing. These cyclical swings in prices obscure the working of innovation on the trend in particular goods or groups of goods. This is particularly true for primary commodities, which dominate listings of goods with "sensitive prices" that Schumpeter (1939, p.525) recognizes 'will display cycles in prices both relatively promptly and relatively strongly'. Thus, the movement over time in prices of primary products will reflect the impact of general price cycles as well as any influences of innovation.

Schumpeter argues that the bunching of economic innovations imparts a rhythm to the pattern of economic activity. In particular he emphasizes a long-wave or Kondratieff cycle. He identifies two such cycles in Schumpeter (1939): 1787 to 1842 and 1842 to 1897. The first cycle is associated with the Industrial Revolution, while the latter is connected to the expansion of railroads through Europe and North America. He also identifies a cycle beginning in 1897 and unfinished at the time of publication of *Business Cycles* with the spread of electricity in both industrial and domestic use.

Studies by Mensch (1979), Tylecote (1992) and Freeman and Louçã (2001) stay close to Schumpeter's historical and conceptual emphasis on the role of innovations. However, these studies discard Schumpeter's characterization of regular cycles in favour of a pattern with irregular amplitude and duration. The terminology of a long wave is used in place of the Kondratieff cycle, with the long wave having the duration of something like a half century, but with no clear agreement on the dating of particular cycles.

Much of the empirical work on business cycles has followed Kuznet's (1930) seminal contribution that focuses on shorter cycles and emphasises movements in quantities along with movements in prices.[2] Kuznet's approach has been further developed by the National Bureau of Economic Research (NBER), leading to a procedure for the dating of cycles that is based exclusively on movements in quantities rather than prices. This approach is not very useful for our purposes due to its emphasis on quantities rather than prices and because of the focus on shorter business cycles.

Another alternative approach to modelling of cycles is to formalise the adjustment process for economic variables in terms of a series of difference equations in the time domain as, for example, in Hicks (1956) or Allen (1968). The basic framework of the models is the multiplier – accelerator interaction, with or without floors and ceilings to prevent explosive dynamics. Here, the periodicity of the cycles depends on the lags in the adjustment of variables, as well as the direction and magnitude of the parameters in the difference equations. No consensus has developed on the appropriate values of these lags and parameters or even on the appropriate methodology for estimation. Thus, there is no clear guidance given on the dating of cycles in this approach.

A further complication in examining the impact of natural resource scarcity and innovation on primary commodity prices is that there is feedback between scarcity and innovation. While nature may constrain expansion of capacity in primary production, impediments to growth are also opportunities for profitable innovation. Scarcity, as measured by high prices, presents clear opportunities for opening up new sources of supply, improved production technology and economizing in use. Schumpeter (1939, pp. 430-432) discusses as an example the development of rubber plantations, particularly in Asia, to augment the supply of "wild" rubber from Brazil after the surge in demand for tires following the innovation of mass produced motor cars.

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[2] Kuznets (1940) provides a sharp critique of Schumpeter's embrace of regular cycles and his arguments for long cycles based on innovation.

Under capitalism, the dictum "necessity is the mother of invention", becomes "profitability is the mother of innovation".

Rostow (1980, Chapter 2) formalises the process of delayed expansion of natural resource production capacity, incorporating long lags in feedback from prices to expanded capacity. Rostow's model includes two sectors, one producing industrial goods and the other producing basic commodities. Natural resources in the form of land only enter into the production of basic commodities. In contrast to neoclassical models, where land is assumed to be fixed in quantity forever, Rostow assumes that amount of land can be augmented. However, the augmentation occurs with a substantial lag behind growth in labour and physical capital, taking up to three decades to match the growth rate of labour and physical capital. Simulations of the model generate a growth cycle of some fifty years, with the relative price of the basic commodity and the rent of land rising in the early decades of the cycle and then falling back towards the original levels.

Augmentation of natural resources in Rostow's model is meant to capture the pattern observed in his historical work (see Rostow, 1978). Rostow argues that spurts in industrial production following on major technological innovations drive up the relative price of basic commodities as supplies are inelastic in the short run. He identifies three types of lags that slow the augmentation of the natural resource in response to an increase in relative price. Recognition lags occur because it takes time for commodity producers to become convinced that the higher prices are not temporary. Gestation lags occur because large scale infrastructure, such as rail links or pipelines, is often necessary to open up new production provinces. Finally, exploitation lags occur because it takes time to reach full potential as the number of production units expand to take advantage of the infrastructure.

We find merit in Schumpeter's argument that innovation leads to long cycles in prices. He chooses the beginning and end point of his cycles to reflect what he considers to be normal levels of prices for all goods. He also argues that cycles should be regular and of about 56 years in duration, based on his notion of the long cycle overlapping shorter cycles (Kitchin cycles lasting slightly longer than three years and Juglar cycles lasting the length of three Kitchin cycles or nine and a quarter years, such that a Kondratieff cycle contains 6 Juglar cycles). We adopt Schumpeter's original dating of the cycles from 1787 to 1842 and 1842 to 1897 and we then use his method of counting a Kondratieff cycle as having duration of 56 years to add two more recent cycles: 1897 to 1953 and 1953 to 2008, and two earlier cycles: 1731 to 1787 and 1675 to 1731. This provides a systematic way of dividing the full sample period, although without any guarantee that the beginning and end points of the cycles reflect years with normal levels of the prices of all goods.[3]

4. FOOD PRICES IN THE LONG RUN

We examine long historical series of price indexes for food products. The price indexes are each deflated by a corresponding price index for manufactured goods to provide a real price index for each food product. The series have been constructed as part of a database on the prices of internationally traded primary commodities starting from 1650. These data come from a variety of sources, which are described in the Appendix to Harvey, et al (2010). Data are available for us to calculate intra-cyclical trends for all six cycles for five food products: beef, lamb, sugar, tea and wheat, while for other food products the number of calculated trends is smaller.

The patterns of price movement for wheat, sugar, beef and lamb, the four price series that go all the way back to 1650, are depicted in Figure 1. The vertical axis in each figure gives the natural logarithm of the real price index with a base value of 1.0 in the starting year of 1650. The logarithmic scale is used so that a given vertical distance on the graph represents the same percentage change regardless of the initial value. For example, a rise of 0.1 represents a ten percent increase whether the rise starts from an index value of 0.5, 1.0 or 2.0.[4]

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[3] We develop an alternative dating of cycles in Bloch and Sapsford (2010) based on the observed movements of real commodity prices, but recognise that this method is judgmental and may confuse the influence of exogenous shocks (wars, droughts, etc) with the endogenous influence of waves of innovation. This gives rise to cycles of variable length (between 25 and 61 years), but the main conclusion drawn below for intra-cyclical trends in prices, namely that the pattern across time and product is uneven, is not affected

[4] Because of the peculiarities of percentage calculations, a decrease of .1 represents a percentage decrease of 100/1.1 or 9.09 percent. However, the amount of the percentage decrease is the same from any starting value.
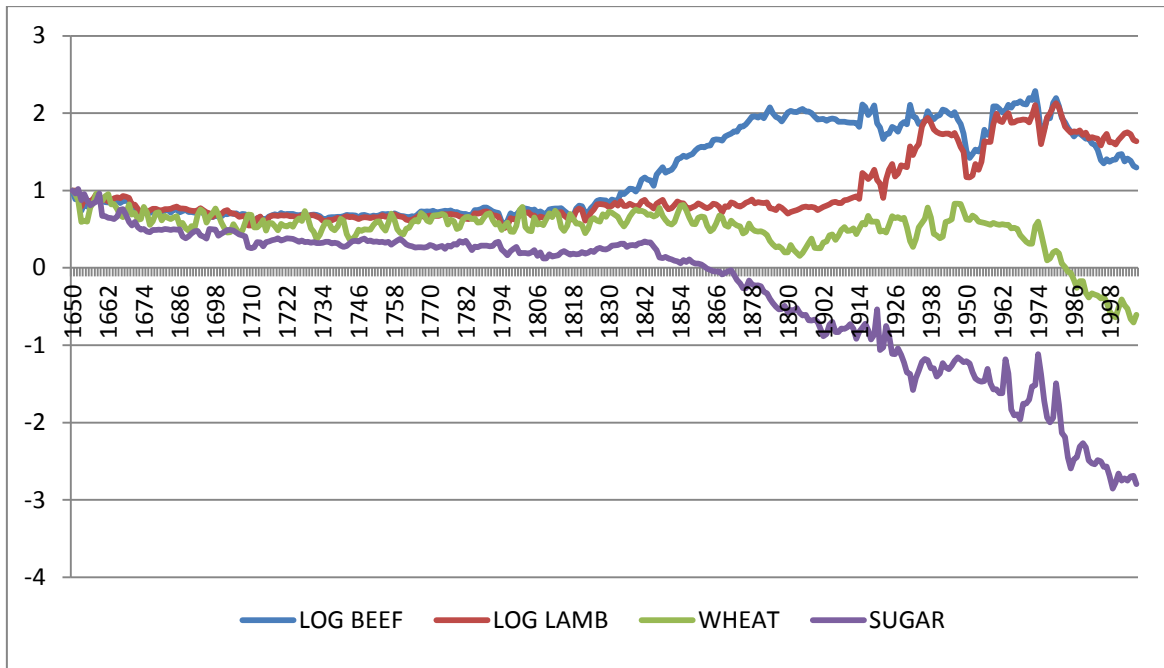
Figure 1 – Real Prices of Beef, Lamb, Sugar and Wheat 1650 – 2008

All four series in Figure 1 move downward through the middle of the Eighteenth Century, after which sugar prices continue to decline while the other series level off. Beef prices rise substantially during the Nineteenth Century, while lamb prices follow after the middle of the Twentieth Century. In contrast, both wheat and sugar prices fall dramatically after this time. Finally, all prices decline substantially after about 1980. Notably, all series have considerable fluctuations, especially from the start of the Twentieth Century.

To remove the cycles associated with the Kondratieff cycles identified using Schumpeter's dating method, we calculate intra-cyclical trends for each food product in terms of the average annual rate of change of price for each of the six cycles: 1675-1731, 1731-1787, 1787-1842, 1842-1897, 1897-1953 and 1953-2008. These intra-cyclical trends are shown in Table 1 along with the average annual rates of change over the full period for which data are available for that particular series.

A positive price trend in Table 1 suggests increasing scarcity, while a negative trend suggests decreasing scarcity.[5] There is clearly a mix of positive and negative trends over both time and products. Negative intra-cyclical trends clearly dominate for some food products, such as tea (5 out of 6 cycles), sugar (4 out of 6 cycles), coffee (4 out of 5 cycles) and rice (4 out of 5 cycles), while positive trends dominate for lamb (4 out of 6 cycles). Comparing across cycles, eight of the nine food products (all but lamb) experience pronounced negative trends for the most recent cycle, 1953 to 2008, with rates of decrease in real price of more than one percent a year for five products (cocoa, coffee, sugar, tea and wheat). In contrast, during the cycle from 1787 to 1842, the cycle Schumpeter associates with the Industrial Revolution, there are more products with price increases than prices decreases. This mixed pattern suggests a variety of influences at work, but clearly the data fail to support the dire prediction of the Malthusian model for an increasing real price of food.

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[5] Changes in market structure might also lead to trend movements in real prices of particular commodities. A general influence of this type is the increasing concentration of manufacturing production, which is found to have decreased the average real price of all primary commodities over the second half of the 20th Century in Bloch and Sapsford (2000).

Table 1 – Intra-cyclical Trends in Food Prices (average % per annum)

Period	Banana	Beef	Cocoa	Coffee	Lamb	Rice	Sugar	Tea	Wheat
1675-1731		-0.045			-0.075		0.590	1.190	-0.438
1731-1787		0.129		-0.144	0.049	-0.395	-0.081	-0.685	0.222
1787-1842		0.742		-0.531	0.309	-0.282	0.102	-0.207	0.237
1842-1897		1.550	1.362	0.128	-0.167	0.731	-1.852	-1.313	-0.731
1897-1953		-0.875	0.127	-0.212	0.993	-1.928	-1.346	-0.834	0.596
1953-2008	-0.839	-0.267	-1.014	-2.960	0.611	-0.769	-2.415	-3.526	-1.995
Full period	-0.819	0.107	0.129	-0.704	0.189	-0.362	-1.050	-1.182	-0.403

It is interesting to reflect on the characteristics of those food products that have defied the predominant trend towards falling real prices, namely beef, lamb and cocoa. These are all considered to be luxury foods, with demand that rises relative to other food products with the rising standard of living over the centuries. Even if productivity improvements for these products were equivalent to those affecting other food products, rising relative demand would lead to rising relative price. Thus, relative demand seems to play an important role in explaining the differences in price trends for different food products over time.

In terms of the comparing price trends over different cycles, the dominance of upward price trends during the cycle from 1787 to 1842 seems to reflect sharp increases in manufacturing productivity during the height of the Industrial Revolution. Declines in prices of manufactures following these productivity improvements raise the real price of food products as the manufacturing price index is used to deflate the price of each food product in calculating the real price. Demand influences also seem important in the variation of price trends over cycles. Relatively slow growth in the developed economies over the period since 1980 has contributed to the predominance of negative price trends in the cycles from 1953 to 2008. Even the rapid growth of China and other developing economies towards the end of this cycle has not been sufficient to offset the trend.

5. CONCLUSIONS

Contrary to the dire prediction made by Malthus in his *Essay on the Principle of Population*, the world has not been kept to a subsistence level existence, at least for a substantial proportion of the population. Rather than experience increasing scarcity of food as reflected in rising real prices of food products, the dominant trend has been to declining real prices. Of the nine food products examined, six have had net decreases in their real prices over a period of time stretching back in some cases to 1650. The magnitude of the price decreases for these products is in each case larger than the magnitude of the price increases for the other three products. The dominance of price declines is clear in each of the six long business cycles over three and a half centuries, aside from equal price increases and decreases at the height of the Industrial Revolution from 1787 to 1842. The most recent cycle, 1953 to 2008 has seen price decreases for eight of the nine food products.

What is missing in the "dismal science" that explains the failure of the Malthusian prediction? Clearly, there is an offsetting force to rising scarcity due to growth in production with a constraint of fixed natural resources. In the Schumpeterian approach, innovation plays the central role with new production processes, new methods of organisation and new sources of supply having generally been more than sufficient to offset the tendency towards higher food prices. It is essential to recognise that these innovations are not accidental or manna from heaven, but rather are the result of human effort motivated, at least in part, by the allure of profit. Scarcity raises price and, other things equal, increases potential profit, thereby attracting enhanced effort. Effort does not guarantee results nor does it unambiguously determine the direction of any induced innovation (more efficient production, new sources of supply, new substitute products or more efficient consumption). However, the existence of this feedback mechanism needs to be recognised in any attempt to more adequately model growth and development in the world economy.

What about the future? History may not repeat itself, but the forces of endogenous growth and development under capitalism have been robust in providing productivity-enhancing innovations in agriculture. Against this is the likely rising demand for food based on projections of rising world population for at least the next half century and probable increases in standard of living for large numbers of low to middle income households, especially in Asia. The pattern of large real price decreases for most food products experienced over the last Kondratieff cycle (1953 to 2008) may have been an anomaly, but a sudden move to sustained increases in the real price of most food products seems unlikely.

ACKNOWLEDGMENTS

REFERENCES

Allen, R.G. D. (1968), *Macro-economic Theory: A Mathematical Treatment*, London, Macmillan.

Bloch, Harry and Sapsford, David (2000), 'Whither the terms of trade? An elaboration of the Prebisch-Singer hypothesis', *Cambridge Journal of Economics*, 24, 461-481.

Bloch, Harry and Sapsford, David (2010), 'Innovation, Real Primary Commodity Prices and Business Cycles', paper presented to the 2010 International Schumpeter Society Conference, Aalborg, Denmark. http://www.schumpeter2010.dk/index.php/schumpeter/schumpeter2010/paper/viewFile/166/180

Freeman, Chris and Louçã, Francisco (2001), *As Time Goes By*, Oxford, Oxford University Press.

Harvey, David I., Kellard, Neil M., Madsen, Jakob B. and Wohar, Mark E. (2010), 'The Prebisch-Singer hypothesis: Four centuries of evidence', *Review of Economics and Statistics*, 92, 367-377.

Hicks, John R. (1956), *A Contribution to the Theory of the Trade Cycle*, Oxford, Clarendon Press.

Kuznets, Simon S. (1930), *Secular Movements in Production and Prices*, Boston, Houghton Mifflin.

Kuznets, Simon S. (1940), 'Schumpeter's Business Cycles', *American Economic Review*, 30, 257-71.

Malthus, Thomas (1991 [1798]), *An Essay on the Principle of Population*, Oxford, Oxford University Press.

Mensch, Gerhard (1979), *Stalemate in Technology*, Cambridge, MA, Ballinger.

Ricardo, David (1911[1821]), *The Principles of Political Economy*, London, J. M. Dent Everyman's Library.

Rostow, Walter W. (1980), *Why the Poor Get Richer and the Rich Slow Down*, Austin, TX, University of Texas Press.

Schumpeter, Joseph A. (1934), *The Theory of Economic Development* (translation of second German edition by Redvers Opie), London, Oxford University Press.

Schumpeter, Joseph A. (1939), *Business Cycles, Volumes 1 and 2*, New York, McGraw-Hill.

Smith, Adam, (1910 [1776]), *The Wealth of Nations*, J. M. Dent Everyman's Library.

Tylecote, Adnrew (1992), *The Long Wave in the World Economy*, London, Routledge.